

European Network Operations Plan 2023-2027

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1 Introduction

1.1 Scope of the European Network Operations Plan

This document addresses the requirements set forth in EC Implementing Regulation (EU) 2019/123 of 24 January 2019, laying down detailed rules for the implementation of air traffic management (ATM) network functions for the RP3 and supplemented by the requirements set forth in the EC Implementing Regulation (EU) 2019/317 of 11 February 2019 laying down a performance scheme for air navigation services and network functions. The regulation establishes several ATM network functions to be performed by a Network Manager; EUROCONTROL has been appointed as the Network Manager entrusted to perform these network functions.

The EC Implementing Regulation (EU) 2019/123 lists in Chapter II, Article 7 paragraph 1(b) one of the tasks of the Network Manager: establish the Network Operations Plan specified in Article 9 to implement Network Strategy Plan, covering the calendar years of the reference period and the annual, seasonal, weekly and daily periods.

The EC Implementing Regulation (EU) 2019/123 also provides in Chapter II Article 9 the high level requirements, and in the Annex VI the template for the Network Operations Plan.

The Network Operations Plan, hereinafter referred to as the NOP or the Plan, has been developed in the context of the Network Management Functions, by the areas concerned with European ATM Network Operations Planning and Management. This Plan covers the activities planned and required to enhance European network operational performance over the period 2023-2027 and will be updated on a yearly basis or as deemed necessary. The Network Operations Plan implements, at operational level, the Network Strategy Plan and the Network Performance Plan.

The Network Operations Plan 2023-2027 includes also the main projects resulting from Functional Airspace Blocks (FAB) developments.

This document provides a short to medium-term outlook of how the ATM Network will operate, including expected performance at network and local level. It gives details of capacity and flight efficiency enhancement measures planned at network level and by each Area Control Centre (ACC), as well as a description of the airport performance assessment and improvement measures that are planned.

Overall, the Network Operations Plan 2023-2027 addresses the operational performance indicators and targets resulting from the application of the EC Regulation 2019/123 of 24 January 2019 laying down the rules for the implementation of ATM network functions. As per the Annex VI of the said Implementing Regulation, the Plan describes the operational actions to be taken by the Network Manager and other operational stakeholders, needed to respond to the performance targets set for the third Reference Period (RP3) for the period 2022-2024. The Plan responds to the EC Implementing Regulation (EU) 2019/317 of 11 February 2019, and is following the performance targets set forth in the Commission Implementing Decision (EU) 2021/891 of 2 June 2021.

The NOP also provides both a qualitative and quantitative assessment of the impact of these actions on the performance of the network.

As a requirement of the ATM Network Functions Implementing Regulation (Articles 7, 9 and Annex VI), 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.

With the overall aim of implementing the Network Strategy Plan, the scope of the NOP refers to the following main subjects:

- Airspace structure enhancement
- ACC capacity enhancement
- Air Traffic Flow and Capacity Management
- Airport efficiency enhancement and network integration

The following topics are also within the scope of the NOP:

- Safety aspects and requirements
- Military aspects and requirements
- Management of scarce resources

This Network Operations Plan addresses a period of 5 years (2023-2027) providing data required for the SES Performance Scheme Reference Period 3.

Following the agreed CDM process, the Plan is to be approved by the Network Management Board.

The rolling seasonal Network Operations Plan is developed on a weekly basis and is electronically hosted on the Network Operations Portal of the Network Manager. A seasonal part of the Network Operations Plan is also developed every year to address the Transition Plan for Major Projects in Europe.

The daily Network Operations Plans are electronically hosted on the Network Operations Portal of the Network Manager.

1.2 Geographical Area covered by NOP 2023/2027

The Network Operations Plan covers the following geographical area:

- **EU member States:** Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden plus Norway and Switzerland.
- **EUROCONTROL member States**, including those that are not EU members: Albania, Armenia, Bosnia & Herzegovina, Georgia, North Macedonia, Moldova, Montenegro, Serbia, Turkey, Ukraine and the United Kingdom.
- EUROCONTROL comprehensive agreement States: Israel and Morocco.

In addition to this document, 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 mentioned above.

1.3 Preparation of the Plan

The preparation of the Network Operations Plan 2023-2027 was 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.

The States, Air Navigation Service Providers (ANSPs), airports and aircraft operators work together with the Network Manager to optimise the ATM network and how it is used, addressing the en-route ATM capacity gap and supporting an interactive approach for the development of robust local capacity plans.

Integration of airports into the Network Operations Plan, including capacity figures for airports, current and future, are a vital input into the planning process to ensure there is sufficient capacity available in the correct locations.

This is a rolling process, through continuous assessment of performance and identification of improvement and/or mitigation actions. At the end of each summer season, the Network Manager, in consultation with ANSPs, airports and the airspace users, carries out an assessment of Network performance, including identification of bottlenecks and constraints.

Coordination throughout the year is made in the framework of the normal working arrangements, from the high level Network Management Board (NMB) and the Network Directors of Operations (NDOP) meetings, through to the arrangements for Capacity Planning, Route Network Development, Airspace Management, ATM Procedures, Airport Operations, Safety Management and Air Traffic Flow and Capacity Management that are established within the Network Manager.

Additional continuous coordination takes place between the Network Manager, the Functional Airspace Blocks (FAB) and individual ANSPs or Airports, to ensure the proper planning and management of local issues that could impact network performance.

The validation of the local information included in this Network Operations Plan has been made individually and collectively through the cooperative decision making processes with all the operational stakeholders.

The validation of the network information, including the performance forecasts has been made through the network data and tools that the Network Manager is using for its operational planning processes.

2 Description of the Network Operations Plan, Operational Targets & Objectives

The European ATM Network Operations Plan represents a view, at any moment in time, of the expected demand on the ATM Network at a particular time in the future and the resources available across the network, together with a set of agreed actions to accommodate this demand, to mitigate known constraints and to optimise ATM Network performance. It is a tool used to implement the Network Strategy Plan (NSP).

The time-frame of the Network Operations Plan is medium to short-term, moving into pre-tactical planning. However, this document is strategically focussed, listing the medium to short-term activities that contribute to the safe provision of additional capacity and improved flight efficiency at European ATM network level.

2.1 Strategic Objectives

The Plan responds to the following Strategic Objectives of the Network Strategy Plan (NSP 2020-2029) endorsed by the NMB at NMB/25 on 27 June 2019

- <u>Strategic Objective 1 (SO1)</u>: Manage network performance through 'Networkminded' decision making
- <u>Strategic Objective 2 (SO2)</u>: Deploy and integrate interoperable and secure information management systems
- Strategic Objective 3 (SO3): Optimise Network design
- <u>Strategic Objective 4 (SO4)</u>: Optimise Network operations
- <u>Strategic Objective 5 (SO5)</u>: Develop European connectivity and airport services
- <u>Strategic Objective 6 (SO6)</u>: Ensure network safety and security and reinforce crisis management
- <u>Strategic Objective 7 (SO7)</u>: Optimise ATM/CNS infrastructure and services to support evolutions towards more efficient network operations and services
- <u>Strategic Objective 8 (SO8)</u>: Develop the network human capital and improve its flexibility through excellence
- Strategic Objective 9 (SO9): Improve environmental sustainability
- <u>Strategic Objective 10 (SO10)</u>: Support European aviation at global level

2.2 A Collaborative Process

The Plan has been developed through the formal Cooperative Decision Making Process established between the Network Manager and its operational stakeholders. It is a consolidation of all network and local capacity plans to provide an outlook of the expected network performance for the period 2023-2027 by comparing the expected benefit from planned capacity enhancement initiatives with the requirements at network, Functional Airspace Block (FAB) and local level, as determined by the Single European Sky Performance Framework. The objectives of the NOP are:

- To ensure coordinated planning, execution, assessment and reporting of all measures agreed at operational level
- To be used as a tool in the execution of the network management functions, under the governance of the Network Management Board and the Network Directors of Operations
- To assist Network Manager stakeholders, mainly ANSPs, in carrying out agreed activities towards enhancing and/or optimising performance
- To provide references for the monitoring and reporting as a part of Network Management activities
- To ensure formal commitment of all operational stakeholders towards the implementation of the agreed measures.

The document identifies potential bottlenecks and gives early indications to the European Commission, Network Manager, States, ANSPs, Airports and Aircraft Operators for the need to plan better use of existing resources or, if required, to plan for additional resources, on network interactions and on the need to implement improvements coordinated at Network level.

2.3 EU Performance Targets Application

The operational targets and objectives will be applied from the strategic phase through to the tactical phase. The established capacity planning process is based on the revised annual performance targets set by the Single European Sky Performance Framework for 2022 to 2024 (RP3), and the performance targets published in the Commission Implementing Decision (EU) 2021/891 of 2 June 2021. These were translated into reference values (targets as indicated in the Annex VI of the Network Management Functions IR) at FAB, ANSP and ACC level.

The process of cascading the yearly network performance targets for capacity into monthly, weekly and possibly even daily targets has been established, with the objective to produce operational daily delay performance targets for a number of critical areas aimed at focussing efforts on achieving overall performance targets.

2.4 **Priorities and Resources**

An assessment of the current plans against requirements in the medium term clearly indicates that the ANSPs need to give priority to a flexible use of resources to open optimum sector configurations, either through improved staff management and flexibility, or, in certain areas through additional ATCOs. Solutions in that respect need to be looked more and more at FAB or European level. Changes to working practices will also be required and will be possible only if difficult social issues are successfully and continuously addressed.

The Network Manager will offer direct, open and consolidated support, through a smooth partnership process from planning to operations. A consolidated approach between capacity planning, airspace improvements, integrated data and tool

availability for all planning phases, enhanced ATFCM planning, planning and coordination of significant events will be ensured.

All this requires full commitment and increased flexibility from all stakeholders – NSAs, FABs, ANSPs, Airports, airspace users and the Network Manager.

2.5 Impact on ATM and Other Areas

The ongoing evolution of the NOP will improve both the planning and management of Network Operations.

The inclusion of the strategic phase of planning into the NOP will provide all ATM stakeholders, including the Network Manager, with the timely information required to plan for the capacity needed to meet expected demand and to develop permanent solutions to close existing capacity gaps.

The improved level and quality of information regarding the capacity available at ACCs and Airports will facilitate improved flight planning by the airspace users and enhanced management of the ATM network, through the early identification of constraints and the development and implementation of mitigating measures.

For the ATM network to operate at optimum levels there is a need for improved flexibility, not only from the network itself, but also from all airspace users.

2.6 Strategic Evolution of the NOP

The Network Operations Plan has evolved since it was first produced in spring 2006. The former paper document was a short-term strategic plan, providing details of the capacity expected to be available at Network and local level (ACCs and Airports), known constraints, capacity shortfalls, and proposed mitigation measures for the coming summer and winter seasons. The information is now accessible on-line by the various users of the NOP through the NOP Portal.

This Plan looks further ahead, giving a prognosis of performance in the medium term across the European Network, including capacity and flight efficiency improvements. It also integrates all the Network Strategic Projects.

The objective is to provide all relevant information on-line, providing dynamically updated data, accessible through the different areas of the Portal, covering all phases of planning and operations: long-term (years), mid- to short-term (seasonal through to pre-tactical), execution (day of operations) and post operations analysis, allowing the various operational stakeholders to access only the data relevant to them.

2.7 Preparations for the Network Operations Plan

The following calendar has been followed for the preparation of the Network Operations Plan:

Action	Date	Who
Distribution of Summer 2022 capacity achievements (baselines)	November 2022	NM
Distribution of 2023-2024 capacity requirement profiles and delay reference values	November 2022	NM
Bi-lateral meetings between NM and all ANSPs	November 2022 – mid January 2023	NM / ANSPs
NOP 2023-2027 consolidation and approval through the CDM process	February-April 2023	NM / Operational Stakeholders
Publication of NOP 2023-2027 and identification of further actions required to meet the RP3 targets	April 2023	NM
Further updates and synchronisation actions between NM and ANSPs to ensure the achievement of RP3 targets	May-June 2023	NM / ANSPs
Revised NOP 2023-2027 consolidation and approval through the CDM process	May-June 2023	NM / Operational Stakeholders
Publication of revised NOP 2023-2027	July 2023	NM

• Capacity KPA – Development of the Network Operations Plan

• Environment KPA – Development of the European Route Network Improvement Plan – Part 2 – ARN Version 2023-2030

Action	Date	Who
Distribution of all known airspace design plans until 2030 to all States/ANSPs/FABs and proposals for the Airspace Restructuring Programme	September 2022	NM
Comments and updates received from all States/ANSPs/FABs on the initial list of airspace projects	December 2022	NM / Operational Stakeholders
Preparation of the first version of the ERNIP Part 2 - ARN Version 2023 - 2030	February 2023	NM / Operational Stakeholders
Comments and updates received from all States/ANSPs/FABs on the list of airspace projects	March 2023	NM / Operational Stakeholders
Preparation of the second version of the ERNIP Part 2 - ARN Version 2023 - 2030	April 2023	NM / Operational Stakeholders
ERNIP Part 2 - ARN Version 2023 - 2030 consolidation and approval through the CDM process	April - June 2023	NM / Operational Stakeholders
Publication of ERNIP Part 2 - ARN Version 2023 - 2030	July 2023	NM

3 Overall Network Operations Planning Processes

3.1 Strategic Planning Processes Description

3.1.1 Network Planning Processes

The Network Manager works in partnership with all the operational stakeholders for the enhancement of European ATM network capacity at ACC and network level, through improved capacity planning processes and tools.

The en-route part of the capacity planning process is a mature, rolling process, with the integration of agreed delay targets at European Network and local level. It has the full support and commitment of ANSPs, in regard to the assessment of current ACC capacity, the evaluation of future capacity requirements and the cooperative development of capacity plans.

The Network Manager support to Airports for capacity planning and assessment is different compared to the ACC planning process, because of the commercial nature of Airports and the need to coordinate with all the different entities involved in Airport operations. The Network Manager focus is with those airports that have the greatest impact or have the most significant demand upon the ATM network. The Network Operations Plan ensures a full integration of the airport capacity plans with the network capacity planning process.

The Network Manager distributes to all operational stakeholders the common network capacity planning and airspace design tools and data and provides support and training to ANSPs. Through these actions a collaborative, interactive capacity and airspace planning process has evolved. In addition, local traffic growth information is supplied directly by many airports, based upon their local knowledge of aircraft operator intentions.

The Network Manager ensures dynamic and systematic provision of data relevant to the capacity planning and airspace design process, in a format suitable for various tools, both internal and external to the Network Manager.

In addition to the planning and management of the ATM Network Operations, the Network Manager is responsible for the coordination of scarce resources, specifically frequencies and transponder codes. Processes for this area were developed according to the Network Strategy Plan and the related Cooperative Decision Making processes.

3.1.2 En-Route Planning Processes

The Network Manager, as per the requirements of the ATM Network Functions Implementing Regulation (IR), produces capacity requirement profiles for each ACC (to achieve the level of capacity required to meet the European capacity target) and provides support to ANSPs to work them into the local capacity plans. These are consolidated annually into this European Network Operations Plan in a dynamic, interactive and collaborative process.

As part of the Network Manager CDM Process, the Capacity Planning Sub-Group (CAPLANSG) of the Network Operations Team (NETOPS) is a dedicated group, made up of ANSP capacity managers and planners and is the driver for improvements to the medium term en-route capacity planning process and tools development, while agreeing the work programme for the coming years.

The annual capacity planning process of the Network Manager, starting in summer and terminating the following spring, looks ahead over a 5-year period and is consistent with the EC Regulation 2019/317 of 11 February 2019 for the RP3, laying down a performance scheme for air navigation services and network functions.

It comprises the following steps, based on a collaborative process with the ANSPs:

- Step 1: Evaluate performance for the summer season Establish a capacity baseline for each ACC
- Step 2: Provide future traffic demand and distribution
- Step 3: Provide future capacity requirement profiles and delay breakdown per ACC (according to European targets)
- Step 4: Provide support to ANSPs to develop local capacity plans
- Step 5: Consolidate the capacity plans in the NOP
- Step 6: Provide a performance forecast
- Step 7: Identify capacity bottlenecks and propose improvement measures and support
- Step 8: Revise capacity plans and update the performance forecast if necessary

A key step in the above process is the calculation of the ACC capacity requirement profiles and the corresponding delay breakdown which is achieved by simulating future scenarios based on the following inputs for an ACC:

- Capacity baseline
- Future traffic
- Future delay targets at Network level

An iterative simulation calculates delays and increases the capacity in the different ACCs until the overall Network delay target is reached. This is done using the Model for Economical Evaluation of Capacities in the ATM system (MECA), ensuring that the iterations are optimised in order to reach the European delay target at a minimum total cost. Once the target is reached the output of the simulation provides results for the capacity requirement profiles and the corresponding delay breakdown.

ACC capacity requirements for the period 2023-2024 were derived according to this established cooperative and transparent process, with the full agreement of the service providers. The Network Manager provided ANSPs with a range of scenarios for future traffic demand and distribution over the route network, including the expected demand at ACC level and where necessary at sector level.

A full description of the agreed capacity planning process is provided at the following link <u>Capacity assessment and planning guidance document | EUROCONTROL</u>

3.1.3 Airport Planning Processes

For airports, the institutional arrangements differ widely, with ownership and business models varying across the European region. Decisions on the development of airports and the creation of new runways is a local/State responsibility and many factors apart from traffic growth form part of this decision making process. The airport capacity figures (both existing and future), once confirmed, are used as essential inputs to the network capacity planning process. Airports are required to regularly update the Network Manager on any planned initiatives or special events that may affect airport operations (capacity or efficiency). This information is used in the network capacity planning process, allowing existing and future airport operations to be taken into account as the network is developed. This also enables early identification of issues that will affect capacity, allowing strategic ATFCM measures to be planned and implemented.

3.1.4 Flight Planning Processes

To fully realise the benefits of improved integration of airspace design, airspace management, Flexible Use of Airspace (ASM/FUA) and Air Traffic Flow and Capacity Management (ATFCM), a more dynamic and flexible approach to flight planning from the airspace users is required. This would enable capacity to be used as soon as airspace becomes available, even at short notice.

The Network Manager has initiated actions to enable more flexibility in flight planning, and some users have initiated improvements to their systems to allow this, but more responsiveness is required from all airspace users and flight planning service providers, together with process and system improvements in the areas of flight planning and airspace status notification.

The NM flight efficiency (FE) initiative focuses on the improvement of the quality of flight planning. After the FPL is filed and accepted by IFPS, the complete FPL database is regularly being reprocessed, in order to detect potential route improvement allowing shorter routes within a certain cost-efficient perspective for flight plan filer. Proposals are being made available for AOs to consult and apply if accepted.

A Flight Efficiency Task Force back office was established in 2020 to support AUs to file efficient routes. The FE TF performs analysis of the filed FPL in IFPS on a daily basis in order to detect inefficient routes and propose changes to the AUs. The next step will be to move the activity in the NMOC in close coordination with the FE TF back office, looking at the FE initiatives during the day of operations.

3.1.5 Airspace Structure Developments

The process related to the airspace improvements is carried out in a cooperative and coherent manner, within the framework of Route Network Development Sub-Group (RNDSG). This is the Network Manager working arrangement concerned with the development of the European Route Network Improvement Plan (ref. ANFIR Article 6 paragraph 5 and Annex I).

The planning process includes the area of airspace structure developments. The planning is carried out at the level of entire European airspace with the participation of adjacent non-European States.

The airspace structures and route network enhancements offer alternative routings and direct route alignments, closer to the user preferred routes, ensuring coherency with local and Functional Airspace Block (FAB) developments, as well as coherency with the other parts of the ICAO European and North Atlantic Region and interfaces with other ICAO regions.

3.2 ATFCM Phases and Processes

Air Traffic Flow and Capacity Management (ATFCM) consist of four phases:

- 1. Strategic Flow Management takes place seven days or more prior to the day of operation and includes simulation, planning and coordination activities.
- 2. Pre-Tactical Flow Management is applied during the seven days prior to the day of operation and consists of planning and coordination activities. This phase analyses and decides on the best way to manage the available capacity resources and on the need for the implementation of a wide range of appropriate ATFCM measures, in full coordination with ANSPs. Airports and AUs. The output is the Initial Network Plan (INP) published via the NOP portal.
- 3. Tactical Flow Management is applied on the day of the operation. This phase updates the daily plan according to the actual traffic, capacity and monitoring values and reacts to unexpected events impacting the Network (Weather, ATCO staffing issues or any other issue).

Capacity shortfalls are addressed by the NMOC during the Pre-tactical and Tactical phases by using the ATFM delay mitigation toolset

4. Post Operational Analysis is applied following the day of operation. This phase analyses the day of operation, and feeds back into the three previous phases.

Detailed ATFCM Procedures are published in the Network Operations Handbook (ATFCM manuals) that are available on the NOP Portal (Resources tab).

https://www.public.nm.eurocontrol.int/PUBPORTAL/gateway/spec/index.html

ATFCM considers continuously and pro-actively all possible ATFCM solutions through an iterative process, from the strategic planning through to the execution of operations. The anticipation of any events according to new information allows to minimise their impact on the network or to take benefit of any opportunity and fine tune the plan accordingly.

To resolve capacity shortfalls and improve the management of the network capacity whilst minimising constraints, a variety of ATFCM solutions have to be considered, as shown in the table below.

Capacity Shortfalls						
Current Delay Mitigation Toolset						
 Sector Configuration Management Provide adequate number of radar sectors to accommodate traffic demand with minimal ATFM delay Civil/Military Coordination AUP/UUP Processes Flexible RAD (Pre-tactical only) Review Monitoring Value ATFM Rates Sector Occupancy/Monitoring Management (OTMV) Flow Management Position Balancing departures and arrivals at airports – (Airport Function within NMOC) an Curfew Management ATFM Scenarios (Re-routing/level capping) specific Flows or Flights in Pre- tactical/Tactical ATFCM phase Tactical RRP (Re-routing Proposal) require Airspace User acceptance Advancing traffic (EOBT change – cherry picking in coordination with Airspace Users) Cross border STAM RRP (last minute contingency) Slot list manipulation (User Command) Weather delay mitigation en-route (WX cross border procedure and at airports (SMART WX) MIRROR SEQ 12/AROT ATFM Regulation Optimizer Tool Mandatory Cherry Picking (MCP) 						
Future ATFM tools in Future Releases						
New ETFMS DashboardOccupancy counts with ETFMS						
Integration ASM/ETFMS						
 NMP Flow application will also allow MCP regulation requests to be sent by FMPs directly to NM. 						

3.3 Description of Data and Tools Used

3.3.1 Demand forecasting

The EUROCONTROL Statistics and Forecasting (STATFOR) Service works with stakeholders to produce a shared forecast of future network traffic. More specifically, STATFOR produces seven-year forecasts (also known as Medium-Term Forecast) of annual numbers of IFR flight movements for volumes of airspace called 'traffic zones' or 'States' but also for larger aggregate regions. For each traffic zone, forecasts are published for the main region-to-region flows. Traffic flows are also categorised by major flow i.e. arrivals/departures, internals and overflights.

The review body for STATFOR is the STATFOR User Group (SUG). The SUG is a team of air traffic statisticians and forecasters from civil aviation authorities and Air Navigation Service Providers as well as from international organisations around the World. The SUG meets once or twice per year. It reviews the inputs of the seven-year forecast and the resulting draft forecast. The aim of the review process is to produce a forecast which is consistent at European level and acceptable to Member States. This does not necessarily mean the forecast is the same as that produced nationally.

In normal circumstances, the STATFOR seven-year forecast proposes three forecasts that are random variations around a single scenario. The low-growth and high-growth

forecasts between them capture a range of future likely growth in flight movements; the baseline scenario indicates a more likely position within this range. These forecasts are intended to help users assess the risks related to decisions.

Since the beginning of the COVID19 outbreak, the statistical approach could not be used. Instead of proposing one single scenario with some random variation, an approach with three independent scenarios has been chosen to better cover the high uncertainty linked to this unprecedent event. These scenarios should be considered as different stories anticipating the possible development paths of annual IFR movements. More recently, the uncertainty surrounding the impact of the War in Ukraine and the economic fallout are the main drivers of the differences between the scenarios.

The flight forecast is built up in four stages:

- An Initial Annual Forecast takes into account a broad range of economic, transport and other trends (see Figure below).
- This is combined with a Monthly Trend Forecast¹ that is strongly influenced by the recent traffic trends, airline developments and network plans, but only looks two calendar years ahead. Since the start of the COVID-19 outbreak², this monthly trend forecast is de-activated due to the uncertainty that is wider than what would be considered by a statistical approach. That being said, a monthly estimate of the airlines' future capacities is currently considered (6-month ahead) to capture the right levels for the first year of the forecast.
- The result is constrained by Airport capacity to give an annual forecast of traffic between airport pairs.
- Finally, this forecast is mapped onto the airspace network to give counts of flights in the airspace of each State or region.



Method of the Initial Annual Forecast:

¹ As the Monthly Forecast Trend component is de-activated, since the start of the COVID-19 outbreak, it is therefore not detailed here anymore.

² This concerns the November 2020, May and October 2021, May and October 2022 forecasts.

The main scenario inputs to the Initial Annual Forecast are:

- Economic growth, summarised as GDP growth forecasts in real prices in EURO;
- Recent trends in annual traffic;
- Historic flight data giving the number of flights of different types between airports;
- Past and future events, a percentage adjustment to movements per traffic zone, which can be used given supporting data to correct in the past or model in the future the effects of irregularities in the baseline (e.g. strikes, airspace closure, airline failures), or local one-off events (e.g. sport events);
- High Speed Train (HST) network developments, summarised as distance and expected changes in rail or road travel time on city pairs as this may impact the market share of air-travel between these city-pairs;
- Low-cost market share, which will add additional flight movements, on top of economic growth to reflect new flight movements generated by low-cost airlines;
- Demographics, which have only a small impact at these short and medium horizons. These data are derived from UN population forecasts;
- Emissions Trading Scheme characteristics, prices of CO₂ allowances, cap on historical CO₂ emissions and the level of auctioning in the ETS determine the additional costs of airlines from aviation participation in the ETS. The forecast assumes that these are passed onto passengers and therefore reduces the passengers' demand accordingly. This component is currently de-activated in the forecast;
- Aircraft size, in number of seats, used to convert from numbers of flights into a number of seats;
- Load factors, used to convert from number of seats into a number of passengers, are assumed to change from a current level to a future level that can vary with region and scenario. The load factor forecast is calibrated on historical data.

The traffic is split into five segments and the growth of the number of flights on each airport pair for each segment is as follows:

- Cargo flights are grown based on GDP growth.
- Small airport pairs (< 25 flights per year) are kept constant.
- Military flight movements in the first year of the forecast is the average of the last three years for the traffic zone as a whole, with a maximum change of 5% compared to the last year of actual, and this number is kept constant afterwards.
- Business aviation flights are grown based on observed trend at a State level together with economic growth if this is a useful explanatory variable for this State.
- For other traffic, ('other' here is the majority of passenger flights) the use of supply-side or demand-side approach is considered.
 - Supply-side is used if traffic matches one of the standard histories (circular flights, long-term stable or declining traffic and direct relationship to GDP) and if demand exceeds the supply. Otherwise, it is demand that drives and limits the growth.

- In the demand-side, passenger numbers are estimated from flight counts, aircraft type and load factors, then grown according to GDP growth and the elasticity for this flow, then converted back to a number of flights using the forecast load factors and a number of seats-to-flights relationships calibrated on historical data.
- The growth of movements on an airport-pair may then be reduced if there has been a reduction in journey times by HST since the baseline year and adjusted for low-cost growth in the traffic zone and for any network change assumptions (future events). The growth of movements on an airport-pair is also adjusted for population change and costs of emissions trading passed on to passengers.

Constrained airport-pair forecast method:



The resulting growth per airport pair for all types of flight (passenger, all-cargo etc.) is then compared with future airport capacities that have been provided by the airports. Growth of the final forecast is constrained by these capacities.

Overflights:

The final step is to calculate how many flights are generated in each airspace by these airport-to-airport flights. This is usually done using a combination of the routings through airspace observed during the last twelve months and trends in overflight growth per traffic zone. These twelve months have been modified since the COVID-19 started. For the October 2022 forecast update, we considered the routes flown in the period March 2022 to September 2022. When not available, the 2019 routes have been used instead. Routes for the flows impacted by restrictions on the airspaces of Ukraine, Russian Federation, Belarus and Moldova and which are not yet back in 2022 were recalculated based on alternative routings.

For more information on the STATFOR methodology, please contact statfor.info@eurocontrol.int

3.3.2 Demand Data Repository (DDR)

The Demand Data Repository (DDR) was created to support the network collaborative planning process, giving access to a consolidated and integrated European strategic view of traffic demand and distribution.

The DDR2 Web portal provides a simple and comprehensive interface allowing generation and download of future traffic for planning purposes and past traffic and environment data for post-ops analysis of traffic trends, statistics and routeings comparison to support flight efficiency. It also provides tools download (SAAM & NEST) for airspace design and capacity planning simulations. Tools and data delivered by DDR2 web portal are interoperable and their usage restricted to DDR2 users formally registered.

Past traffic demand is available for any day, for all Europe, from September 2011.

The DDR web application can generate a variety of traffic samples as follows:

- Future traffic samples according to the low, baseline or high STATFOR forecast
- Future traffic samples with current demand distribution (flight plan / flight plan enhanced with radar data)
- Future traffic samples with new routeings* calculated on future environment
- Past traffic samples with new routeings* calculated on future environment

*Two options are available for the generation of new routeings:

- Shortest path (minimum route length)
- Cheapest path (minimum cost taking into account route length and route charges)

The future traffic samples can be enriched in the DDR2 using the flight intentions. DDR2 collects early available flight intentions from Airlines (SSIM / INNOVATA data) and from Coordinated Airports through EUACA.

The flight intentions are used as an input in the DDR2 as illustrated below:



The forecast traffic samples cover the whole of the European airspace geographically, and are available from the planning phase up to the pre-tactical phase.

Continuous testing and refinement of the consolidation and enrichment processes will ensure that forecast traffic demand samples are as accurate as possible for all planning purposes. DDR2 Web portal provides monthly report of strategic forecast quality.

Access to DDR web application is restricted to ANSPs and Airline Operators (these last can only access their own traffic fleet data and benefit from a specific flight efficiency DDR2 function) within Europe. Standard limits are fixed to 2 AIRACs or 60 days of historical traffic to download, and 60 days of traffic for forecast generation, each week.

Information on how to register to use the DDR may be found on the website: <u>www.eurocontrol.int/ddr</u>.

3.3.3 EUROCONTROL Network Manager Capacity Analyser (CAPAN)

CAPAN (CAPacity ANalysis) is a methodology which was developed by EUROCONTROL Network Manager to calculate sector capacities - based on the evaluation of air traffic controller workload - through a fast time simulation. Each CAPAN study is performed in close coordination with operational controllers at the ACCs concerned, to determine the workload of simulated controller positions for a given traffic sample. The capacity of the sector is reached when the workload reaches a threshold of 70%.

The CAPAN methodology takes into account a highly customisable controller task list and controller working method simulation methodology, making it adaptable to all ATC systems and working environments.

The CAPAN methodology is normally used for defining sector capacity, which is particularly useful in case of changes to the airspace structure, to the route structure, or to the ATC procedures. The introduction of major ATC system changes can also be analysed using the CAPAN methodology, either before to confirm expected benefits, or after to help redefine the sector capacity with the new ATC system.

For more information on the CAPAN methodology, please contact <u>CAPAN@eurocontrol.int</u>.

3.3.4 Network Strategic Tool (NEST)

NEST is a scenario-based modelling tool developed by EUROCONTROL. It is used by the Network Manager and the Air Navigation Service Providers (ANSPs) for:

- Designing and developing the airspace structure
- Planning the capacity and performing related post operations analyses
- Organising the traffic flows in the ATFCM strategic phase
- Preparing scenarios to support fast and real-time simulations
- Ad-hoc studies at local and network level.

NEST is used to optimise the available resources and improve performance at network level. NEST can also be used locally by Area Control Centres (ACCs) or airports and also globally for strategic planning at network level. NEST can process and consolidate large quantities of data spanning multiple years, but also allows the user to drill down into the detail and analyse and observe 10-minute periods of data. NEST is scenario based: users can make changes to the original dataset or reference scenario to model an unlimited number of different operational planning options. NEST uses datasets describing the consolidated pan-European airspace and route network, the traffic demand and distribution as well as the STATFOR traffic forecasts which are provided by EUROCONTROL at the end of each AIRAC cycle. Also a daily cumulated traffic with minimal environment is provided every day, allowing to access traffic data before the end of the AIRAC.

All this data can be downloaded from the Demand Data Repository web site (after subscription). The simulation algorithms include:

- Future traffic samples
- 4D traffic distribution
- Configuration optimiser
- Regulation builder
- Delay simulation

NEST provides a suite of data visualisation features including tables, charts and fully integrated capabilities for creating 2D/3D presentations.

The tool also addresses the following needs:

- Assess the capacity of an ACC
- Assess the benefit in terms of capacity of measures being implemented in an ACC
- Simulate temporary capacity reductions and their impact
- Optimise opening schemes based on local constraints
- Simulate traffic growth in sectors
- Identify capacity bottlenecks
- Generate future traffic samples
- Optimise ACC configuration opening schemes, balancing controller hours with capacity overloads and related delays
- Compare planning scenarios using built-in ATFM simulation capabilities
- Study airspace reorganisation options
- Visualise load distribution, saturation, complexity and traffic mix analysis
- Simulate degraded operational scenarios at reduced capacity
- Browse and edit all environment and traffic data
- Capture groups of flights by defining detailed custom traffic flows
- Run simulation of network effects
- Assess free route airspace projects,
- Assess route network development projects
- Model and simulate the effect of RAD changes
- Run Cost Benefit Analyses on economic and environmental indicators
- Study traffic rerouting scenarios
- Enhance flight efficiency.

Information requests regarding NEST may be made at nest@eurocontrol.int.

3.3.5 Airport Capacity and Performance Portal Tools

PIATA Neo

PIATA Neo, provides the end-user with a tailored user-interface in compliance with the modern software application standards. It allows stakeholders, such as Airport Operators and Air Navigation Service Providers, to perform detailed statistical analysis and modelling of airport airside capacity. PIATA Neo includes functionalities such as a Graphical Representation and a TMA module, which will receive a major update, for an analysis of operations in a terminal airspace. Recently, a major project has redesigned the Data Collection process, which has become highly automated providing larger coverage and accuracy. This automation uses ADS-B data received from the arrivals and departures of the airport.

The results of this analysis can be incorporated into the local capacity declaration process and the resulting figures are used as inputs into the Network Planning process. PIATA Neo can additionally be used in capacity enhancement exercises to determine potential capacity gains when modifications are being considered to existing infrastructure such as the construction of new rapid exit taxiways. The output of PIATA Neo is a set of data and information on how the airport airside system is currently used by ATC Services and Aircraft Operators.

A development project is ongoing to enhance the PIATA Neo tool and benefit more extensively from the ADS-B automation initially designed for the Data Collection phase. As such, the PIATA Neo tool will soon be fully migrated into a Web-Application, ACAT (Airport Capacity Assessment Tool).

Refer to section 6.2.2.3 – Airport capacity and performance studies, for further information about its use.

Continuous Capacity and Performance Monitoring (CCPM) application

The CCPM application has been designed to support an automated data collection, to provide the main airport stakeholders with a comprehensive operational view and to enable a continuous (24/7) capacity and performance monitoring.

The main data sources, feeding CCPM, rely on existing surveillance systems, dedicated equipment and EUROCONTROL data sources. The source chosen for each Airport is the outcome of coordinated decision between the main stakeholders and EUROCONTROL.

CCPM provides the User with the following information:

- **Default airport capacity indicators** 11 information items (indicators) are provided to the User who can then filter and group the results according to analysis preferences. Additional information items may also be defined.
- Full flight list the application shows a comprehensive table to the User with all attributes and events of each recorded flight. The User may customise this table with additional settings and export results.
- **Visualisation module** the application provides the User with a dynamic replay module and a static track view module. The User may select visualisation preferences through a comprehensive toolset.

The CCPM application supports a seamless coordination between the Airport Operators and the ANSP, inviting them to jointly define, review and propose the main information items that represents Airport Operations. A reporting module is presented to the Users, who may customise the content of a report and distribute it according to certain provisions.

Both, **ACAT and CCPM**, are available through the **ACAP Portal**, which has become the centralised platform for airport capacity and performance related applications in EUROCONTROL.

3.3.6 iDemand

iDemand is a tool able to calculate/predict the effect of reactionary delay across de network.

Reactionary delay accounts for around 40% of the delay reported in the network. Assessing on a tactical basis which is the impact of that delay in the remaining flights of the day has a very positive impact on all the stakeholders Common Situational Awareness and improves the Decision-Making Process.

The iDemand tool is able to visualize the effect of reactionary delay across the network providing additional information to the airports to improve the resources allocation process. This can include gate and stand management, border controls, customs, aircraft and passengers handling services, etc.

This tool is available to all the airports in the ECAC area to assist them in improving their performance and minimize their impact on the ATFM Network.

3.3.7 Airport Corner (Airport Network Digital Data Centre)

To support the effective management of the European ATM network, the Network Manager (NM) regularly captures airports information thought its planning and operational processes. To enable airports to provide information in an efficient and harmonized manner, NM implemented the Airport Corner in 2008, an airport focused data repository supported by a secure web application enabling information provision from European airports to NM at any time.

The underlying process facilitates collaboration between the local ANSP and Airport Operators resulting in a "coordinated airport view". The information scope covers a wide range of information from strategic, pre-tactical, tactical operations to postoperations and enables real time sharing between airports, NM and airlines, providing customizable subscription services and making the information available via a number of dedicated interfaces. The information scope can be easily expanded to attend to new business needs.

Currently about 130 airports are contributing to this process. Since 2018 a dedicated Airlines interface is available and about 100 airlines have already subscribed to it.

By regularly providing information via the Airport Corner, airports can comply with the obligations stated by the NM Implementing Rule 677/2011 (refer to Annex V – Appendix 2) as well as the EU Regulation 255/2010 ("Laying down common rules on Air Traffic Flow Management").

Considering the operational and technical evolutions foreseen for the "Airport Corner", the system is evolving towards an "Airport Network Digital Data Centre", a new name to better label the new scope of services that will be offered (from an "airports information provision to NM tool" towards enhanced "information services to airports" as well). This new approach aims to increase the benefits to airports in return to their efforts in regularly providing information via the Airport Corner to NM.

Refer to section 6.2.2.2 – Airport Network Digital Data Centre, for further information about its use.

3.3.8 PREDICT

PREDICT is the main network operations tool used to support the Pre-Tactical planning for the day being planned (D) and can be accessed by FMPs via CHMI (read only access) as from D-6.

PREDICT provides:

- A reasonably accurate overview of the traffic loading on the day being planned.
- Sector configurations and monitoring values supplied by FMPs.
- An ETFMS-like environment in which patterns of ATFCM measures (regulations and rerouting) can be simulated off-line, without consequence on OPS, to see their overall effect.
- Ability to cope with the network effect.

PREDICT input consists of:

- Flight Data: Historical demand derived from (first filed) flight plans at D-7, by default, is used to build the future traffic forecast. Several corrections of historical demand are applied in PREDICT to generate:
 - An enrichment of historical FPL data with DDR2 flight intentions in order to better reflect new flights or remove historical flights reported as not being operated in the future
 - NAT flows substitution in order to best reflect forecast NAT tracks
 - Routing connections resulting from airspace or RAD constraints/changes
- ENV Data: PREDICT receives new Environment data every 4 weeks as part of the normal AIRAC Cycle, as well as on-line environment updates.

3.3.9 ATFCM Simulations and SIMEX

A simulation platform SIMEX (**Sim**ulation and **Ex**periment) is provided to enable operational staff to simulate and assess the impact of the application, modification or cancellation of ATFCM measures before they are applied operationally.

The simulation platform is used in various ATFCM phases:

- Tactical activities (from simple evaluation of short-term ATFCM measures on ETFMS operations before application, to evaluation of the best approach to solve unexpected events)
- Pre-tactical activities (preparation of an ATFCM regulation plan, starting with flights from a reference day)
- Special events and long term activities (e.g. airspace restructuring, prevalidations of ENV data).

Requests for ATFCM simulations in the strategic phases should be addressed to <u>NM.Strategic.Operational.Planning@eurocontrol.int</u>. Pre-tactical and tactical simulations are carried out as part of the respective operational processes. SIMEX is now also available for FMPs to use via the CHMI.

3.3.10 Network Events Tool (NET)

Event information is essential to facilitate the planning and coordination of those events at network and local level. Information on events impacting capacity, efficiency or demand enables early identification of issues that may affect the capacity of the ATM Network as a whole, allowing the necessary ATFCM measures to be developed in due time. Sharing the same network event information to enable timely and synchronised planning across the organisation is a key enabler for executing effective network operations.

For several years EUROCONTROL Network Manager (NM) has obtained information on events that impact the network from multiple sources: internal business units, Airports, ANSPs, airlines, etc.

The Network Events Tool (NET) represents a move towards a centralised approach and rolling NOP, to facilitate the planning and coordination of events at network and local level. NET consists in a consolidated repository of event information obtained by EUROCONTROL from various sources and stored in various databases and provides a unique access point to that repository to interested users both internal and external to the Agency.

NET Input and Output



NET is available as a "Calendar of Network Events" portlet on the Network Operations

(<u>http://www.public.nm.eurocontrol.int/PUBPORTAL/gateway/spec/index.html</u>), and accessible in all planning phases (strategic, pre-tactical, tactical, post operations). As such, NET increases the visibility of events that may have an impact on network operations and aims to enable identification of interdependencies and support efficiency gains in the coordination and planning of mitigation actions in a collaborative manner with stakeholders.

NOP Network Operations Portal	02/02/2018 16:3817	UTC	DATE: 018 ATEG Strates	09/02/ IC) gic	2018 SET		Usem	ame: gul	eang	SEARCI	
Airspace and Route Structure	NOP Updates		62	Incident	Manage	ment Too					12
The following links provide information on:	12/07/2017			Network	Events						
ERNIP Database:	The European Network Opera	ations Plan 2017-2019/21 has		Februa	ry 2018				<		
The European Route Network Improvement Plan Database is central interactive database accessible via a web interface.	a been released. This version has Management Board (NMB) on J	been approved by the Network	nlete	Month	Dav						_
integrating short, medium and long-term improvement project	s document following the link here	e above.	Picto	Mon	Tue	Wed	Thu	Fri	Sat	Sun	
already implemented, planned for implementation or under development to improve the European ATS route network, the	ACC information for 2017 is ava Airports information is available	ilable via the ACC Info portlet.		29	30	31	0	2	3	4	
airspace structure and its utilisation at local and network leve	I. Planning of Network Changes p	ortlet.		5	6	7	8	9	10	11	
ERNIP Database (for externals)	and hosted on the PreTactical a	NOP are continuously updated and Tactical areas of the Portal.	3	40	12	44	45	40	47	40	
The ERNIP database website is live under:	40/04/2040		- 1	12	15	14	15	10	11	10	
ERNIP Database website	The Transition Plan for Major	Projects in Europe - Winter		19	20	21	22	23	24	25	
Early Access to Weekend and Conditional Routes (EAW)	: 2017/2018 was approved by the You can also find the document	NMB.		26	27	28	8	2	3	4	
established to facilitate the access on Busy Fridays and	Network Changes.	below in the portiet Flaining o		5	6	7	8	9	10	11	
weekends to these routes at an early time, from 1000 UTC or Enday until 0600 UTC on Monday for the period of summer	ACC Info			-	-		-				-
season.	Airport Info		8	-							-
The process is based on the agreement between participating States for granting access to these routes on an annual basi	Planning of Network Changes			Create		Subscrib	e 🕨	Sear	ch 🕨	List	<u> </u>
The list of Busy Fridays and associated CDRs for summer	Claims		8	DDR							
season are available here. Reference A/S Publications: EB EH LE LS	OneSky Online		2	SAAM							2
Network Axis Management	Contacts	<u> </u>		NEST							
ATFCM Measures (Scenarios)	Portal Assistance	۵.	8	EAD							
AIM	2			AIS Ago	na –						12
RAD	83			STAIFU	R	-					-

NET is intended to support the Network Planning Processes by enabling a consolidated source of event data, with sufficient and reliable details that can be used at any planning iteration. NET supports directly the first planning phase, the "early notification", and will enable efficiency gains in the coordination required in subsequent planning steps.

Currently, the NET repository (database) stores event information from the following sources:

- ERNIP Part 2 ARN Version 2023 2030 which includes airspace proposals scheduled for implementation during the specified period; as well as all completed proposals stored in previous versions of ERNIP Part 2;
- Airport Corner Database, which includes Airport On-going and planned activities; selected events only;
- Special Events;
- Military events;
- ATFCM events;
- Direct input through its own interface on the NOP portal.

The NET database also provides direct input to DDR2 (included in DDR2 Calendar of events).

3.3.11 **Pre-Validation of Airspace Changes**

In order to ensure that all significant airspace changes can be assessed from ATFCM and flight planning perspective and accurately reflected in the Network operations systems, a pre-validation facility is provided for all ANSPs. The main purpose is to detect any inconsistencies or incompleteness before official publication by the ANSPs. Detailed procedures for the use of this facility are contained in the Network Operations Handbook manual "Provision of Environment Data" available on the NOP Portal (Resources tab).

https://www.public.nm.eurocontrol.int/PUBPORTAL/gateway/spec/index.html.

Normally such pre-validations should be requested with at least six months' notice and at the latest three AIRAC cycles before required changes become effective, so that all

data changes may be fully validated in time for the AIRAC AIP data publication schedule. For the processes and the tools described, the main traffic and delay data source is the Network Operations flight data. Data may be enriched, as required, by the information acquired locally from the ANSPs or even airspace users.

3.3.12 Airspace Data Contribution to ATFCM Processes

In NMOC the Central Airspace and Capacity Database (CACD) - alias Environment (ENV) – is maintained with both live updates and AIRAC related updates. This is the common aeronautical infrastructure database used primarily by the NM operational systems.

Additionally, NM staff through the ECAC Centralized Airspace Data Function (CADF) produce the consolidated European Airspace Use Plan (EAUP/EUUP) and its updates. This is a daily listing of ATS/Conditional Routes availability, planned Restricted Airspace activations and related Restrictions based on information provided by each national Airspace Management Cell (AMC).

More details on the pre-validation process are published in the ERNIP Part 1 Edition 2.6 from 06/07/2022.

4 Overall Context and Operational Requirements

4.1 Summary description of 2022 network performance

TRAFFIC

European aviation's recovery from the Covid-19 pandemic continued throughout 2022. There were 9.3 million flights in 2022 (83% of 2019) – 1.9 million fewer flights than 2019. Summer network traffic reached 86.8% of 2019 levels.



Monthly Network Traffic Evolution

Most states lifted travel restrictions for the summer period, which helped the traffic recovery. Traffic reached 30,000 daily flights by the beginning of June and stayed at that level through to end September.

Fridays were the busiest days with Friday 8 July seeing the highest summer daily traffic at 32,392 flights.

Ryanair was the busiest carrier in the network in 2022 followed by Turkish Airlines and Lufthansa. Ryanair had over 3,000 flights on some summer days.

Business Aviation and All-Cargo were the only market segments above their 2019 traffic levels in 2022 at 116.0% and 105.1%, respectively. They represent 12.8% of 2022 flights. Low-Cost carriers (32.3% of 2022 flights) were at 85.5% of 2019 whereas Mainline (32.4% of 2022 flights) and Regional (13.3% of 2022 flights) recovered at a slower pace than Low-Cost and were respectively at 74.7% and 74.0% of 2019 levels. Although severely impacted by the Russian invasion of Ukraine, Charter (3.6% of 2022 flights) ended the year at 86.5% owing to a strong summer.

Aircraft operators had some difficulties fulfilling all their planned schedules. NM observed an increase in non-operated airline schedules starting mid-May. The indicator rose from just over 5% to 8%-10% on several days until settling back at end July. Ground and flight operations industrial action caused some of the "non-operation", e.g. Lufthansa reported to have cancelled over 1,000 flights due to a ground staff strike on 27 July. Such action impacted later operations as aircraft were out of position. Non-operated schedules returned to levels of over 10% in mid-December when winter weather impacted operations.

IGA Istanbul was the busiest airport in 2022 with, on average, 1156 flights per day, followed by Amsterdam/Schiphol and Paris/Charles de Gaulle with similar traffic levels. Some airports, notably Amsterdam, Heathrow, Frankfurt and Gatwick, implemented a

traffic reduction programme requiring aircraft operators to reduce their scheduled flights.

The Russian invasion of Ukraine and the subsequent airspace and operator restrictions continued to cause significant problems and deviations from the normal routings in that part of the network. NM estimated some 650 flights are now using more, southerly routes. Flights from Türkiye to Moscow use two main routes depending on the operator. Those flights route via Azerbaijan / Caspian Sea or via airspace to the west of Ukraine and through Belarus. The latter option increased summer traffic levels in some ACCs in central-east Europe, e.g. Budapest ACC (109.9% of 2019, May-September), Makedonia ACC at 107.3% and Belgrade ACC at 103.9%.

In general, traffic in the ACCs of north and west Europe remained below 2019 levels.

PUNCTUALITY

Arrival Punctuality at the start of 2022 was over 80% in low ATFM delay periods (up to week 13).



Arrival Punctuality and ATFM delay (En-route or Airport)

A period of ATFM delays (weeks 13-19) saw arrival punctuality fall to around 75%. The summer season traffic increase and the re-occurrence of network disruptions led to a decrease in punctuality to the low 60%s from week 22 (early June). The SE axis saw departure punctuality below 50% at times during summer. This level of arrival punctuality was lower than previous years. For example, average network arrival punctuality in 2019 only dropped to the low 60%s in weeks with, on average, over 200,000 minutes of daily ATFM delays (much higher than 2022 levels). Poor punctuality returned in mid-December due to winter weather impacting ground operations.

The MIRROR Turnaround indicators provide insight into other factors affecting punctuality. From mid-May, actual turnaround times increased as several operators at specific airports experienced various ground handling problems. This coincided with increased network issues and the increased reactionary delays meant reduced available time for turnaround. These two factors together produced unprecedented, poor on-time performance.



Airline schedule delay during the summer (20.4 min/flt) was significantly higher than 2019 levels with some impact from network issues. But CODA data indicates that most of the 6 min/flt increase was mainly due to Reactionary and Airline delays.



Breakdown of the Network Average Delay per Flight on Departure: Summer 2019 - 2021 - 2022

Average delay per flight comparison summer 2022, 2021 and 2019

NETWORK OPERATIONS

Network issues

En-route ATFM delay was at similar levels to 2019. En-route ATFM delay per flight in 2022 was 1.8 minutes, which corresponds to, on average, 44,500 minutes of daily ATFM delays (93% of 2019 with fewer flights).

Summer en-route ATFM delays were concentrated at the end of the week. Fridays and Saturdays had, on average, over 100,000 minutes.



En-route ATFM delay per week day in summer 2022

Capacity and staffing represented just under half of en-route ATFM delay this summer at around 21,200 minutes per day.

Weather accounted for around a quarter of en-route ATFM delays. Two system implementations (Reims and Prague) accounted for most of the en-route events.

There were fewer serious disruptions during 2022. However, three French ATC strikes in June and September did impact daily network operations. The two in September had ATFM delays of over 200,000 minutes



Year-to-date proportion of ATFM delays

ATFM regulation reasons in 2022
The network traffic recovery brought back pre-pandemic capacity issues, namely in Karlsruhe UAC. It provided sectors in line with the Network Operations Plan but the capacity proved insufficient for the summer traffic levels at 98% of 2019. Its en-route ATFM delay per flight was 2.6 minutes in 2022 compared to 1.7 minutes in 2019. The South-East axis flights were particularly exposed to Karlsruhe summer ATFM regulations, which were active from first rotation period and onwards.

Reims ACC implemented a new system in April 2022 and it took longer than expected to recover sector capacities. NM worked well with DSNA to plan the implementation and applied network measures that were co-ordinated with neighbouring ANSPs, e.g. DFS. Some sector specific measures were extended until October. Summer traffic in Reims was at 90% of 2019 levels. En-route ATFM delay per flight was 1.7 minutes in 2022 compared to 0.5 minutes in 2019.



ATFM delay locations in 2022

Prague ACC implemented their new system in February 2022 with necessary sector capacity reductions. Prague expected capacity levels to return by summer but technical issues prevented this and ATFM measures were needed to manage the traffic. Although summer traffic was at 68% of 2019 levels, the reduced sector capacity led to higher en-route ATFM delay. En-route ATFM delay per flight was 1.5 minutes in 2022 compared to 0.3 minutes in 2019.

Warsaw ACC experienced industrial relations problems in Spring 2022 that affected capacity. Relations improved for summer when traffic levels were at 70% of 2019. Enroute ATFM delay per flight in 2022 was 1.4 minutes compared to 0.2 minutes in 2019.

Bremen summer traffic was at 72% of 2019 levels. En-route ATFM delay per flight was 1.3 minutes in 2022 compared to 0.9 minutes in 2019. Increased military operations, particularly during summer, led to more reserved airspace for longer periods and reduced capacity in specific (German and Polish, particularly Bremen) sectors to handle airspace transition.

Apart from the hotspots mentioned above, most ACCs in the network performed well, with very low levels of ATFM delay.

Airport ATFM delay was at 0.4 minutes per flight in 2022 corresponding to 10,500 minutes of daily delay, approximately 57% of 2019. Airport weather, aerodrome capacity and airport ATC capacity and staffing were the main regulation reasons.

Lisbon ACC system implementation after summer impacted Lisbon and Porto airport operations. Gatwick airport had the highest airport ATFM delay per flight over summer

followed by Amsterdam Schiphol. But, in general, airport flow measures were needed to manage "shifted" demand rather than to counter capacity shortages.

Ground issues

Several airports had departure punctuality at or below 50% during summer.





There were reported problems with ground "processes" due to staffing shortages over the summer. MIRROR's turnaround indicator shows clearly that departures at several airports suffered badly from "longer than scheduled" turnaround times from mid-May onwards. The list includes Gatwick and Amsterdam. In addition, network effects meant fewer flights arrived ahead of schedule, which reduced available time to turnaround some aircraft for their next leg.





NM estimates that flights that had no network restriction, nor in-bound (reactionary) delay, experienced 14 mins departure delay and 9 minutes arrival delay during the peak period (early July). This is the effect of the ground process issues.

³ Operational estimate of departure punctuality from ETFMS and schedule data

Airport capacity

During Summer 2022 (May to September) Airport ATFM delay significantly reduced compared to 2019. However, at the same time, and as a consequence of ground "processes" problems, ground delay of flight neither suffering from ATFM regulation nor reactionary delay increased by almost 20%.



The average departure ground delay reached a peak around 11 minutes per flight early July. This led to an average 9 minutes arrival delay. The average departure ground delay for the whole summer was of 7.7 minutes per flight leading to an average 6.6 minutes arrival delay.



NM operations

Greek airports improved their capacity since summer 2021. Nevertheless, SE axis flights to Greece were very exposed to Karlsruhe UAC regulations from the early hours and through the day. NMOC airport function paid close attention to the tourist airports, striving to use the "first hours" capacity. It also helped operators improve their on-time performance, avoid curfews and supported Greek authorities to identify off-slot early arrivals. The top 10 Greek destinations had an arrival punctuality of around 60%, which is around the network average for summer.



Greek airports on-time arrivals in summer 2022

Weather

There were just under 5 million minutes of weather ATFM delay in 2022, 77% of 2019 levels.

NMOC had a MET expert over the summer and their analysis, along with ops expertise, improved the weather risk assessment at D-1. However, FMP engagement with the cross-border WX procedure was disappointing. As NM highlighted to NDOP weekly meetings, several FMPs chose to manage tactically the weather situations and applied weather regulations far too late. This contributed to the general volatility of regulated traffic.

Regulated traffic volatility

Regulated traffic volatility during summer was higher than 2019 for all ATFM regulation reasons except disruptions. Weather regulations were particularly volatile this year.

Several FMPs adjusted regulation parameters too often and too quickly (within 3 minutes, 15%-20% of the time). This led to frequent updates to CTOTs (via slot messages) and difficulty for aircraft operators and airports to plan (short-term) their operations, e.g. departure sequence.



Regulation volatility 2022

FLIGHT EFFICIENCY

The Network Manager, together with the operational stakeholders, suspended up to 1,200 RAD measures in 2020 and most remained suspended through 2021. However, most of the measures were re-instated in 2022.

New network (re-routeing) measures were applied for Reims ACC transition to 4 Flight and for Karlsruhe UAC capacity/demand imbalances. In total, there were 70 network re-routeing measures for Summer 2022; the majority were removed or relaxed by end August.

Political unrest in Ukraine, the Middle East, and the south Mediterranean region created inefficiencies at the interface of NM and affected the environmental flight efficiency indicators. The Russian invasion of Ukraine has added to the inefficiency as flights have been unable to use Ukrainian airspace since February.

As part of the Flight Efficiency Plan, States and ANSPs cooperated closely with NM to develop and implement enhanced airspace design solutions. More than 100 airspace improvement packages were co-ordinated at network level and implemented during 2022. As a result, the route extension due to airspace design (RTE-DES) continued its downward trend throughout the year, reaching its lowest ever average level in 2022, at 1.88%.

NM area fuel burn

The traffic recovery from COVID at the start of 2022 saw an increase in total fuel burn in the NM area⁴. NM estimates that 42.8 million tonnes of fuel were burnt in the NM area in 2022. The difference between FPL and actual fuel burn fell to around 0.6% during summer months as tactical options for route improvement were more limited.

⁴ Based on ETFMS individual flight fuel burn estimates within the NM area.







NM area FPL v Actual fuel burn % difference

Horizontal efficiency

The KEP and KEA indicators remained high through summer, despite the lower traffic levels. Although RAD restrictions have been reapplied, the impact of February's Ukrainian airspace closure on routes is the main reason for the increase.



Flight planning indicator



Actual distance flown indicator

Vertical efficiency

The non-adherence RFL indicator⁵ increased in 2022 versus 2020 and 2021, but it is still below the 2019.

Flights are maintaining their requested RFL at the same rate as 2020 when there were few flights.



Non-adherence RFL indicator

Scenarios

In 2018 and 2019, ANSPs implemented over 8500 and 7400 scenarios, respectively. These are daily airspace restrictions (zero rate regulations) that essentially encourage aircraft operators to avoid specific airspace or incur high ATFM delays. In 2022, there have been over 3800 scenarios. The Spanish ANSP, ENAIRE, applied half of these and has maintained the technique for traffic management.

NM has identified 18500 flights in 2022 that re-filed to avoid a scenario at a cost of 1802 tonnes of extra fuel - around 100 kg of fuel per flight. Other flights may have anticipated scenarios and filed an initial FPL avoiding the restriction. But overall, NM considers the extra fuel burn as relatively low.

<u>Note</u>

The 2020 Network Fuel Efficiency study⁶ introduced the Excess Fuel Burn indicator. The network has recently been relatively more fuel efficient than the 2019 period when the indicator was over 9%. Following the COVID period, NM is recalibrating the indicator to account for new aircraft type / route combinations and the absence of 2019 reference values. The recalibrated metric will be published in due course.

⁵ The non-adherence to RFL measures the proportion of the en-route distance that is flown at a different flight level (at least 1,000ft difference) from the RFL in the flight plan. *It captures both cases of (potentially) non-optimal flight planning when the pilot asks for a different flight level, but also ATC tactical improvements when restrictions in place at the flight planning stage are no longer needed. It also covers situations where a different flight level is cleared due to separation issues.*

⁶ ref Environmental Assessment: European ATM Network Fuel Inefficiency Study

4.2 Challenges and Opportunities

The main challenges and opportunities for this NOP are:

- Capturing accurately the evolution of the traffic demand;
- Capturing accurately the evolution of en-route capacity;
- Minimising to the largest possible extent the operational constraints in the network;
- The continuous adaptation of the European ATM network capacity to the evolution of traffic demand;
- The scheduling of the implementation of major projects, events, military exercises and their possible synchronisation over a short period of time.

Delays are likely to remain above the target at some ACCs in Europe for some years or during the entire period. In most cases, this is due to inflexible use of staff, shortage of qualified controllers in some areas and unresolved staff management issues, combined with planned reductions in capacity during the training and implementation of major ATM system upgrades and/or airspace structure reorganisations. In spite of significant efforts to ensure a more effective and flexible resource utilisation, these ACCs are expected to continue to open less than optimum sector configurations during peak hours.

The main challenge in the medium term for ANSPs is to resolve staffing issues and ensure a flexible use of staff to open optimum sector configurations when needed. This calls for robust staff planning and for the recruitment and training of additional controllers if required, as well as the introduction of dynamic and flexible staff rostering.

Actions and solutions coordinated at network level will be more and more required to address under performances and to ensure that network effects are properly taken into consideration to the benefit of the overall network performance.

In the short term, structured contingency planning and preparation is needed to enable the Network Manager to successfully mitigate the effect of unplanned constraints, e.g. industrial action or severe weather.

Airspace users already have the opportunity to flight plan according to their preferences (e.g. shortest/quickest/cheapest routes). However, the real challenge is to take advantage of the many additional options available (e.g. conditional routes, free route) and benefits are only likely to be fully realised through the use of dynamic flight planning systems that take into account all changes to the airspace, even those of a temporary nature.

The capacity planning process is now mature and the delay reduction activities are part of this ongoing process. It is implemented in a collaborative manner and the challenges posed by the requirements arising from the Network Functions Implementing Regulation and the Performance Framework have been fully answered. All operational stakeholders, including the Network Manager, now have precise obligations in the context of the new performance framework and all partners are working together in a cohesive way.

The increasing number of special events and major project implementations (see Chapter 7) poses a significant challenge to the smooth operation of the Network. Nevertheless, the collaboration with the relevant operational stakeholders in structured planning, coordination and mitigation of possible negative impacts provides a real opportunity to establish a robust process for handling all special events.

The major opportunity in exercising the network management functions and activities is the establishment of the Network Operations Plan (NOP) based on the Network Strategy Plan (NSP). The NOP provides a common mechanism for planning and operations across Europe.

4.3 Network Traffic Forecast

4.3.1 Seven-year Traffic Forecast

The <u>latest EUROCONTROL Seven-Year Forecast</u>, covering the period 2022-2028, was published mid-October 2022. It updates and extends the forecast published in June 2022, before the summer season.

> Latest trends influencing the Traffic Forecast

At European level, 2022 started with a new wave of travel restrictions prompted by the Omicron. This caused traffic stagnation at 72% of 2019 levels during the first quarter of the year.

The recovery from the pandemic is on-going. There has been strong demand during summer 2022 in most European States, but this has been held back, both by the capacity of the sector to handle the rapid growth (staff shortage, strikes) and also by the impact of the war in Ukraine.

Over the first 9 months of 2022, flights in Europe have reached 82% of the 2019 level.

The Low-Cost Carriers are recovering more swiftly from the COVID-19 pandemic. This segment grew from 31.9% in 2019 to 32.5% in 2022 (comparing same period from January to September). In particular, Ryanair and Wizz Air quickly exploited the high demand for intra-European leisure traffic and expanded operations to 109% and 112% of their respective 2019 levels.

> Traffic Forecast results

Due to the high level of uncertainty of the impact of the War in Ukraine and the economic fallout, the forecast is presenting **three independent scenarios**. These three separate scenarios (Low/Base/High) are anticipating the possible development paths of annual IFR movements.

All three scenarios consider that the restrictions on Ukrainian, Russian, Belarusian, and Moldovan airspaces will continue until the end of the horizon (2028).

Description of the three scenarios:

The **High scenario** envisages moderate GDP growth in 2023 and beyond, a limited impact on demand from inflation, good passenger confidence and limited capacity constraints in 2023 at airports and airlines.

The **Baseline scenario** is based on GDP being weak in 2023 for most European States, inflation (including jet fuel price) impacting demand and lower passenger confidence/propensity to fly. Business travel is partly replaced by digital alternatives, and we see the environmental concerns affecting the consumer decision (mostly impacting the domestics flows, trains being an alternative for short distances).

The **Low scenario** considers the impact of several downside risks, including several states in recession in 2023 and demand for travel strongly reduced by the effects of inflation. This scenario considers also some occasional re-imposition of travel restrictions, due to resurgence of COVID-19 variants. Business travel is substantially replaced by digital alternatives. Environmental concerns strongly affect the travel choices. We also foresee in this scenario more extensive staffing/capacity issues at airlines/airports in 2023.

Forecast results:

In the most-likely scenario (Base scenario), Europe in 2023 is predicted to close at 92% of 2019, with the summer months (again) exposed to operational constraints.

Overall, this is a slight downward revision on previous forecast dated June 2022, owing to the rather weak economic growth and high inflation. The 2019 levels will not be reached until 2025 - one year later than forecasted in June 2022.

The low scenario does not foresee a recovery to 2019 levels by the last year of the forecast, 2028.

The High scenario expects the 2019 levels to be surpassed in 2023 at European level.

However, there are still significant regional disparities and many risks surrounding the forecast.

The gap between the High and Low scenario is considering the risks.



Any user of the forecast is strongly advised to consider the low-to-high ranges.

Risks to the forecast growth

Some risks have already been anticipated in the three scenarios. Users of the forecasts are strongly advised to use the forecast range (low-growth to high-growth) as an aid to managing their own business risks.

However, there are other potential risks:

• Higher inflation and greater uncertainty triggered by Russia's invasion of Ukraine have emerged as key risks. A longer period of conflict with bigger disruptions to energy markets would translate into a bigger hit to the global economic expansion. Current forecast includes different economic forecasts, but a further deterioration of the economic situation is a downside risk.

- The volatility in oil and fuel prices: It is uncertain how the airlines will be able to pass the fuel price spikes to travellers in a market recovering from the numerous COVID-19 lockdowns. This is a downside risk for the airline industry.
- Future airspace and network changes (e.g. unexpected closures, new routes) and airlines' changing choice of routes are not modelled by the forecast. We currently assume that the Ukrainian and Russian airspaces remain closed till the end of the horizon (2028).
- Terrorist attacks, bans of one country on another one, wars and natural disasters. These are impossible to predict. Their impact on air traffic could however be temporary, or more long term.

4.3.2 Analysis of the Traffic Forecast

The following maps show the traffic increase from 2023 to 2027 compared to 2022 at ACC level for the baseline traffic growth scenario of the EUROCONTROL Seven-Year forecast 2022-2028 (October 2022), assuming route and profiles choices and availability of Summer 2022. Expected traffic demand per ACC on the baseline growth scenario is presented in Annex 1.







4.3.2.1 Impact of Traffic Distribution

For medium term capacity planning, it is important to take into account the likely redistribution of traffic between the different ACCs.

The following factors have a significant impact on traffic distribution and on future capacity requirements:

- The implementation of free-route airspace in certain areas;
- The general improvement to route network efficiency resulting from route network design and increased number of options for airspace users;
- The transition of the future traffic demand towards shortest and/or cheapest routes and unconstrained vertical profiles;
- The different en-route charges applied in different States;
- The capacity availability, especially in the cases of major bottleneck areas;
- The airspace availability following crisis situations.

The choice of route varies between airspace users and for different flights operated by the same user, and is influenced by a number of different factors, including time of day, rotation of flight (knock-on effect / reactionary delays), fuel price paid, applicable route charges, position of the high altitude jet stream, and even the local currency exchange rate. Hence herein lies the need for alternative options and flexibility in the availability of the route network and airspace structure.

4.3.2.2 Effect of Traffic Distribution via Shortest Available Routes

The impact of the traffic distribution when comparing current routeings to shortest routes remains high in some parts of the network, with the difference being significant on the South East axis especially. These effects are assessed through the capacity planning process and communicated on a regular basis to the ANSPs.

The choices made by the aircraft operators can significantly impact the traffic distribution, resulting in differences between forecast and actual demand. This highlights the need for additional flexibility, if user preferred routings are to be accommodated to the greatest extent possible.

4.3.2.3 Network Manager Recommendations on the planning assumptions at Local Level

Based on the latest traffic evolutions, it is recommended for all ACCs to plan according to the **base scenario** of the EUROCONTROL Seven-Year forecast 2022-2028 (October 2022) for Summer capacity planning.

4.3.3 Main Airports Forecast

Traffic forecast by airport

The yearly traffic forecast for the period 2023 to 2027 was published in October 2022 and is available in <u>EUROCONTROL Forecast Update 2022-2028 | EUROCONTROL</u>. The details included in this part of the document present evolution in the Base scenario. More details can be obtained from the STATFOR team contacting <u>statfor.info@eurocontrol.int</u>

Airport Code	Airport Name	2023 Forecast	2023 Growth	2024 Forecast	2024 Growth	2025 Forecast	2025 Growth	2026 Forecast	2026 Growth	2027 Forecast	2027 Growth
EBBR	Brussels National	211.927	13%	221.896	5%	227.598	3%	233.081	2%	237.307	2%
EDDB	Berlin International	457.156	16%	500.341	9%	509.894	2%	516.961	1%	523.684	1%
EDDF	Frankfurt	436.095	19%	475.842	9%	486.243	2%	494.645	2%	502.388	2%
EDDH	Hamburg	120.466	15%	132.056	10%	134.493	2%	136.283	1%	137.927	1%
EDDK	Koln/Bonn	125.896	9%	136.041	8%	139.435	2%	142.043	2%	144.426	2%
EDDL	Dusseldorf	184.266	16%	200.111	9%	202.954	1%	204.782	1%	206.358	1%
EDDM	Munchen	333.613	17%	364.333	9%	370.404	2%	374.484	1%	378.156	1%
EETN	Tallinn/Ulemiste	40.097	14%	42.731	7%	43.628	2%	44.408	2%	45.184	2%
EFHK	Helsinki/Vantaa	155.680	19%	175.183	13%	177.947	2%	180.370	1%	182.621	1%
EGCC	Manchester	187.088	15%	205.523	10%	210.441	2%	215.201	2%	219.398	2%
EGGW	London Luton	136.384	13%	148.005	9%	152.699	3%	156.825	3%	160.544	2%
EGKK	London Gatwick	261.746	15%	288.896	10%	297.074	3%	304.363	2%	310.671	2%
EGLL	London Heathrow	427.325	20%	469.409	10%	478.018	2%	480.066	0%	480.065	0%
EGSS	London Stansted	189.029	15%	208.200	10%	215.114	3%	221.661	3%	227.572	3%
EHAM	Amsterdam Schiphol	468.049	11%	478.670	2%	484.955	1%	490.616	1%	495.561	1%
EIDW	Dublin	223.107	9%	236.343	6%	241.349	2%	246.367	2%	251.072	2%
EKCH	Copenhagen/Kastrup	247.268	18%	255.326	3%	259.989	2%	264.210	2%	267.657	1%
ELLX	Luxembourg	73.174	10%	76.193	4%	77.869	2%	79.417	2%	80.539	1%
ENGM	Oslo Gardermoen	249.588	9%	261.521	5%	265.351	1%	269.141	1%	272.739	1%
EPWA	Warsaw Chopin	176.610	10%	186.051	5%	190.014	2%	193.740	2%	197.177	2%
ESSA	Stockholm Arlanda	193.450	21%	200.539	4%	205.307	2%	209.611	2%	213.527	2%

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Airport Code	Airport Name	2023 Forecast	2023 Growth	2024 Forecast	2024 Growth	2025 Forecast	2025 Growth	2026 Forecast	2026 Growth	2027 Forecast	2027 Growth
EVRA	Riga Intl	67.452	23%	77.332	15%	79.047	2%	80.208	1%	81.623	2%
EYVI	Vilnius Intl	42.257	12%	44.015	4%	45.077	2%	45.968	2%	46.768	2%
GCLP	Gran Canaria	128.918	5%	134.584	4%	137.727	2%	140.088	2%	141.618	1%
LATI	Tirana	40.800	4%	44.464	9%	46.634	5%	48.778	5%	50.896	4%
LBSF	Sofia	58.102	15%	62.172	7%	64.109	3%	65.820	3%	67.565	3%
LCLK	Larnaca	56.360	8%	59.107	5%	61.368	4%	64.349	5%	66.382	3%
LEBL	Barcelona	335.322	9%	356.206	6%	373.399	5%	388.518	4%	401.846	3%
LEMD	Madrid Barajas	414.014	7%	434.846	5%	452.577	4%	467.935	3%	480.947	3%
LEMG	Malaga	134.366	7%	142.662	6%	148.699	4%	153.779	3%	158.055	3%
LEPA	Palma De Mallorca	210.396	10%	225.556	7%	236.070	5%	244.734	4%	252.117	3%
LFMN	Nice	135.816	6%	143.529	6%	146.015	2%	147.990	1%	149.454	1%
LFPG	Paris Charles De Gaulle	452.307	13%	490.404	8%	500.714	2%	511.634	2%	521.265	2%
LFPO	Paris Orly	200.397	9%	213.230	6%	218.208	2%	223.663	2%	228.495	2%
LGAV	Athens International / Eleftherios Venizelos	233.959	3%	243.655	4%	249.557	2%	255.825	3%	262.060	2%
LHBP	Budapest	112.311	13%	120.098	7%	125.197	4%	129.724	4%	134.287	4%
LIMC	Milano Malpensa	226.624	10%	239.817	6%	245.794	2%	250.881	2%	255.301	2%
LIML	Milano Linate	84.816	4%	88.619	4%	89.763	1%	90.422	1%	90.800	0%
LIRF	Rome Fiumicino	302.088	10%	320.189	6%	329.023	3%	336.771	2%	343.682	2%
LJLJ	Ljubljana	21.499	30%	27.158	26%	27.624	2%	28.083	2%	28.517	2%
LKPR	Prague	130.212	29%	144.439	11%	150.590	4%	156.102	4%	160.307	3%
LLBG	Tel Aviv Ben Gurion	159.246	16%	169.375	6%	178.321	5%	186.982	5%	195.796	5%

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Airport Code	Airport Name	2023 Forecast	2023 Growth	2024 Forecast	2024 Growth	2025 Forecast	2025 Growth	2026 Forecast	2026 Growth	2027 Forecast	2027 Growth
LMML	Malta Luqa	55.096	13%	58.333	6%	60.137	3%	61.901	3%	63.552	3%
LOWW	Vienna International	253.960	22%	273.970	8%	279.830	2%	285.177	2%	290.136	2%
LPPT	Lisboa	216.430	4%	223.859	3%	232.257	4%	239.426	3%	245.334	2%
LQSA	Sarajevo	16.713	9%	18.034	8%	18.819	4%	19.607	4%	20.412	4%
LROP	Bucharest Henri Coanda	117.124	6%	123.856	6%	127.969	3%	132.080	3%	135.874	3%
LSGG	Geneve	167.613	9%	175.908	5%	178.582	2%	181.106	1%	183.524	1%
LSZH	Zurich	244.981	13%	257.229	5%	261.086	1%	265.001	1%	268.825	1%
LTAI	Antalya	160.491	5%	171.155	7%	175.121	2%	177.895	2%	182.443	3%
LTFJ	Istanbul Sabiha Gokcen	210.892	5%	230.386	9%	238.452	4%	246.845	4%	259.775	5%
LTFM	Istanbul Airport	448.594	6%	484.486	8%	506.430	5%	529.166	4%	552.842	4%
LWSK	Skopje	18.038	9%	19.461	8%	20.338	5%	21.248	4%	22.196	4%
LYBE	Belgrade Nikola Tesla	71.996	5%	72.515	1%	72.512	0%	72.510	0%	72.508	0%
LYPG	Podgorica	15.532	6%	16.210	4%	16.637	3%	17.058	3%	17.469	2%
UGTB	Tblisi	36.946	28%	39.581	7%	41.657	5%	43,788	5%	46,213	6%

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4.3.4 Analysis of Special Events and Major Projects Impact

The Network Manager provides operational and technical expertise to model the increased demand and different traffic patterns for each special event, to enable ANSPs concerned to optimally configure the airspace accordingly.

For the reference period of this Plan no major impacts are foreseen by special events (sports events, or similar) that would temporarily but significantly increase traffic demand at one airport or group of airports, or in one or more FIRs. Two sporting events, World Athletic Championship in 2023 (Budapest), and Olympic Games in 2024 (Paris) may cause an increase of traffic demand at some European airports.

A number of major projects may lead to temporary capacity reductions, due to the implementation of major airspace reorganisations or due to migration to new/upgraded ATM systems.

Major airspace projects are planned to take place during the period 2023-2027, and include the implementations of cross-border FRA, and airspace reorganisations at a medium to large scale. Details for all airspace projects can be found in the European Route Network Improvement Plan – Part 2 – ARN Version 2022 - 2030, and in the seasonal Transition Plan for Major Projects in Europe.

New or upgrades of the ATM systems are planned over the period 2023-2027 in Albania, Belgium, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Hungary, Israel, Italy, Moldova, Morocco, Netherlands, North Macedonia, Norway, Portugal, Spain, Serbia, and UK.

Many projects, both technical and airspace related, are usually preceded by quite long and intensive training of operational staff. The familiarisation training can last between few weeks to several months, during which period already existing staffing issues may significantly intensify, extending a project lifecycle even onto a summer season, and likely to impact the network performance.

Detailed information on major projects and significant events is provided in chapter 7 and in the seasonal Transition Plan for Major Projects in Europe.



The yearly Transition Plan for major projects in Europe will address capacity critical transition periods of major projects, providing optimal solutions, agreed during the coordination activities among all entities affected and the NM.

A high level of cooperation and preparations at ATM network level is ensured, starting a year in advance for major events, with a refinement of the study as more information becomes available. Annual, seasonal and pre-tactical planning phases are covered, through to tactical operations. An integrated planning, encompassing all phases, will be in place to ensure that operational performance is maintained at optimum levels. In some cases, changes to the transition plan and/or the implementation period will be coordinated.

For the ad hoc significant events, information is collected individually, and the planning is made at least three months ahead of the event.

4.4 Network Operational Performance Requirements

4.4.1 Overall Network Capacity Requirements

The current planning period of the NOP covers two years of the Single European Sky (SES) third reference period (RP3) of the Regulation No 2019/317 of 11 February 2019 and is following revised performance targets set forth in the Commission Implementing Decision (EU) 2021/891 of 2 June 2021 as follows:

- 0.5 min/flight in 2023
- 0.5 min/flight in 2024

Network Performance Plan (NPP)

The Network Performance Plan (NPP) 2020-2024 developed by the Network Manager defines formal targets for RP3 in compliance with the Performance Regulation No 317/2019.

The table below shows the RP3 targets for NM area related to capacity.

	N	IM key per	formance indicators	Target							
САР	KPI	E-DLA-S	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							
CAP	KPI	A-DLA-S	The percentage of arrival ATFM delay savings	Deliver additional operational benefits in terms of en-route delay savings of 5% of total airport delay							

Special attention will be necessary in the following areas:

- Address weekend delays
- Reduce individual flight penalties
- Increase ATFCM measures efficiency
- Mitigate weather generated delays
- Reduce first rotation delay and reactionary delays
- Airport area actions:
 - · Reduce first rotation delays and improve of airport slot usage
 - Support the implementation of A-CDM and Advanced Tower
 - · Integrate AOP-NOP
 - · Deploy Target Time of Arrival
 - Deploy RECAT-EU and Time Based Separation

The Network Manager identified the following initiatives and activities to achieve the required capacity improvements:

- Address the specific issues that impact the imbalances between demand and capacity, both en-route and at airports, at network and local level.
- Provide full support to its stakeholders to achieve and improve their capacity performance, prioritising the FABs, ANSPs and airports that most impact the network.
- Deploy its own initiatives to address network issues to reduce the delays so that the en-route and airport ATFM delay performance targets and objectives are achieved.
- Address the critical areas through the NOP planning process, identifying actions to mitigate the problems.
- Develop and publish the Transition Plan for Major Projects in Europe, to minimise the impact on the network performance caused by major airspace or ATM system improvement projects.
- Deploy its toolkit of measures to manage the network issues, which includes CDM network procedures (e.g. network delay attribution), NMOC actions (e.g. Slot swapping, extensions and exclusions) etc.

• Integrate airport operations in the network; this had started back in RP1, accelerated during RP2, and shall continue during RP3, so that capacity problems are addressed wherever they appear.

The ultimate objective is to bring additional benefits to performance achievement due to the specific and unique role of NM to trigger and take initiatives in the network management procedures. This will not be achieved without the involvement of all other actors.

4.4.2 EU Target Delay Reference Values

The reference values for 2023-2024 are based on the performance targets for RP3 as published in the EC Implementing Decision 2021/891 of 2 June 2021. They represent the delay requirements for each ACC in Europe to ensure that the European network en-route delay target is made. This delay breakdown was made at ACC, ANSP and FAB level.

The methodology used to calculate the delay reference values was approved by the Network Management Board and is included in the Appendix 1 to the European Network Operations Plan 2013-2015 – Edition June 2013 - Capacity Assessment and Planning Guidance. The approach has proved to be solid and stable and has been tested over several years and under various traffic hypotheses.



The following map indicates the annual reference values per ACC for 2023 and 2024.



4.4.3 ACC Capacity Requirements

Capacity requirement profiles are established for each ACC through the overall European ATM Network capacity planning process for each year of the planning period, to provide early information and enable flexible and interactive planning of ATM capacity and to better reflect the local needs and realities.

The ACC capacity requirement profiles per ACC are provided in Annex 1. The ACC capacity requirement profiles were agreed to be used as the basis for cooperative planning and provision of capacity for the planning period.

The ACC capacity requirement profiles are based on the planning assumptions agreed with the ANSPs through the regular working arrangements, to meet the yearly delay targets.

En-route delay reference values and capacity requirement profiles have been calculated based on the following targets:

- 0.5 min/flight in 2023
- 0.5 min/flight in 2024

The following scenario was provided for ACC capacity requirement profiles, based on the EUROCONTROL Seven-Year Forecast 2022-2028 (October 2022):

• <u>Baseline</u>: Baseline traffic forecast, assuming route and profile choices and availability of Summer 2022

Based on the latest traffic evolutions, it is recommended for all ACCs to plan according to the **baseline scenario**.

For the medium-term capacity planning of the European ATM network, capacity profiles are set for existing and future ACC configurations (i.e. those planned to be operational during the planning cycle) in the European area, by considering the entire ATM network and giving due consideration to the airports' capacity constraints.

The current ACC capacity requirement profiles are linked to the ACC capacity baselines that were assessed during summer 2022 and are used as a reference for medium term local capacity planning.

The following maps show the capacity increases required over the summer season for each ACC for the baseline traffic growth scenario to achieve the annual capacity targets during the period 2023-2024. Details are included in Annex 1.

This assessment has been made for the summer season as it is the most demanding period in terms of capacity requirements and provision, and is done in comparison with the capacity baselines for the summer 2022.



4.4.4 Airport Capacity and Performance Requirements

The Performance Regulation, as part of the Single European Sky regulations, does not include capacity targets for airports in RP3. Capacity related decisions rest either at State or airport operator level and are based on political, commercial or other local considerations.

However, local level performance targets for Air Navigation Services (ANS) at airports related to the Performance Scheme, Regulation 2019/317 in RP3 has been foreseen.

Demand Capacity Balancing, punctuality and resulting ground delay into the Network will be reviewed weekly and investigated with relevant stakeholders.

When the reasons for delay are identified as being linked to a potential non-optimal use of existing capacity, the NM can support the airport stakeholders in identifying underlying reasons and mitigation actions to improve the situation. The proposed Network Manager actions for each individual airport are listed in Annex 2 – Airports (NM Recommendations / Planned Actions).

One of the key tasks of the Network Manager is to provide the network view to the local operational stakeholders and support them in managing their capacity to enhance network operations. This is done by ensuring that airport operations are fully aligned with both Network strategic planning and day-to-day operations.

The current airport capacity as well as forecast capacity for the period 2023 to 2027 can be found in Annex 2 - Airports. The description of local airport initiatives that may contribute to an increase in airport capacity or efficiency in the medium or long term can be found in the same section.

4.4.5 Environment / Flight Efficiency Requirements

In response to the Commission Regulation (EU) 2019/317 of 11 February 2019 (laying down a performance scheme for air navigation services and network functions), a new set of Key Performance Indicators and associated targets have been set for the 3rd Reference Period (RP3).

It includes two important key performance areas and associated key performance indicators and performance indicators, related to the operational performance of the European ATM network for the period 2023 - 2024.

The KPI average horizontal en route flight efficiency of the actual trajectory (KEA) is applicable at both network and local level and is defined as follows:

- the indicator is the comparison between the length of the en-route part of the actual trajectory derived from surveillance data and the achieved distance, summed over IFR flights within or traversing the European airspace
- 'en-route part' refers to the distance flown outside a circle of 40 NM around the airports
- where a flight departs from or arrives at an airport outside the European airspace, the entry or exit points of the European airspace are used for the calculation of this indicator as the origin or destination respectively, rather than the departure or destination airport
- where a flight departs from and arrives at an airport inside the European airspace and crosses a non-European airspace, only the part inside the European airspace is used for the calculation of this indicator
- 'achieved distance' is a function of the position of the entry and exit points of the flight into and out of each portion of airspace for all parts of the trajectory.

Achieved distance represents the contribution that those points make to the great circle distance between origin and destination of the flight

• the indicator is calculated for the whole calendar year and for each year of the reference period, as an average. When calculating this average, the ten highest daily values and the ten lowest daily values are excluded from the calculation.

The following performance targets for RP3 were published in the EC Implementing Decision (EU) 2021/891 of 2 June 2021:

KEA - Average route extension

- 2.40% in 2023
- 2.40% in 2024

Network Performance Plan (NPP)

The Network Performance Plan (NPP) 2020-2024 developed by the Network Manager defines formal targets for RP3 in compliance with the Performance Regulation No 317/2019.

The table below shows the RP3 targets for NM area related to environment/flight efficiency.

	N	IM key p	performance indicators	Target
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 3.73% for NM area for KEP indicator by 2024

The annual values set for the KEP indicator are:

	2023	2024
	3.94%	3.73%
KEP NM area	0.21 pp	0.21 pp
	reduction	reduction

The Network Manager coordinates the following activities to achieve the required improvement in flight efficiency:

- 1. Enhancing European en-route airspace design through annual improvements of European ATS route network, high priority being given to:
 - Full implementation of Free Route Airspace (FRA);
 - Implementation of a coherent package of annual improvements and shorter routes;
 - Improving efficiency for the most penalised city pairs;
- 2. Improving airspace utilisation and route network availability through:
 - Actively supporting and involving aircraft operators and the computer flight plan service providers in flight plan quality improvements;
 - Gradually applying route availability restrictions only where and when required;

- Improving the use and availability of civil/military airspace structures;
- Implementation of single CDR category
- Aligning the cross border availability of CDR's.
- 3. Efficient Terminal Manoeuvring Area (TMA) design and utilisation through:
 - Implementing advanced navigation capabilities;
 - Implementing Continuous Descent Operations (CDO);
 - Improved arrival/departure routes, optimised departure profiles, etc.
- 4. Improving awareness of performance.

4.4.6 Safety Requirements

Commission Implementing Regulation (EU) 2019/123 of 24 January 2019 Art. 7.2 (e), requires the Network Manager to "*identify operational safety hazards at network level in cooperation with operational stakeholders and assess the associated network safety risk and report them to the Agency*". To do this the Network Manager coordinates safety management and operational safety improvements at Network level, supporting ANSPs and other NM stakeholders to manage existing hazards and anticipate new safety threats, in order to increase the resilience of the Network. The ultimate goal is to maintain or improve the safety of the Network, regardless of potential traffic level fluctuations. NM will need to invest in innovative combinations of reactive, proactive and predictive methods, placing increasing emphasis on novel techniques, such as ML/AI, resilience engineering and ergonomics.

The following main safety requirements were identified:

- Support and improve the safety of operations by identifying operational risks in cooperation with operational stakeholders. The identification of said operational stakeholders is a challenge in itself. These include, but are not limited to, ANSPs (large and small, public and private, EU and non-EU), airports, other operators such as airlines, drone operators, general aviation, OEMs or space operators.
- Report the identified safety risks to the Agency. This activity may entail multifaceted actions: on the one hand, NM reports directly to the Agency risks identified by its own activities. On the other hand, NM facilitates and supports reporting of identified safety risks from the national level to the Agency and EUlevel.
- Coordinate and facilitate operational safety enhancements. In practice, NM will
 continue its previous activities to promote and support a common approach to
 tackling both known and new safety risks based on identified hotspots and
 trends in the Network, and to address the safety challenges that lie ahead.
- Disseminate safety knowledge in the network and continue to remain an authoritative reference point for safety information. NM is already an established facilitator in exchanging safety knowledge and will continue to invest in maintaining and further improving the exchange of, and easy access to, relevant safety information, to the benefit of all interested stakeholders.
- Manage change and diverse/multiple NM programmes and projects to ensure that the individual parts of the Network are safe so that, collectively, capacity and flight efficiency benefits can be realised in line with customer expectations and established performance targets, in a cost-efficient way.

 Improve the effectiveness of safety management systems (SMS) across the Network and in particular, mature its own SMS so that it achieves 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 RP3 EU-wide targets.

For NM the 2022 safety targets in RP3 for the Effectiveness of Safety Management (EoSM) have already been achieved in 2021.

Network Performance Plan (NPP)

The Network Performance Plan (NPP) 2020-2024 developed by the Network Manager defines formal targets for RP3 in compliance with the Performance Regulation No 317/2019.

The table below shows the RP3 targets for NM area related to safety.

	NM ke	ey perforr	nance 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 policy and objectives', 'safety assurance', and 'safety promotion' and at least Level D in the safety management objective 'safety risk management

• The annual values set for the EOSM indicator are:

	2023	2024
EoSM: Effectiveness of Safety Management	Level C or above in 80% of MOs, i.e. safety promotion + safety policy and objectives + safety culture + safety assurance + safety risk management	At least Level D in safety risk management and Level C in the other MOs

4.4.7 Contingency Requirements

The term contingency, in the context of the Network Management Function and related activities, refers to any situation that is likely to jeopardise ATM network operations, for example: ATM system failure, natural disaster, large scale adverse weather phenomena, industrial action or military activity.

4.4.7.1 Network Crisis

In the event of crisis at network level, resulting in widespread traffic disruption, the Network Manager will activate the European Aviation Crisis Coordination Cell (EACCC) and will apply previously agreed measures in coordination with all relevant operational stakeholders. These collaborative activities are done at network, regional and local levels.

4.4.7.2 ACC Contingency Plans

Contingency measures to be applied in the event of ATM system failures or other ACC outages are tailored according to their impact on network capacity.

ATM system failure can result in significant and long lasting disruption affecting the functioning of the European network. An increased risk of ATM system failure exists during transition to a new system, or immediately following a complete shutdown of old system. Normal ANSP services may also be affected by industrial action, security threats, etc. ANSPs are required to provide and regularly update ATFCM contingency plans to help mitigate the effects of such outages.

Apart from addressing any temporary capacity impact of project transitions, the Network Manager will analyse them from a network contingency perspective. In this context, the Network Manager collects the local contingency plans and, in coordination with all relevant operational stakeholders, develops a number of strategic ATFCM scenario options to be applied in case of a contingency situation.

4.4.7.3 Network ATFM Operations Contingency

The Network Operations ATFM contingency procedures have been put in place to minimise the impact of any failure at Network level on operational stakeholders and airspace users. A very high level of technical redundancy is provided for all network operations systems (IFPS, ETFMS, CACD, CCAMS). The IFPS service operates permanently with two synchronised systems, each able to immediately assume responsibility for all flight plan processing across the network. In the event of Enhanced Tactical Flow Management System (ETFMS) failure, a contingency system is available and a biannual procedural contingency plan is prepared and published. This procedural contingency plan defines maximum flow rates per aerodrome and flow to ensure that European ATM can operate at approximately 90% of normal capacity in the event of an outage of the ATFCM system.

4.5 Operational Needs As Expressed by Different Stakeholders Including Military

The information is covered in the paragraph 4.4 and in the chapter 8 of this document, respectively.

5 Network Operational Performance Plans and Actions at Network Level

5.1 Implementation of the Network Strategy Plan

This section presents the actions taken by the Network Manager to initiate the implementation of the NSP following its adoption by the European Commission by the Decision (EU) 2019/2167 of 17 December 2019. The Network Strategy Plan 2020 - 2029 defined several strategic objectives. The results achieved provided a fundamental contribution in maintaining a reasonable operational performance. For each strategic objective, the Network Strategy Plan defines the list of the most significant actions to be implemented in the course of RP3 and RP4, indicating the operational stakeholders involved.

The European ATM Master Plan addresses the high-level operational and technological evolutions of the ATM system, clustered as "Essential Operational Changes" and detailed by deployment scenarios. The Network Strategy Plan is an integral part of this change process. It targets concrete operational issues that can be solved over the period 2020 - 2029 and beyond via any operational and technical means. It ensures that the planned SESAR deployments necessary to the execution of the Network Functions and tasks are synchronised and have maximum Network benefit. However, the ATM Master Plan also covers some operational and technical aspects that do not have a Network dimension as they are considered as local without substantial impact on Network performance

As a result, the Strategic Objectives of the Network Strategy Plan have been aligned with the essential operational changes of the European ATM Master Plan.

The following Strategic Objectives are defined in the NSP:

- SO1: Manage network performance through 'Network-minded' decision-making.
- SO2: Deploy and integrate interoperable and secure information management systems.
- SO3: Optimise Network design.
- SO4: Optimise Network operations.
- SO5: Develop European connectivity and airport services.
- SO6: Ensure network safety and security and reinforce crisis management.
- SO7: Optimise ATM/CNS infrastructure and services to support evolutions towards more efficient network operations and services.
- SO8: Develop the network human capital and improve its flexibility through excellence.
- SO9: Improve environmental sustainability.
- SO10: Support European aviation at global level.

The NSP achievements are regularly monitored and they are reported in the Network Manager annual report (Annex II- NSP Implementation).

The **High Level Network Operational CONOPS** aims to operationalise the NSP vision and Strategic Objectives, clustering the required operational Improvements into five Directions of Change (DoCs) identifying their applicability's per specific flight phases.

To address the challenges to network performance in RP3/RP4, the Network Stakeholders need to build on the instruments established under the Single European Sky and align their action plans accordingly. As a result, NM has retained a number of Network Strategic Projects, corresponding to the Strategic Objectives, fully aligned with the ATM functionalities defined in CP1 regulation and corresponding SESAR Deployment Programmes. The achievement of the strategic objectives relies to a large extent on the timely execution of the Network Strategic Projects. These strategic projects coordinate the implementation of the main operational and technical evolutions led by the NM. This includes their network-wide deployment during the RP3/RP4 timeframe. They are directly linked with the scope of SESAR Deployment Programmes as well as some additional topics required for efficient Network Operations and coordination with Stakeholders.

5.2 Network Roadmaps

In order to provide a comprehensive and detailed view of the three levels of the NSP - Strategic, Operational and Technical – NM has developed three roadmaps:

- Network Evolutions Roadmap;
- Network Operational Roadmap;
- Network Technical Roadmap.

Those roadmaps are an integral part of this edition of the Network Operations Plan. The development of those roadmaps provides clarity on the overall network evolutions. It enables a better coherence of the SESAR deployment programme with the Network Strategy Plan and the Network Operations Plan (as requested in the Commission Implementing Regulation (EU) IR 409/2013 and the Commission Implementing Regulation (EU) IR 716/2014), facilitates the logical synchronisation of the various implementation steps and consequently avoids duplication of effort.

The **Network Evolutions Roadmap** is an integral part of **High Level Network CONOPS** and the objective is to provide a high level overview of the key operational and technical evolutions expected to take place over the period of the current NSP. It aims at:

- ensuring that the actions required at network level to achieve the RP3/RP4 performance targets are fully covered.
- ensuring that these actions are aligned with the ATM Master Plan, the Common Project 1 (CP1) and corresponding SESAR Deployment Programmes, and the SES/ICAO regulatory framework.

The **Network Operational Roadmap** translates the Network Evolutions Roadmap into operational capabilities. It consolidates in a single reference document the following:

- Detailed operational requirements derived from the major events/milestones;
- Clustering of operational requirements;
- Identification of gaps and missing links (operational, technical, etc.).

The **Network Technical Roadmap** translates the operational capabilities into technical requirements. The Technical Roadmap covers only NM part, more specifically the planning of future NM system evolutions and associated Functional Blocks and Change Requests. It provides the list of actions for the initiation of appropriate work to better prepare development and implementation. It consolidates in a single reference document the following content:

- Grouping of requirements for NM systems developments for better cost efficiency;
- A more transparent and flexible way to define NM systems requirements;
- Identification of gaps and missing links (operational, technical, etc.).

2023 2029 2022 2024 2025 2026 2027 2028 FRA exte laries, towards full European d beyond nat pport of cross-border FRA FRA connectivity with TMA ed ASM/ATFCM integration and ASM scen Optimised Network Design Dynamic Airspace Manage Area (DMA) ent/Dynamic Ai ns (DAC) and Dy mic M r Level Opera ons and drones/UAV rk integration of Hig Cross border delegation of ATS provisi TMA or on, PBN-based or res and CDO/CCO nded TMA namic Exte D Flexibility and dynamicity of airspa lishing ATFM measures Full Ops actors in olvement in estab rdination dialogue (SYSCO) ATC exchan Transfer and co on of TWR/APP/ACC coon on exch Optimum n awareness and er nced demand and capacity bala Capacity and on of ATFCM and ATC planning (INAP) Integra Flight Enhanced use for CPDLC excha nges (ATN B2 imp ed clearanc Efficiency Planning ed Multi SI Network UDPP DCB to supp nd ATS serv rt car configuratio v Ma n Fik STAM, traffic complexity tools and Multi c ple ATFCM TT managem Extended AMAN ATC sup rt to mult Trajectory Rolling Network Plan and Netwo rk CDM pla inges of ATC tactical u and Earl Cooperative EPP processing and trajectory upd: Traffic Network Flight brief ices for ARO and AU Management FF-ICE R1 service FF-ICE R2 services End-to-end 4D Business/Mission Trajectories at Netwo Network VFR Flight Planning Integrated OAT Flight Pla A-SMGCS and Airport Safety Nets Airport and TMA-A-CDM Extended AOP-NOP integrati ous real-time data exchange and CDM, throu gh local APO on, co ded On-Time Perfo Exte mance (OTP) through increased application of Target Times Network Integration Local DCB function at Airports, balancing arrival, turn-around and de ocess and Total Airport man Enhanc ent of APOC pr Integratio n of small/regional airports into the Ne 1.31 - INM NM crisis Mana n of i EPP gr CNS evo Network CNS ratio Components, Enhan ents of CNS Infrastru system and SWIM YP exchanges of flight, netw logical data autical and m CNS SWIM A-G, G-G and CIV-MIL ba and exchanges infrastructure OLDI via SWIM YP ATC automation (adap ed co istency (EAD/CACD integration) as part of initial iNM deliv ved aer utical data co en ATC D-NOTAM

Network Evolutions Roadmap

Network Operational Roadmap

This section presents the main operational requirements arising from the implementation of the Network Strategic Projects.

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Optimised Network Des	sign											
FRA extended beyond	I national boundaries, towards full European Airspace												
Enhanced FRA Implementation for the whole ECAC Area	Cross-border implementation offering wider and more efficient operational options Need for continued fine-tunings (data models, systems and operational processes, connectivity with TMA's, Fight Level Orientation Scheme J to support further expansion of cross-border FRA implementation in an harmonised manner. Some ANSPs, AUS and NM system modifications are required to support cross-border FRA and FRA connectivity with TMA.	NSP 2020+ CP1/DP (AF 3.2.2)	SO03-3	NM, ANSP, AU									
System Evolution and	tools to support cross border FRA												
Enhanced FRA Implementation for the whole ECAC Area	Some ANSPs, AUS and NM system modifications are required to support cross -border FRA and FRA connectivity with TMA as: -NM systems (Environmental database adaptations for cross-border FRA operations and FRA connectivity with TMAs; Data exchange for cross border FRA and FRA connectivity with TMAs]. -AU systems (Optimisation of free routing trajectories taking into account the ATM constraints). -ATC systems (OP management for FRA supporting Cross Border COP handling; Tatical Controller Tool (TCT), managing the Cross-Border clearances, Multi-Sector Planner/Extended ATC Planner, MTCD probing)	NSP 2020+ CP1/DP (AF 3.2.2)	SO03-3	NM, ANSP									
OLDI exchanges with trajectory data	Adaptation and tuning of OLDI data messages exchanges by inclusion of route/trajectory data. Adaptation of bilateral agreement of OLDI exchanges to cover the exchange of route/trajectory data.	OEP	SO04-1	ANSP									
FRA connectivity with	ТМА												
Enhanced FRA Implementation with connectivity to TMA	On-going implementation of FRA projects, gradually expanding to cover the whole pan-European airspace and ensure connectivity with TMA, in many cases by lowering vertical limits till TMA upper boundaries. (upper airspace with some projects gradually expanding to lower airspaces, down to TMA's).	NSP 2020+ CP1/DP (AF 3.2.2)	SO03-3	NM, ANSP, AU									
Enhanced ASM/ATFC	M integration and ASM scenarios												
Improved ASM process Rolling AUP/UPP	Support to further flexibility, dynamicity and efficiency required in the ASM process to meet the AFUA concepts Support to full rolling dynamic ASM process from D-6 to D, with the process of changes whenever required (no more snapshots, simultaneous preparation by AMCs of several UUPs,)	CP1/DP (AF3.1.1)	SO03-4	NM, ANSP, AU, CFSP									
Local coordination and support to cross-border	Support the management of ARES information, cross-border activities and interoperability (exchange of ARES) with neighbouring ASM systems, whenever required The ASM support systems exchange airspace status data with ATC system.	CP1/DP (AF3.1.1) (AF5.3.1)	SO03-4	ANSP									
Harmonised exchange and processing of real time airspace data	Real-time airspace status updates allowing ATC, AUs, and NMOC to take early advantage of possible opportunities and/or to increase awareness of real-time airspace situation: exchange of ASM level 3 data not processed for the generation of EAUP/EUUP. Integration of real-time ASM with ATC system and processes; depiction of the activation and de- activation of configurable airspace reservations in ATC systems	CP1/DP (AF3.1.1)	SO03-4	NM, ANSP, AU, CFSP									
Enhanced notification to AU's	Support a more effective communication of the outcome of the ASM process to AU's, via HMI and NM B2B interfaces : publish & visualize on maps the draft/consolidated EAUP/EUUP	CP1/DP (AF3.1.1)	SO03-4	NM, AU, CFSP									
Enhanced support to ASWATFCM coordination	System supported ASM/ATFCM integrated processes to achieve an optimised airspace availability & utilisation through a continuous CDM process with as input rolling updates about MIL and civil demand needs, potential hotspots and network performance needs	CP1/DP (AF3.1.1)	SO03-4	NM, ANSP									
Network impact assessment & What-if for ASM	. Automated support to assess the impact of AUP/UUP: impacted traffic flows, anticipated changes on sector load (counts). . Impact assessment - enhanced exchange with stakeholders, negotiation between MILO/ AMC's . Ability to quickly identify alternative solutions in the ASM process: FL, Time sector configuration to reduce impact of AUP UUP	iNM requirement s	SO03-4	NM, ANSP									
Extended ASM features	. Creation / validation / publication of ad-hoc RSA's, . Improve the AMA (AMC Manageable area)/NAM (Non AMC Manageable area) with definition of AMC RSA and flexible parameters . Support dynamic management of NP2 to optimize Airspace capacity, via AUP/UUP . Manage group restrictions from all types, dependent from a specific RSA activation/de-activation . Flexibility to accommodate airspace reservation outside the AIP published times/vertical limits . SID / STAR closure due to RSA activation, through AUP/UUP	iNM requirement s	SO03-4	NM, ANSP, AU, CFSP									
Automated support for rerouting opportunities	. Rerouting opportunities to be automatically exchanged with AUs' systems . Evolution of RRP concept towards Volumes Opportunity Proposals (VOPs), in the context of FRA operations	iNM requirement s	SO03-4	NM, ANSP, AU, CFSP									
ASMFUA KPIs	Post-ops assessment of FUA process outcome	iNM requirement s	SO03-4	NM									

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
Dynamic Airspace Ma (DMA)	nagement, Dynamic Airspace Configuration (DAC) and Dynamic Mobile Areas												
Pre-defined airspace configurations	System evolutions and procedures in support to the management ASM scenarios (pre-defined airspace configurations), with system detection & notification support of specific combinations of active areas that might trigger capacity issues considered as critical for the network.	AAS Transition Plan CP1/DP (AE3.1.2)	SO03-4	NM, ANSP									
Dynamic airspace configurations (DAC)	Support dynamic Airspace Configurations include all manageable airspace elements, e.g. ATC sectors, airspace reservations (ARES), associated restrictions into Airspace Configurations which are designed and dynamically managed to respond flexibly to different performance objectives which vary in time and place, including the support to capacity-on-demand concept and the optimisation of the military airspace utilisation. Gradual levels of dynamicity have been identified in the DAC concept as different options representing different performs dynamically to create/ update/ delete dynamicily new sector configurations DAC 1 - Ability to manage Elementary ATC sectors (renamed Sector Building Blocks - SBB) as available today, to create/ update/ delete dynamicily new sector configurations DAC 2 - Sharable Airspace Module (SAM) that can be allocated dynamically to neighbouring sectors/centres to balance workload - DAC 3 - new Elementary sectors (SBBs) and SAMs defined at strategic phase and tactically dynamically allocated , including across ACCs - DAC 4 - all areas are composed of sharable airspace modules (SAM) that can be associated dynamically to become a control sector, including across ACCs.	NSP 2020+, AAS	SO03-4	NM, ANSP									
Dynamic mobile areas (DMA)	. Dynamic Mobile Areas are an enhanced segregation feature, supporting the dynamic configuration of the airspace and mission trajectory management. Several dynamicity options are part of the DMA concept (corresponding of different levels of maturity): - DMA Type 1: areas defined with lateral/vertical dimensions + timeframe allocation needs at variable geographical locations; the final location decided through CDM to ensure the best possible Network scenario - DMA Type 2: areas defined with lateral/vertical dimensions along the mission trajectory, each with its timeframe allocation. - DMA Type 3: integral part of a mission trajectory , this volume of airspace is designed to move as the flight and the formation of flights are progressing.	SESAR Wave 2	5003-4	NM, ANSP, AU									
NIA in support to DAC/DMA	Support for network impact assessment of dynamic airspace configurations before application. Similar request to support CDM required for DMA.	SESAR Wave 2	SO03-4	NM, ANSP									
Dynamic RAD restrictions	Enhanced collaborative management and notification process allowing activation / de-activation of restrictions	iNM requirement	SO03-4	NM, ANSP, AU, CFSP									
Network Integration of	higher level operation and drones/UAV												
New Airspace users and operational concepts	Accommodate specific requirements to support the network integration of new entrants operating in the higher layers of airspace, from FLSOD and above: specific requirements in flight planning, trajectory computation and progress monitoring. Targeted new entrants are: - High Speed (Supersonic, Hypersonic) - Sub-orbit A to A and A to B, Commercial space ops Sub-Orbit - air launch, - Orbital ops launch and recovery - Low Speed - High Altitude Long Endurance platforms (balloons, Stratobus,)	ATM Master Plan, NSP	SO03-7 SO09-3	NM, ANSP, AU, CFSP, AMC									
ASM procedures for new entrants	Adaptation of ASM/FUA procedures might be required to support the use of segregated airspace for specific commercial operations (orbital and sub-orbital launches) : NOTAMs + AUF/UUP, DMA 1, 2, 3 civil to civil coordination civil to military (via AMC) TSA or D, dynamic creation of segregated airspace, transit GAT FPL to/from segregated airspace.	ATM Master Plan, NSP	SO03-7	NM, ANSP, AU, CFSP, AMC									
Support to crisis management of new entrants	Provide appropriate contingency/crisis support associated to new entrants: - Dynamic airspace management (e.g. airspace opening / dosure) in event of non nominal situation. - Ensure situational awareness of ops in event of accident or emergency. - Risk based decision support to assist ANSPs with mitigating actions. - Aircraft hazard area generation to identify affected airspace. - Means of response to expedite mitigation actions.	ATM Master Plan, NSP	SO03-7	NM, ANSP, AU, CFSP, AMC									
Cross-border delegat	on of ATS provision												
Support to the Cross- border ATS Service	. Ability to move sectors from one AUA to another one . Evolutions to support cross border dynamic sectorisation . Dependent applicability in a cross border environment	NSP 2020+, SO03	SO03-1	NM, ANSP									
TMA optimisation, PB	I procedures and CCO/CDO												
optimisation	To be further developed	NSP2020+	SO03-3 SO09-1	NM,ANSP									
CCO/CDO procedures	Continuous Climb and Descent Operations (CCOs and CDOs) are aircraft operating techniques enabled by airspace design, instrument procedure design and facilitated by air traffic control (ATC). CCO and CDO allow aircraft to follow a flexible, optimum flight path that delivers major environmental and economic benefits - reduced fuel burn, gaseous emissions, noise and fuel costs - without any adverse effect on safety.	NSP2020+	SO09-1	NM, ANSP, Airport, AU									
PBN procedures	Implementation of RNP 1 departure and arrival routes (SIDs, STARs and transitions) including the use of the Radius to Fix (RF) path terminator where benefits are enabled for noise exposure, emissions and/or flight efficiency (reducing environmental impact). Required Navigation Performance (RNP) is a type of Performance Based Navigation (PBN) that allows an aircraft to fly a specific path between two defined points in space independently of terrestrial navaids placed along the route. RNP also requires monitoring and alerting capability on- board to safeguard the integrity of the position sensor.	PBN IR	5009-1	NM, ANSP, Airport, AU									
Dynamic Extended TM	A												
Dynamic TMA configuration	Support to dynamic TMA configuration and dynamic route structure in terminal areas and application of advanced continuous climb and descent operations. Dynamic route structure is to be understood as an intermediate step between fixed PBN routes, and future concepts doser to full Trajectory Based Operations where aircraft are assigned an individually optimised/tailored route	SESAR 3	SO09-1	NM, ANSP, Airport, AU									

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
Flexibility and dynami	city of airspace utilisation												
Dynamic sectorisation	. Dynamic sectorisation with the capability to adjust the sector boundaries depending on the traffic flows and exchange with NM via NM B2B; Dynamic airpace re-sectorisation based by traffic load and complexity, possibly resulting from machine learning algorithms; Dynamic cross border sectorisation: ability to move sectors between AoRs. ANSPs to provide the predefined sector plans to NM via NM B2B.(OEP WST07)	AAS, OEP	SO03-1	NM, ANSP									
Support to airspace re- configuration	Support to the analysis of areas of inefficiencies at network level, validation activities and delivery of an optimised airspace organisation in compliance with agreed airspace design principles, and based on ECAC wide free-route traffic flows	NSP 2020+ AAS	SO03-1	NM, ANSP									
Improve strategic simulations tools	Support for strategic planning and simulations of scenarios reflecting special events, military events, new restrictions, contingency, strikes, airspace closure, etc. Used for capacity planning, traffic growth and delay analysis, re-routings, re-sectorisation. Capability to generate routes best reflecting the future changes anticipated in the simulated scenarios. Streamlined and flexible simulations tools with the capability to reflect a full dynamic environment and to evaluate validate results over several day of operations. Accommodate different levels of accuracy and completeness in the data used in the simulation, in particular in the trajectory computation. Provide the ability to quickly editing any environment data and use it in simulation and trajectory computation.	iNM requirement S	SO03-2	NM, ANSP									
Support to pre-validation of airspace changes	Enhanced simulation capabilities to pre-validate large future airspace changes, which are cloned from the operational system and which have the capability to merge back to ops, once the validation is successful. Provide automated validation reports to the originators of the information.	iNM requirement s	SO03-5	NM, ANSP									
NIA & What-if of airspace live updates	Ability to easily and quickly evaluate the impact of dynamic airspace changes (live updates) before activation in operations.	iNM requirement s	SO03-5	NM, ANSP									
Evolutions in the flow constraints model	Evolution of the flow constraints model, accommodating new operating methods and offering an extended set of traffic selection capabilities to support more focused traffic filtering resulting in less impacting restrictions (e.g., specific ACFT types or equipment's, level bands, SID, list of ARCIDs,) . First steps towards the convergence of TV and RS capabilities Dynamic Flow Condition (s): granular, live updateable, monitorable, dependent applicability (configurations, linked to counts) . Use of entry/exit gates instead of points; gates to be used in traffic volumes in the FRA context . Harmonisation and dynamicity of Letters of Agreement (LoAs) (which will be collected in a central repository) . Increased consistency between RAD restrictions and ATFM measures, with more complex sequences of elements used in the traffic capture , including time conditions (time spent in a sector) . Support for more complex counts based on combined flows, restrictions and sector entries	iNM requirement s	SO02-5	NM, ANSP, AU									
Achievement of higher sector throughputs	To be further developed	OEP	SO03-6	ANSP									

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Optimum Capacity and Flight Effici	ency Pla	nning										
Full ops actors involve	ement in establishing ATFM measures												
To be developed	To be further developed												
Transfer and coordina	tion dialogue (SYSCO) ATC exchanges												
Wider utilization of OLDI transfer and dialogue messages	Wider deployment of OLDI transfer messages (COF, ROF, MAS, TIM, SDM and HOP) and the OLDI dialogue messages (RAP, RAV, CDN, TIP and RTI) and their operational responses (ACP, RIC and SBY). AMSPs that implemented these messages on a limited basis should extend with additional interfaces if beneficial and operationally justified.	OEP	SO04-1	ANSP									
	PP/ACC coordination exchanges												
data exchanges for notification and coordination purposes : OLDI or legacy ones	The integrate these structures in proton information, and single (ACS and respective APP) (WR). In read to exchange messages that support notification, coordination and planning process (AB). After the coss-border. Also PAC message for APP/TWR close to border to exchange the preliminary activation could be considered, only if it is needed and operationally justified.	OEP	SO04-1	ANSP									
Common Network situ	ation awareness and enhanced demand and capacity balancing tools												
Improved pre-tactical traffic demand forecast	. Probabilistic trajectory and traffic demand predictions with uncertainty indicators . Use of early FPL/FF-ICE preliminary flight plan information in the early traffic demand forecast . Complement traffic demand picture by the use of big data (historical trajectory data) and machine learning algorithms	NSP2020+	SO01-2	NM									
Reactionary delay anticipation	Process information about aircraft identification/registration and airport transit view (ATV) information, in order to link previous and next flight and anticipate / manage the potential reactionary delay affecting the traffic demand, possibly including the concept of airlines margins: airline margins augment the ATV of schedule times (e.g., earliest and latest In-Block-Times) to reflect the airline scheduling of passenger connection and flight crew hours. (industrialisation of MIRROR proof concept)	iNM requirement s	SO01-2	NM, AU									
Predictability Performance Indicators	Definition, computation and reporting of Predictability Key Performance Indicators and non adherence to filed route (time, vertical, horizontal): * Intruders counts & causes analysis * Detection and management of Yo-Yo flights * Deviation between filed and flown route	iNM requirement s	SO04-6	NM									
Improved predictability of flights in execution, with extended sources	Availability of DEP, AFP, APL, FSA, CPR, APR, FDI, MFS, MSS messages from NM area, as well as from neighbouring ANSP / States. Integration of ADS-B for areas from where we don't have CPR (outside NM area) and integration of EPP(comes with ADS-C), in support of: .global ATFM .global Network Wide Monitoring .contingency of loss of communication of CPR data from ACC's Use of ground surveillance data to detect certain events affecting the turnaround process of the aircraft and convert into events used in the update flight progress (e.g. off-block, in-block, take-off)	NSP2020+ CP1/DP (AF4.3.1)	SO01-2 SO04-5	NM, ANSP, AU									
Evolutions to NM HM/s and NM B2B services	. Consolidated access through HMI's, with customisation capabilities . Consistent data and services provided both by HMI's and B2B services . Delegated User access administration covering HMI's and NM B2B services . Dynamic access management to accommodate NMOC requirement for more dynamic staff assignment . Support the controlled / limited access to specific confidential/security data from Military origin . Performant exchange platform required to face an increasing volumes of B2B requests.	iNM requirement s	5004-1	NM, AU, CFSP, ANSP, AMC, AIRPORT									
Improved CCAMS and CAL	Improvements of CAL tables. More flexible and automated management of SSR code allocations and assignments by CCAMS, supported the computer-aided analysis of general SSR code usage and generation of CCAMS assignment/retention rules enabled by the aggregation of information based on AI techniques	NSP2020+	SO04-7 SO07-2	NM, ANSP									
Enhanced CSST	Enhanced user interface (including NM B2B), reporting on CSST service usage (HMI and NM B2B), integration of CSST services with flight, flow and airspace data services, enhanced similarity detection, including between AO's, optimal Alerting capabilities.	iNM requirement s	SO04-1	NM, AU									
Enhanced callsign similarity detection & resolution	Improve scalability to remove current constraints limiting the number of schedules included in the conflict resolution. Enhanced automated resolutions and user interface capabilities (also including NM B2B service access) Integration of CSST with airspace data and use of wider catalogues of routes better reflecting Airlines nominal routings. Support for multi-AU's de-confliction (strategic phase). Possible extension of de-confliction closer to operations and alerting mechanisms	NSP 2020+	SO04-1	NM									
Integration of ATFCM	and ATC planning (INAP)												
Address the planning gap between ATFCM and ATC processes and facilitate layered ATM planning in the execution phase.	Transparency and exchange of information between local ATFM and ATC in respect of necessary action the execution phase Relevant and shared information on the predicted complexity of the operation with workload impact in short and medium term up to 45 minutes. Informed decision making via integration with local resource management (scheduling tools) Use of the information in the local ATFM and ATC decision support tools in a harmonised and integrated manner.	SESAR wave 2	S004-1	ANSP									
Extended use for CDP	DLC exchanges (ATN B2 improved clearances and instructions)												
DLS harmonised technical and operational deployment	Based on the evaluation of the capacity benefits of datalink, coordinate DLS system improvements in critical areas such as: - harmonization of DLS operations - air/ground performance (reducing PA rate and message delays) - ground network architecture and interconnectivity - automated transfer procedures and tools - continuation of multifrequency deployment - interoperability testing - airborne, network and ground equipment deficiencies correction	NSP 2020+	SO07-4	NM, ANSP, AO's									
Automated multi slots	swapping												
Enhanced slot swapping	Enhanced slot swapping process more largely supported by automated machine to machine exchanges capabilities and digital helpdesk (iDAP) to: 1) exchange enhanced slot swap requests (including multi-swaps) 2) assess the impact of enhanced slot swapping requests based upon ATFM operations manual procedures. 3) accept, reject slot swapping requests or refer slot swapping requests to the NMOC user (digital helpdesk - iDAP).	iNM requirement s	SO04-3a SO04-5	NM, AU, ANSP									
Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
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Network UDPP													
Flight delay critical indicators (FDCI)	Provide the airlines with the possibility to express their flight priorities (business value) and/or the criticality for input into the flight, airport, ASM and ATFM measure planning processes. (FDCI: P/R - Flight Delay Critical Indicator: Pro-active / Reactive) Allow the airlines to indicate critical flights that should be protected from flow measures: e.g., request for flight exclusion from regulation or delay improvement; special attention in the implementation by FMP's of local target measures implemented to manage hotspots, etc	AOG SESAR IR	SO04-3a SO04-5	NM, AU, ANSP									
Fleet Delay Reordering	Attributing priority numbers per flight based on flight value in order to redistribute the fleet delay impacted by the capacity constraint.	SESAR ER	SO04-3a SO04-5	NM, AU									
Selective Flight Protection	Allows an airline to protect a constrained flight enabling its departure or arrival on time or near on time. Those other flights get suspended and pushed at the end of the constraint period Allows to identify flights that need to go through in case of crisis	SESAR ER	SO04-3a SO04-5	NM, AU, ANSP									
Airline margins	Airline margins are time windows expressed by AU's around their flights. It provides the AU's with the possibility to express time values on certain constrained flights: • "Time not After": not to be later than the value indicated. • "Time not Before": not to be earlier than the value indicated. These values are used as inputs to DCB imbalance solution optimisation to reduce the AU fleet impact, and airport impact, of ATFM constraints.	SESAR IR	SO04-3a SO04-5	NM, AU, ANSP									
DCB to support capa	ity on demand ATS services												
To be developed	To be further developed												
Airspace consolidatio	n / reconfiguration												
Airspace re-configuration programme	To be further developed												

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Trajectory and Cooperative Traffic	Manage	ment	•									
From Flow Manageme	nt to Flow Centric Operations, through CDM												
Support to flow centric operations	Support to service provision to flows instead of sectors where the flows can span across several areas of responsibility	ATM Master Plan, AAS Transition Plan	NSP2020 + Step 2: 2025- 2035/204 0 -	NM, ANSP, AU									
Flight centric in evolution	Assigning aircraft to ATCOs without references to geographical sectors, and the aircraft controlled by that same ATCO across two or more geographical sectors. It requires flight-centric specific allocation, visualisation (traffic filtering), coordination tools and advanced Conflict detection and resolution tools Specific flight-centric allocation, coordination and visualisation tools will support the first steps of flight centric ATC operations	HL Network Operational CONOPS AAS transition plan NSP2020+	NSP2020 + Step 2: 2025- 2035/204 0 -	NM, ANSP, AU									
STAM, Traffic complex	ity tools and Target Time (TT) Management												
Scenario Management in support to any DCB measures	Scenario management concept is expected to evolve and to encompass any DCB measure (ASM, RAD, Airspace/sector config, FL/RR/MCP/CP, regulation, pre-defined airspace configurations). A scenario can be implemented as an individual measure or a set of complementary measures (including targeted measures), with conditions of applicability and pre-defined or recurrent timing of applicability. It also covers the automated support, accessible via NM B2B or HMI, required to facilitate the coordination and the approval process of the requests / proposals for scenario's / measures implementation / update (e.g., restrictions, traffic volumes, regulations, local measures, scenarios, etc.), involving the relevant actors and offering reduced manual intervention and tracing capabilities.	NSP 2020+	SO04-3a SO04-5	NM, ANSP									
STAM - best practises	Support to an harmonised application of STAM measures, based on the identification and the promotion of best practises supported by guidance documentation, training packages and harmonized operational procedures. STAM are specific and targeted measures applied to a limited number of flights (pre-departure or airborne flights) or on specific flows, to reduce the complexity and/or manage traffic peaks (hotspots, cold spots,) with minimal impact on operations.	CP1/DP (AF 4.1.1)	SO04-3a SO04-5	NM, ANSP, AU									
Enhanced load monitoring and traffic complexity assessment	. Detection of overloads/hotspots through the use of enhanced monitoring techniques, such as occupancy counts and dynamic monitoring values, complexity indicators (complexity locally assessed and shared at network level). . Continuous monitoring and assessment of predicted traffic complexity (at local / network level) with predefined complexity metrics and qualitative scale. The predicted complexity metrics and qualitative scale. The predicted complexity enables ATFCM to take timely action to adjust capacity or request the traffic profile changes. Traffic complexity tool include what-if and probing capabilities . Common /standardized methods / computation of traffic counts / complexity indicators, widely accepted through the whole network, allowing for a consistent monitoring and efficient cooperation between network and the different local actors. . Watch lists allowing more systematic detection of specific local issues (e.g. holding building up at an airport) and subsequently early implementation of remedial actions to limit the impact on the network.	CP1/DP (AF 4.1.1) (AF 4.3.1)	SO01-2 SO04-3a SO04-5	NM, ANSP									^
Network system based coordination	Deployment of system based Network coordination processes, involving all actors (NM/FMP/ATC/AO). Automated platform supporting NMOC workflows in the processing, the assessment and the coordination of requests from all network actors - iDAP (integrated Digital ATFCM Platform) . Allow AU's and FMP to subscribe to specific information regarding flow and flight measures, in areas that may impact their own AOR: e.g. cross-border re-routings, delays, etc. . Support and integration of local tools (INAP tools), providing an automated interface between FMP, NMOC and ATC planning, to assist controllers to reduce anticipated traffic complexity, density and flow problems.	CP1/DP (AF4.1.1)	SO04-3a SO04-5	NM, ANSP, Airport, AU									
Use of Target Time to support ATFCM process	Improved (4D) traffic predictability by cooperation between AOC, ANSP, Flight Crew and ATCO to better manage delivery of traffic in regulated or hotspot sectors, using initial time based operations	iNM requirement s	SO04-3a	NM, ANSP, Airport, AU									
Target Times of Arrival (TTA)	Integration of airport (AOP) General Arrival Planning Information, including, but not limited to, estimated and actual arrival times, STAR, RWY, Terminal, Stand. The target time of arrival (API) issued by the constrained airports in pre-flight phase is taken as input to the constraints reconciliation done at network level with other measures impacting the flights.	iNM requirement s	SO04-3a SO04-4 SO04-5	NM, ANSP, Airport, AU									
Target Time Over(TTO)	TTO API service will be used to inform NM about Target Times of flights that have been agreed between ATCs/AUs. It applies only to airborne flights.	iNM requirement s	SO04-3a	NM, ANSP, Airport, AU									
Notification of TT to OCC /flight crews	TT affecting airborne flights will be notified to flight crews from their OCC and to ATC actors, in order to support its adherence during execution	iNM requirement s	SO04-3a SO04-5	NM, ANSP, Airport, AU									
Target Time in FF-ICE	Integration and coordination of target times in the context of FF-ICE (4DT Target Time application Service)	FPFDE implementat ion strategy	SO02-4 SO04-3a	NM, ANSP, Airport, AU									
Network Monitoring													
Network Performance Cockpit	Support performance analysis and improvements on all areas including connectivity (including European connectivity with other regions), inter-modality and access to airports, passenger information and satisfaction, vertical flight efficiency, safety risks, peruntan factors (e.g. change management, crises management, working conditions), environment sustainability (e.g. fuel consumption, biofuels, gas emissions, noise reduction) Support the monitoring of performance indicators as required by the EU performance regulation.	NSP 2020+	SO01-3 SO02-2 SO09-2 SO05-1 SO05-3 SO010-1	NM									
Network monitoring	Online network monitoring enhancements based on extended performance indicators (indicators best anticipating the notion of rolling network states)	SESAR Wave 2	SO01-3 SO02-2	NM									
Network state prediction	Network state modelling and prediction algorithms for state transitions based on the network performance indicators and allowing for early detection of critical states and triggering remedial actions	SESAR Wave 2	SO01-3 SO04-3a	NM, ANSP									

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
Multi constraints reso	lution , multi ATFCM time based measures												
Multi-constraints reconciliation	. Integration and coordination of 4D constraints from the various stakeholders (airports, ANSPs, AUs and NM) to ensure network stability and performance . Reconciliation of multiple (possibly conflicting) constraints - ATFCM, airport CDM measures (TTA), AU's preferences, integrating local & network planning processes to ensure overall Network Performance	NSP 2020+	SO04-3a SO04-4 SO04-5 SO02-4	NM, ANSP, Airport									
Evolution of slot allocation algorithms (CASA)	Improve the current slot allocation algorithms to include both entry and occupancy counts and possibly based on traffic complexity. Optimise the impact of interacting regulations Optimise the effect of regulations, namely by allowing different rates on a subset of flows of a traffic volume (targeted casa)	NSP 2020+	SO04-3a SO04-5	NM, ANSP									
Extended AMAN													
eAMAN	. Deployment of extended AMAN by ATC, with the corresponding ATC systems upgrades and procedures . ATC exchanges of extended AMAN info (OLDI AMA or SWIM base exchanges), also covering the apportionment of extended AMAN delay between different ATS unit within the extended AMAN horizon. . Application of queue management techniques for multiple airports, extended Arrival Manager with overlapping horizon (OEP WST07)	CP1/DP AF1.1.1 OEP	SO04-6	ANSP, Airport, AU									
NM Management of extended AMAN information	Exchanges with NM for constrained arrival planning of pre-departure flight. eAMAN determines the proposed solution and notify this pre-departure requests to NM. Mwill process information from extended AMAN (as API or FSA), to update NM trajectory prediction / flight profile calculation and for the display of extended AMAN info.	CP1/DP AF 1.1.1	SO04-5	NM, ANSP, Airport, AU									
ATC support multiple	extended AMAN												
To be developed	To be further developed												
Rolling Network Plan	and Network CDM platform												
Network Impact assessment (NIA)	 Network impact assessment will be extended to support the assessment of individual and combined measures, for a wider set of measures: restrictions, regulations, target measures (MCP/CP), re-routings, capacity measures (sector configs), ASM scenario's and associated restrictions (AUP/UUP). Network Impact assessment will be complemented with optimisation capabilities and extended comparison facilities and user-friendly graphical display, allowing to compare different solutions among Shared / remote access to NIA via NM B2B and HMI, in support to CDM 	iNM requirement s CP1/DP (AF4.1.1) (AF4.2.1) (AF3.1.2)	SO04-5 SO04-7 SO09-1	NM, ANSP									
What-if functionality for local (draft) measure	Support ATM network actors [FMPs, Airspace Users, NMOC, Airports etc.] with customisable fast what-if capabilities, remotely accessible (NM B2B / HMI). Allow local actors to quickly assess draft measures, before submitting the proposed measure for coordination, a wider network impact assessment and final approval. What-if capabilities will be available to support the assessment of measures implemented during the pre-tactical and the tactical planning phases.	iNM requirement s CP1/DP (AF4.1.1)	SO04-3a SO04-5	NM, ANSP									
Identification of best measures	Automated support to identify best measures, through the use of techniques based on big data and machine learning or other types of algorithms, deemed relevant to identify interactions between measures, taking into account specific conditions / event affecting the network (weather / natural hazards, critical events, etc.).	iNM requirement s	SO04-3a SO05-5 SO06-5	NM, ANSP									
What-if & NIA of airborne rerouting	Support the network impact assessment of airborne measures (re-routings, Target time) when required, to assess, share and coordinate with the impacted stakeholders the cross-border impact of the changes on the downstream part of the trajectory and the penetrated sectors.	iNM requirement s	SO04-3a SO04-5 SO04-7	NM, ANSP									
Dynamic Network Plan, based on optimised workflow and publication support	Support the management of the DNP, from early planning phase and progressively refined as time getting closer, through efficient exchange & validation mechanisms involving the relevant stakeholders: system-to-system and HMI interfaces to collect event data; system-based workflows to process and validate the data involving NMOC; publication of processed event data via HMI and system-to-system interfaces (supported by publich-subscribe mechanisms) Semantic links able to guide & support any user during strategic. Pre-tactical and/or tactical operations; Includes the concept of "Interactive Rolling NOP" of CP1	NSP 2020+ CP1/DP (AF 4.2.1)	SO04-2	NM, AU, CFSP, ANSP, AMC, AIRPORT									
Rolling Network Plan	Evolution of the existing ATFCM daily plan, with dynamic interactions allowing to build collaboratively and share efficiently the rolling network plan through a common platform from strategic phase till tactical phase and the post operational feed-back: Streamline the pre-tactical & tactical rolling / iterative development / workflow of the Network Plan, supporting the dynamic Network situation, while tracing applied changes and keeping baselines at significant times and the monitoring of its execution. Layered collaborative planning, integrating local DCB, covering airspace management and ATC planning, Airport planning and airspace users' requests - Provision by ANSPs of sector capacities, sector configuration activation, monitoring values, traffic volume activation and runway in use Baselining the plan (demand and capacity) at different time horizons (snapshots) will allow to monitor the variability at different planning iterations and its impact on the network stability	NSP 2020+ CP1/DP (AF5.5.1)	SO04-5	NM, AU, CFSP, ANSP, AMC, AIRPORT									
IDAP (integrated Digital ATFM platform) Responsive simulation	Extended NM helpdesk service supporting NMOC to efficiently manage and coordinate the increasing number of requests from its stakeholders communicating via multiple channels (NM B28, HMI, VCS, mails). IDAP shall integrate the requests related to Flow, Flight and ENV. The required evolutions will cover the following capabilities: Coordination of requests, with queue management supported by automated filtering & request pre-processing, using static rules and more dynamic rules configurable by NMOC. - Facilitated access to relevant documentation & assessment tools automatically pre-filled with the information collected with the request - Integrated exchange capabilities in support to facilitated coordination (e.g. chat box, screen sharing) - Customisable views to cope with individual needs and with dynamic users profiles. - Operational dashboard supporting dynamic allocation of requests affecting the same entity (e.g. same flights or the same area / airspaces, to facilitate consistent replies). Ability to automatically simulate alternative measures/scenarios, analyse and compare the exclution advancement of support to identified the two endows and year of constructions of exclution advancement of a support to facilitate consistent replies).	iNM requirement s	SO04-3a	NM, AU, CFSP, ANSP, AIRPORT									
	different options Ability to export selected measures from the simulations for implementation Ability to export selected measures from the simulations for implementation Support the external access to simulation capabilities and the sharing of results between different actors	iNM requirement s	SO02-3 SO04-1	NM									

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
Integration of simulation tools	Consistent tools used at different planning phases: sharing algorithms and possibly libraries, to have a more accurate assessment and avoid redundancies (cost efficiency). The exchange of data between simulation tools used at different phases needs to be significantly improved to smoothen the overall planning process. Use of a consistent data model shared by all systems and services (from strategic planning till tactical planning & execution).	iNM requirement s	SO02-3 SO04-1	NM									
Support to data branch & merge	Capability to (re)synchronize simulation data with live data on request: simulations supporting tactical operations requires quick synchronization of the simulation environment with the possibility the refresh of all data (demand / flight / trajectory, DCB measures, Environment) from the live environment, on a user controlled manner. Creation of a simulation data branch from the ops data and ability to merge back the data to ops once validated by the simulation	iNM requirement s	SO02-3	NM									
Replay tool and time control	Replay tools with high flexibility supporting time control and users preferences manageable through a dedicated HMI, in order to reduce the heavy preparatory work required with current replays capabilities.	iNM requirement s	SO02-3 SO04-1	NM									
Improved rerouting in simulations	In support to assessing major disruptions in the Network (heavy weather impact, closure or highly reduced airspace capacity), provide simulation options to reroute and spread a significant amount of traffic according to different criteria, in order to limit undesirable bottlenecks	iNM requirement s	SO02-3	NM									
Exchanges of ATC tac	tical updates with network												_
Use of ATC tactical updates by NM systems	Processing of the tactical updates (as results and coordination/transfer ATC exchanges), including trajectory and/or constraints modification applied during the flight execution (AFP, FNM,MFS). These tactical updates as result of OLDI coordination .	NSP2020+ iNM requirement s	SO04-1 SO04-5 SO04-7	NM, ANSP									
EPP processing and t	rajectory updates												
NM processing of EPP information	Integration of relevant portions of Extended Projected Profile from the aircraft in airborne phase to improve NM trajectory prediction during the flight execution	CP1/DP (AF6.2.1).	SO01-2 SO04-5	NM									
ANSP processing and presentation of EPP data	ANSP Systems are capable of receiving, processing and displaying ADS-C/EPP data to provide warnings to the ATCO in case of discrepancies between the downlinked trajectory and the ground system trajectory	CP1/DP (AF6.1.2).	SO01-2 SO04-5	ANSP									
Network Flight Briefing	g for ARO and AU												
Flight Briefing	Briefing Service for ARO and ALIs, integrating aeronautical data, weather, flight and flow management information, as part of INM Support to pre-flight briefing and its updates during the execution phase	NSP 2020+	SO04-7	NM, AU, ANSP									
FF-ICE R1 services													
FT_NER RTPhase T- Filing Service	. Filing Service: AU/MM systems sharing P+-LCJ Tilgting pain data based on FiKM4 (ePFL) MM to support Filing Service (minimum service that a transitioning ASP must provide) – the ability to accept a filed flight plan and associated messages (Judpate, Departure, Arrival, Cancel) and to provide the appropriate response messages (Submission Response, Filing Status) in accordance with FF-LCE procedures; Implies: Reception & processing of AD trajectory, flight specific performance data, for more accurate climb and descent profile, GUF implementation (unique identifier to be provided by the AUS), consistent constraints, flight status, ATM environment data (runway, SID, STAR, MET, restrictions), between NM and AUs,	NSP 2020+ ICAO FF-ICE CP1/DP (AF 4.3.1) (AF5.6.1)	SO02-4 SO04-3b	NM, CFSP, AU									
FF_ICE/ R1 Phase 1 - Data Request service	Allows relevant actors to request filing status, flight data (including supplementary data) and associated trajectory as available in the last received eFPL.	NSP 2020+ ICAO FF-ICE CP1/DP (AF5.6.1)	SO02-4 SO04-3b	NM, ANSP, CFSP, AU									
FF_ICE/R1 Phase 1 - Trial Service	Trial Service: allows AUX to test ePE prior to its submission / update to the Filing Service. The test covers the operational evaluation of potential flight plan data, on a what if basis, against constraints and conditions anticipated for applicability at the time of the flight. Trial Service is composed of Trial Request and Trial Reply with the checking results and the Planning Status provided in one reply: Status - concur: Filed Route/ADT is acceptable without any change (optimum case) Status - Negotiate: Filed Route/ADT is different to NM Route/ADT but w/o impact upon acceptability (Route description changed e.g. DT replacement, NM use of additional environment factor (PTRs) Status - Non concur: Filed Route/ADT unacceptable	NSP 2020+ ICAO FF-ICE CP1/DP (AF 4.3.1) (AF5.6.1)	SO02-4 SO04-3b SO04-7	NM, CFSP, AU									
FF_ICE/R1 Phase 2 - Planning Service	Allows an enabled AU to submit Preliminary Flight Plans (PFPs), for operational evaluation and coordination against network constraints as anticipated at the time of the flight: . Warnings on violations of flight and flow constraints, provisional information about delay and target times . Trajectory changes proposal (e.g. RR/FL proposals to avoid hotspots , route opportunities), allowing for trajectory negation processes . Standardised DCB/ATM trajectory changes proposal to airspace users: (e.g. RR/FL proposals to avoid hotspots, route opportunities), part of the planning service negotiating trajectories . Enriched DCB information to ALS on the planned trajectory (hotspots, congestion indicators) . Advanced what-if for Preliminary flight intentions	NSP 2020+ ICAO FF-ICE	SO02-4 SO04-3b SO04-7	NM, CFSP, AU									
FF_ICE/ R1 Phase 2 - Notification Service	Transmission and reception of notifications for significant events related to the flight, such as Flight Departure and Flight Arrival, the transition between FF-ICE R1 and R2 procedures.	NSP 2020+ ICAO FF-ICE CP1/DP (AF5.6.1)	SO02-4 SO04-3b SO04-7	NM, AU, CFSP, ANSP, Airport									
FF_ICE/ R1 Phase 2 - Data Publication Service	Provide information to registered and authorised subscribers about flights that are relevant to their operations. Subscribers might include AU's, ATC's, and Airports, other relevant flight stakeholder groups and relevant authorities.	NSP 2020+ ICAO FF-ICE CP1/DP (AF5.6.1)	SO02-4 SO04-3b SO04-7	NM, AU, CFSP, ANSP, Airport									
FPL / eFPL mixed mode environment	Transition in a mixed mode environment: a) Support AU's to file FPL's either under ICAO2012 format or eFPL format b) NM to provide the translation service (eFPL and associated trajectory into ICAO 2012 FPL) and the ability to distribute the FPL/eFPL to ANSPs in the appropriate format and via the appropriate interface.	NSP 2020+ ICAO FF-ICE	SO02-4 SO04-3b	NM, AU, CFSP, ANSP, Airport									
FF_ICE/ R1 Phase 3 - Consolidated feedback	Extended negotiation capabilities, including ATC reply to NM	NSP 2020+ ICAO FF-ICE	SO02-4 SO04-3b SO04-7	NM, AU, CFSP, ANSP, Airport									

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
FF-ICE R2 services									1				
FF_ICE/ R2 - eFPL revision during execution (post- departure)	Ability for the AUs to submit modifications, during the flight execution, to the downstream part of the trajectory still in planning for downstream ATC centres. Support to coordinate and negotiate the required changes between relevant stakeholders, primarily ATC impacted by the changes to the planned trajectory (post-departure trajectory negotiation)	NSP 2020+ ICAO FF-ICE	SO02-4 SO04-3b SO04-7	NM, ANSP, AU, Airport									
Network VFR Flight P	anning												
VFR flight planning	- Implementation of reception, processing and distribution, by NM systems, of flight plans for flights that operate as VFR - Harmonisation of VFR FPL content (Field 15) and addressing	NSP 2020+	SO04-2 SO04-7	NM, AU, ANSP									
End-to-en 4D Busines	s/Mission Trajectories at Network level												
NM as a 4D trajectory coordinator	 Build, negotiate and distribute a consolidated reference 4D trajectory reflecting the different constraints/preferences from AUs and ANSPs and airports. Keep track of the initial AU intentions and flight-specific performance, together with the history of changes for a given flight Capability of NM to serve as 4D trajectory coordinator, responsible for the validation, negotiation and the timely sharing of consolidated flight data across the entire flight life cycle Support to the stakeholders in progressively and smoothly migrating to new technologies and processes (mandated by PCP or ICAO), by supporting mixed mode operations and the associated technologies and formats Chanace docoperation & support between NM, CFSP's and AU's 	NSP 2020+	SO04-3b SO04-7	NM, CFSP, AU									
Single 4D TRJ and flight status	. Consistent flight profiles for flight planning and flow management activities - Maintain different representations of the trajectory to reflect different prediction models and/or sources of information . Single flight status management for the whole flight life cycle in support of business and mission trajectory management	iNM requirement s	SO04-3b SO04-7	NM									
Customisable 4D trajectory engine to support all flight phases	The 4D trajectory calculation shall be able to accommodate different requirements in the level of accuracy, depending on the context where it is used (strategic, pre-tactical, tactical planning and execution), as well as the availability, completeness and accuracy of the context data	iNM requirement s	SO04-3b SO04-7	NM									
Integrated OAT Flight	Planning												
OAT flight plan integration	Initial MT in the form of IOAT FPL disseminated to the concerned ATM and non-ATM (e.g. AD units) actors Reception, validation and distribution of OAT FPLs by NM systems . Use by OAT flights of reserved airspaces . Associate and validate OAT flights against airspace activations . Use OAT flight data in support to the ATFCM planning processes	NSP 2020+	SO02-3 SO04-5 SO04-3b	NM, AU, Military (/Civil) ANSPs									
4D mission trajectory	Support the NM role as coordinator of the 4D Mission Trajectory, in compliance with security and interoperability requirements defined for civil-military interactions.	NSP 2020+	SO04-3b SO04-7	NM, AU, Military (/Civil) ANSPs									
Improvements to I efficiency	Flight Plan Processing & Route Assistance Services & Flight												
Improvement to Automatic pass rate	Enhancement of the flight plan automated validation & notification process, in order to reduce the % of manual corrections, possibly through the use of big data and machine learning algorithms	iNM requirement s	SO04-3b	NM, CFSP, AU									
Improved flight planning to minimise tactical deviations	Improve aspects of flight planning that reduce the need for tactical deviations from flight plan, including better access to ATC constraints and late FPL updates: * Common /shared view on RAD / PTR's / LoX's, * Remove effect of count restrictions on trajectory predictions * More efficient and cleaned RAD (remove unnecessary RAD restrictions with duplicated effect on the same flow) * Facilitate common awareness of SIDs and STARs between Airports, ATC, Airlines and NM * Consistency checking between the declared CNS information in flight plans and CNS information collected by the monitoring systems (measured aircraft capability, RVSM approval,) * Identification / rejections of Yoyo flights and sharp turn angles	iNM requirement s	SO01-2 SO04-3b	NM, CFSP, AU									
Support to Routing / rerouting	(Re) Routing services that provide more route alternatives and more cost effective routes, using different algorithms including with the support of machine learning techniques Rerouting opportunities that are triggered on changes of constraints, with customisation by AUs of their expected conditions to receive relevant notification, e.g., specific city pairs, specific RSAs, minimum improvements (distance, time flight, fuel, delay, etc.)> Flight efficiency GRRT templates - Expanded, enhanced and harmonised utilisation of existing NM tools including GRRT and Rerouting tools (OEP WST04)	iNM requirement s	SO04-3b	NM, CFSP, AU									
Network RAD impact assessment	 Re-categorisation and simplification of RAD measures Dynamic allocation / de-activation of RAD restrictions 	NSP 2020+	SO01-2 SO01-4	NM, ANSP									

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Airport and TMA - Network In	tegration	-										
A-SMGCS and Airport	Safety Nets												
Airport safety nets	Deployment of airport safety services including Runway Monitoring and Conflict Alerting (RMCA), Conflicting ATC Clearances (CATC) and Conformance Monitoring Alerts for Controllers (CMAC) and corresponding procedures	CP1/DP (AF2.3.1)	SO04-1 SO06-2	ANSP, Airport									
A-CDM													
Airport departure information (A_CDM)	. Further deployment of A-CDM (full A-CDM / Regional Network Integrated (RNI) / Advanced Tower) with harmonised procedures for airports with similar operational environment	CP1/DP (AF2.2.1)	SO04-4 SO04-5	NM, ANSP, Airport									
Extended AOP-NOP in	tegration, continuous real-time data exchange and CDM, through local APOC's												
Initial AOP	Deployment of an initial Airport Operations Plan (iAOP) including flight trajectory data, airport resources data and Meteo data, with corresponding system upgrades and procedures	CP1/DP (AF2.2.1)	SO04-4	ANSP, Airport									
initial AOP / NOP integration	. Deployment of Initial AOP (iAOP) through extension of the time horizon of the departure information in support to early predictability (P-DPI) . Integration in the network of airport arrival constraints through the Arrival Planning Information (API) / Target Time of Arrival (TTA) (optional for iAOP) . Dashboard for monitoring the tactical exchange of DPI and API messages	NSP 2020+ CP1/DP (AF 4.2.2)	SO04-4	NM, Airport									
Extended AOP	Deployment of the extended Airport Operations Plan including in addition to the iAOP data and extended set of data including landside data that have a performance impact on flight predictability and efficiency, with corresponding system upgrades and procedures; include services for airport performance monitoring	CP1/DP (AF2.2.2)	SO04-4 SO04-5	ANSP, Airport									
Full/extended AOP / NOP integration	Integration of Airport Operation Plans (AOP) and constraints into Network Operations Plan (NOP), through improved data/information exchange, possibly with Airport Operations Centres (APOC), where available Extend the coordination and the anticipation of the impact of significant events affecting airport operations (e.g. weather events). Exchange of airport curfew information in support to validation in flight plan processing and the implementation of ATFCM measures - Monitor consistency between airport slots and flight plans - Full integration of Iocal DCB (AOP) into network DCB using TTAs feeding into Extended AMAN	NSP 2020+ CP1/DP (AF 4.4.1)	SO04-4 SO04-5	NM, ANSP, Airport, AU									
Extended On-Time Pe	rformance (OTP) through increased application of Target Times												
To be developed	To be further developed												
Local DCB function at	Airports, balancing arrival, turn-around and departures												
AMAN/DMAN integration	Integration of Arrival and Departure management with improved co-ordination between En- Route/Approach, local ATC and airports, with corresponding system upgrades and procedures	CP1/DP (AF1.2.1)	SO04-5	ANSP, Airport									
Departure management synchronised with pre- departure sequencing	Optimise departure flows by deploying departure management synchronised with pre-departure sequencing, with corresponding system upgrades and procedures; includes integration of an electronic clearance system and an A-SMGCS system; additionally, integration with A-CDM system is required	CP1/DP (AF2.1.2)	SO04-5	ANSP, Airport									
Enhancement of APO	C process and Total Airport Management												
coordination processes	, Provice airports with simulation capabilities to assess the network impact of locally pre-defined sequences. Support the diversion process with a more dynamic exchange of diversion capabilities from connected airports through NM 828 connection with stand and gate allocation systems . Early adoption of coordinating measures to ensure stand capacity at diversion airports . Develop the airport transit views allowing to detect and mitigate the impact of significant delay affecting the operation of the next flight legs. Provide virtual APOC solutions (used as local DCB) for small airports. Development and implementation of predicted capacity at diversional ports and implementation of predicated capacity and diversion spectra based on machine-learning techniques . Ingrove the Airport Network Digital Data Centre (Airport Corner) with comprehensive data analytics & machine-learning to support pre-tactical planning & tactical decision making . Develop an harmonised procedure & tool set (SMART) for better D-1 assessment of weather impact	NSP 2020+	SO04-2 SO04-4	NM, ANSP, Airport									
Integration of small / re	egional airports in the Network												
Network integration of departure estimates from medium and small sized airports	The Network integration of departure estimates from medium and small sized airports via the exchange of Departure Planning Information (DPI), specifically ATC-DPI and CNL-DPI messages is needed to enhance the network benefit and improve the flow management process. The sub- functionality aims to improve integration of departure estimates from medium or small-size airports when serving a complex airspace with dense traffic through improved availability of aircraft pre-departure information to the ATM Network, through the provision of accurate pre-departure information to the NM.	NSP2020+ SESAR1	SO04-5	NM, ANSP, Airport									
Advanced Tower	To be further developed				1	1	1	1					l l

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Network Components / system and C	NS infras	tructu	re	1		1	1					
New Network Manage Digital Platforms	Fystem - INM Digital Platform is a technical layer that enables development, deployment, hosting, operations and governance of the iNM Digital Products. The design of the Digital Platform follows a technology agnostic approach, relying as much as possible on standard off-the-shelf solutions.		SO02-2 SO02-3	NM, AUs, ANSPS, Airports									
NM crisis Managemen	t enhancements and inclusion of new entrants												
Crisis management	Network crisis management Collaborative management of disruptive adverse events (recovery procedures and predictive tools) Support to global crisis management Provide appropriate contingency/crisis support associated to new entrants Extend the scope between different modes of transport and a multitude of actors representing the different modes of transport	NSP 2020+	SO03-7 SO06-5	NM									
Security & Cyber security	Implement security standards to support Network operations Continuous improvement of the cyber-security measures and tools (Security Operations Centre, Integrated Security Management System) Integration with the European Common Aviation PKI	NSP 2020+ CP1/DP (AF5.2.1)	SO06-3 SO06-4	NM									
Business continuity	Improve NM Systems resilience, within the iNM context: reduce the impact of switching over to back-up systems and switching back (e.g. continuous backup of active measures to use in contingency) Mitigation measures at network level to ensure operations continuity Support operation under contingency mode. Quick access to ATFCM Procedural Contingency Plan	NSP 2020+	SO06-1	NM									
EPP ground distribution	on												
Ground distribution of ADS-C/EPP data	Common ADS-C server for reception and distribution of EPP data.	CP1/DP (AF6.3.1).	SO01-2 SO04-5	NM, ANSP									
CNS rationalisation													-
Navigation infrastructure optimisation and harmonisation	Update standards, guidance material and software tools to ensure that navigation technology improvements are implemented and deliver the expected benefits. This is mainly done through contributions to ICAO in groups such as IFP (Instrument Flight Procedures Panel), SASP (Separation and Airspace Safety Panel), PBNSG (Performance-based Navigation Study Group) and NSP (Navigation Systems Panel), as well as EUROCAE WG107. Coordinate the evolution of the European VOR and NDB infrastructure towards the Minimum Operational Network (IMON). Aim for a strategic and harmonised rationalisation of the navigation infrastructure to eliminate the maintenance, operation and replacement costs of redundant navaids. Foster cross-border utilisation of navaids and share navigation infrastructure planning best practices.	NSP 2020+	SO07-4	NM, ANSP, AO's									
GNSS threats assessment	Studies and actions to assess GNSS interference impact and maintain GNSS operational benefits. Provide data and information to stakeholders on GNSS outage events taking into account the CNS and operational context. Develop tools to detect GNSS RFI and to geolocate RFI sources.	NSP 2020+	SO07-4	NM, ANSP, AO's									
Address Spectrum efficiency	Optimize the use of aeronautical spectrum through and efficient evolution of CNS infrastructure services. Prepare common aviation positions for coordinated Member State contributions to international forums, and in particular to CEPT and ITU.	NSP 2020+	SO07-4	NM, ANSP, AO's									
Infrastructure outages, infrastructure monitoring	Collect and build a global view of CNS performance/outages. Look for root causes of problems. Propose and implement CNS system improvements/simplification.	NSP 2020+	SO07-4	NM, ANSP, AO's									
Resolve key Avionics anomalies	Define process with aircraft operator/manufacturer to facilitate avionics anomaly investigation and resolution. Coordinate stakeholder actions to correct anomalies or develop workarounds to reduce impact on the Network. Perform early verification of new surveillance avionics.	NSP 2020+	SO07-4	NM, ANSP, AO's									
Address GNSS reversion	Production of a strategy for the maintenance of a cost-effective ground-based infrastructure providing adequate redundancy in the event of GPS being unusable to meet the levels of safety (and business continuity) required.	NSP 2020+	SO07-4	NM, ANSP, AO's									
Address Saturation/ Over- interrogation in 1030/1090 Bands	Define and implement optimised 1030/1090 transmissions. Define and develop improvements to resolve common 1030/1090 transmission issues (e.g. cone of silence, ADS-B use). Define and develop an implementation plan of system improvements to reduce 1030/1090 transmissions (e.g. DAP sharing /server)	NSP 2020+	SO07-4	NM, ANSP, AO's									
CNS evolutions													
Surveillance infrastructure evolution	Support the performance based modernization of European ATM Surveillance, to enable Network performance improvements towards optimisation and ensure global interoperability. Support the ongoing ADS-B implementation by the ANSPs and airspace Users and the realisation of the benefits. Produce Specifications and guidance material including Performance Based Surveillance (PBS) documentation, as well as implementation plans and reports. Aim for the optimisation of the surveillance infrastructure, through a coordinated and efficient approach, taking benefit of the ADS-B ground implementations and a transition to a cost and spectrum efficient Surveillance sensor mix. The focus will be on SSR and PSR optimisation. Foster cross-border utilisation of the surveillance infrastructure to support optimization	NSP 2020+	SO07-4	NM, ANSP, AO's									
IP services and Voice Over IP	Provide IP support services and related tools for ground-ground and air-ground data and voice (incl. VoIP) safety critical communications. Maintain the IP standards (ICAO/IPS, EUROCAE, RTCA, AEEC) for both mobile and fixed networks and produce VoIP implementation guidance (SIP addressing implementations guidance, SBC implementation guidance, VoIP Security Handbook, etc.)	NSP 2020+	SO07-4	NM, ANSP, AO's									
Harmonised Downlinked Aircraft Parameters	Guidance material sharing ANSP implementation experience and best practices from the use of DAPs in their systems to improve controllers' productivity and system performance.	NSP 2020+	SO07-4	NM, ANSP, AO's									

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
SASS-C	Enhance the Surveillance Analysis and Support System for ATC centres (SASS-C). This tool-set allows planning and verification of the operational Surveillance infrastructure in accordance with applicable standards in a multi-sensor environment (including radar, ADS-B, MLT and surveillance data processing systems).	NSP 2020+	SO07-4	NM, ANSP, AO's									
ARTAS	ARTAS (ATM surveillance Tracker And Server) produces an accurate air situation picture to enable the safe application of lowest uniform separation minima throughout the complete European airspace. Several enhancements are being progressed: date-to-gate, non-cooperative surveillance and virtualisation and some major refactoring (e.g. ASTERIX codec, HMI, Space Based ADS-B, ADS-B server, cybersecurity) is planned to improve maintainability and keep the EUROCONTROL SDP System in line with the Surveillance needs. The plan will have also to address the various enhancements requested by the more than 40 ARTAS Users that are operating the current 53 Operational ARTAS systems deployed in Europe.	NSP 2020+	SO07-4	NM, ANSP, AO's									
SDDS	SDDS is an intelligent communication gateway for the exchange of ASTERIX Surveillance messages over IP network. Several improvements are being progressed to increase cybersecurity, support ASTERIX evolutions (new ASTERIX codec, CAT 025, Space Based ADS-B), refactoring of the HMI and clear layering separation of the application from the Operating System to facilitate virtualisation. In addition, the plan considers some refactoring of the ADS-B server, ASTERIX filtering, ASTERIX category conversion and to assess and validate the IP-v6 functionality that will subject to various changes in the near future. The plan will have also to address the various enhancements requested by the more than 20 SDDS Users that are operating the current 7 Operational SDDS systems deployed in Europe	NSP 2020+	SO07-4	NM, ANSP, AO's									
Enhancement of CNS	Infrastructure monitoring												
DLS Performance Monitoring	Improved monitoring capabilities, facilities and tools; improved issues management and support to resolutions of reported problems; and enhanced ANSP and Aircraft operator performance dashboards.	NSP 2020+	SO07-3	NM, ANSP, AO's									
DLS Interoperability Testing	Upgrade and enhance the testing facility and avionics test suite	NSP 2020+	SO07-4	NM, ANSP, AO's									
DLS Deployment and Operations	Prepare for new tasks based on agreements with and on requests from stakeholders (i.e. datalink governance, enhanced monitoring capabilities, flight testing, avionics testing)	NSP 2020+	SO07-4	NM, ANSP, AO's									
RVSM Regional Monitoring	Use of ADS-B for the monitoring of Altimetry System Error (ASE)	NSP 2020+	SO07-3	NM, ANSP, AO's									
Central Monitoring Data Analysis Tool (SDCMA)	Development of a big data environment to store and analyse surveillance data to ensure the good operation of interrogators, avionics and ACAS.	NSP 2020+	SO07-3	NM, ANSP, AO's									
Local surveillance data analysis tool (BDAMS+)	Enhanced tool to analyse local surveillance data (BDAMS+) to identify problems with the operation of surveillance avionics.	NSP 2020+	SO07-3	NM, ANSP, AO's									
Ground monitoring stations	Further deployment of the 1030/1090 MHz Monitoring ground system to measure 1030/1090 MHz activity and detect overload events.	NSP 2020+	SO07-3	NM, ANSP, AO's									
Surveillance forecast tool	Enhance the model to run simulations to anticipate future use of the 1030-1090 MHz RF bands to forecast problems and also validate optimization measures.	NSP 2020+	SO07-3	NM, ANSP, AO's									
AMC application	General upgrade of the application developed 19 years ago to increase performance and maintainability.	NSP 2020+	SO07-4	NM, ANSP, AO's									
European IPS Repository (EIPR)	EIPR is the web-based database supporting NAMS. It provides the central repository of network addresses and resources (for voice and data) in order to ensure ATM system interoperability, for all States of the ICAO EUR/NAT regions.	NSP 2020+	SO07-4	NM, ANSP, AO's									
Network Test Tools (ETIC, VOTER)	Enhancements to the tool to test IP-based systems (VOTER) and the tool to test compliance with light Message Transfer Protocol (ETIC)	NSP 2020+	SO07-4	NM, ANSP, AO's									
SAFIRE	SAFIRE is the central repository of aeronautical radio frequency assignments for the ICAO EUR region. The system, developed more than 10 years ago, requires a full upgrade to increase performance and maintainability.	NSP 2020+	SO07-4	NM, ANSP, AO's									
MANIF	MANIF is the PC-based tool to analyse the radio frequency assignments contained in SAFIRE. Developed more than 15 years ago and with more than 1 million lines of code, it will be re- engineered to maintain its performance.	NSP 2020+	SO07-4	NM, ANSP, AO's									
MICA	Re-engineering of the Mode S Interrogator Code Allocation tools (MICA) used to process Interrogator Code requests for new Mode S Interrogators, analysing coverage and a lockout coverage.	NSP 2020+	SO07-4	NM, ANSP, AO's									
DEMETER	DEMETER provides an essential capability for ANSP and State Regulators to rationalize and optimize the navigation infrastructure to support the network.	NSP 2020+	SO07-3	NM, ANSP, AO's									
e-PBN Portal, CNS Dashboard and PBN Infrastructure and Map Tools	e-PBN portal and the PBN Infrastructure and Map tools provide access to a wide range of information on all aspects of performance-based navigation (PBN) to support stakeholders implementing PBN. The CNS dashboard provides a unique source of information on the C, N and S capability of aircraft and flights.	NSP 2020+	SO07-4	NM, ANSP, AO's									
AUGUR	Improvements to AUGUR, the web-based tool that checks the availability of GPS integrity (RAIM) for different operations including terminal area and final approach operations.	NSP 2020+	SO07-3	NM, ANSP, AO's									
SWIM YP exchanges of	of flight, network, aeronautical and meteorological data												
Network Information Reference	Extend the scope of information shared and collaboratively managed at network level between relevant stakeholders, as "Network common, standardised data sources", supported by efficient exchange mechanisms (NM B2B, HMI), to support effective collaborative network management, using common assumptions, accurate and consistent data sets: e.g. accurate and up to date information about airspace capacity, sector configuration, anticipated hotspots and their evolutions during tactical operations (protection hotspots, overloaded / busy /sensitive sectors, specific meteo conditions (CB), activated/de-activated constraints), etc	NSP 2020+	SO02-5 SO04-5	NM, AU, CFSP, ANSP, AMC, AIRPORT									
Develop and adopt interoperability standards	Contribute to the development and the adoption of interoperability standards as defined at ICAO level : SWIM profiles, FIXM, AIXM/XWWM as enablers of the 4D Trajectory, PIXM for performance data collection and analysis, FF-ICE (Flight & Flow Information for a Collaborative Environment), Meteo information	NSP 2020+	SO02-4	NM, AU, CFSP, ANSP, AMC, AIRPORT									
Implement Interoperability Strategy	Deploy the interoperability strategy in full alignment with Airspace Architecture Study, European Aviation Strategy and the Digital Agenda	NSP 2020+	SO02-1	NM, AU, CFSP, ANSP, AMC, AIRPORT									

Deliverables	High level description	Source	Ref to NSP	Impacted Stakeholders	2022	2023	2024	2025	2026	2027	2028	2029	2030
SWIM A-G, G-G and Cl	V-MIL backbones and exchanges												
To be developed	To be further developed												
OLDI via SWIM YP										\square			
OLDI modernisation	Migrate OLDI exchanges from point to point to SWIM YP Enable wider subscription to OLDI data via the multicast function.	High Level Network	SO04-1	ANSP									
ATC automation (adapt	ted conflict detection /resolution tools)	contors											
Enhancements of conflict detection and providing conflict resolution support	The Conflict Detection Tools (CDT) besides the enhancement for MTCD, include the tactical tools based on the shorter look-ahead time, as well as the basic conflict resolution advisor and what-if function. In the new planning environment with extended planning horizons and integration between local ATFCM and ATC processes, the enhanced resolution tools will propose decision(s) on conflict resolution, which will have no negative network effect.	SESAR Wave 2	SO04-1	ANSP									
Improved aeronautica	I data consistency (EAD/CACD integration) as part of initial iNM delivery												1
EAD workflows enhancements	Enhanced EAD workflow supported with new/upgraded modules for AIS Data management, AIS library management (HMI and workflow), knowledge base Aeronautical data model: further alignment of eEAD and CACD data models . Development of an integrated workflow and dataflow between EAD (AIS views) and CACD (operational views). Support the co-existence of different views in a consistent way. . Changes within the AIRAC have their validity period correctly represented (added) . AIM data provision harmonisation (OEP WSTIO)	NSP 2020+ OEP	SO02-6	NM, ANSP									
Enhanced publication support tools	AIP library, AIP production tool, Chart production	NSP 2020+	SO02-6	ALL									
Enhanced integration of EAD and CACD data management	Integrated processes between AIS, ENV Coord. and NMOC, for production, validation and publication of both official and operational airspace data, starting from the AIS data preparation, with full traceability in compliance with ADQ regulation.	NSP 2020+	SO02-6	NM, ANSP									
Aeronautical information in support to Trajectory based operations	Common AIM service for sharing consistent aeronautical, LoA's and airspace configuration data in the Trajectory Management context	NSP 2020+	SO02-6	NM, ANSP									
Aeronautical data in support to OAT and VFR flight plan integration	Harmonisation of aeronautical data that is used in OAT and VFR flight planning (e.g., naming conventions)	iNM requirement s	SO02-6	NM, ANSP, AU									
Restrictions management process	Full automated collection, maintenance and distribution of all restriction types, semi-automatic generation of restrictions with full traceability	iNM requirement	SO02-6	NM, ANSP									
Full dynamicity of data	Enable the full dynamicity of the data, independent of AIRAC cycle (AIRAC validations are done at the moment of input).	iNM requirement s	SO02-6 SO09-1	NM, ANSP, AU, CFSP, AMC									
Integration of additional data required by operations	Improve the integration of the different data sets required for flight and flow management, including: a) Meteorological data, required for the Flight Briefing Service and for the Flight Service in the computation of trajectories b) Natural Hazards data, required to support the Crisis Management Service c) Route charges information from CRCO, required for the calculation of the route costs when proposing re-routings d) Airport information, which may complement the AIS data, and would be supporting the flight and flow management services e) Code Allocation List (CAL), to support the generation of the SSR codes by the CCAMS service	NSP 2020+	SO02-6	NM									
Aircraft performance data management	Aircraft performance data management: . BADA performance data, required for the Flight Service in the computation of trajectories . Use of machine learning techniques to derive airframe based models . Extension of the data set with models needed for handling VFR and OAT FPLs and for new airspace entrants	NSP 2020+	SO02-6	NM									
ATC virtualisation													
To be developed	To be further developed												
D-NOTAM Digital NOTAM	Digital NOTAM management, with the ability for tracing corresponding signage changes in the											-	
management	operational airspace data back to the NOTAMs	NSP 2020+	SO02-6	ALL									
Support European Av	ation in Global Markets									\square			
Cooperation with other regions	Promote the European ATM approach in other regions Accelerate implementation of common ATM standards in Europe (through the Operational Excellence Programme) and promote their applicability to other regions Ability for other regions to use NM tools - consider the deployment in other regions of some NM components vs. central deployment and use by other regions	NSP 2020+	SO10-1 SO10-2 SO10-3 SO10-4	NM									
Support to ICAO transition plans	Support to transition to FF-ICE at global level: promote the implementation strategy agreed for Europe and their applicability to other regions	NSP 2020+	SO02-4 SO10-4	NM									
Support to Network of Networks concept	Interconnection of regional network operations nodes Inter-regional exchange of flight and flow data: e.g. ability to receive and process request from other ICAO regions to ground delay departures in the IFPS zone and vice & versa) . Cooperation between regions in support of global ATFM	NSP 2020+	SO02-4 SO10-1 SO10-3	NM									

Network Technical Roadmap

This section presents the Network Technical Roadmap resulting from the implementation of the Network Strategic Projects and from other essential Network operational projects.

ID	Task Name	Start	Finish	
1	Release 27.0	Tue 25-04-23	Tue 25-04-23	٣
2	Optimised Network Design	Fri 01-04-22	Tue 25-04-23	
3	Enhanced ASM/ATFCM integration and ASM scenarios	Fri 01-04-22	Tue 25-04-23	1
4	Single CDR Category - part of FB1191	Fri 01-04-22	Tue 25-04-23	1
5	RAD management via AUP/UUP - part of FB1191	Fri 01-04-22	Tue 25-04-23	1
6	ASM scenario further developments - part of FB1191	Fri 01-04-22	Tue 25-04-23	1
7	FRA extended beyond National boundaries, towards full European Airs	pace Fri 01-04-22	Tue 25-04-23	1
8	FRA improvements - FB1193	Sat 02-04-22	Tue 25-04-23	
9	Enhanced GRRT - FB1186	Fri 01-04-22	Tue 25-04-23	
10	Flexibilty and dynamicity of airspace utilisation	Fri 01-04-22	Tue 25-04-23	1
11	Restriction model enhancement - FB1206	Fri 01-04-22	Tue 25-04-23	1
12	Network components/systems	Fri 01-04-22	Tue 25-04-23	
13	Improved aeronautical data consistency	Fri 01-04-22	Tue 25-04-23	
14	CASTAR operational usability improvements - FB1232	Fri 01-04-22	Tue 25-04-23	1
15	Trajectory and Cooperative Traffic Management	Fri 01-04-22	Tue 25-04-23	
16	Flight Domain Improvements - FB 1204	Fri 01-04-22	Tue 25-04-23	1
17	ATFCM Domain Improvements - FB1205	Fri 01-04-22	Tue 25-04-23	1
18	Correction and tuning of external data processing - FB1203	Fri 01-04-22	Tue 25-04-23	1
19	FF-ICE Release 1 services	Fri 01-04-22	Tue 25-04-23	1
20	FF-ICE/R1 Correction & Tuning - FB1192	Fri 01-04-22	Tue 25-04-23	1
21	OAT Flight Plan Integration	Fri 01-04-22	Tue 25-04-23	1
22	NM reception, processing and distribution of OAT FPL - I -FB1078	Fri 01-04-22	Tue 25-04-23	1
23	STAM Phase 2	Fri 01-04-22	Tue 25-04-23	1
24	Full STAM NM B2B (part 2) - FB1198	Fri 01-04-22	Tue 25-04-23	1
25	Rolling Network Plan and Network CDM platform	Fri 01-04-22	Tue 25-04-23	1
26	Best regulations/measure (part 2) - FB1199	Fri 01-04-22	Tue 25-04-23	
27	Predictability improvements - FB1158	Fri 01-04-22	Tue 25-04-23	
28	Multi-constraint resolution, multiple ATFCM time-based measures	Fri 01-04-22	Tue 14-03-23	
29	Occupancy CASA prototype - FB996	Fri 01-04-22	Tue 14-03-23	
30	Airport and TMA Network Integration	Fri 01-04-22	Tue 25-04-23	
31	A-CDM	Fri 01-04-22	Tue 25-04-23	
32	A-CDM Alerts reception and dissemination - FB1125	Fri 01-04-22	Tue 25-04-23	
33	Extended AOP/NOP Integration	Fri 01-04-22	Tue 25-04-23	
34	AOP/NOP integration - Phase VII - FB1194	Fri 01-04-22	Tue 25-04-23	1
35	Optimum capacity and flight efficiency planning	Fri 01-04-22	Tue 25-04-23	
36	Common network situation awareness and enhanced DCB tools	Fri 01-04-22	Tue 25-04-23	
37	Airspace HMI	Fri 01-04-22	Tue 25-04-23	1
38	RAD operational improvements - FB1238	Fri 01-04-22	Tue 25-04-23	
39	Upload of RAD from RAD@NES into CACD - FB1195	Fri 01-04-22	Tue 25-04-23	
40	Flow HMI	Fri 01-04-22	Tue 25-04-23	
41	NMP Flow v2 -FB1172	Fri 01-04-22	Tue 25-04-23	
42	Flight HMI	Fri 01-04-22	Tue 25-04-23	
43	C&T of NMP Flight for NMOC and AO - FB1208	Fri 01-04-22	Tue 25-04-23	
44	NM B2B Services	Fri 01-04-22	Tue 25-04-23	
45	NM B2B improvements - FB 1202	Fri 01-04-22	Tue 25-04-23	

4	Single CDR Category - part of FB1191
	CR_050020 – Single CDR Category
	States are to implement the Single CDR Category (SCC), where only CDR1 will be used and CDR2 and CDR3 will be
	disbanded. NM systems and ASM Support Tools will support the conversion and re-classification of all conditional
	routes into SCC of CDR1 category.
5	RAD management via AUP/UUP - part of FB1191
	CR_052011 – Adapt ENV Restriction model for dynamic activation
	CR 052012 – Activation of single dynamic RAD Restrictions from AUP
	CP 052013 - EMP access to ALIP activation of dynamic RAD Restrictions
	or_boot of access to Apr acces
6	ASM scenario further developments - part of FB1191
	CR_050624 – ASM Scenario usability and flexibility improvements
8	FRA improvements - FB1193
	CR_049315 – Allow definition of route segments that are available/not-defined
	CD AF7242 Dublication of FDA Daint FLOC (Flight Lovel Opiontation Scheme)
	CR_052312 – Publication of FRA Point FLOS (Flight Level Orientation Scheme)
	CR_052314 – FRA Point Type Usage & Automated FRA Restrictions generation
	CR 052026 – IFPS check against FRA Point Usage
	CR_052315 – Point Type Usage for IOAT
9	Enhanced GRRT - FB1186
	Changes in this FB will consist in:
	 Enhancing rerouting algorithms (vertical, horizontal, time)
	 Improving RRPs for the purposes of FEI (Flight Efficiency Initiative)
	 Introducing user's response to OPP/RRP
	 Local rerouting features and parameters
	 Improving GRRT Template management and advanced traffic selection
	Structured OPLOG (part 2)
11	Restriction model enhancement - FB1206
	CR 043209 - RAD published conditions related to information present in the RMK/ field of the FPL
14	CASTAR operational usability improvements - FR1232
	The CASTAR application is used operationally.
	This change enhances the operational usability of the tool, based on NMOC's feedback.
16	Flight Domain Improvements - FB 1204
	CR_049115 – Additional comment required for FPL message association rejections
17	ATFCM Domain Improvements - FB1205
	CR 050112 - Protect zero-rate regulations from any profile shift
	CR 050109 - Assign a complexity factor per TV
	CD_020002 - Activation of the DED loading on ETEMS
	UR_U02020 - ACtivation of the PFD loading on ETFM5
18	Correction and tuning of external data processing - FB1203
	CR_050919 – New triggering event for the EFDs/PSFDs when MPR is changed
	CR_051715 – Increase maximum size of the EFD message
	CR 052111 - No EED nor PSED for a DAU event on a terminated flight
	CR 051019 - The IORT and EORT in ETEMS output on leases and NM P2P
	CR_031013 - The IODT and EODT IN ETEMS output on legacy and NM B2B

	CR_051412 – Allow diversion change when subsequent information confirms it
20	EE ICE /P1 Correction & Tuning EB1102
20	With the NM-26.0 release, the implementation of the FF-ICE/R1 Filing Service, Trial Service and Notification Service brought a better alignment of the NM implementation with the ICAO Specification for the FF-ICE/R1 and FIXM4.2.
	The overall scope of this FB caters for items that could not be delivered during NM-26.0 and possible corrections identified during the ongoing validation activities with external partners.
22	Some of the functionalities included in this FB will require the support of FIXM4.3. NM reception, processing and distribution of OAT FPL - I -FB1078
	The objective of this FB is to initiate the implementation of improved Operational Air Traffic (iOAT) flight plan in NM systems.
	iOAT flight plan operational scope is strictly limited to IFPZ and addresses only OAT flights conducted in controlled airspace under IFR.
	The overall implementation will be performed in a stepped manner, comprising several phases starting with the NM-27.0 release and later continuing within the iNM framework.
24	This FB addresses the Phase I of the implementation and focuses on the flight planning aspects. Full STAM NM B2B (part 2) - FB1198
	CR_050312 – Enable full process of ad hoc rerouting measures
	CR_050313 – Automation and harmonisation of STAM RRP measures
	CR_050314 – Facilitate AO's role in the STAM RRP process
25	Rolling Network Plan and Network CDM platform
26	Best regulations/measure (part 2) - FB1199
	CR_048813 – KPIs for Measure Efficiency
27	Predictability improvements - FB1158 CR_050215 – STA/YY enhancement
29	Occupancy CASA prototype - FB996
	CR_050318 – Occupancy CASA – Slot manipulation
	CR_050319, CR_050320, CR_050321 – Occupancy CASA – NMOC tooling
	CR_050322 – Occupancy CASA – System interfaces
32	A-CDM Alerts reception and dissemination - FB1125 CR_049109 - A-CDM alerts reception
	CR_049122 – A-CDM alerts dissemination
34	AOP/NOP integration - Phase VII - FB1194
	CR_048209 – Show TTOT values from Extended DPI on Flight List

38 39	RAD operational improvements - FB1238 This is a functional block for the NMP RAD - minor additions, defect corrections, usability improvements of the HMI based on user's (RMG, NMOC RAD Team) feedback. This change contains, amongst others, changes to the RAD DMR workflow, forces users to use the existing grammar in some particular cases, defines clearer usage of the date definition formats, corrects bugs, and changes the formatting of the RAD export/output files. Upload of RAD from RAD@NES into CACD - FB1195 To compare and download new or modified military airspaces directly from EAD/SDO into CACD, and RAD from users' RAD inputs
41	NMP Flow v2 -FB1172
43	To enhance the NMP Flow application with functionalities required to meet CP1 functionalities. C&T of NMP Flight for NMOC and AO - FB1208 This is a corrections and tuning functional block for the NMP Flight - minor additions, defect corrections, usability improvements of the HMI based, derived from user feedback, as well as unfinished features from previous releases
45	NM B2B improvements - FB 1202
	CR_049908 – Add IATA Flight number to NM B2B Flight Data
	CR_052319 – Cherry-pick regulation ids will start with 'X' instead of 'CP'
	CR_049216 – Flight list on ALTN aerodromes for NM B2B clients
	CR_052415 – Export 'nmDesignator' as part of NavAid and DesignatedPoint features in NM B2B Airspace Structure

5.3 Network Strategic Projects

This section presents high level details about some of the Network Strategic Projects.

5.3.1 Free Route Airspace (enabler for SO3/3)

Scope of the project

Free route airspace is a specified airspace within which users may freely plan a route between a defined entry point and a defined exit point, with the possibility to route via intermediate (published or unpublished) significant points, without reference to the ATS route network, subject to airspace availability. Within this airspace, flights remain subject to air traffic control.

The project provides support to the implementation of the FRA concept, as described in the European Route Network Improvement Plan Part 1 across the NM area. It also forms an integral part of Network Operations Plan (NOP) for the forthcoming five years and is expected to make a major contribution to the Network Performance Plan (NPP). It manages the required system changes in NM and undertakes airspace design, simulation and validation activities required for FRA implementation as well as monitoring and reporting on implementation progress.

Project Objectives

Under the NM Network Management Implementing Rule - and its responsibilities for the European Route Network Design (ERND) Function - the project ensures and co-ordinates the gradual implementation, in a harmonised way, of FRA throughout European airspace to achieve the SES Performance Scheme Environment KPA target. At the same time, it works towards implementing the Commission Implementation Regulation (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project One (CP1). FRA target dates linked to the Regulation are included in the following implementations:

- Initial FRA by the implementation target date of 31 December 2022.
- Final FRA, including cross-border FRA with at least one neighbouring state and FRA connectivity with TMAs, by the implementation target date of 31 December 2025.

The current Free Route Airspace developments at local and network level have reached a very good level of maturity. The stepped approach to implementation continues as planned in the short term with more and more cross-border implementation which maximise the benefits of the concept.

Main objectives of the project:

- Contribute to the reduction of the flown flight plan route length by 25-75000 NM per day.
- Facilitate and co-ordinate the gradual implementation of the Free Route Airspace concept over the European Airspace.
- Ensure rapid expansion of cross border FRA to achieve the flight efficiency target planned in SES Performance Scheme for RP3.
- Bring the European Network to the same level of FRA operations.

From these high-level objectives, the following working level objectives are drawn:

OBJ1: Improve environment/flight efficiency; assist in providing users with more route choices and options; find and maintain optimum trade off against the need for capacity, while maintaining safety.

OBJ2: Provide <u>implementation support</u> to the SESAR Deployment Manager (SDM), ANSPs, FABs, NSAs and airspace users to <u>ensure harmonised and expeditious deployment</u> of FRA across the Network. Further develop existing common guidance material.

OBJ3: Ensure the readiness of NM systems for the changes required by the FRA concept to support the stakeholder implementation.

OBJ4: Track and report performance gains in the network against full potential FRA implementation.

OBJ5: Improve awareness of the FRA concept and operations amongst all operational stakeholders.

Project Purpose

The improvement of European environment and flight efficiency and the optimisation of the European route network is, by definition, a Pan-European issue which requires a holistic approach carefully coordinated by the Network Manager. Uncoordinated, local initiatives may not deliver the desired objective, especially if the airspace is comparatively small and a large proportion of the observed inefficiency is due to the interface with adjacent States or FABs.

Strategic Fit

This project is one of a number of NM Strategic Projects originated from the Network Strategy Plan (NSP) in which Free Route Airspace is a key component.

It will address the NSP Strategic Objective SO3 - Optimise Network Design while deploying full free route airspace throughout the European ATM network, to the maximum extent possible, while achieving the flight efficiency targets.

The NSP and NPP stress the need for the accelerated deployment of FRA as high priority. The success of the Network Operations Plan (NOP) and its European Route Network Improvement Plan (ERNIP) will be largely dependent on the successful implementation of more than 60 FRA implementation projects planned at local ANSP and FAB level up to 2023 and beyond. Key for the future is that current plans lead to implementation which is fully harmonised across the Network and bring consistent benefits to airspace users.

FRA implementation will make a significant contribution to the SES Performance Scheme notably Environment and the associated binding target required for RP3, which will only be possible through cross border FRA operations.

The project supports and complements the other network initiatives aiming at improving Flight Efficiency notably:

- Improving airspace management through advanced FUA.
- Improving airspace utilisation through the provision by NM of flight efficiency tools and support to airspace users, and the commitment and engagement of airspace users on better airspace utilisation.

Work Packages and Deliverables

• Network Performance and Implementation scenarios

This work supports the NM Strategy Plan and best-case scenarios for future Network implementation. Performance gains are reported regularly based on SES RP2 and now RP3 Environment KPA and KPI targets and FRA implementations. The Capacity KPA is also addressed and the identification of best trade-off between flight efficiency and capacity with associated scenarios is also captured. Large scale cross border FRA requires a rolling redesign of the Network to find optimum performance levels of operation.

• Operations Support

This work package builds on the work already undertaken for several years by NM. Tasks currently undertaken and listed below are consolidated under one main deliverable as follows:

- Airspace modelling and design.
- Fast and real time simulations.
- Capacity planning relating to FRA.
- Pre-operational NM Environment testing and validation including new requirements CACD/IFPS.
- Trials.

• ATM systems and architecture

This work package ensures, with operational stakeholders, that NM systems and architecture can fully support FRA operations. Where necessary facilitation and support to stakeholders regarding other ATM system aspects, where common requirements and solutions are considered as being beneficial to contributing to Network performance and implementation of the concept takes place. It covers the following topics:

- NM systems/tools.
- Common ATC support tools evolution.
- Common FDP evolutions.
- Common ATC coordination.
- Appropriate Network system data sharing.

• Concept, procedures and change

The current concept, as described in ERNIP Part 1, is reviewed regularly based on the experience of current operations, including additional elements that might need to be added for cross border operations. ASM/AFUA elements specific to FRA operations (i.e. airspace availability) will be further evaluated, if required, particularly the change from fixed route structures to full large scale cross-border FRA operations. The revision can be expected to ERNIP Parts 1 to 4 and the NOP. This work provides requirements and guidance material for flight planning procedures, processes, and system requirements (CFSPs and IFPS) needed to support large scale FRA operations. NM flight efficiency and reporting tools are being upgraded to accommodate the concept. This will address the following topics:

- ERNIP and NOP.
- Relationship with ASM and A/FUA.
- Flight planning and RAD.
- Local/FAB concept review.
- Changes to ATFCM procedures.
- Change management skills, performance and training linked to FRA.

Expected Benefit

Current implementations show visible changes following FRA implementation. The higher degree of flexibility provided for, at flight planning level, is shown as the flight plan trajectories are much more dispersed in those areas where FRA has been implemented. For the most part, where FRA has already been implemented, the former gap between the last filed flight plan and actual aircraft trajectory flown was relatively small. However, at FAB or regional level, a larger gap exists which suggests that future implementation across this wider scale will lead to further significant improvements.

The full benefits of the implementation of the planned airspace changes are published in the ERNIP Part 2 - ARN Version 2023 - 2030.











5.3.2 Airspace Management and Advanced FUA (enabler for SO3)

Scope of the Project

The project addresses the coordinated airspace management improvements required to achieve the flight efficiency - and indirectly the capacity - RP3 targets, both at network and local/FAB level. It focuses on the implementation of improved ASM/ATFCM processes and on the Advanced Flexible Use of Airspace concept, combining operational procedures and technical systems support.

The scope of the project is fully aligned with the responsibilities of the Network Manager and its NM Functions.

Project Purpose

The purpose of the project is to improve Network performance through better utilisation of existing ASM processes:

- Improve Flight Efficiency through the optimised and flexible use of available airspace, especially in cross border operations, and through the provision of additional route options
- As a direct consequence, improve Cost Efficiency

This will also enable to some extent a more efficient use of capacity thanks to the increased dynamicity of airspace availability through more efficient CDM operational processes.

Project Objectives

The project has the following objectives:

OBJ1: Improve Airspace situational awareness

Since 2015, the project improved the shared airspace situational awareness at network and FAB level, therefore enabled more efficient flight planning and improved flight efficiency. The implementation of the new AUP template is providing additional information to airspace users, namely FUA restrictions FUA RAD restrictions, Flight Buffer Zones (FBZ) and No Planning zones (NPZs) processed via AUP/UUP and automatically exchange with AUs via B2B service.

OBJ2: Implement rolling ASM/ATFCM process

In 2017 an enhanced implementation of the advanced ASM/ATFCM process has been achieved, supporting dynamic operations in fixed route network and FRA environments. Full rolling snapshots (every 30 minutes) ASM/ATFCM process is implemented.

OBJ3: Implement CDM based processes

The project shall implement seamless, Collaborative Decision Making (CDM) ASM/ATFCM/ATS processes with management of airspace scenarios implemented in 2022 and continuous information sharing.

Strategic Fit

The NSP and NPP stress the need for the full implementation of Advanced Flexible Use of Airspace and Airspace Management.

Advanced Flexible Use of Airspace and Airspace Management implementation will make a significant contribution to the SES Performance Scheme notably Environment and the associated binding target required for RP3, which will only be possible through a more efficient use of the airspace, especially for cross border operations. As a consequence the focus for the Network in RP3 will be on:

- Improving airspace management through advanced FUA
- Improving flight efficiency providing availability of airspace structures based on traffic demand

 Improving airspace utilisation – through the provision by NM of flight efficiency tools and support to airspace users, and the commitment and engagement of airspace users on better airspace utilisation

This project will make a significant contribution to achieving the above aims. It will respond to the Network Strategy Plan Objective 'SO3 – "Optimise Network design".

Work Packages and Deliverables

This project will deliver the following operational products or services to satisfy the objectives of the project:

ASM Solutions

The ASM solutions process is aimed at delivering ASM scenarios options that can help alleviating capacity problems identified in any particular area of European airspace as well as improve flight efficiency ensuring synchronised availability of airspace structures according to traffic demand. *New procedures were implemented in 2016, amending ERNIP Part 3 ASM Handbook. Technical implementation for the management of ASM scenarios started in 2021 and continued in 2022. Fine tuning is expected in 2023 with NM release 27.0.*

• Dynamic Airspace Configuration & CDM

This Key Deliverable focuses on defining a reference Dynamic Airspace Configuration concept, including roles and responsibilities in an advanced CDM process. It will work in close cooperation with SESAR for supporting validation activities and identifying improvements mature for implementation. Procedures for the management of pre-defined airspace configuration were approved in 2017, amending ERNIP Part 3 ASM Handbook. The management of pre-defined airspace configurations (combined ASM and ATFCM scenarios) at national as well as cross border level was implemented in 2022 with NM release 26.0.

• Rolling ASM/ATFCM process and response

This Key Deliverable focuses on airspace improvements, in coordination with all appropriate operational stakeholders. It ensures a continuous, seamless and reiterative planning, allocation and operational deployment of optimum airspace configurations, based on airspace request at any time period within both pre-tactical Level 2 and tactical Level 3. It will result in a rolling process, supporting the enhancement of the daily Network Operations Plan. This will allow airspace users to better take benefit from changes in airspace structures in real-time. *An enhanced snapshots process was implemented in 2017. In 2019 started activities linked to the implementation of full rolling process at AMC level, with initial implementation in 2021, allowing the simultaneous management of UUP. These improvements have been completed in 2022 with NM release 26.0.*

• ASM in FRA environment

This Key Deliverable addresses the required improvements supporting an efficient ASM within a FRA environment. The definition of improvements required will be further developed on the experience of current operations and the need to deploy cross border operations and final European wide FRA. It will require a revision of the current ASM procedures, as well as improved coordination and support for the military partners for the switch from fixed route structures to full large scale FRA operations.

This also includes working out requirements and guidance material for flight planning procedures, processes and system requirements (CFSPs and IFPS) needed to support large scale FRA operations.

Improved ASM operations in FRA were achieved in 2016 with the implementation of FUA restrictions and FBZ managed via AUP/UUP. In 2020 new technical feature and procedures have been implemented to process NPZs via AUP/UUP. Improved management of complex restrictions and grouping restrictions linked to the activation of RSAs have been implemented in 2021. In NM release 26.0 the grouping restrictions has been improved introducing the management of FUA RAD restrictions to process via AUP/UUP those RAD restrictions with time dependent applicability from RSAs.

• ASM Performance

This Key Deliverable addresses the development and monitoring of KPIs related to ASM. New ASM performance monitoring reports were implemented in 2017. New indicator to measure the effective utilization of areas vs initial plans (comparison UUP vs AUP data) have been introduced in 2020.

Schedule and milestones

Lifecycle

The project lifecycle is from 2020 to 2025.

Phases and milestones

No specific phases are expected, focusing of continuous implementation of improvements according to the schedule defined in the ASM Work Plan and the level of maturity reached.

Expected benefits

Airspace users gain a significant improvement to flight efficiency and cost reductions based on a more efficient availability of airspace.

5.3.3 Airport Network Integration (enabler for SO4 and SO5)

This activity addresses the strategic plans of the Network Manager, which consolidate the operational relationship between the actors involved in the airport/network operations, during RP3, RP4 and beyond. It includes initiatives aimed at monitoring and understanding airport/network performance, optimising airport operations and minimising airport disruptions and delays.

The main focus of this project is to work towards the **full integration of airports as the component**⁷ **of the ATM Network**, driving network and local performance in support of the European aviation and citizens' mobility. The required network services are developed in close collaboration with the operational stakeholders and allow meeting the increased demand for predictability and punctuality, as well as crisis management.

To this end, NM is supporting stakeholders in the implementation of collaborative and predictive processes and tools, as well as new concepts based on the outcomes of SESAR and other R&D projects. Efforts are focused on building a complete network, where airports are considered as an integral component. NM, in a harmonised implementation and planning coordination process with Airport Operators, Airport Coordinators, States, ANSPs and Airspace Users will drive improved network performance. Most NM deliverables will be assisting stakeholders' implementation projects, with NM in a coordination and support position while implementation remains under the responsibility of operational stakeholders.

The strategic NM projects for the airports are focused on the following areas:

Airport Connectivity

Depending on the size, operational needs and resources available airports can take different approaches towards network connectivity. By 2030, it is expected that the integration of all major European airports into Network Operations will be finalised, with these airports being fully part of the CDM processes and an integral part of ATM. These solutions evolve towards the integration of airport and network operations, addressing the links AOP – NOP and the connectivity between APOC and NMOC, whilst considering the ground and landside constraints in a Total Airport Management concept of operations.

⁷ COMMISSION IMPLEMENTING REGULATION (EU) 2019/123 of 24 January 2019 laying down detailed rules for the implementation of air traffic management (ATM) network functions and repealing Commission Regulation (EU) No 677/2011; article 3 (1)

However, as the connection of the major airports to the network through A-CDM/AAT is now almost achieved at European level, it is also time to bring the smaller, regional airports into the picture enabled by a simplified and more cost-effective solution.

These airports account for roughly 50% of the departing traffic within the ECAC area and some of them have an impact on the Air Traffic Network. Sharing accurate take-off times for flights from those airports will bring network performance benefits as a result of the overall enhanced traffic predictability. NM is facilitating this connection through the CRSA (Connecting Regional and Small Airports) programme.

Operational capacity and predictability

This area focuses on the monitoring and prediction of airport/network capacity and performance together with the airport stakeholders. It covers enhanced operational NM activities like Airport Function and AOP/NOP integration that facilitate the coordination, timely information exchange and flexible adaptation to changing network situations both in pre-tactical and tactical phase, including quick reaction for and recovery from the crisis situations.

NM has established a reporting process to capture relevant airport information and monitor airport operations and planning. This process is supported by a secured web-based tool, the Airport Corner, which enables quick and easy information provision from airport stakeholders. It facilitates collaboration between local ANSPs and Airport Operators resulting in the provision of a coordinated airport view.

Sharing airport information allows NM to identify issues that may affect network performance early on. It also ensures that existing and future airport operation plans are fully taken into consideration, so that enough capacity is made available at the right places to accommodate traffic from and to European airports. Above all, it sharpens situational awareness for ATM partners, and, ultimately, results in optimised airport and network performance.

Airport related data collection and analysis, with the increased role of digitalization and machine learning, will allow for more predictable assessments of A-CDM information, airport movements, slots, turn-round times, CO2 emissions in TMAs, noise in airports vicinity, etc.

In addition, NM supports its operational stakeholders with airport performance studies, airport capacity assessments and root-cause analyses where required. This will further evolve through the development of permanent airport capacity monitoring tools based on available and new local ADS-B live data collection.

In the coming period there will be as well increased focus on environmental challenges, which will drive many of the capacity related enhancements.

Turnaround performance predictability will be developed in order to alleviate the lack of transparency of delay generation between in-block and off-blocks.

Operational improvements

NM ensures SESAR concepts are ready for operational implementation by closing the gap between research and deployment, developing operational requirements, preparing guidance material, performance cases when appropriate, making available online services supporting safe deployment and defining procedures and transition plans.

Local airport performance improvements can be achieved by minimising airport arrival delays, reducing taxi times, minimising the impact of weather on airport operations and by promoting deployment of airport throughput enablers, such as RECAT-EU (wake separation), ROCAT (Optimised Runway Separation), TBS (Resilience to headwind), LORD (Optimised runway delivery) and Enhanced Approach Procedures used to minimise environmental impact unlocking capacity. Preliminary RNEST simulation has shown that a generalisation of RECAT could reduce by 10% ATM Airport Delays.

Network operations will transition to the use of target-time concepts as one enabler for moving from departure towards trajectory management focus.

With the support of local demand-capacity-balancing (DCB) through APOC and AOP processes, related iterative network demand and capacity balancing, airport and airline needs will be considered as an equal constraint within the network assessment process in a more automated way in the course of RP4.

NM will assess identified challenging operational performance areas e.g. runway throughput, airport weather regulation, incorrect A-CDM behaviour and will undertake the process of collecting, collating and disseminating best practice, with stakeholders, based on clearly identified airport / network performance excellence.

As of 2023 NM will also focus on new entrants and the facilitation of the new type of UAS operations and traffic into the airport operations' context. This collaboration shall aim at building trust and confidence between existing ATM and U-space/UAM and preparing for challenges of future operations.

iNM for airports

The iNM programme is presented as the digitalisation of the current overall NM system with the aim to increase flight processing capacity, user experience, process automation and performance. As an additional means for better and full airport integration into the network, the various airport-related functionalities will be progressively integrated onto the iNM digital platform, the Airport Corner being the first to be integrated and available by the end of 2025. Other major airport-related functionalities will be integrated in later iNM releases (e.g. the Airport Function, the European Connected Regional Airport (ECRA), etc), the ultimate vision being that most of them (if not all) are fully integrated into the iNM world.

Strategic Fit:

The Project fully addresses the NSP Strategic Objectives SO4 - Optimise Network operations, SO5 - Develop European connectivity and airport services, and ensures a close links to the Strategic Objectives SO1/2/3 (SO1: Manage network performance through 'Network-minded' decision-making; SO2: Deploy and integrate interoperable and secure information management systems; and SO3: Optimise Network design).

Project objectives:

The strategic NM airport related network and local activities are currently covered by nine work streams of the Operational Excellence Programme (OEP). The link between the OEP work streams and the strategic objectives of the NM for airports is described below:



5.3.4 Cooperative Traffic Management (enabler for SO4/3/5 and SO5)

Scope of the project

Cooperative Traffic Management is the collaborative process of determining and implementing optimal ATFCM solutions for network operations through continuous information sharing of individual and local preferences, by cooperation between actors in the planning and execution phases of ATM.

For effective application of improved ATFCM cooperative processes, the current processes for cooperation between stakeholders need to adapt to be able to respond to an increasing level of dynamicity in network operations as part of dynamic DCB. This dynamicity is the result of increased coordination and application of tactical and fine-tuned measures to deal with imbalances at local and network level.

The CTM strategic project addresses 3 capability areas, namely:

Targeted measures

- CTM is focusing on delivering targeted flight-specific route and time-based ATFCM measure optimisations such as enhanced Slot Swaps (eSS), Exclusion from Regulation, CTOT improvements, Network Cherry Picks, Rerouting Proposals, Target Times, etc., and in parallel on improving shared functionalities such as the NM Group rerouting tool (GRRT), the simulation capabilities and the Network Impact services (see enabling capabilities). There is also foreseen a lot of effort for the development of targeted flow regulations and tactical DCB measures (MDI, MIT, even tactical reroute INAP)
- CTM works in close cooperation with FMPs, AO's, airports and NMOC to improve both NMOC systems and user interfaces and giving a priority to B2B developments for a fully transparent process: the objective is to make sure that all actors share the same information.

Optimized network measures

Fine-grained local DCB measures using network coordination processes and network performance indicators allow identification and coordination of Best Network Measures. Local and network coordination processes work side-by-side to find optimized DCB solutions for both local and network performance.

Enabling transversal coordination capabilities (simulation, sharing network impact information, coordination, traffic load/complexity)

Application of targeted flight/flow based measures requires efficient support of traffic loads/complexities and simulation capabilities including transparent data-exchange and presentation of simulation and impact analysis results for efficient coordination between relevant partners.

Exchange of awareness information vectored by the hotspot information family (hotspot, protection hotspot, etc.).

Project Purpose

The purpose of CTM Strategic Project is to support capacity, flight efficiency and cost-efficiency performance improvements required in the context of the SES performance targets. The CTM Strategic Project addresses the interface between ATFCM and Tactical Capacity Management and intends to reduce the gap between planning and execution phases.

Strategic Fit

The CTM Strategic Project contributes directly to the following NSP Strategic Objectives:

- SO4: Optimise Network operations
- SO5: Develop European connectivity and airport services.

Project Objectives

The CTM Strategic Project aims to optimize the delivery of traffic through a cooperative approach between Network, ATC, Flight operations and Airports, and the introduction of time based processes that facilitate a smoother and more predictable sequencing of flights into ATC sectors and Airports.

The full operational application of enhanced time based processes that extend into the execution phase requires:

- Integration of current local operations (tactical DCB measures like MDI, MIT, tactical ATC reroutings etc.) in the Network for a transparent view at all levels, which not only improve predictability but also enables NM to better support the ATM community and is also the first step to enable optimisation and efficient Network performance;
- New ATFCM cooperative processes and techniques for managing local and network imbalances, including the interface to the executive phase;
- new traffic predictability processes, addressing improvements in the flight planning phase including flight efficiency, and including predictability requirements in the operational phase.

The CTM Strategic Project aims, through the principles of dynamic DCB, to:

- Minimise ATC constraints on individual flights;
- Increase cost-effectiveness, e.g. improved planning leads to better use of ATC resources;
- Further reduce the need for ATFCM regulation, i.e. reduce the need for measures such as departure ATFM slots (CTOT) or re-routings;

• Improve operational flexibility for aircraft operators by optimising the departure sequences.

Where ATFCM measures are still required, the accuracy and predictability of their execution will be increased, supporting a more effective ATFCM service. The higher predictability and targeted approach will also allow a network support to extended arrival sequencing which will benefit arrival efficiency and the ability to enable specific sequencing requirements.

Benefits

The use of targeted ATFCM measures by some FMPs has seen significant reductions in ATFCM delay. Wider deployment will further minimise the need for conventional regulations. System supported ATFCM coordination processes is required to ensure adequate involvement of all operational partners in establishing measures where needed. Improved predictability, required to effectively execute ATFCM measures, will increase ATC confidence in ATFCM planning which may then lead to consideration of capacity margin reduction.

Work Packages & evolution area:

The CTM project has been organised along the following evolution areas (also seen as work packages):

- *Network measure optimization:* through the optimisation of the local measure themselves (interacting measures, targeted measures, measure fine tuning...) for one part and network optimization (flow centric optimisation, network measures...) for the other part with the aim to improve the efficiency of the European flow management.
- Impact information sharing and awareness: improve the awareness of all actors on the consequence of measures on flights but also flights modification on measures.
- *Traffic complexity management* aims to put to light the complexity of traffic in sectors and improve the management of its associated workload (Occupancy regulations)
- Flight Plan Predictability: aims to improve traffic predictability for the benefit of network performance, through reduction of over-deliveries and unanticipated traffic by improved adherence to the last filed flight plan, while recognizing the continued need for (managed) flexibility.
- The Short Term ATFCM Measures (STAM) project aims to reduce the impact of ATFCM measures on network performance through the delivery of a complete package of system support and operational procedures initiated by improvements to scenario management functionalities, to enable, in a harmonised way, the application of targeted ATFCM measures (coordinated throughout European airspace) on the day of operations.
- *Target Times Operations* aim to improve the delivery of traffic and to reduce the shortcomings of CTOT (which are restricted to the departure phase only) by extending the management of time-measures to the constraint itself. With *target times* all actors have a common reference in case of time-managing a constraint.
- Support to (extended) Arrival Sequencing aims to offer effective support to ATC's extended arrival sequencing processes, either directly by improving predictability or more indirectly to en-route ATC in the case of cross-border extended AMAN procedures. The project also addresses the interface of (extended) AMAN processes with network and local DCB processes.
- User driven Prioritisation project aims to support Airspace Users to optimise their flights affected by arrival constraints.

More details about the deliverables expected from these evolution areas can be found in the NOP section about NM roadmaps, with indicative planning indications.

CTM and Flight Efficiency

Flight efficiency has a significant economic and environmental impact and so is a key component in the sustainable growth goal. Environmental flight operations are set to be the priority in the coming years. Flight Efficiency activity was re-scoped in 2017 in close cooperation with the airspace users and the Computer Flight Plan Service Providers to address computer flight planning systems evolutions and flight planning strategic advice to the airspace users (rerouteing opportunities customised by the Airspace Users). The NM flight efficiency (FE) initiative focuses on the improvement of the quality of flight planning.

To enhance tactical and strategic support to AOs to achieve more sustainable operations, NM established internal Flight efficiency (FE) task force. FE task force, through close and continuous cooperation between NM and the airspace users and their computer flight plan service providers, contributes to:

- Most dynamic use of the network in flight planning;
- Strategic and continuous improvement of the airline operators' route catalogue;
- Improvement of the flight planning practices;
- Appropriate evolutions of the flight planning systems to take into account the past and future evolutions of the airspace concepts leading to savings in fuel, miles and improving network predictability.

NM contributes to the fulfilment of the requirements of the European ATM Master Plan, of the EUROCONTROL Agency Objectives and of the requirements arising from the relevant European Commission Implementing Regulations through:

- Support of activities related to the improvement of European Flight Efficiency, in light of the associated Single European Sky Performance Targets;
- Development, system enhancement, optimisation and co-ordinated utilisation of NM (Re)routing tools;
- Work with individual AOs and CFSPs on a strategic and tactical level (including work on flight planning quality improvement and reduction of unanticipated flight plans, e.g. Yo-Yo and Sharp turns);
- Promotion of good flight planning practices;
- Contribution to the maintenance of technical guidelines for CFSP systems and other relevant documentation;
- Proposal of relevant operational procedures and contribute to NMOC training as required;
- Contribution to the identification of airspace design and procedural improvements, RAD restriction simplification;
- Conduction of relevant flight efficiency analyses.

5.3.5 Flight Plan and Flight Data Evolutions (enabler for SO5)

Scope of the project

The Flight Plan and Flight Data Evolution Project (FPFDE) is one of the strategic projects within NM intended to deliver the flight planning and flight data exchanges as required within the European ATM Master Plan, the Network Strategy Plan, etc.

This project co-ordinates the gradual implementation, in a harmonised way, of the processes, procedures and systems adaptations required to elaborate and to share 4D trajectory information for planning purposes, enabling better quality air traffic management (ATM) planning across the European ATM network. The project provides an initial step towards

Trajectory Based Operations (TBO) and includes developments in support of the ICAO Flight and Flow Information for a Collaborative Environment (FF-ICE)

More specifically, the FPFDE project encompasses the implementation of FF-ICE/R1 which focuses on pre-departure processes. It includes the introduction of the Planning service in which the Airspace User can obtain an assessment of the constraints and operational acceptability of the flight prior to filing i.e. it introduces the 4DT negotiation process.

FFICE/R2 which addresses post-departure trajectory management processes and procedures is currently under development by ICAO ATMRPP.

Airspace Management and the introduction of A-FUA requires knowledge of the expected traffic, both civil and military. The provision, processing and use of OAT flight plans is included in the scope of the FPFDE project.

NM has been requested to support the processing of VFR flight plans to facilitate the evolution of the ARO function and to rationalise access to all flight plan data within Europe.

The scope of the project may further evolve as the needs of States and the role of NM both in the implementation of pre-departure and post-departure flight plan and flight data exchange processes and procedures in the ICAO EUR Region will be determined.



Objectives

The main objective of the project is:

OBJ1: To deliver the flight plan and flight data exchanges utilising more flexible and precise data capabilities with improved trajectory granularity and precision, necessary to support improved quality ATM planning across the European ATM Network, as foreseen within the European ATM Master Plan, the Network Strategy Plan, and ICAO requirements.

As such it will determine the coordinated European requirements and the resultant detailed deployment with regard to the implementation within NM systems of the procedures and processes related to FF-ICE/R1 services, VFR flight planning support and OAT flight plan integration and distribution. This will enable the NM evolution towards FF-ICE/R2 in support of future Trajectory Based Operations.

Additional project objectives are:

- **OBJ2**: Improve the quality of the ATM Network Planning Processes by sharing accurate and timely flight and flow data.
- **OBJ3**: To support the deployment of the associated Operational Stakeholder implementation in Europe.

Strategic fit

The project is a key contributor to the NSP Objective 'SO4: Optimise Network Operations' and more specifically to sub-objectives SO4/2, SO4/3 and SO4/5.

It also contributes to the NSP objectives 'SO10 – Support European aviation at global level', through the sub-objective SO10/4, via the FF-ICE/1 implementation and 'SO2 – Deploy and integrate interoperable and secure information management systems', through SO2/3 and SO2/4.

Work Packages and Deliverables

• FF-ICE/R1 Step 1– Filing, Trial and Flight Data Request Services,

Stepped implementation: 2019-2023

This step will implement the future flight plan, the ICAO eFPL as it has been developed up to the present time. In practice this means providing primarily the ability to submit a flight plan that includes the planned 4D trajectory of the flight as well as flight specific performance data and other FF-ICE data elements, such as the globally unique flight identifier (GUFI). The NM systems will be modified in order to integrate the new data within the NM systems, with the aim to align the AU desired trajectory with the trajectory used by ANSPs and NM for flight plan validation and resource planning, particularly demand information for DCB purposes.

Initial focus will be on the exchange of trajectory related information between AUs/CFSPs and NM.

New NM B2B services will be developed corresponding to FF-ICE/R1, effectively migrating flight plan data exchanges to FIXM and the ICAO eFPL. NM will provide a translation service and the ability to distribute the resulting flight plan to ANSPs in the appropriate format and via the appropriate interface (B2B, AFTN, etc.) while ensuring consistency is maintained within this mixed mode environment which, in the global context, is expected to last for many years.

Together with the Filing Service, NM will provide the Trial Service that enables the operator to determine the acceptability/validity and the ATM impact on a flight plan without actually filing the plan. The trial service can therefore assist in ensuring the stability and relevance of information held within the main ATM system.

The NM implementation of FF-ICE Flight Data Request Service replicates for FF-ICE flight plans (data and format) the ICAO FPL 2012 function of the RQP and RQS messages, and allows in addition queries related to the status of an individual flight. Note that this capability is meant for use with single flights and not as a general publication service.

• FF-ICE/R1 Step 2 - Data Publication and Notification services Delivery date: Stepped approach from 2020 until end of 2025 (iNM)

This step will implement NM capability to distribute the eFPLs to ANSPs migrated to FF-ICE and that are capable of receiving the eFPLs accepted by NM, and the Notification Service. The eFPLs distribution is achieved through NM B2B publish subscribe services and constitutes an initial implementation of the FF-ICE Data Publication service.

There are two events currently defined to be notified via the Notification service (the departure and arrival of a flight) which equate to the ATS messages DEP and ARR. Although these two events are, by definition, post-departure their inclusion is considered to be advantageous to early FF-ICE implementers giving them the ability to exchange departure and arrival information within the FF-ICE environment rather than reverting to the AFTN.

These first two steps will therefore provide a flight plan filing functionality similar to that which is available today but with the addition of the FIXM format and the Global Unique Flight Identifier (GUFI) which will be implemented in accordance with internationally agreed procedures and format. This will support the automated negotiation process which is planned for implementation in the next step.

• FF-ICE/R1 Step 3 – Planning Service and Consolidated European feedback Delivery date: Stepped approach from 2025 (iNM)

This step aims to provide the 'Planning' service that is part of FF-ICE (FF-ICE/R1) and the consolidated European feedback that NM provides to airspace users as response to their submissions.

The FF-ICE 'Planning' process enables the Airspace User to provide early or preliminary flight plan data and to receive from NM an indication of the validity of the proposed route/trajectory and an indication of all constraints affecting the flight. The AU will engage in an automated systematic dialogue or negotiation to determine the route/trajectory that best suits its business criteria for the flight. Such a process will provide the AU with the ability to plan the flight more efficiently, taking its business needs into consideration and will also provide ATM with improvements in terms of demand accuracy while facilitating capacity management initiatives to address the demand. The feedback provided to the operator will be automatically updated as time advances in order to take into account the progressive and collaborative flight planning and flow management processes.

This step will also aim to implement CDM processes and procedures between NM and ANSPs for constructing the consolidated European feedback that NM will include in the response provided to each submitted flight plan. This should be viewed more in the context of fine-tuning the European ATM expected 4DT.

• OAT flight plan integration Delivery date: from 2023

This work package includes the reception, processing and distribution, by NM, of harmonised and improved flight plans for flights that operate as OAT (iOAT flight plans). In addition to the ICAO 2012 flight plan data, iOAT flight plans will allow sharing of military specific ATM information needed to fulfil mission requirements e.g. special en-route activities, identification of reserved airspace. It will therefore support enhanced FUA and airspace management processes.

• VFR Flight Planning Support Delivery Date: from 2024 (iNM)

This deliverable aims to provide support by NM to VFR flight planning systems by ensuring adherence to standard flight planning format and syntax.

It enables a centralised flight plan processing and distribution service for VFR flight plans similar to the one currently in operations for IFR flight plans. Centralised storage and access via NM to supplementary flight plan information for VFR flights for search and rescue purposes

is included. Participating Aerodrome Reporting Offices (AROs) will be able to remotely access VFR flight plan messages within the NM system for flights departing within their area of responsibility for manual processing.

This service will be deployed in operations in the two steps:

- a) Step 1 includes the centralised VFR flight plan validation and distribution by NM supported by AROs;
- b) Step 2, in addition to Step 1, includes the flight Route validation and the addressing of the flight plan by NM.

• FF-ICE/R2 Step1 and Integration of aircraft downlinked data Target delivery: 2030

This deliverable addresses the post departure related exchanges that are still under elaboration, including the developments, integration and sharing by the ground systems of the trajectory information downlinked by the aircraft during the flight execution phase, thus ensuring a consistent view on the flight trajectory between air and ground systems.

This deliverable aims to implement new and/or adapt the existing procedures related to the exchange of information between NM and ATC/ANSPs. It addresses feedback from ATC/ANSPs concerning planned trajectories or required modifications and subsequent actions or responses from NM. Its primary objective is to incorporate post-departure CDM processes that facilitate the planning of route/trajectory modifications.

Expected benefits

- High fidelity traffic demand resulting from enriched and coordinated trajectory information, including aircraft performance data;
- Improved flight efficiencies through the incorporation of preference and constraint information enabling more informed choices;
- Enables introduction of new concepts of operation and new functionality such as, but not limited to, advanced PBN which may not be supported by the current flight plan format;
- Interoperability and data exchange between Europe and other adjacent Regions to improve traffic predictability and airspace capacity utilisation in Europe;
- OAT integration is expected to enhance the processes associated with determining demand, enabling better resource allocation in support of advanced FUA;
- Better traffic predictability for better anticipation of traffic clustering and definition of dynamic Demand Capacity balancing solutions;
- More accurate input to arrival and departure management processes, Airspace Users and Airport Operators access to more accurate flight information for local planning purposes.

5.3.6 European ATM Information Management System (EAIMS) (enabler for SO2)

Scope of the project

The European ATM Information Management Service (EAIMS) project aims at delivering the service that provides the reference source of aeronautical information for pan-European, FAB and national systems. Through EAIMS, the end user will be provided access to all the required, consolidated, consistent and operationally validated data in a seamless, secure and standardised way from a single access point. EAIMS will be implemented in a step-wise approach in order to minimise the project risks.

<u>Objective</u>

The main objective of EAIMS is to deploy the reference source of aeronautical information to cover operational stakeholders' needs. This will enable the seamless integration of the upstream-downstream processes and provide services/tools enabling AISPs to fulfil their ICAO and Single European Sky (SES) obligations, such as compliance with the Aeronautical Data Quality (ADQ) Regulation, and Flight Operations community to maintain necessary data. In order to achieve the above objectives, the state-of-the-art services and supporting systems, compliant with System Wide Information Management (SWIM) concepts will be deployed. Whilst implementing new generation systems, the EAIMS will take into consideration the legacy systems to ensure a smooth migration and transition to the new service.

Strategic fit

The project is a key contributor to the NSP Objective 'SO2 – Deploy and integrate interoperable and secure information management systems', and fully addresses the NSP Action SO2/6.

The project is an enabler to the NSP Objective 'SO4 – Optimise Network Operations', and more specifically to the Action SO4/3 and SO4/7, by providing the context data that allows building the shared 4D trajectories.

By bringing a shared view of the ATM context information, the project also contributes to the NSP Objective 'SO3 – Optimise Network Design', and in particular to the implementation of the Advanced Flexible Use of Airspace and Free Route Airspace concepts.

Work Packages and Deliverables

A new implementation plan is being developed, as part of the iNM programme.

Expected benefits

The EAIMS will deliver a consistent, accurate and up-to-date ATM context data set. It will provide reliable access to this common source of pertinent information, with safety, security, operational and efficiency benefits.

5.3.7 NM Ops service platform (n-CONECT) (enabler for SO2, SO4 and SO5)

Scope of the project

The n-CONECT (network-COmmoN Enhanced Collaborative ATM) programme, corresponds to the "NM Ops Service Platform" Strategic Project identified in the NSP (Network Strategy Plan), providing a global vision for the NM service interfaces.

The initial focus of n-CONECT is a planned convergence to single, redesigned HMI for all users, fit for purpose and flexible enough to meet the needs of the different user roles (both internal and external).

Through a sequence of projects, the programme will develop services and tools to:

- ensure access to the Network view to all Stakeholders involved in evolution of NM functions and future ATM;
- make Network information & decision flows available to support operational CDM between different Stakeholders, across the Network and across the ATFCM phases; and
- take advantage of new technologies (such as HTML5, COTS products for building the HMI).

In addition to extensive stakeholder consultation at a working level, visibility of the work in the NSP means that there will be discussion and agreement at highest level

<u>Objectives</u>

The project aims at setting up a new NM operational collaboration platform and related processes which shall respond to the following objectives:

OBJ1: Virtual Operations Room

Improve Network situational awareness and increase operational CDM efficiency for all network stakeholders, through:

- Better Network information sharing;
- Facilitated collaboration between Network Stakeholders;
- Better awareness of the Network situation that could impact Stakeholders' operations;
- Simplification of the HMI (making it quicker to use and to locate relevant information);
- Increased interoperability;
- Reductions in the need for manual interventions;
- Improved connectivity between operational processes via the supporting tools, accessible through both desktop and mobile devices.

OBJ2: Common HMI – "one-stop shop" for NM information and services

Provide a common HMI for all Network Stakeholders (external), customisable and flexible enough to meet the needs of the different user roles and different organisations' ways of working.

OBJ3: SWIM Implementation

Enable the development of SWIM-compliant B2B services and migration of existing services to SWIM standards as they become mature.

OBJ4: Support the NM service interface requirements of the NM Strategic Projects

Enable the timely implementation of the NM service interfaces required by the NM Strategic Projects, addressing both their functional and non-functional requirements, thus supporting the PCP deployment in the short term and paving the way for the longer term SESAR/Centralised Services evolutions.

OBJ5: Improve User Satisfaction with NM Service Interfaces

Improve the users' satisfaction through:

- Improved consultation and providing them with an efficient & easy to use interface;
- Improved delivery time by making n-CONECT application developers more productive and enabling new resources (internal and external) to be used;
- Services becoming accessible also via mobile devices.

OBJ6: Improve Customer Service Management

Improve customer service management for NM services, for instance through:

- Knowing who is using which services, how often and via which means;
- Enhanced service access control;
- Better measurement of NM's service delivery;
- Improvement of NM's service delivery;
- Improvement of NM's customer relationship management.

OBJ7: Improve NM Cost-efficiency

Deliver cost savings for NM through:

- The rationalisation of the existing B2C interfaces (CHMI, NOP Portal), solving the current issues of diverging interfaces and fragmented development;
- Making n-CONECT application developers more productive and enabling new resources (internal and external) to be used with reduced learning curve;
- Enabling more efficient customer management.

Purpose of the project

Since Release 12, NM has offered services based on internet technologies (NOP Portal, B2B Web Services) alongside other legacy interfaces (CHMI, EHMI). These service interfaces need to be enhanced to the level needed to cope with future requirements (e.g. coming from SESAR research, the initial deployments in the Pilot Common Project (PCP) and the introduction of the centralised services (CSs).

The NM Strategy is to capitalise on the internet technology to deliver value to the business and to take into account the SWIM concepts.

In order to address the current issues of:

- fragmented development of service enhancements according to user priorities within the NM work programme
- diverging interfaces CHMI, NOP Portal
- increasing Stakeholder dissatisfaction

an NM programme with a concrete plan is required to manage the evolution and to ensure that it is done in line with Stakeholders' expectations.

Strategic fit

The Project is a major enabler of the NSP Strategic Objective SO2 - 'Deploy interoperable and effective information management systems'.

It addresses:

- Most of the scope of the NM activities for SO2/1 Action 'Extension of the current NM
 Operational Service Platform with development frameworks and enrichment of NM
 and stakeholder systems with the functionalities required to support the CDM
 processes and the SES requirements' and related milestones; it excludes the work on
 the back-ends;
- Most of the scope of the SO2/4 Action 'Implement a service-oriented architecture in compliance with the European SWIM specifications to ensure interoperability in support of the Network Functions at central, regional or local level' and related milestones; it excludes the work on the back-ends.

Evolution areas and Deliverables

This project will bring evolutions to the following areas:

- Enhanced single NM service platform for existing services
 - Migration to new NM Operational Service platform: Migration to new platform, SWIM enabled and supporting profile management and publish subscribe mechanism
 - Operational use of single interface: Operational users will migrate from use of the existing interfaces (NOP Portal, CHMI) to the use of single enhanced platform interface

- WEB-based B2B services for existing B2C functionalities: Provide operational users with B2B services corresponding to existing services, in a publish/subscribe environment. n-CONECT will provide the technical enablers, allowing other projects to develop these services
- NM Service Platform in support of new services
 - Access to new Services through a single NM Service Platform Human Machine Interface

Enable development of new Human Machine Interface applications based on the operational requirements coming from the Strategic Projects of NM

- New Web based B2B services corresponding to new services

Enable development of new B2B data exchange services based on the operational requirements coming from Strategic Projects of NM.

To cover the evolution areas above, n-CONECT will deliver the following products and services:

- B2C interface
 - Provision of single HMI for external users (enabling the phase out of the existing legacy interfaces CHMI, NOP Portal, some Remedy applications, AME and PRFPL):
 - migration/enhancement of existing applications
 - enabling the development of new applications
 - Front-end framework for the development, testing and integration of HMI applications, addressing both desktop machines and mobile platforms
- Service management developments in support of both the B2B and B2C services, such as:
 - Delegated user administration
 - Access rights
 - Service integration layer
 - Service level management.

Expected Benefits

n-CONECT will:

- Improve the users' satisfaction (in particular FMPs & AOs) through improved consultation and providing them with an efficient & easy to use interface;
- Deliver cost savings through the rationalization of the existing B2C interfaces (CHMI, EHMI, NOP Portal);
- Improve delivery time by making n-CONECT application developers more productive and enabling new resources (internal and external) to be used;
- Bring opportunities derived from new technological evolutions;
- Enable increased efficiency through better Network information sharing, facilitated collaboration between Network Stakeholders, awareness of the Network situation that could impact Stakeholders' operations, simplification of the HMI (making it quicker to use and to locate relevant information), increased interoperability and reductions in the need for manual interventions;
- Provide improved integration and interoperability between operational processes via the supporting tools, accessible through both desktop and mobile devices;
- Support risk management, for example the re-engineering of the service layer to make it more modular will improve service availability; B2B services can offer an alternative to some B2C services; and for some users, the fact that services offered over PENS can also be provided via the internet could constitute a backup solution.

Thus, the project will support all Network Stakeholders in achieving and delivering Network performance as expected.

5.3.8 Integration of New Entrants in the European ATM network operations (iNEO) – SO3/7 Network integration of new entrants including drones and EHAO

Scope of the project

iNEO is the strategic project that covers two distinct domains: very high altitude operations – including HALE/HAPS, supersonic/hypersonic aircraft, commercial space - and other altitudes operations by drones.

For HAO, the project will address operations in the Higher Airspace (HA), above FL500 as well as the transit of new entrants through the European ATM network. The project will focus in particular on network planning, contingency management and civil-military cooperation in ATM. iNEO will address, inter alia, airspace organization and management, operational procedures, development of operational interfaces with non-aviation actors (e.g. space agencies), use of scarce resources by new entrants.

For other altitudes UAS operations, that also includes the equivalent of the ICAO RPAS, the project will focus on understanding the potential impact of these operations on network nodes such as airports and the associated impact on network performance. The project will analyse specific elements related to network contingencies scenarios where the network safety and performance could be impacted.

Project Objectives

Under the NM Network Management Implementing Rule – and its responsibilities for the European Route Network Design (ERND) Function, the project will ensure and co-ordinate the gradual implementation, in a harmonised way, of Higher Airspace throughout European airspace, as a minimum, at approximately FL500 and above by 2026. At the same time, it will work towards the establishment of a seamless European Higher Airspace Block in accordance with SESAR airspace architecture study.

Main objectives of the project:

- Detail aspects of the European CONOPS for HAO for network operations;
- Facilitate and co-ordinate the definition and adaptation of network planning processes for new entrants to include new actors from space domain;
- Ensure that a single airspace planning process is developed and used at scale for new commercial space operations inside the EUROCONTROL NM area;
- Ensure the European higher airspace volume is defined and implemented in a coordinated and synchronised manner across the EUROCONTROL NM area;
- Identify operational and system requirements supporting the adaptation of NM systems new entrants' operations (e.g. contingency capabilities for commercial space nonnominal scenarios);
- Ensure that civil-military cooperation elements specific to HAO are identified and included in further updates of relevant procedures between civil and military authorities;

- Develop updated procedures for contingency scenarios related to commercial space operations from inside or outside the EUROCONTROL NM area;
- Identify new scenarios that may require updates to the EACCC contribution from the EUROCONTROL NM;
- Contribute to the update of the relevant regulatory frameworks underpinning aviationspace operational interface.

From these high level objectives, the following working level objectives are drawn:

OBJ1: Develop operational procedures, safety, performance and interoperability requirements in support of HAO for the Network Manager.

OBJ2: Provide implementation support to the, ANSPs, FABs, CAAs, NSAs and airspace users in order to ensure harmonised and expeditious deployment of HAO across the Network. Further develop existing common guidance material.

OBJ3: Ensure the readiness of NM systems for the changes required by the HAO concept to support the stakeholder implementation.

OBJ4: Track and report performance evolution in the network against HA operations.

OBJ5: Improve awareness of the HAO concept and operations amongst all stakeholders.

OBJ6: Establish processes for coordination with non-aviation actors involved in new entrants' operations (e.g. space agencies) and define operational interfaces between ATM-STM.

OBJ7 Ensure that UAS operations do not trigger a reduction in safety and performance for the ATM network from an NM perspective.

OBJ8 Share Procedures, Legislation, Best Practices, Guidelines and Main conclusions of the main projects regarding integration of HAO and UAS in EU and in coordination with ICAO.

OBJ9 Contribute to the identification of new regulatory requirements.

OBJ10 Contribute to the development of procedures for crisis management regarding HAO as appropriate.

Project Purpose

iNEO aims to deliver the seamless integration of new entrants into European ATM network operations.

Strategic Fit

The project is one of a number of NM Strategic Projects originating from the Network Strategy Plan (NSP) and its objectives within the cycle 2020-2029 in which new entrants' operations are a key component.

The project will support EUROCONTROL's contribution to the European Action Plan/roadmap for higher airspace operations.

iNEO will be executed in line with the following NM strategic objectives described in the Network Strategic Plan (NSP) for the reference period 2020-2029: SO3/4, SO3/7, SO6/5, SO 9/3, SO 10/4.

Work Packages and Deliverables

WP 1 Programme Management

This work package will be responsible for ensuring the management of the iNEO Network Strategic Project.

Deliverables

- D1.1 Roadmap to define, develop and implement HA for the EUROCONTROL NM area : Phase 1: 2022-2023
- D1.2 Implementation of HA roadmap : Phase 2: 2023-2026

• WP 2 Network operations planning integration

This work package will be responsible for identifying planning elements for new entrants that have to be included in the Network Operations Plan (NOP) and the European Route Network Improvement Plan (ERNIP). The work package will analyse existing planning procedures and processes against the specifics of new entrants' missions and update the network planning documentation and processes. In relation to new entrants' obligations to follow the network planning processes, the work plan will coordinate with WP7 the appropriate working arrangements to ensure consistent input is provided to NM planning processes. In relation to the network performance impact due to new entrants' inclusion into the European ATM network, the work package will coordinate the necessary input for the network performance planning processes.

Deliverables

- D2.1 Identification of new entrants planning elements for NOP and ERNIP : Phase 1 2022-2023
- D2.2 NM performance plan analysis: Phase 1 2022-2023
- D2.3 Updated NOP/ERNIP to include new entrants planning: Phase 1: 2022-2023

• WP 3 Operational procedures harmonisation

This work package will be responsible for the definition and harmonisation of operational procedures related to the transit through classic ATS airspace and operations in HA for new entrants. It will start from the European ConOps for HAO and the Network Operational Framework.

Deliverables

- D3.1 Updates to regional and global regulations for relevant ATM procedures

• WP 4 Airspace organisation and management

This work package will be responsible for coordination of the higher airspace definition, adoption, publication, implementation and management across the EUROCONTROL NM area.

An evaluation will be performed to determine the potential impact on current network operations in terms of environmental effects and ATC capacity. A generic simulation shall show these effects by comparing a baseline scenario (i.e. 2030 situation without HA) with a scenario with maximum envisaged HA developments. This simulation will depend highly on assumptions and uncertainties regarding HA operations but will provide a "maximum effect" situation.

In order to plan for the potential impact of individual HA missions on current network operations, this work package foresees the provision of a standardised impact analysis method. This methodology will provide data regarding the environmental effects as well as the capacity impact. Rules have to be established regarding where and when to perform such an impact analysis. A post-ops analysis shall become an integral part of this methodology.

The work package will be responsible for the evaluation of existing airspace management procedures for new entrants operations and their improvement in accordance with research that aims to minimise impact on network performance.

Considering the different types of vehicles and missions that intend to operate in HA, this work package will propose a generic procedure for booking/reserving airspace.

The work package will generate input to amend relevant documentation for the Network Manager in relation to airspace organisation and airspace management. The ERNIP documentation shall be updated to include guidelines on how to implement higher airspace. Three individual areas of interest shall be covered:

- Interaction of HA traffic in conventional airspace
- Transition of HA traffic from conventional airspace to HA
- Interaction in the HA proper with other HA users

Close cooperation with other work packages is required to provide all necessary information for the ERNIP documentation. For other NM documentation, the authors/owners of the documents will be approached with a request to update their documents with relevant HA information.

Monitor on-going research related to airspace organisation and management and include in operations specific elements that have reached maturity; advise on prioritisation for new solutions that may be needed by new entrants. Contribute to identify operational and system functionalities that would be needed to improve the efficacy of solutions designed to maximise the dynamic use of airspace.

Deliverables

- D4.1 MESH Maximum Effect Simulation of HA
- D4.2 SIAM Establish a Standardised Impact Analysis Method to evaluate the potential impact of individual HA missions
- D4.3 Evaluate and improve existing ASM procedures for new entrants
- D4.4 Propose an organisation of airspace users' criteria for booking/reserving airspace
- D4.5 Include HA in NM documents (ERNIP et al)
- D4.6 Establish a process for monitoring on-going research for HA operations

• WP 5 Civil military cooperation

This work package will be responsible for coordinating civil-military aspects related to new entrants. It will include but not be limited to, developing information packages for appropriate consultation arrangements for civil-military matters, identifying specific topic of interest for the network manager responsibilities in relation to new entrants operations, coordination with iNEO relevant work packages to improve and adapt airspace management and operational procedures.

For the term "cooperation", the meaning will be the same as the one described in the ICAO Doc 10088 (Manual on Civil-Military Cooperation) First Edition, 2021, which states: "Cooperation is the more practicable effort towards developing mutually agreeable optimized solutions to strategic and pre-tactical issues and challenges in the nearer time horizon".

The work package will monitor relevant developments in relation to interfacing with the space domain and support identification of new operational requirements that are relevant for the EUROCONTROL Network Manager.

The input provided by WP 5 will be coordinated with the Civil-Military ATM Coordination (CMC) Division from the EUROCONTROL Directorate for European Civil Military Aviation (DECMA). The CMC experts will contribute to the relevant WP activities and the WP deliverables.

Deliverables

- D5.1 Regular briefings to coordination bodies for civil-military cooperation in ATM
- D 5.2 New procedures for civil-military cooperation in HAO
- D5.3 Update to ICAO documentation relevant for civil-military cooperation in ATM (e.g. Doc10088)

• WP 6 Contingency management

This work package will be responsible for developing contingency management procedures for new entrants with a view to identify the Network Manager's responsibilities in case of nonnominal events that have an impact on the Network. The work package will work through NM CDM processes with stakeholders to define the roles and responsibilities at national, regional and network-wide level in contingency scenarios related to new entrants. The work package will start by analysing the current scenarios covered in the network contingency procedures against use cases stemming from new entrants declared mission intent.

Deliverables

- D6.1 Gap analysis and identification of new scenarios Phase 1: 2022-2023
- D6.2 Inclusion of new contingency scenarios in the network contingency plan
- D6.3 Ops & system requirements for iNM update

• WP7 Implementation planning and identification of further research needs

This work package will be responsible for specifying the implementation changes and development to NM functions and systems identified as part of the NM scope in the European Higher Airspace Operations Concept of Operations. It will describe a NM implementation plan and roadmap. The work package will maintain an active watch of stakeholder implementation initiatives in the European region.

This will start with short-term implementation activities required to support pioneer airspace users where the adaptation of existing NM processes may be possible to facilitate low frequency operations. However in the medium term, as the frequency of operations and traffic increases in the HA, operational requirements and developments will be identified and targeted at the future development of iNM and its services. In the longer term, the integration of solutions coming from SESAR, which have been validated and have reached a sufficient level of maturity for pre-operational trials, will also form part of the implementation planning. The implementation plan will aim to build on user demand.

The work package will identify needs for further research initiatives to support new entrants.

Deliverables

- D7.1 Implementation Plan and Roadmap v1 2023
- D7.2 Implementation Plan and Roadmap v2 2026

• WP 8 UAS Network interfaces analysis

This work package will identify relevant operational interfaces between NM/U-Space and potential influences of new operations on the current ATM network in order to evaluate the potential impact on safety and performance

The primary aspects to be considered by NM regarding expected activities of UAS new entrants relate to, as much as possible improving, but at least maintaining, safety and efficiency of the ATM network.

Some of these activities will remain segregated for some time, some other will proceed towards earlier integration in the airspace. In all cases, there will be a potential impact on the organisation of the airspace and on the requirements and procedures applicable for the access to airspace, therefore an impact on safety and efficiency of the network.

NM is not directly involved in the development and validation of the safety and efficiency of UAS operations, however, these emerging operations will have a potential impact on the existing activities related to ATS procedures, airspace management and interface with technical systems.

Deliverables:

- D8.1 Report on the impact of UAS operations on safety and performance of the ATM network

• WP 9 UAS Impact assessment on network nodes and operations

This work package will be responsible to evaluate and monitor the potential impact of emerging operations. The analysis will be focused towards the interfaces identified in WP8

The adopted legislation leaves a significant flexibility for EU States to organise their airspace and procedures to accommodate new entrants, in particular under the U-Space regulation. Therefore one of the essential aspects will be to ensure that information related to the development of unmanned operations in national airspaces will be properly monitored and analysed, in order to permit understanding of their impact at network level.

The LSSIP process already includes material related to UAS operations and it will be used as a primary source of information. Depending on future developments, it might be necessary to further develop reporting processes in order to make sure that NM is aware of new operating environments and able to monitor their impact on the network.

Once the information is available and properly monitored, it will be necessary to evaluate the impact in terms of safety and performance and to investigate possible measures or evolutions in the case it would be deemed necessary.

Deliverables:

- D9.2 Proposed approach to mitigation of identified impact, including sharing of best practices

• WP 10 UAS Disruption, security and contingencies

This work package will monitor and evaluate the impact on the network of possible non-nominal situations related to UAS and to explore procedures and processes that could be developed to reduce the probability, the occurrence and the impact of such situations.

Normal procedures for new operations should not produce detrimental effects on safety and performance of the ATM network.

However, like for any kind of aerial operations, risks of disruptions and contingencies cannot be excluded and have to be taken into account. The specific situation with the absence of a pilot on board, the expected high levels of automation and the fact that all this is a very new area implies a level of risk that requires careful monitoring.

Deliverables:

- D10.1 Report on the impact of non-nominal UAS operations on safety and performance of the ATM network.

- D10.2 Proposed approach to mitigation of identified impact, including sharing best practices.

Expected Benefit

Development of airspace organisation and management solutions bespoke for new entrants' requirements with a view to avoid airspace fragmentation across the EUROCONTROL NM area.

Identification of specific needs for airports/aerodromes, as network nodes, in context of new entrants operations, e.g. commercial space operations use of existing infrastructure.

Higher Airspace will aim to be a unified volume of airspace which will be free from the fragmentation currently existing in the ATS airspace volume below HA.

5.4 Airspace Restructuring Programme

The Regulation on implementing the ATM network functions describes the European Route Network Design (ERND) Function, as follows:

- a. Achieve a European Route Network Improvement Plan for the safe and efficient operation of air traffic, taking due account of the environmental impact;
- b. Facilitate, within the European Route Network Improvement Plan, the development of an airspace structure offering the required level of safety, capacity, flexibility, responsiveness, environmental performance and seamless provision of expeditious air navigation services, with due regard to security and defence needs, and
- c. Ensure regional interconnectivity and interoperability of the European route network within the ICAO EUR Region and with adjacent ICAO Regions.

The development of the European Route Network Improvement Plan (ERNIP) relies on a cooperative decision-making process (CDM). The European Route Network Improvement Plan forms part of the Network Operations Plan.

Member States remain responsible for the detailed development, approval and establishment of the airspace structures for the airspace under their responsibility.

Currently, airspace improvement initiatives are discussed and coordinated at network level through the CDM process for the ERND Function and also includes the Route Network Development Sub Group (RNDSG) of the Network Operations Team (NETOPS). The members of the RNDSG are civil and military experts in airspace design and airspace utilisation and availability from EUROCONTROL, the ECAC member States and EUROCONTROL Network Manager participating and associated States and their ANS providers, ICAO, airspace users international organisations, flight planner organisations and other relevant international organisations (IFATCA, IFALPA etc.). Non-ECAC member States and industry may be invited to nominate representatives.

Full integration of all operational planning processes has been achieved, including the creation of stronger links between airspace designers and the users intending to use new airspace structures. The RNDSG, the RAD Management Group (RMG), the ATFM Environment database coordinators and the Flow Management Position (FMP) managers work closely together to ensure early coordination of airspace design and airspace utilisation.



5.4.1 En-route Airspace Enhancements

The ERNIP Part 2 - European ATS Route Network (ARN) Version 2023 - 2030 containing the Catalogue of Airspace Projects to be deployed over the period 2023 - 2030 will be approved by the Network Management Board in July 2023.

The ERNIP Part 2 - European ATS Route Network (ARN) Version 2023 - 2030 provides a network-consolidated picture of network and local/FAB projects and the evaluation of their expected performance in response to the European network performance targets and local environment reference values. As a result of those evaluations it can be derived that the performance targets of the 3rd Reference Period of the Single European Sky Performance Scheme (RP3) will be met if the proposed NM measures will be implemented and if further improvements take place with respect to flight planning.

<u>The</u> ERNIP Part 2 - European ATS Route Network (ARN) Version 2023 - 2030 <u>also</u> represents in its entirety the contribution of all the operational stakeholders to the development and implementation of the Airspace Restructuring Programme.

The ERNIP Part 2 - ARN Version 2023 - 2030 will ensure the implementation, in cooperation with the ANSPs and the FABs, of the Airspace Vision agreed by the Network Management Board that includes:

- a comprehensive cross-border implementation of Free Route Airspace, at least at and above FL310, in the European airspace;
- an optimised route structure below FRA ensuring efficient connectivity in/out terminal airspace;
- a simplification of the RAD;
- a harmonisation of the airspace publications;
- more efficient Flexible Use of Airspace procedures and the associated system support to enable a better utilisation of the civil/military airspace structures;
- a closer co-operation between the Network Manager, the airspace users and the computer flight plan service providers (CFSPs) aimed at ensuring a better utilisation of the available airspace structures.

The ERNIP Part 2 - ARN Version 2023 - 2030 has the following objectives:

- achieve an European Route Network for the safe and efficient operation of air traffic, taking due account of the environmental impact;
- keep operational consistency of the European airspace organisation;
- consolidate into a network approach the Functional Airspace Blocks developments, the wide implementation of airspace projects from Free Route Airspace to TMA developments;
- facilitate the development of an airspace structure offering the required level of safety, capacity, flexibility, responsiveness, environmental performance and seamless provision of expeditious air navigation services, with due regard to security and defence needs;
- ensures regional interconnectivity and interoperability of the European route network within the ICAO EUR Region and with adjacent ICAO Regions.

The consolidation of all medium-term projects into one single European airspace design view until 2030 ensures the following:

- Clear visibility of the evolution of the European airspace structure throughout the period
- Identification of network effects;
- Integration of FAB Projects through co-operative decision making processes;
- Identification of inconsistencies between FAB, sub-regional or national projects;
- Identification of corrective actions to ensure an integrated approach and to maintain consistency of the overall European airspace design, including at its interfaces;
- Harmonisation of operations in the European airspace;
- Clear identification of benefits.

ERNIP Part 2 - European ATS Route Network (ARN) Version 2023 - 2030 containing the Catalogue of Airspace Projects to be deployed over the period 2023 - 2030 is currently under preparation and will be included in the NOP 2023-2027 in June 2023, following its approval by the Network Management Board.

5.4.2 Integration of Terminal Control Areas (TMA) into the overall network

A proactive approach towards the full integration of TMA into the ATM network includes the collection of data concerning Terminal Control Areas and respective ATS units, clarification of the capacity plans for congested European TMAs and the identification of bottlenecks. Specific proposals are being developed to enhance Terminal control area design, improve flight efficiency and capacity by exploiting new ATC techniques as well as enhanced Performance-Based navigation (PBN) capabilities based on RNAV or RNP specifications developed by ICAO. Such PBN initiatives could include the increased use of existing terminal navigation specifications such as RNAV 1 or RNP 1, as a basis for the design and deployment of SID/STAR procedures as well as the use of RNP APCH specifications as the basis for the design and deployment of Instrument Approach procedures on all instrument runway ends, as required in Commission Implementing Regulation (EU) no. 2018/1048 and in accordance with ICAO Resolution 37-11 and the ICAO Performance-based Navigation (PBN) Manual. All these initiatives will be followed up through bilateral discussions with ANSPs, in a similar process to that of en-route capacity planning.

5.4.3 Further developments

Having in mind a number of on-going and planned development projects affecting the overall European ATS route network any potential inconsistencies need to be resolved prior to implementation. In this respect, all States/FABs/ANSPs initiatives and sub-regional group activities are required to proactively provide the information to the Route Network Development Sub-Group to support the required network approach. This ensures transparency and coherency of all airspace design work.

There has been good progress to implement the actions foreseen in the Flight Efficiency Plan. Nevertheless, work is continuing for the following:

- The further development and implementation of dynamic and flexible airspace design solutions to support improved flight-plannable routes;
- Prioritisation of the development of ATM system support for improved airspace utilisation;
- Rapid and coherent implementation of free route airspace initiatives;
- Making the Route Availability Document (RAD) more flexible;
- A harmonised and accelerated deployment of Airport Collaborative Decision Making (A-CDM);
- Systematic use of Continuous-Climb Operations (CCO) and Continuous-Descent Operations (CDO);
- Systematic deployment of RNP approach procedures with vertical guidance (using either Baro or SBAS) to instrument runways;
- Increased use of RNAV and RNP specifications as a basis for route design, particularly in the TMA.

5.4.4 Enhancing the utilisation of airspace improvements

The actions below will contribute to enhancing the utilisation of airspace improvements:

- The RNDSG Airspace Implementation Synopsis (RAIS) will continue to be used to improve the awareness amongst the airspace users on expected airspace changes;
- The RAIS maps showing a network view of new established airspace structures can be used as a base to help AOs to improve their flight planning;
- A privileged network relationship established with the AOs will continue to be used to achieve network environment/flight efficiency improvements (simple relation, straightforward dialogue, strong operational points of contact with the airspace users that can influence flight planning, etc.);
- On an AIRAC basis, publicity of the airspace changes is made, showing benefits achievable in terms of distance (nautical miles), CO2 emissions, etc.;
- Dedicated airspace users briefings through teleconferences;
- After AIRAC implementation, follow up of the actual flight planning;
- Follow up with airspace users and looking into the reasons why these routes have not been used; seeking for solutions and integrating their feedback;
- Providing constant, valuable feedback to RNDSG.

With respect to strategic improvements, the work conducted in the context of the RNDSG, with various airline groups (AOG, IATA RCG, IACA CAFO, etc.) or with the Computer Flight Plan Service Providers (CFSPs) help in the identification of possible improvements with respect to flight planning. Several actions have been taken and will continue in the future as follows:

- Continuous monitoring of the flight planning versus the best options offered in the route network;
- Identification of improvements in flight planning for various flows and city pairs taking into account the latest network situation;
- Assessment of individual airline's flight plans;
- Identification of airspace design actions or airspace utilisation rules leading to improvements in flight planning;
- Suggestions made to the airspace users and the CFSPs on better utilisation of the existing airspace structure;
- Presentation to dedicated airline groups of possible improvements in flight planning and the identification of areas/airlines where such improvements can be brought.

With regard to pre-tactical and tactical improvements, the flight efficiency services include notification to AOs of existing tactical potential flight efficient options, and could further include the following:

- Coordination by the Network Manager, with ANSPs and, if required, military partners, of the deployment of the best flight efficient network configurations and further flight efficient refinements in a proactive manner;
- It is worth noting that a notification process (in passive mode of operations) is already described in ASM Handbook and implemented via EAUP/EUUP. This process could be considered passive because the notification of airspace status information is broadcasted on the Network Operations Portal via EAUP/EUUP or via eAMI message for those using B2B service, therefore, the interested AOs are responsible to detect those flight efficiency opportunities.

A number of enablers facilitate such support as follows:

- IFPS staff reprocess daily the entire operational flight pan database through the group re-routing tool, using a cost effective approach from airspace users; opportunities are then communicated back to flight plan originator for further consideration;
- AOLO addresses individual AO requests and provide an advice on better planning options when requested, and where available - subject to AOLO workload;
- CDRs availability and opportunity identification and notification to AO by flagging them for individual flights;
- EAUPs/EUUPs provide updated information of airspace status to the users via NOP Portal as well as via eAMI message for those using the B2B service;
- Selective, limited RRPs sent to potentially interested AOs;
- System developments already available to be used for Flight efficiency Service provision;
- Flight efficiency targets are clearly established and displayed in Ops via the flight efficiency playbook;
- Enhanced post ops processes to include on continuous basis flight efficiency, included specific personal follow up for airspace users requesting it.

Additional enablers have been put in place as follows:

- Monitoring process and feedback on the planned, current and expected flight efficiency performance indicator;
- Process towards States/FABs/ANSPs aiming at enabling flight efficient network deployment/change during the pre-tactical and tactical phases (CDRs opening request to AMCs, use of inactive areas basing on real time airspace status data, RAD deactivations proposals/requests, etc.);
- Further development of the interoperability between NM and local ASM support systems to ensure common situational awareness and continuous sharing of ASM data
- Implementation of Single CDR Category (SCC) across the network.

Such an approach ensures that, from a network and local perspective, Network Flight Efficiency improvement measures (proposals) are acceptable for AOs.

Such a support will provide benefits for the following:

- Airspace Users: operational flight efficiency improvements resulting in reduced cost per flight;
- ANSPs: improve flight efficiency contributing to reaching defined targets for the FAB they belong to;
- Network: provision of a pro-active response to environment/flight efficiency targets and the introduction of flight efficiency performance management processes at network level.

5.4.5 Benefits

When compared to the baseline year 2019 (before the start of RP3), the cumulative benefits that ENRIP Part 2 - ARN Version 2023 - 2030 would bring by 2030 represent approximately 1000 million NMs, i.e. the equivalent of 6 million tons of fuel saved, or reduced emissions of 20 million tons, or 5 000 million Euros.

The ERNIP Part 2 - ARN Version 2023 - 2030 re-sectorisation projects are aiming at reducing the complexity of the airspace structure. Based on fast time simulations of a number of projects, it is expected that the ARN Version 2023 - 2030 implementation would bring an additional 7 - 10% capacity to the European ATM network when fully implemented.

5.5 Airspace Utilisation and Route Network Availability Improvements

The Performance Scheme for air navigation services and network functions defines the environment/flight efficiency KPIs for the RP3.

It is essential that the design of the airspace structure and its intended use, including any rules or restrictions, are developed in parallel, to ensure coherent evolution of the ATM network, with the agreement of all stakeholders.

The relevant objective of the IATA/CANSO/EUROCONTROL Flight Efficiency Plan requires the relevant stakeholders to ensure optimum flight efficiency through the following actions:

• Actively support and involve aircraft operators and the computer flight plan service providers in flight plan quality improvements

- Gradually apply route availability restrictions only where and when required
- Improving the utilisation of flexible airspace structures.

The design of the route network continues to improve, with the airspace design indicator showing a continuous downward trend. The indicator for flight planning is improving, but at a slower pace, being impacted by:

- different flight planning/ airline choices
- traffic composition
- geopolitical crisis/ airspace closures
- weather
- industrial action/ special events
- regulations applied due to capacity problems in the network.

With airspace design continually improving, the improvement of the use of the network is the main driver for an improved ATM network performance.

5.5.1 Further Improvements of Airspace Utilisation

Further improvements are expected in airspace utilisation on the basis of additional support provided by the implementation of ASM scenarios. The Network Manager Operations Centre (NMOC), together with the Military Liaison Officer (MILO) position, will further contribute to meeting the needs of ANSPs and airspace users by delivering improved flight efficiency and reduced emissions.

The following activities are envisaged:

- Dynamic Airspace Management;
- Identification of re-routeing opportunities;
- Promote airspace improvements to aircraft operators to improve route utilisation;
- Identification of RAD measures affecting regulated sectors;
- Gradual implementation of following RAD evolution steps:
 - Re-definition of the CDM process on the acceptance of proposed RAD restrictions in accordance with the justification, assessment results and objective goal of the proposed RAD restrictions;
 - Definition of a new process for the "Last minute" changes;
 - Establishment of a post-ops process to continuously re-evaluate the existing RAD restrictions and if additional justification not provided to ask for those RAD restrictions to be suppressed;
 - Propose simplification of the RAD restrictions; Collapse multiple RAD restrictions in one network RAD restrictions with the same effect; Evaluate and propose suppression of RAD restrictions constantly not respected on ATC;
 - Define network oriented RAD restrictions together with concerned States / FABs / ANSPs, after the provision of clear objective goal and justification for RAD restriction implementation;
 - Propose structural airspace changes to eliminate the need for RAD restrictions;
 - The final content of any amendment to the RAD shall be positively agreed between the NM RAD Team and State / FAB / ANSP concerned;

- Define the requirements and gradually implement an enhanced pre-validation process supported by automation to allow better validation and flight planning;
- The new RAD CDM processes defined shall take fully into account the new technical support being implemented through AURA@n-CONECT as from 2019;
- Definition of enhanced promulgation processes for the RAD relaxations.

5.5.2 ASM Rolling Process and ASM Solutions

The ASM work plan 2020-2025 focuses on short- to medium-term improvements. A number of improvements have been achieved, one of which is the enhancement of the management of areas in a more flexible way, including temporary adaptation on modification introduced by NOTAM.

An additional improvement has been achieved introducing the management of grouping restrictions functions, allowing the local AMC to cluster restrictions associated to areas to define scenarios for a more dynamic management of traffic flows.

The initial implementation of ASM scenarios management will allow the effective application of processes/procedures implemented in the ERNIP Part 3 ASM Handbook. The ASM scenarios aim to improve the present practices in order to overcome capacity and flight efficiency constraints and facilitate efficient flight operations of both civil and military airspace users.

Additional steps in terms of more flexible management of airspace structures and defined restrictions is the possibility to manage No Planning Zones via AUP/UUP.

Live trials started to verify the possibility to process RAD restrictions dynamically via AUP.

5.6 Enhanced Network Procedures and Processes

Network Operations continues to develop Air Traffic Flow & Capacity Management (ATFCM) procedures, working with ANSPs and AOs to achieve a better utilisation of ATM capacity and a better integration of ATFCM and ASM processes. Major airspace changes, the implementation of new ATM systems and other special events are coordinated at European level through extensive preplanning and coordination process, carried out between the key players, under the coordination of the Network Manager. The whole set of the ATFCM mitigation toolbox is aimed at minimising the delays caused by the events mentioned above.

The NM is engaged in a business evolution programme, aiming to take a major leap in digital transformation. This will allow the transformation of the business processes through the use of today's digital technological capabilities, which will take the NM to an entirely different level of effectiveness. Integration with business partners through interoperability standards will continue, allowing to extend to them the intelligent processes and leading to optimised Network operations.

Currently, airspace, flight and flow services are managed independently and supported by independent systems. The future services will rely on a strong interdependency of CDM processes with full and smooth information exchange during the four phases of operation: strategic, pre-tactical, tactical and post operations.

5.6.1 Enhanced Network Disruption and recovery Procedures

The Enhanced Network Disruption and Recovery procedure is in force and has been applied successfully numerous times since 2016.

5.6.2 Driving Down Delay

The objective is to produce operational daily delay performance targets for a number of critical areas. Those targets are aimed at focussing efforts on achieving overall performance targets. A methodology has been developed using 5-year delay history and a 4 week delay trend to identify every day of the year, the 'high risk' delay areas (both en-route and airport) and to produce a pre-tactical forecast confirming the critical areas 6 days ahead.

The pre-tactical forecast is used to ensure all agreed measures/procedures are in place and executed on the day of operations.

5.6.3 Mandatory Cherry Picking (MCP) and Arrival Cherry Picking (ACP)

A Mandatory Cherry Pick regulation (MCP) is used as a measure to solve short peaks (e.g. 1h or 1h 30min) of limited number of flights in congested areas. It consists of selecting flights creating complexity and applying ATFCM measures only to those flights. It may be used in combination with other measures (e.g. scenario) or other options available to the FMP.

Upon request by a FMP, NM supports the implementation of these tactical measures by means of implementation of 'cherry-pick' flow regulations, i.e., the "cherry picking" process is triggered by the FMP. The local flow manager designs the tactical ATFM measure and requests NM tactical staff to delay the flights subject to the measure(s).

The objective is to allow as many flights as possible to operate according to desired profile and using a very limited number of "slot times" (CTOT) or mandatory re-profiles to replace traditional regulations or Scenarios that apply to entire traffic flows.

The mechanism aims to solve short peaks in en-route sectors by delaying/re-profiling minimal numbers of flights and allowing the majority to operate without regulation.

The Mandatory Cherry Picking (MCP) is now a part of the NM delay mitigation toolset.

A different kind of MCP is the CCP (Collaborative Cherry Picking), applied in full coordination with the Airspace Users, deciding which flights have to be assigned a ground delay in coordination with the NMOC.

Since the beginning of 2019, the mandatory cherry-picking procedure has been successfully extended to airport arrivals (ACP – Airport Cherry Picking).

MUAC and ENAIRE are expected to start with the usage MCP proposals while NM will offer the same functionality via the NMP Flow interface as of NM 27.0 release (planned for April 2023).

5.6.4 Dynamic Delay Mitigation

The objective is to drive down significant delay caused by ATFM measures. It consists of an enhanced form of Last-Minute Improvement procedures - but the responsibility lies entirely with the FMP to identify flights that can be improved or excluded from the ATFM measure. The procedure requires a departure from the traditional principle of ATFM equity in favour of network optimisation.

5.6.5 Keystone Regulation/ATFM regulation optimiser

The objective is to minimise the number of regulations active at any given time by identifying a single regulation that would manage an entire flow of traffic and all associated congestion. The concept of Network Delay Optimisation supports this proposal.

Changes in the ETFMS system that should make this process automatic are currently under development by NM, but not expected to be fully implemented in a short timeframe.

A new software (SEQ12 – provisional name), developed by NM LAB/DECMA was trialled in the NMOC during 2022.

5.6.6 Short Term ATFM Measures (STAM)

The STAM procedure introduces the possibility for an FMP to solve an identified and recurrent DCB issue by proposing a rerouting via B2B and AFTN to targeted flights in order to avoid applying a regulation.

STAM measures will help in reducing the number of ATFM regulations. STAM measures are nowadays applied widely by a significant number of FMPs using Occupancy Counts.

5.6.7 Rerouting Proposal (RRP) and Slot List Manipulation (e-helpdesk)

Serving as the central point for flight plan reception and ATFCM, the NM has instant, immediate and complete visibility of the past, current and future Network situation. NM supports AU operations to find an adequate response to Network disturbances or potential routing improvements, through several (re)routing assistance capabilities:

- the Flight Plan Validation System (IFPUV) may be used by AUs to validate route proposals before filing a FPL;
- the AO What-If Reroute (AOWIR) tool allows users to directly evaluate possible route alternatives with the current route submitted in their flight plan;
- the Group Rerouting Tool (GRRT) automatically investigates the existence of alternative routes, considering AU predefined cost criteria;
- the Centralised What-If Reroute (CWIR) used by NMOC provides re-routing alternatives to selected flights.

When proposing rerouting, the NM system considers historic flight plan information and uses an internal route generator to find possible alternatives.

The RRPs have been part of the NM delay mitigation toolset since several years. RRPs are sent to AUs by the AOLOs whenever a flow measure is applied for an en-route sector. A considerable amount of en-route delay is saved yearly using this technique.

Slot list manipulation is a well-established and efficient NMOC activity, constantly improving year on year, run by flow staff within NMOC.

5.6.8 Weather Delay Mitigation

Weather phenomena are impacting the Network more and more in terms of ATFCM delays.

The weather impact mitigation process within NMOC starts with the Aircraft Operator Liaison Officer (AOLO), assessing Network weather four times a day and coordinating with the Deputy Operations Manager (DOM) the weather hotspots (en-route or airport) that are likely eligible for flow measures. With the DOM/SNOC (Senior Network Operations Controller) this is covered during the summer via the Cross-Border weather, and in the winter when necessary. A Network impact assessment (tactical ATFM simulation) is then conducted by the DOM and shared with the relevant FMP/TWR (upon their request), in order to agree a mitigation action (flow measures, traffic demand reduction in agreement with AUs etc).

One of the major weaknesses of the process is the lack of a common European MET forecast. Since the beginning of Summer 2019, NM is providing daily a single weather forecast in collaboration with EUR MET NET, a number of MET services providers for SE UK, MUAC, NE France and KUAC areas, supported by pre-tactical or tactical teleconferences, in order to trigger awareness of MET phenomena impacting the Network and enhanced collaboration among the affected ANSPs through the application of shared ATFM measures.

EUMETNET forecast now covers all of the network except Scandinavia. There were also two summer trials of using forecasters in NMOC and this will continue to be developed.

5.6.9 The Airport Position

The Airport Function position is now fully integrated within NMOC, staffed by Airport Unit and Airport secondees. Since 2021 the Airport Position has extended the scope to all the airports in Network. Tools like the Tableau Server, Airport Function dashboard, MIRROR and Airport Corner are used to support staff in the Airport Function position with their decision making. A special emphasis is placed on potential 'night curfew' issues each day from early afternoon.

5.6.10 Flight Level Adherence

Across the European Network, regulations are put in place to protect ATC from receiving more traffic than the controller can handle safely. However, it happens that more aircraft than planned enter the protected sectors, exceeding their capacities by more than 10%, which is regarded as an ATFCM "over-delivery". When investigating those reported occurrences in most cases it is found that additional flights (called unanticipated: former intruders) entered the concerned sector (or arriving at the destination airfield) as a result of the following:

- Flying a different FL than the initial requested flight level (RFL) as in FPL,
- Departing at times different from the original estimated departure time (ETD) or calculated take-off time (CTOT), or
- Entering/arriving in the sector/airfield earlier or later than originally planned, or deviating from their original planned route

The Network Manager is fully committed to minimise the number of unanticipated flights with a set of actions such as:

- Direct coordination with FMPs/TWRs
- Use of RAD restrictions
- Reporting the AOs behaviour (AOLC)
- Bilateral meetings between adjacent ANSPs
- Workshops with AOs and CFSPs highlighting the need for FPL adherence.
- NM system improvements to help ANSPs to spot unanticipated flights.

A document named ""All Together Now" is published on the NOP portal and social platforms. It contains recommendations and best practices to be followed by flight dispatchers, TWR/ACC ATCOs, FMPs and Pilots.

5.6.11 YO-YO flights

The YO-YO flights represent one of the reasons for unpredictability. The ODSG group was tasked to find a permanent solution to this long standing problem, by finding a common definition for YO-YO flights and implement a system/procedural change by the end of 2018. A

procedure was agreed and a tool to detect and report YO-YO flights was successfully implemented in release NM23.

5.6.12 Flight Efficiency

This function allows Airspace Users to identify flights that may benefit from more efficient routes to take advantage of opportunities and optimise flight planning operations.

The Flight Efficiency Initiative (FEI) operates on the basis of a dynamic route generator (GRRT) and historical catalogue of routes flown in the past. The routes are evaluated on the basis of subjective cost criteria provided by participating AUs, such as flying time costs, fuel costs and the cost of ATFCM delays.

Flight Efficiency activity was re-scoped in 2017 in close cooperation with the airspace users and the Computer Flight Plan Service Providers to address computer flight planning systems evolutions and flight planning strategic advice to the airspace users (rerouteing opportunities customised by the Airspace Users).

The Network Impact Assessment (NIA) tool will continue to be used by the MILOs (Military Officers in NMOC) to help Airspace Users in optimising their planning via CDR routes.

5.6.13 Initial Network Plan/Dynamic Network Plan (INP/DNP)

At the end of 2015, The DNP project had started between TEC and NMOC. The idea was to produce a software that would support the pre-tactical planning activities of NMOC and communicate the agreed plan with the external stakeholders.

The first phase of the DNP project was the Initial Network Plan (the application is called Network Plan). NM combined some activities/products (named daily teleconference, NOP Daily Plan and Network News) into the Initial Network Plan (INP), a pdf document that provides an Initial Network Assessment for the following day. This document is published on the NOP portal and consumed by external partners.

The information provided by NM to the stakeholders is a key for Network Operations. Most of the information is channelled via the NOP portal.

The pre-tactical Network daily plan used to be provided to stakeholders via the Network News (distributed by SITA/AFTN). Network News was decommissioned in 2016 and replaced by the Initial Network Plan (INP). The INP is an enhanced version of the Network News, containing detailed operational info on flow measures, ATFM delay, military activities and any other event impacting the Network, supported by a modern graphical interface and distributed via e-mail (upon request) and via the NOP portal, easily accessible by all stakeholders.

In its last iteration INP will become the Dynamic Network Plan (DNP), fully linked to the NM systems, automatically retrieving data and info, then becoming a single one stop-shop for any operational info necessary for Airspace Users and ANSPs. DNP will be published several times per day and contain tactical updates on the Network situation (the INP is published only once on Day-1).

The Network News (AIM) is the back-up tool in case of INP/DNP unavailability.

The main components for the current DNP are:

- The task-oriented editor (INP Editor), used by NMOC to create/edit/update the initial network plan document
- The INP document A pdf file that is published every day at 1700, for externals to present the plan for the following day
- The DNP viewer a component that is not built yet, but it intends to offer an interactive map with graphical representation of different events in the network.

Integration of Network Brief and Feedback in the INP Editor

The Network Brief and Feedback are interfaces that support the internal planning and coordination of NMOC. The Network Brief can be seen as a network plan for the following day but with the information that is only relevant for internal NMOC staff. It is used as follows:

- As a repository of long-term events that are not necessary reflected in INP;
- To store procedures to be used for coordinating measures with individual FMPs pretactically;
- To transfer knowledge from the NM pre-tactical team to other NMOC positions on:
 - the long-term events / procedures,
 - the coordination which took place to prepare the measures applied pre-tactically for the INP.

The Network Brief is usually released (a report in plain text document or a word document) at the same time as INP is published.

The Feedback is used as follows:

- By the NM tactical team to record the reasoning behind decisions taken during the day of operations;
- By post ops for analysis of significant events and/or incidents.

The Network Brief and Feedback are currently distributed via FREE. The objective is to integrate these two interfaces into the INP Editor.

One of the first enhancements expected from the iNM programme is to integrate Network Brief and Feedback into the INP Editor.

Objective of future DNP

As the Network situation changes continuously, the INP needs to evolve into a more dynamic tool (DNP) that is updated frequently to improve situational awareness of airspace users during their planning processes.

The clear intention of the NM is to evolve the current INP into the Dynamic Network Plan (DNP). The main limitation of current INP application is lack of dynamicity – once the INP is published to external world, it is no longer updated. INP is a static pdf file, published once per day, not able to reflect the real time updates of the network.

The dynamicity of the Network Plan should be achieved through two steps:

- Initial plan preparation happens at D-1 (pre-tactical) and aims to collect and share the most accurate prevision of the status of the network on the following day;
- Throughout the tactical phase, the plan is continuously updated (both automatically by the system and manually by operators).

An external stakeholder reading the plan should have a seamless, coherent view of the information as operations progress.

The DNP should provide the clear split between pre-tactical and tactical information. The layout of each section and sub-section should make it clear whether information originates from the pre-tactical or from the tactical source. External stakeholders retrieving the network plan need to know without ambiguity in which phase an information was added to the plan.

A **map (DNP Viewer)** is essential part of DNP. It is envisaged to support a graphical view of information affecting the network including (but not limited to) regulations, scenarios, and locations of interest, NAT tracks and MET data.

5.6.14 E-Helpdesk enhancements, i-DAP

The core of the Network CDM component is the integrated Digital ATFCM Platform (iDAP). It serves to assists network stakeholders who have critical operational problems that cannot be resolved by means of the standard ATFCM message exchange process.

Current iDAP service covers the Flow Management HelpDesk, with a clear vision of NM to expand this service to other domains as well – Airspace Data and Flight Planning.

The iDAP service assists with correct procedures, flight delay reduction and information provision on ATFCM measures. The iDAP service is available via the telephone, NOP Portal, NMP interfaces and via the NM B2B Web services, through the E-Helpdesk application.

This application is the main tool for dealing with requests coming from external stakeholders. For this reason, the iDAP application has the priority over telephone calls. The telephone service is reserved for users who do not have the internet access and for network critical requests.

The iDAP application is used to manage the queue of requests. Some are treated and answered automatically, while others require manual processing by NMOC. The resolution of some requests may require actions to be done manually in the ETFMS system (e.g. slot extensions, slot improvements, etc.).

Each user of eHelpDesk is able to provide set of proposals/requests directly into ETFMS. NM is able to manage access rights of each user via the configuration management of the token/B2B Certificate.

5.7 Operational Excellence

The Operational Excellence Programme is created to complement the development and implementation of the Airspace Re-configuration Programme. Its aim is to identify and implement best-in-class operational and technical evolutions to deliver harmonised common operational capabilities among all operational stakeholders. This will ensure the achievement of operational and technical harmonisation aligning on best-in-class performance and delivering the required operational performance.

The work on the Operational Excellence Programme started in November 2020 and will deliver gradual improvements taking into consideration other major projects under development and implementation. The need to progress towards seamless cross-border operations will also address systems connectivity and interoperability and improvement of operational procedures.

Within the framework provided by the European Commission Implementing Regulations, the Operational Excellence Programme will ensure the co-ordination for the implementation of operational and technical evolutions, enhanced operational and technical concepts, covering: changes of operational procedures, Letters of Agreement, application of A-FUA and ATFCM (including the associated system support), AIM data publication and flexibility, flight planning improvements, flight notification and coordination exchanges, operational utilisation of human resources, harmonised implementation of new operational concepts and technologies, enhanced sector throughput, airports as a component part of the Network and associated airport operational improvements, systems connectivity and interoperability, harmonised implementation of new concepts and evolutions of CNS infrastructure and technologies. Progress of the programme is closely monitored by the NDOP and NDTECH. The Operational Excellence Programme Management Plan is regularly reviewed and amended, as required, to take account of the latest developments in the European ATM. Details are available in Annex 4.

5.8 Scarce resources

The NM Scarce Resources Functions are detailed below and include the latest status reports from the Radio Frequency Function and the Transponder Code Allocation Coordination Function.

5.8.1 Frequencies for VHF voice communications

The main objectives of the Radio Frequency Function (RFF), created by NM in 2011 and performed in close conjunction with ICAO, is to mitigate the network impact of the aeronautical frequencies shortage and to ensure that the European frequency management processes and tools support the satisfaction of the CNS network performance objectives.

5.8.1.1 Frequencies for VHF voice communications

The activities of the RFF together with the continuous implementation of 8.33 kHz below flight level FL195 has enabled to satisfy again all requests for new aeronautical frequencies in Europe in 2022. The chart below shows the evolution of the request satisfaction rate for the European most congested areas. Two assignments in the Russian Federation are still under coordination (though solutions for shifting these frequencies were proposed/provided by the NM) for freeing up two additional channels for VDL2. While solutions exist for the replacement of these assignments, there is currently no response from the Russian Federation on the matter; the issue has been escalated to the ICAO EUR regional office.

The number of interferences has maintained high in the last period mainly due to tropospheric ducting events and out of designated operational coverage transmissions by aircraft. Several of the interferences depicted below are in the status of being re-assessed.



Interferences in assessment status vs no. of Block Planning solutions to be implemented in October 2022

The following chart provides the percentages of 8.33kHz spaced channels vs. 25kHz frequency assignments (i.e. exempted assignments) in the States implementing 8.33 voice channel spacing below FL195 (EU Member States):



8.33 channels assignment distribution in Sates implementing 8.33VCS in October 2022

However, the following chart shows the implementation progress situation per State in October 2022. This situation is provided in comparison with States submitted planning at 15th of June 2021. The green bars show the number of converted frequency assignments, the blue bars show the number of frequency assignments that were planned for conversion according to the planning submitted in June 2021, while the orange bars show the number of frequency assignments for which the initial planning submitted by States has changed (e.g. delays in conversion date, change in exemption rationale, expiration date, etc.).



8.33 VCS implementation progress status vs. June 2021 planning, in October 2022

The current observed frequency congestion (i.e. the frequency shortage) is not the same in all European states. To show the geographical distribution of frequency congestion the RFF produces diagrams named Congestion Charts. These charts depict the number of frequencies available at each geographical location for a typical service (i.e. for typical frequency requests). The following colour scale is used to illustrate the number of available frequencies at each location:

0 0 1 2 3 4 5 6 7 8 9 0 1

Black indicates the areas where no frequencies are available. Red indicates that 5 frequencies are available, orange for 10, yellow for 20 and a transparent colour is used for 70 or more frequencies available.

The consumption of frequency assignments in the European region continued to increase.

The figures below illustrate the evolution of the European frequency congestion, both in 8.33kHz spaced channels and in 25kHz frequencies, in 2022 compared with 2021.



0 0 1 2 3 4 5 6 7 8 9 0 1

Number of available frequencies for a typical 25 kHz ACC sector (ACC 50NM radius up to FL450) in October 2021



Number of available frequencies for a typical 25 kHz ACC sector (ACC 50NM radius up to FL450) in September 2022

The best way to show the difference between the two situations above is a Difference Chart. These charts show the difference between two Congestion Charts. The gain in frequencies at each location is shown in green and the loss in frequencies is shown in red using the following scale:



Transparency is used to indicate the areas where there is no change to the number of channels available within the area of study:



Gain and Loss of frequencies for a typical 25 kHz ACC sector (ACC 50NM radius up to FL450) in 2022

The large transparent area in the central European region is the area where no 25 kHz spaced frequencies for typical ACC sectors can be found, therefore no loss of channels was possible.

It can be observed that Frequency congestion has increased in the periphery of the core of Europe, especially in the North East and South-West, due to new 25 kHz frequency assignments.



0 0 1 2 3 4 5 6 7 8 9 0 1

Number of available frequencies for a typical 8.33 kHz ACC sector (ACC 50NM radius up to FL450) in October 2021



0 0 1 2 3 4 5 6 7 8 9 0 1

Number of available frequencies for a typical 8.33 kHz ACC sector (ACC 50NM radius up to FL450) in September 2022



9876543210987654321 01234567890123456789

Gain and Loss of frequencies for a typical 8.33 kHz ACC sector (ACC 50NM radius up to FL450) in 2022

It can be observed that frequency congestion has been reduced in some of the 8,33 States in Central & South-Western Europe, mainly due to the implementation of 8,33 conversions. However, the number of available channels has decreased in larger areas (compared with the situation at the beginning of 2021), due to the demand of new frequency assignments, in 25 kHz and 8.33 kHz channel spacing, during the last year.

It has to be noted that in some small areas in the core of Europe the number of 8.33 channels potentially available for a new ACC sectors (within the geographical definition above) is less than 10. Some of this congestion is also due to an increased number of temporary assignments, which are expected to be removed in the near future (e.g. channels used for gliding championships, training, military exercises, etc.).

5.8.1.2 Frequencies for Navigation Aids

The navigation frequency bands also continue to be congested but the demand for new frequencies remains much lower than for voice communications. However, it has to be noted that the frequency availability for some navigation aids is almost depleted in the central Europe area.



Number of available ILS/DME frequencies October 2022



Gain and Loss of ILS/DME frequencies in 2022



0 0 1 2 3 4 5 6 7 8 9 0 1

Number of available VOR/DME (100NM radius, FL500) frequencies October 2022



Gain and Loss of VOR/DME (100NM radius, FL500) frequencies in 2022



0 0 1 2 3 4 5 6 7 8 9 0 1

Number of available DME (100NM radius, FL500) frequencies October 2022



Gain and Loss of DME (100NM radius, FL500) frequencies in 2022



0 0 1 2 3 4 5 6 7 8 9 0 1

Number of available GBAS (23NM/FL100 EIRP=17 dBW) frequencies October 2022



9876543210987654321 01234567890123456789

Gain and Loss of GBAS (23NM/FL100 EIRP=17 dBW) frequencies in 2022

Frequency Congestion for ILS/DME, VOR/DME and DME services is still very high in the centre of Europe. A small gain (up to 3 frequencies) is achieved in some areas, mainly due to the deletion of COM3 assignments; however, the loss in the number of available channels is more significant in the periphery of the core area due to the coordination of new assignments.

Concerning frequency congestion for DME, the loss in the number of available frequencies in L5E5 bands is very low and mainly located around 250 NM from the hotspot area to the South. Concerning the L3E5 band, there is a higher loss in some areas in the North of Europe, beyond 250 NM from the hotspot.

5.8.1.3 Main RFF Key Performance Indicators (KPIs)

The evolution of frequency requests for which a block planning exercise was required (i.e. a direct allocation solution was not possible) is presented in the chart below:



Frequency request evolution per Block Planning Exercise

No Block planning requirements were introduced by Sates in the last 3 years. It is noted that the first Block Planning exercise of 2020 (BP50) was specifically designed to support the migration of the remaining voice assignments in the VDL band to frequencies below 136.500MHz. This is required to allocate new frequencies to data link communications. The two frequencies remaining to be implemented are in use in Russian Federation, for which several solutions were provided.

The following Key performance indicators are used to the status of the European frequency management. These values provided below reflect the situation as recorded in October 2022.

Description	This KPI measures the quality of the European process to mitigate the impact of reported interferences.
Value	The number of reported radio frequency interferences that have not been closed within 6 months of the report.
Current Value	8 Interferences

5.8.1.3.1	Number	of Radio	Interferences
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Several new interferences have been reported in 2022 are potentially due to tropospheric ducting events or related to aircraft transmission outside of the designated operational coverage for the responding frequency. Coordination is on-going with the ICAO regional offices and the airlines representatives for a reasonable resolution of these cases.

It is also noted that the cases identified above do not contain the constant interference observed in the VDL channels from voice and industrial transmissions.

5.8.1.3.2 Number of Unsatisfied Requests

Description	This KPI measures the quality of the European process to satisfy frequency requests.
Value	The number of frequency requests that have not been satisfied within 6 months of the request.
Current Value	0 Unsatisfied requests

No BP requests have been received from States in the last 3 years

5.8.1.3.3 Average Time to Satisfy a Request

Description	This KPI reports the average time required to satisfy a frequency request (plus the minimum and maximum number of days required).
Value	This KPI measures the average of the time difference between the time a BP request is filed and the time when a new frequency assignment is available to satisfy the request.
Current Value	N/A

5.8.1.3.4 Number of Unsatisfactory Shift Proposals

Description	This KPI measures the quality of the BP process.
Value	The number of shift proposals that are not processed correctly (i.e. in accordance with the agreed RAFT procedures) during the previous 12 months.
Current Value	0 Unsatisfactory Shift Proposals

5.8.1.3.5 Planned RFF Activities

The European National Frequency Managers at their 22nd meeting of the Radio Frequency Function group (RAFT) agreed the following areas of activity:

- 1. The further development of automation to support fully the processes, defined in the RFF Cooperative Decision Making (CDM) processes, and to monitor the implementation of Best Practices. This includes the development of SAFIRE v6 and improvements to the MANIF toolset.
- 2. The improvement of the European frequency management rules defined in the European Frequency Management Manual (ICAO EUR Doc011).
- 3. The allocation of Europe-wide shared channels for air-to-air GA communications and for special events.
- 4. Perform frequency bands usage evaluation exercises

In addition, NM will continue providing frequency management support to States in the following areas:

- 1. Managing the semi-annual ICAO block planning process to find effective frequency shifts to satisfy frequency requirements.
- 2. Managing the RFF Radio Interferences reporting process.
- 3. Restart the spectrum monitoring activities through the measuring of the VHF channel occupancy and spectrum use on an experimental platform

- 4. Assisting States in finding appropriate frequencies and maximising the use of the available aeronautical spectrum.
- 5. Assisting States in finding suitable frequencies in cases of urgency (e.g. interference cases).
- 6. Providing training and support for the use of frequency management software tools (2 different courses are planned for 2023).
- 7. Coordinate European actions to accommodate future frequency requests (e.g., shared Europe-wide channels).

5.8.1.4 RFF Automation

To support the RFF activities, the software tools listed below will continue to be maintained and developed.

The European Aviation Frequencies Central Register

A new version of the SAFIRE (Spectrum And Frequencies Information REsource) tool is under development in order to:

- 1. Store the information which is necessary to support the enhanced frequency management processes required by the ATM network functions Regulation No. 2019/123;
- Support the complete life-cycle of a frequency assignment, as defined in the RFF Cooperative Decision Making (CDM), providing suitable support to the assessment of the network impact and the prioritisation of new requests;
- 3. Provide support to the identification of suitable frequencies when a proposed assignment has an impact on the network;
- 4. Provide enhanced support to local studies to find solutions when a frequency request cannot be satisfied;
- 5. Analyse frequency assignments for compliance with the Best Practices available in the RAFT Manual and inform the relevant NFM(s) of issues for resolution when applicable.

The current planning is to deploy in operations a first step SAFIRE v6 version end of Q1 2023. When the new system will become operational, while not all the historical data will be migrated from the current SAFIRE into the new platform, a means to access this information will be provided.

To mitigate for any potential issues, for the day-to-day frequency management operations the current SAFIRE version 5 will be kept in operations until end of December 2023.

Tools for the monitoring and evaluation of aviation frequency bands

MANIF (MANagement Interactif des Frequences) is the software tool offered to support the frequency managers to extracts the contents of the SAFIRE database in view of performing several advanced analyses. It encompasses several tools that support the finding of frequencies without interferences and the analysis of the usage of frequencies in any European area (e.g. it generates the congestion charts shown above). MANIF will continue to be enhanced to support the future RFF Best Practices and to provide improved integration with SAFIRE 6. The development of MANIF is synchronized with the deployment of SAFIRE v6. In addition, future versions are foreseen to be developed, including a cloud version for streamline on-line access.

5.8.1.5 Frequencies for VHF datalink Communications

In addition to the VHF voice frequencies, dedicated VHF frequencies are used for the datalink exchanges over the VDL2 (VHF Digital Link Mode 2) datalink technology supporting CPDLC (Controller Pilot Datalink Communication) operations as well as airline communications.

In the European airspace, the frequency band from 136.700 to 136.975 MHz has been identified for the assignment of VDL frequencies, providing currently for a total of 5 VDL2 frequencies to be used in Europe. The Common Signalling Channel (CSC), at 136.975 MHz which is actually reserved worldwide for VDL2 exchanges, is used as a first contact channel providing a means for an aircraft to log on to the datalink system, either when on the ground or when airborne. Subsequently, depending on the availability of additional alternate frequencies, the aircraft may use other VDL2 frequencies for the CPDLC exchanges. In Europe, there are currently four additional frequencies (136.875, 136,825, 136,775 and 136.725) used by the VDL2 datalink service providers as dedicated en-route frequencies, or dedicated ground frequencies, or "mixed" (ground and en-route) frequencies.

To alleviate the VDL channel congestion a new VDL frequency allotment plan has been approved by the National Frequency Mangers participating in the Radio Frequency Function Group (RAFT) and the ICAO Frequency Management Group. The new plan (pending endorsement by the ICAO EASPG and publication in the ICAO EUR Doc 011) will offer CSPs the possibility of using the current adjacent channels within the VDL sub-band resulting in a total of 12 channels reserved for VDL. Since the migration to the new allotment will require investment from the data link service providers, an additional channel (136.675MHz) has been released for temporary VDL usage (until end 2024).

5.8.2 Transponder Code Allocation Coordination

Transponder Code Function

The main objective of the Transponder Code Function (TCF) is to address the network impact of SSR transponder (Mode 3/A) codes allocation and use.

The European transponder code usage situation:

The management of transponder codes allocations for the European region is currently performed by EUROCONTROL on behalf of ICAO.

The European SSR Code Management Plan has been established to provide States in the ICAO EUR Region with a means to coordinate the use of the SSR codes based on the principles of the Originating Region Code Assignment Method (ORCAM) and enhanced ORCAM (eORCAM).

The ICAO EUR Region has been divided in eight participating areas (PAs). All available SSR transponder codes are allocated statically to States and fully used in each of the participating areas. A detailed Code Allocation List for the EUR Region (CAL) for defined participating areas (PAs) covering the EUR region and certain adjacent areas was developed.

The figure below depicts the ICAO EUR region participating areas:



The transponder codes allocations evolved over the years in a very complex arrangement. At the same time, as a result of traffic increase, static allocation and ATS systems evolution, it became increasingly difficult to find transponder codes that could be reallocated in order to meet the traffic demand.

In order to mitigate the potential impact on operations of SSR transponder codes shortages a number of initiatives and technologies are in the process of being deployed throughout Europe, namely Mode S Elementary Surveillance, eORCAM and the Centralised Code Assignment and Management System (CCAMS).

The Mode S Elementary Surveillance allows the use of the downlinked aircraft identification, and introduces the use of the conspicuity code (A1000) instead of discrete SSR codes, alleviating as such the pressure on discrete transponder codes needs.

Enhanced ORCAM adds functional capability for ATS Systems and will allow for directional assignment of transponder codes and simultaneous codes use.

The Centralised Code Assignment and Management System (CCAMS) serving a number of European States introduces the dynamic transponder codes allocation for a larger geographic area, allows the simultaneous use of the same code in volumes of airspace separated by an agreed buffer zone and started operations in February 2012.

In accordance with EU regulatory material, the States will move to the full use of the downlinked aircraft identification by 2020. In the meantime, the transponder code function will need to ensure that operations are not adversely impacted by SSR transponder codes shortages, the number of code changes or wrong code assignments.

Transponder Code Function main tasks

The Transponder Code Function must continue to provide the services currently being provided by EUROCONTROL on behalf of ICAO, which include:

- 1- Managing the transponder codes planning process to find effective solutions to satisfy transponder codes allocations requests;
- 2- Maintaining the Code Allocation List for the European Region;
- 3- Assisting States in maximising the use of the available SSR transponder codes;
- 4- Assisting States in finding suitable SSR transponder codes arrangements in cases of urgency (e.g. unplanned shortfalls, crisis situations);
- 5- Maintaining an appropriate level of co-ordination for civil-military aspects through the appropriate channels (e.g. NATO).

In addition, the Transponder Code Function will need to perform specific activities stemming from the EU regulatory material and that include:

- 1- Assisting States in fulfilling their requirements on data provision;
- 2- Assisting States in the evolution to the full use of the downlinked aircraft identification and the conspicuity code (A1000);
- 3- Identifying and recommending directions of evolution for the Centralised Code Allocation and Management System;
- 4- Developing and maintaining efficient reporting tools and mechanisms for the Transponder Code Function.

Transponder Code Function 2023 Planned Activities

The main elements that the Transponder Code Function will address in 2023 are:

- 1. Production of the code allocation list for 2023;
- 2. Extension of CCAMS operations;
- 3. Implementation of CCAMS improvement and optimisation actions in support of participating States and third parties;
- 4. Progressive extension of the operational use of the downlinked aircraft identification including the extension of the geographical scope as well as the increase of the number of eligible flights. The first step in this direction is the planned move to the second phase of the IFPS flagging for Mode S eligible flights;
- 5. Implementation of transponder codes usage improvements aimed at enhancing the overall network performance;
- 6. Monitoring and evaluation of transponder codes usage;
- 7. Implementation of data provision mechanisms and tools in support of the transponder codes management (e.g., implementation by States of enhanced tactical flow management system correlated position reports containing SSR transponder code assignments).

Production of the code allocation list for 2023

The Code Allocation List for the EUR Region (CAL) is updated in accordance with the yearly process defined in the TCF CDM processes and is done over a period of approximately four months (November to February of next year). For the 2023 CAL update (CAL Edition 4.10), the first round of consultation will be completed in January 2023. The second round of review, the approval and the publication will be completed by March 20223 in order to allow implementation, operational evaluation and potential corrections prior to the summer peak traffic period.

Extension of CCAMS operations

CCAMS entered into operation on the 14th of February 2012, the first State joining CCAMS being Ukraine. The current total of States using CCAMS is 20.

A medium term vision that includes CCAMS as a complementary solution to Mode S for all NM States by 2020 was proposed and endorsed by the NMB in 2015. This scenario will allow the elimination of code changes for the European Region. The long-term vision has been approved by the Network Management Board (NMB) as part of the Network Strategy Plan (NSP). A number of ANSPs are in the phase of specifying their next generation ATS Systems as well as planning the functionality included in the various releases. It is expected that in 2023 ANSPs will include CCAMS in their specifications taking into account the NSP proposed time horizon for implementation. For ANSPs that develop the next generation of ATS Systems as part of common projects (e.g. iTEC, Coflight, etc.), the early inclusion of CCAMS in their development plans will allow the sharing of costs and as such further enhancing the CCAMS benefits.

In 2023, the CCAMS area might extend to cover another three States namely Albania, Israel and Morocco.

Implementation of CCAMS improvement and optimisation actions

The increased area of application for CCAMS will create the basis for a more flexible and efficient code assignment for the participating States, but at the same time, it will have a beneficial effect on adjacent States. For flights transiting CCAMS States located in different Participating Areas (PAs), CCAMS assigns a unique code for the whole duration of the flight. For these flights, a code change is no longer required when crossing PA boundaries resulting in a number of benefits for all the States along the route of such flights. As an example, flights transiting Bulgaria and later on entering UK may no longer require a code change at the boundary between PA EUR-E and PA EUR-B. Through CCAMS, code usage optimisation the result will be a significant reduction of the number of code changes on this boundary.

Similarly, as a result of the Sweden and Finland implementation of CCAMS, code changes between PA EUR-C and PA EUR-B are no longer required for approximately 600 flights per day. By comparison to previous years, because of slower technology deployment, it is expected that in 2023 the number of code changes will not decrease significantly.

Extension of the operational use of the downlinked aircraft identification

The progressive extension of the operational use of the downlinked aircraft identification, including the extension of the geographical scope as well as the increase of the number of eligible flights, has continued in 2022.

The geographical extension together with the gradual implementation of the Mode S Phase 2 assignment logic have significantly increased the number of flights eligible for the use of a conspicuity code (A1000) instead of a discrete code. Some Mode S States have already started assigning the conspicuity code to all eligible flights crossing their area of responsibility, while the others plan to do so in the coming years.

In 2023, the number of flights for which the downlinked aircraft identification is used as the primary identification method for provision of ATS is expected to reach 7000 per day. The blue area in the figure below illustrates the portions of airspace in which the conspicuity code is to be used while the white dots indicate the declared aerodromes. It is to be noted that the Mode S deployment is also slowing down and serious concerns were raised regarding the States' compliance with the ACID-IR.



Down-linked aircraft identification use at the end of 2022

Transponder codes usage improvements

In addition to the overall network code usage improvements that result from the extension of CCAMS and the use of the downlinked aircraft identification, TCF activities will address in 2023 the following three key areas:

- The management of the common pool of codes for temporary special civil and military events;
- The re-organisation of local codes in EUR PA-B;
- The coordination of SSR codes usage at the interface with the ICAO EUR MID Region;
- The coordination with NATO in support of a more flexible use of SSR transponder codes in conflict areas and large-scale military exercises.

Monitoring and evaluation of transponder codes usage

The Network Manager is required to implement tools for the regular evaluation and assessment of the actual use of SSR transponder codes by States and air navigation service providers. The first iteration of these tools entered into operation during summer 2012 and allows the analysis of existing transponder codes allocations and of the potential shortfalls (e.g. unexpected code changes, code conflicts, etc.). The main input data for the monitoring and reporting tools is the enhanced tactical flow management system correlated position reports containing SSR transponder code assignments provided by States.

The operational data obtained during the first year was used to calibrate the tools and identify the improvement areas, while the analysis conducted in 2014 allowed the definition of quantitative targets. The transponder code function target is to reduce the total number of code changes by 50% by the end of the second reporting period (by comparison to the 2012 figures).

In parallel, TCF will continue, in accordance with the NMF-IR and the agreed CDM processes, the periodic assessments of the SSR code allocations.

In accordance with the TCF specific CDM processes the assessment of code allocations for each State will be conducted at least once during a four year time interval. A new four year cycle started in 2022. The schedule for 2023 and beyond will be agreed through the appropriate CDM mechanisms during the first half of the year.

Implementation of data provision mechanisms and tools in support of the transponder codes management

In accordance with the Annex III Part C of the NMF-IR and the TCF approved CDM processes, the States are required to provide data to support the provision of the network function for SSR transponder codes. The provision of Enhanced Tactical Flow Management System's Correlated Position Reports containing SSR transponder code assignments for general air traffic conducting flights under instrument flight rules is planned to be completely implemented within two years from the date of applicability of the regulation.

TCF will act as the focal point for the collection of SSR transponder code usage data and will assist the States in meeting their NMF-IR obligations with regard to data provision.

5.9 Safety Performance Enhancement

For the Reference Period (RP3), The NM target for 2024 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 RP3 EU-wide targets.

	2020	2021	2022	2023	2024
EoSM : Effectiveness of Safety Management	Level C or above in 20% of MOs, i.e. safety promotion + safety policy and objectives Level B safety risk management + safety culture + safety assurance	Level C or above in 40% of MOs, i.e. safety promotion + safety policy and objectives + safety risk management Level B safety culture + safety assurance	Level C or above in 60% of MOs, i.e. safety promotion + safety policy and objectives + safety culture+ safety risk management Level B safety assurance	Level C or above in 80% of MOs, , i.e. safety promotion + safety policy and objectives + safety culture + safety assurance + safety risk management	At least Level D in safety risk management and Level C in the other MOs

The annual values set for the EoSM key performance indicator are:

NM will also support and monitor ANSP implementation of Safety Tools automated safety monitoring tools (ASMT), eTOKAI and RAT (90% of European ANSPs by end of 2024).

5.9.1 Support to Network Safety

The Network Manager 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 Commission Implementing Regulation (EU) 2019/123 of 24 January 2019 reconfirmed and augmented the Network Manager task to "*identify operational safety hazards at network level in cooperation with operational stakeholders and assess the associated network safety risk and report them to the Agency.*"

To fulfil this task the Network Manager put in place a Safety Prioritisation Process, aimed to identify and prioritise the operational network safety risks. The process, ran annually, includes analysis of European A and B severity incidents with Safety Functions Maps (SAFMAPS) barrier models maintained by the Network Manager. Based on the conclusions of the incident data analysis, the prioritisation for 2022+ is as follows:

- Retain the following top 5 safety priorities: Controller Blind Spot", "Flight without transponder or with dysfunctional one", "ACAS RA not followed", "Controlled airspace infringement" and "Controller detection of potential RWY conflict"
- Monitor the risks associated with the following issues: "Restricted airspace infringement", "Synchronisation of arriving to land and of arriving to land and departing aircraft", "Non-commercial and VFR flights in TMA/CTR airspace", "Involvement of drones in incidents", "Incorrect presence of landing aircraft", "Sudden, high energy runway conflict", "Vehicle involvement in incidents of incorrect presence on runway", "Events that could have been prevented by stop bars".

Improved management of available safety knowledge to enhance identification of risks and trends and to make better use of lessons learned and best practice materials is a central NM

strand of safety work to help reduce the level of risk in ATM operations. SKYbrary, EUROCONTROL's on-line aviation safety knowledge repository (www.skybrary.aero) is a major free resource to achieve greater dissemination of safety information. Maintaining and expanding the SKYbrary knowledge base is an ongoing activity.

EVAIR (EUROCONTROL Voluntary ATM Incident Reporting) works with airlines and ANSPs to identify areas of concern and initiate quick-fixes to problem areas identified. Over 200 airlines currently provide their ATM-related incident data to EVAIR. These airlines account for over 78% of the European air traffic. ANSPs provide feedback on received reports and in many cases remedial actions are instigated much quicker than through the 'traditional' mandatory reporting mechanisms. The aim is to further increase the number of participating aircraft operators and further improve the feedback ratio and response times from the ANSPs.

EUROCONTROL produces a variety of safety tools, products and services (mainly for ANSPs), which had been made available to help them implement their local ATM enhancement safety aims, objectives and plans. Examples of the safety tools and products, and associated implementation goals are:

- APF (Aerospace Performance Factor) allows ANSPs to compile aggregated data from various sources which provides a more holistic view of historical safety data which aids future trend analysis.
- Safety intelligence is becoming more and more important. Gathering the data from reports or automatic tools is useful, using it is essential in improving safety. With the continuously evolving nature of the data and the enlarging scope of activities, it has become vital to use advanced tools in order to transform the data into information and support decision-making. The APF was a first step in data fusion, this work is now being continued with the advanced dashboards developed based initially on occurrence data (from TOKAI/RAT, see below) but also combining other relevant data, such as traffic, environment, weather, etc. By using ML/AI techniques, these data will yield even more detailed information that would help making the right decision in order to maintain and improve safety.
- TOKAI (Toolkit ATM Occurrence Investigation) TOKAI also includes the RAT (see below). There are today 80+ ANSPs worldwide using TOKAI and the number of deployments is increasing every year. eTOKAI is a web-based application which helps ANSPs manage the entire air traffic safety incident investigation process: notification, investigation, storage, analysis and reporting (both internally and externally). An added benefit is that eTOKAI users automatically comply with EU Regulations, in particular Regulation No 376/2014 on reporting occurrences in civil aviation and Commission Implementing Regulation (EU) 2019/317 on performance. The full compatibility with the ADREP taxonomy ensures the exchange with ECCAIRS via an embedded interface. With the advent of ECCAIRS2, further efforts will be required to adapt the TOKAI tool for a direct interface with ECCAIRS2, thus continuing to ensure compliance with the regulatory requirements, both for NM and for its ANSP TOKAI customers. The development requirements were done jointly with key ANSP partners like Austro Control, ENAV, DFS, FerroNATS, Skeyes, (MATS) MALTA ATS, IAA, NAVIAIR, ENAIRE and DSNA. Globally, eTOKAI is used by other non-European ANSPs such as ATNS South Africa, Airways NZ, CAAS Singapore, AEROTHAI Thailand. The FAA has been also a key contributor and has regularly attended the User Group. ENAV, DFS, FerroNATS and Austro Control were the Launch customers of the new web platform and technologies in the beginning of RP2.
- RAT (Risk Analysis Tool) provides enhanced severity and risk assessment methodology for reported ATM incidents; the activity supports the EC Performance Scheme (EU 2019/317). The intention is to deploy RAT in all ANSPs in ECAC so that they can report to their NSAs 'ATM Ground' severity using the RAT for the classification 100% respectively of the annually reported Category A-C Separation Minima

Infringements and Runway Incursions incidents and Category AA-C ATM Specific Occurrences.

- ASMT (Automatic Safety Monitoring Tool) enhances safety gathering through the automatic collection of safety data (from surveillance, ACAS systems etc.) to ensure improvements to safety performance monitoring. ASMT supports users in monitoring safety performance of the overall ATM safety. The information obtained can help ANSPs gain a broader and more objective perspective of the current safety issues, such as strategic conflict management, separation provision, and acceptable risk level, identification of hazards, quality and reporting level. ASMT-recorded data can contribute to improvement actions in the following domains like: SMS efficiency, Airspace/airways structure design & sector configuration, Local procedures review, Operational analysis of the impact of traffic distribution/Sector charge on safety, Regulation/flow management, Alert equipment and operational techniques.
- Call Sign Similarity Tool (CSST) allows aircraft operators to detect and then de-conflict similar call signs (according to a set of agreed rules) embedded within their aircraft operator schedules. Single AO de-confliction (Service Level 1) started in March 2012; the decision to move to a limited form multi-AO de-confliction (i.e. between different airlines) involving 'clusters' of airlines was agreed in 2016. Further studies to consider the implications of 'clustering' on the CSS CONOPS and the requirements of CSST were undertaken in 2017. However, the available resources will allow NM to only continue with the Service Level 1 – single AO de-conflicting which allows up to 84% de-confliction of overall callsigns.
- SKYbrary is a web-based electronic repository of safety knowledge related to ATM and aviation safety that allows risk identification and management based on gathering, sharing and learning from safety knowledge acquired by aviation organisations. It continued to thrive in 2022 with more than 9 million visits (see Figure below). The SKYbrary content grew in 2022 by another 6 % by means of developing new risk articles and SKYclips, and integrating other safety deliverables in the operational risks categories and on the bookshelf. The SKYclips are short animation videos that cover a wide range of operational aviation safety topics and deliver key messages to the front line operators – pilots, controllers and vehicle drivers at airports.



SKYbrary content growth

Note: In 2021, SKYbrary transitioned from the old Mediawiki platform to a new modern platform based on Drupal CMS.

SKYbrary user community grew by another 8 % in 2022 (preliminary data). Users come from all over the world as illustrated by the figure, and the map below.



SKYbrary user community growth

Note: Since 2021 Google Analytics does not report on unique visitors anymore. The data about 2022 is extracted from the platform server.



2022- Geographical coverage of SKYbrary

- 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 unstabilised approaches. By the end of November 2022, the 'SKYclips' programme delivered 36 'SKYclip' animated videos covering a wide range of operational aviation safety topics.
- Safety Nets (see section 5.10.2)

- Effectiveness of Safety Management is a specially designed questionnaire to assist in the measurement of the effectiveness of ANSPs' SMS in support of the EC Performance Scheme (EU 2019/317). The measurement is performed annually by NSAs and EASA and results are reported by the PRB. The scope of measurement is purely the SES 30 ANSPs (EU27 + Switzerland and Norway). Since 2010, EUROCONTROL and CANSO have developed a more advanced methodology, based on an improved questionnaire. The objective of this measurement is performance and not compliance. This is the Standard of SMS Excellence (SoE). A second, even more advanced version of the questionnaire is used since 2016, while in 2020 the questionnaire was further updated. This is a global exercise, which is run by EUROCONTROL in cooperation with CANSO. The SoE maintains similarities to the EoSM and supports greatly ANSPs and FABs to achieve the Performance Scheme objectives for 2024: 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'). To improve the support it can provide to its stakeholders it is essential that the Network Manager itself has a properly functioning and regulated internal SMS. The measurement itself and the cooperation with CANSO in running this annual exercise remains the most powerful tool for the NM in order to provide support and ultimately improve the safety of the network. The new SoE version developed jointly with CANSO was accepted by EASA to serve as a basis for a Safety KPI for RP3.
- Just Culture is an integral part of overall Safety Culture. To further enhance the availability of safety data (for instance by encouraging voluntary reporting of non-mandatory occurrences), it is necessary for the majority of European states to improve the Just Culture both within ANSPs, and more widely, at national levels.

Just Culture (JC) enables improved reporting and lesson learning, which are important for improving safety – it is also a safety KPI in the Performance regulation.

The Just Culture achievements during RP2 include:

- Adoption of a new Just Culture Model Policy for prosecution for aviation and railways.
- On average two just culture 'expert' courses each year were run in association with the International Federation of Air Traffic Controllers' Associations (IFATCA) and the European Cockpit Association (ECA) that aim to produce a pool of aviation 'experts' who can interface with national judiciary. At the end of 2019 a total of 252 experts (amongst which 65 ATCOs, 47 pilots, 99 judiciary and 41 observes/organisers/moderators) have successfully undertook the Prosecutor Expert Course.
- Two just culture "expert" courses run in association with ERA (European Union Agency for Railway) to adopt the same approach as in aviation for railways.
- Three to four regional roadshows or workshops were held annually to 'show and sell' the Just Culture Model Policy and the 'expert' course.
- Annual Just Culture Conferences "Continuing to learn from each other" brought on average 150 experts every year from judiciary, aviation, railway, maritime and health care.
- Deployment of the Just Culture climate questionnaire to gauge the implementation of Just Culture at organisation (ANSP) and national (Civil Aviation Authorities and judicial) level in conjunction with SMS Standard of Excellence.
- A first Just Culture repository and knowledge centre is available on Skybrary <u>https://skybrary.aero/enhancing-safety/just-culture</u>
- NM continued to improve the just culture as part of its internal SMS covering all staff, including those working in NM's operational areas.

 Human Performance - despite all the technological advances, the human remains central to ATM. The Network Manager has unrivalled expertise in the field of ATM Human Performance and is leading the way for the implementation of human performance enhancement initiatives. These will be key to the successful deployment of SESAR. The intention is for the Network Manager, working with ANSPs, to jointly develop and implement the Safety Team's Safety Human Performance Plan 2019 and beyond, to ensure the sustainability of the SES 5th Pillar - Human Factors (SHP-SG plan of the Safety Team contains elements of fatigue risk management, weak signals, automation and ergonomics, systemic thinking, TRM and CISM).

5.9.2 Runway Safety (R-SAF)

Prevention of Runway Incursions

The rate and numbers of runway incursion reports remain steady. From the reports and data received, it has been observed that a minimum of two runway incursions continue to occur every day in the European region. Accidents continue to take place on runways. Findings from those incident and accident reports have been used to determine the new recommendations and associated guidance materials contained in this update to the European Action Plan for the Prevention of Runway Incursions (EAPPRI) ed 3.0 issued in November 2017.

The increasing availability of runway incursion incident reports is a positive indication of the commitment of the organisations and the operational staff to prevent runway incursions and runway accidents by learning from the past accidents and incidents, and sharing this information across Europe.

The establishment of local aerodrome Runway Safety Teams (RST), which should comprise, as a minimum, representatives from Aircraft Operators, Air Navigation Service Providers and the Aerodrome Operator, is helping to facilitate effective local implementation of the recommendations. At the same time, aerodrome local Runway Safety Teams address runway safety specific issues related to their own aerodrome.

Core to the EAPPRI 3.0 recommendations is the uniform and consistent application of ICAO and, increasingly, EU provisions. It is for the National Competent Authority to decide upon the strategy for implementation at applicable aerodromes within a State.

The recommendations are mainly generic and it will be for the responsible organisations to decide specific details, after considering local conditions e.g. aerodromes where joint civilian and military operations take place.

The recommendations are the result of the combined and sustained efforts of organisations representing all domains of aerodrome operations. The organisations that contributed to this action plan are totally committed to enhancing the safety of runway operations by advocating the implementation of the recommendations that it contains. These organisations include, but are not limited to, Aerodrome Operators, Air Navigation Service Providers, Aircraft Operators, and Regulators/National Aviation Authorities.

Prevention of Runway Excursions

Runway excursions are the most frequent type of accident in aviation and regularly are identified as one of the most serious risks for large and small aircraft. Because of the complexity of the risk factors, involving different segments of the aviation industry including operators, airports, aircraft manufacturers and air navigation service providers (ANSPs), preventing runway excursions requires coordination and commitment among numerous stakeholders. Systemic or transient variability in operations, like those caused by the COVID-19 pandemic, propagates through the tightly coupled collaborative systems of the stakeholders and has the potential of cumulative impact on runway excursion resilience as shown by recent International Air Transport Association (IATA) reports of an increased rate of unstabilized approaches. In May 2021 EUROCONTROL, Flight Safety Foundation and a wide coalition of

partners published the Global Action Plan for the Prevention of Runway Excursions (GAPPRE). GAPPRE was validated by Airport Council International (ACI), the Civil Air Navigation Services Organisation (CANSO), EASA and IATA. GAPPRE provides a set of recommendations for different time horizons – some can be implemented immediately, and some may require up to 10 years for technology maturation and implementation. GAPPRE creates a robust roadmap for the industry to reduce the risk of runway excursions.

5.10 Pan European Infrastructure Enhancement Plans

5.10.1 Surveillance System and Sensors

Description

This activity supports the implementation, modernisation and optimisation of European ATM Surveillance, to enable Network performance improvements and ensure global interoperability. It aims at the transition to a cost, spectrum and environmentally efficient Surveillance infrastructure, meeting the performance needs of the European ATM Network. It supports the provisions of the relevant EU Regulations 1207/2011 (Surveillance Performance and Interoperability Implementing Rule) and its amendments as well as the Aircraft Identification Implementing Rule (ACID IR). It focuses on the Surveillance end-to-end system and sensors. It covers ground, airborne and space-based components. This WP includes a lead role in topics of the Operational Excellence Programme, i.e. 13.2.1 Surveillance Infrastructure Modernisation, 13.2.2 Surveillance Infrastructure Optimisation and 13.6 Harmonised DAPs (Downlinked Aircraft Parameters).

The activities include support and coordination in the following:

- Monitoring of Surveillance Implementation status and plans.
- Performance Based Surveillance (PBS), application and component Specifications. This includes preparation of harmonised Surveillance Requirements for the application of current and reduced separation minima. These cover various operational applications/types of airspace and will be complemented by Specifications, guidelines and assessments. It also includes Specifications for Surveillance components (e.g. sensors, avionics).
- Implementation/modernisation of Surveillance applications and infrastructure (including ADS-B, Mode S, Multilateration, Independent Non-Cooperative Surveillance, use of Downlinked Aircraft Parameters etc.).
- Optimisation of Surveillance infrastructure, enabling cost and spectrum efficiency as well as environmental sustainability.

The activity performs its tasks in partnership with the stakeholders (civil and military Airspace Users, ANSPs, industry, European and international organisations such as EASA, SDM, SJU, EUROCAE/RTCA, ICAO etc.)

Milestones / Timeline

The main milestones and associated schedule are as follows:

Monitoring of Surveillance Implementation status and plans

Annual update of SUR Implementation plans and reports

Performance-Based Surveillance (PBS) and component Specifications

- 2023-2027 EUROCONTROL Specification for ATM Surveillance system performance (ESASSP) updates (for various use cases and separation min)

- 2023-2027 Inputs to EUROCONTROL, EUROCAE/RTCA, EASA and ICAO documentation for application and system standards, Specifications, certification and guidance material

Implementation/Modernisation Support to stakeholders (incl. guidance material, supporting documentation)

- 2023+ Support for implementation of EU Regulations No 1207/2011, 1028/2014, 2017/386 and future amendment(s) including partnership with EASA, SDM etc.

- 2023-2027 Support to local Surveillance implementations

- 2023-2027 Support integration of GA and other low-end Users (e.g. RPAS/UAS)

- 2023-2027 Support to security and privacy
- 2023-2027 Support to space-based ADS-B use

Infrastructure optimisation support

- 2023-2027 Guidelines (incl. best practices, constraint mitigations etc.), CBA model and other supporting material

Action required from stakeholders

Stakeholders should comply with the provisions of the EU Regulation 1207/2011 (SPI IR), its published amendments (EU Regulation 1028/2014, 2017/386) and possible future amendment(s).

Expected benefits

The modernisation and optimisation of Surveillance infrastructure and applications, including Mode S, ADS-B and Multilateration, provide important features and associated performance improvements to the ATM Network:

- Full "Network-wide" Surveillance coverage
 - Surveillance in all phases of aircraft operation, i.e. no gaps from gate-to-gate
 - Air-to-air surveillance, i.e. traffic picture available on board
 - Surveillance data provided directly from on-board systems
 - The aircraft becomes an integral part of the Network
- Higher performance
- Improved Safety and Security
- Increased Capacity
- Improved Cost-efficiency
 - Reduced cost of the Surveillance infrastructure
- Improved Flight Efficiency

- More efficient flight profiles e.g. in areas where previously Surveillance was not cost-effective

- Fuel savings
- Environmental sustainability (reduced CO2)

- Improved spectrum efficiency, reduced RF pollution and increased sustainability of the 1030/1090 MHz datalink
- Global Interoperabilit.y
- Foundation for future applications (e.g. spacing, separation etc.) targeted in SESAR.

5.10.2 Safety Nets

Description

Ground-based safety nets are an integral part of the ATM system and intended to assist the controller in preventing collision between aircraft or between aircraft and terrain by generating, in a timely manner, an alert of a potential or actual infringement of separation minima. Using primarily ATS surveillance data, they provide warning times of up to two minutes. Upon receiving an alert, air traffic controllers are expected to immediately assess the situation and take appropriate action.

There are four 'classic' ground based safety nets:

- Short Term Conflict Alert (STCA): which assists the controller in preventing collision between aircraft by generating, in a timely manner, an alert of a potential or actual infringement of separation minima;
- Minimum Safe Altitude Warning (MSAW): which warns the controller about increased risk of controlled flight into terrain accidents by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles;
- Area Proximity Warning (APW): which warns the controller about unauthorised penetration of an airspace volume by generating, in a timely manner, an alert of a potential or actual infringement of the required spacing to that airspace volume;
- Approach Path Monitor (APM): which warns the controller about increased risk of controlled flight into terrain accidents by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles during final approach.

To assist ANSPs with the implementation of ground-based safety nets EUROCONTROL has been producing technical guidance material on ground-based safety nets for the best part of two decades. A new set of 'Level 3' documentation was released on 18th January 2017.

Milestones / Timeline

The applicable ESSIP Objectives set the milestones for the implementation of ground based safety nets in a various operating environments (e.g. STCA in TMAs).

Action required from stakeholders

Stakeholders' milestones: review "level 3" ground-based safety nets documentation and applicable ESSIP objective.

Expected benefits

At least maintain and where possible increase the effectiveness of ground-based safety nets in the context of increasing traffic density and evolving operational concepts.

5.10.3 Datalink (CPDLC) Services

Description

Datalink refers to digital air/ground communications between aircraft and ground systems. Datalink is a key enabler to deliver safety and capacity and support efficiency, scalability and

automation in ATM. In addition, datalink is a prerequisite to pave the way towards SESAR's target concept: the introduction of 4D-trajectory management and support the integration of ATM in the air and on the ground.

In the recovery from the COVID-19 crisis, ATM scalability and efficiency have become priority goals, especially compared to capacity. In this context, harmonised datalink operations can be a key contributor to enable controllers and pilots to optimise their time and practices handling flights.

The European datalink system is based on the ICAO ATN (Aeronautical Telecommunications Network) using interconnected routers and end systems over the VDL2 (VHF Digital Link Mode 2), as the air/ground datalink technology, operating in the VHF (very high frequency) band.

Datalink enables applications such as Controller-pilot datalink communications (CPDLC). CPDLC allows flight crews and air traffic controllers to exchange non-urgent Air Traffic Control (ATC) information by data messages instead of voice radio. Text-based messages have the advantages to reduce the margin of error and misunderstandings in situations of poor voice connection, and they liberate space on the congested VHF channels for more urgent voice communications. Operators also use datalink to transmit Airline Operational Control (AOC) messages between flight crew and airline operational centres.



Since February 2020, the Datalink Services Implementing Rule (DLS IR, IR (EC) No 29/2009 as amended), mandates the support for datalink services (DLS) for all flights in the European airspace operating above FL285.

The DLS IR requires the air navigation service providers (ANSPs) to offer four datalink services (DLIC, ACL, ACM and AMC) and the airspace operators to be capable (i.e. to have equipped aircraft and trained crews) to operate these services over ATN VDL2.

While DLIC (datalink initiation capability) allows the aircraft to logon on the datalink system, it is the other 3 services (part of CPDLC, Controller Pilot DataLink Communications) that actually deliver the operational benefits. ACM (ATC communications management) and ACL (ATC clearances) support the efficient transfer of communications and ATC clearances, requiring less time to transmit the required operational content and AMC (ATC microphone check) is improving safety and availability of voice communications by providing a means to the controllers to ask pilots to check if the push-to-talk button maybe accidentally pressed.

The CPDLC services do not replace voice communications as the primary means of communication; both media should always be available, providing a definite safety improvement. In case of non-standard communications or emergencies, "revert to voice" is the procedure to be followed.

As of Q4 2022, the majority of the European ANPS have deployed DLS in accordance with the regulations and the communications services providers (i.e ARINC, SITA, ..), in coordination with the ANSPs, have deployed the VDL2 air-ground datalink network supporting both AOC and ATS communications. On the airborne side airlines have implemented the datalink capability. Nevertheless, further work and effort is required to complete the ground deployment (3 states are not offering DLS services and 8 states are not supporting the automatic transfer of the logon information in all operational links with adjacent centres) and address identified issues and deploy improvements on the ground side the a/g network side as well as the avionics side.

The following priorities have been agreed by the Datalink Support Group in 2022:

- Complete ground deployment:
 - DLS
 - LOF/NAN
- Harmonise:
 - ground systems technical capability (addressed in Ops Excellence Programme WST12.1)
 - operations (addressed in WST01.04 and WST12.1)
- Support activities aiming to increase use of CPDLC (pilot logon as well as ATCOs/pilots using CPDLC services)
- Develop solutions and products to address issues
- Support operators to deploy certified solutions

Expected Benefits

All pilots and controllers exposed to CPDLC recognise the advantages:

- Fewer misunderstandings increased safety
- Reduced R/T time increased efficiency.

Together with the Radio Frequency Function (RFF), and 8.33kHz implementation, datalink is also contributing to an efficient use of the existing scarce VHF spectrum resource.

The role of EUROCONTROL NM

EUROCONTROL, together with the European Aviation Safety Agency (EASA) and SESAR Deployment Manager, aim to ensure an effective and harmonised datalink implementation in Europe. To this effect, EUROCONTROL has established the Datalink Performance Monitoring Group (DPMG) and together with EASA and SDM the Datalink Support Group (DSG) which bring together all relevant European and global stakeholders: Aeronautical Communication Service Providers, Aircraft Operators, Air Navigation Service Providers, National Regulators and manufacturing industry (avionics and OEMs)s. These groups support stakeholders to monitor their current datalink operations and solve technical issues affecting safety, capacity, performance and interoperability on a European level.

Overall, the EUROCONTROL Network Manager datalink activities cover the following three main areas of activities:

- Performance monitoring
- Support datalink deployment and investigations

• Interoperability testing

EUROCONTROL Network Manager is working with all ATM stakeholders (ANSPs, Airports and Airlines) as well as the Datalink Stakeholders to address the required evolution of the current VDL2 infrastructure and set up collaborative and efficient mechanisms to address problems and implement the agreed solutions.

Datalink has been retained as a high-priority activity in the NDOP/NDTECH prioritisation exercise and has been selected for the Ops Excellence initiative (WST12.1 and WST01.04) aiming to harmonise DLS operations.

6 Operational Performance Enhancement Plans and Actions at Local Level

6.1 ACC Capacity Enhancement Measures

The Network Manager supports ANSPs in the development of their local capacity plans to meet the Network performance targets, providing operational and technical expertise as required. This section of the NOP summarises the initiatives undertaken by ANSPs to improve ACC capacity within the current planning cycle.

To ensure the required delivery of capacity in the medium-term, detailed capacity plans are developed by the ANSPs for each ACC, in close partnership with the Network Manager. Details of individual ACC capacity enhancement initiatives can be found in Annex 1 of this document.

The maps below indicate the ACC percentage capacity increases currently planned for Summer seasons from 2023 to 2027 with respect to the 2027 ACC capacity baseline.







The following table describes the improvements planned in the different ACCs during the planning period.

	AIRSPACE							DURES		STAF (F	FING IR)	ASM F	& ADV. UA	TECH. S	YS. / PR	OJECTS	CAPACITY					
State / ACC Capacity Enhancement Measures	Route network & TFC flows improvements	Airspace / Sector optimisation	Free-Route Airspace	DCTs	X-border improvements	TMA Improvements	ATC Procedures	Reduced Separation	ATFCM Procedures incl. sector occupancy	Coordination Procedures	Additional controllers	Improved staff planning/ flexible rostering	ASM Improvements	FUA Improvements	ATM System new or upgrade	Datalink / 8.33 / SUR, ADS-B&WAM	ATC Tools	Create additional sector (max conf)	Extended sector configuration opening	Dynamic Sector Configuration Management	Sector Capacity Increase	
Albania / Tirana		2023-25				2024						2023-27			2024-25	2024						
Armenia / Yerevan																						
Austria / Vienna		2023-27	2023-27						2023-27		2023-27				2023-27		2024;25			2023-27		
Belgium / Brussels	2024						2024		2023-27		2023-27		2023-27		2024							
Bosnia Herzegovina		0000.07							2023-27		2025	0000.00		0000 07	2023-27	0000.00						
Bulgaria / Sofia		2023-27	2022.27			2025.26	2022.24		2023-27		2023-24	2023-20	2024.27	2023-27	2023-20	2023-26	2022			2022		
Cyprus / Nicosia	2023-27	2023-27	2023-27			2023-20	2023-24	2025	2023-20		2023-27	2023-21	2024-27	2023-27	2023-27		2023	2023	2023-27	2023	2023-27	
Czech Rep./ Prague	2020 21	2023:25-2	6		2023-24	2020 21		2020	2020 21		2024-25		2020 21	2020 21	2020 21			2020	2023-26	2020 21	2020 21	
Denmark / Copenhagen	2023-27	2023-27				2023-24			2023-27			2023-24		2023-27	2023-27					2023-27		
Estonia / Tallinn		2023-24			2023-27		2023-27		2024-27			2024-27								2023-27		
EUROCONTROL / MUAC									2023-24		2023-27						2023-27				2023	
Finland / Helsinki		2024-27			2023-27		2023-27		2024-27			2024-27	2023-27	2023-27	2023-24					2024-27		
France / Bordeaux									2023-27			2023-27	2023-27	2023-27	2026							
France / Brest			2025						2023-27				2023-27	2023-27	2026	2023						
France / Marseille			2024-25						2023-27		2023-27		2023-27	2023-27							2023-25	
France / Paris		2024;26	2025			2024-26			2023-27			2023-27	2023-27	2023-27	2023						2024-26	
France / Reims		2025;27	2024-25						2023-27		2024;27		2023-27	2023-27							2023-24	
Georgia / Tbilisi	2023		2023			2023	2025				2023-24										2023	
Germany / Bremen		2023	0004		0004						2023-27										2026	
Germany / Karisruhe		2025	2024		2024		2022.24				2023-27						2022.24					
Germany / Langen		2023-24	2026			2024-25	2023-24				2023-27				2023	2026	2023-24					
Greece / Athinai		2025-26	2023-24			2023-24			2023-27		2023-27		2023-27	2023-27	2025	2020	2020				2024	
Greece / Makedonia		2025-26	2023-24			2023-24			2023-27		2023-27		2023-27	2023-27	2025						2024	
Hungary / Budapest		2023-27	2023		2023						2023-27	2023-27			2024		2024					
Ireland / Dublin		2023			2023-27				2023-27			2023-27										
Ireland / Shannon					2023-27		2023-27		2023-27			2023-27								2023-27		
Israel / Tel Aviv											2023				2027	2023-25						
Italy / Brindisi	2023-27	2023-27							2023-27		2023-27		2023-27							2023-27		
Italy / Milan	2023-27	2023-27				2024			2023-27		2023-27		2023-27		2026		2024			2023-27		
Italy / Padova	2023-27	2023-27							2023-27		2023-27		2023-27							2023-27		
Italy / Rome	2023-27	2023-27							2023-27		2023-27		2023-27		2025	2024	2023			2023-27		
Latvia / Riga		2024									2024	2023-27										
Malta			2025			2024						2023 21		2025	2025							
Moldova / Chisinau			2023		2023	2025					2024			2023-24								
Morocco / Casablanca			2023-24			2023-24		2024			2025-27				2023							
Morocco / Agadir		2023-24	2024				2026	2023			2025-27				2024	2026						
Netherlands / Amsterdam		2026-27									2023			2025	2024		2024					
N. Macedonia / Skopje						2024			2023-27		2023				2024					2024		
Norway / Bodo											2023-27	2023-27										
Norway / Oslo											2023-27	2023-27			2025							
Norway / Stavanger		2022.07	2024		2024	2022	<u> </u>		2022.27		2023-27	2023-27	<u> </u>	2022 27	2025					2022 27		
Polanu / Warsaw		2023-27	2024		2024	2023	2024		2023-27		2023-24	2023-27		2023-21				2023-24	2023-27	2023-27		
Romania / Bucharest	2023-27	2023-27	2020 20		2023	2024	2023-27		2023-27	2023-27	2023-27	2023 21		2023-24			2024	2020 24	2020 21		2023	
Serbia / Beograd		2023	2023-27						2023		2023-24;2	7			2024	2024	2023					
Slovak Rep./ Bratislava	2023-27	2023-27							2023-27		2023-27				2023	2023			2023-27			
Slovenia / Ljubljana	2023-27		2023-27		2023-27	2023-24			2023-27		2023-27				2023-27					2023-27		
Spain / Barcelona		2023-27	2023-25						2023-27		2023-27				2024-26				2023-27	2025-27		
Spain / Canarias		2023-27	2023-24			2023-24			2023-27		2023-27				2024-26				2023-27	2025-27		
Spain / Madrid		2023-27	2023-24		2025				2023-27		2023-27				2024-26				2023-27	2025-27		
Spain / Palma		2023	0077		<u> </u>	2025-27	<u> </u>		2023-27		2023-27	<u> </u>	<u> </u>	<u> </u>	2024-26				2023-27	0005		
Spain / Sevilla	0000.07	23;25-27	2023-25		0004				2023-27		2023-27	0000	0000 07		2024-26				2023-27	2025-27		
Sweden / Maimo	2023-27	2026-27	2024		2024				2023-27		2023-27	2023	2023-27							2023-27		
Switzerland / Geneva	2020-21	2020-27	2023		2024-25		2024		2023-27		2023-27	2023	2023-27		2023-27		2023-27			2020-21		
Switzerland / Zurich		2024	2023		2024-25	-	2023		2023-27		2023-27		2023-27		2023-27		2023-27					
Turkiye / Ankara	2023-27		2023-24			2023			2023-27		2023-27			2023-27								
Ukraine / Dnipro																						
Ukraine / Kiev																						
Ukraine / L'Viv													<u> </u>	<u> </u>								
UK/London ACC			2023				2023-27		2023-27			2023-27		2023					2023-27	2023-27		
UK/London TC			2020			2023:26	2023-27		2023-27			2023-27		2020	2024		2024:26		2023-27	2023-27		
UK / Prestwick ACC						2026;27	2023-27		2023-27		1	2023-27		2023	2025		,_0		2023-27	2023-27		

6.2 Airport Performance Enhancement and Network Integration

This section reports the planned activities in the period 2023-2027, aiming to improve airport and network operations, working with local airport stakeholders to reduce delays and improve the operational efficiency of the airports.

Project partners and NM are actively coordinating these activities through the revised NM working arrangements such as dedicated task forces, working groups and individual meetings. More details regarding the airport related NM working arrangements are available at EUROCONTROL and NM Working Arrangements Portal⁸.

6.2.1 Airport Connectivity

6.2.1.1 Integration of major airports through AOP-NOP

The aim is to further integrate Airports in the network by extending the timeline and content of the data shared between Airports and NM systems with new Arrival Planning Information (API) and Departure Planning Information (DPI) messages. This will enable more efficient cooperation between Network Manager Operations Centre and local airport collaborative structures. The goal is to improve predictability and capacity on the network. Every Airport defines with EUROCONTROL the system requirements for the data exchanges between systems. After the implementation of the new messages in the Airport system there is a phase of validation of the data in a testing environment (replica of ETFMS), as per the CDM Airports. When the validation is successful, the data exchange is moved in the NM OPS systems.

This activity is divided in 2 phases:

- a. Initial AOP/NOP integration, applicable to 18 European Airports and to be deployed by 31/12/2023. This activity concerns the following airports:
- Adolfo-Suarez Madrid-Barajas;
- Amsterdam Schiphol;
- Barcelona El Prat;
- Berlin Brandenburg Airport;
- Brussels National;
- Copenhagen Kastrup;
- Dublin;
- Düsseldorf International;
- Frankfurt International;
- Milan-Malpensa;
- Munich Franz Josef Strauss;
- Nice Cote d'Azur;
- Palma De Mallorca Son Sant Joan;
- Paris-CDG;
- Paris-Orly;
- Rome-Fiumicino;
- Stockholm-Arlanda;
- Vienna Schwechat.
 - b. Full AOP/NOP integration, applicable to 28 European Airports and to be deployed by 31/12/2027. This activity concerns the following airports:
- Adolfo-Suarez Madrid-Barajas;
- Amsterdam Schiphol;

⁸ <u>https://ost.eurocontrol.int/sites/NMWA/SitePages/EUROCONTROL%20and%20NM%20Working%20arrangements.aspx</u>

- Athens Eleftherios Venizelos;
- Barcelona El Prat;
- Berlin Brandenburg Airport;
- Brussels National;
- Copenhagen Kastrup;
- Dublin Airport;
- Düsseldorf International;
- Frankfurt International;
- Hamburg;
- Helsinki Vantaa;
- Humberto Delgado Lisbon Airport;
- Lyon Saint-Exupéry;
- Malaga Costa Del Sol;
- Milan-Linate;
- Milan-Malpensa;
- Munich Franz Josef Strauss;
- Nice Cote d'Azur;
- Palma De Mallorca Son Sant Joan;
- Paris-CDG;
- Paris-Orly;
- Prague;
- Rome-Fiumicino;
- Stockholm-Arlanda;
- Stuttgart;
- Vienna Schwechat;
- Warsaw Chopin.

Lisbon Humberto Delgado Airport successfully completed the deployment of iAOP-NOP integration. The new messages exchange is in OPS since 4th August 2022.

In the initial AOP/NOP integration related timeframe the planning of the implementation is currently the following:

2023	Adolfo-Suarez Madrid-Barajas, Amsterdam Schiphol, Barcelona El Prat,
	Brussels National, Dublin Airport Düsseldorf International, Frankfurt
	International, Milan-Malpensa, Nice Cote d'Azur, Palma De Mallorca, Paris-
	CDG, Paris-Orly, Rome-Fiumicino Stockholm-Arlanda, Vienna Schwechat

6.2.1.2 A-CDM and Advanced ATC Tower

A-CDM

The implementation of A-CDM improves operational efficiency at airports by improving predictability and optimising the utilisation of resources, leading to reducing delays.

A-CDM provides the network with more accurate take-off information on which to base Air Traffic Flow Management (ATFM) slots. As more airports implement A-CDM, the network will be able to use slots more efficiently and reduce buffer capacity due to improved predictability. This enables reduction of ATFM regulations and consequently a decrease in overall delay.

At the end of 2022, 34 airports are connected to the network as CDM airports representing 41.5% of departures in the NMOC area, with the Network Manager supporting a further 8 airports at various stages of implementation. The Network Manager will continue to look to identify suitable airports for implementation and will support any airport considering the implementation of A-CDM.

For further information about the A-CDM project, refer to the EUROCONTROL Airport CDM Website (https://www.eurocontrol.int/concept/airport-collaborative-decision-making).



In the A-CDM related timeframe the planning of the implementation is currently the following:

2023	Gatwick, Dublin, Stockholm Arlanda, Manchester, Stansted, Istanbul
2024	Athens
2025	Leipzig-Halle, Koeln Bonn

Advanced ATC Tower

Airports currently without plans to implement the A-CDM process but still wishing to further integrate in the ATM network may do so by implementing as an Advanced ATC TWR airport. A number of airports consider this option as a first step towards full A-CDM implementation. Such airports provide a reduced set of DPI messages with a reduced set of advantages (compared to CDM airports). An Advanced ATC TWR airport provides Target Take-Off-Time (TTOT) estimations as well as Variable Taxi-Times (VTTs) and Standard Instrument Departures (SIDs) to the NMOC. This information is provided from the moment that the aircraft leave the blocks.

Currently 31 airports are connected to the Network as an Advanced ATC TWR airport representing 10.7% of departures in the NMOC area.

In 2023, 15 airports are working actively towards integration with the Network as AAT representing an additional 3.5% of departures in the NMOC area (in total 14.2%).



In the AAT related timeframe the planning of the implementation is currently the following:

2023	Athens, Kefalonia, , Corfu, Kavala, Mykonos, Aktion, Chania, Skiathos,
	Santorini, Zakynthos, Antalya, Bucharest Henri Coanda, Brno, Karlovy
	Vary, Ostrava

6.2.1.3 Connect regional airports

Regional and small airports are the third category of airports important from the point of view of network integration. They need a more targeted and more cost-sensitive approach, as their budget and infrastructure are usually limited. At secondary airports' level integration needs to be adjusted taking into consideration the associated effort (both entry and recurrent cost), as well as limitations on additional workload.

Activities conducted with a group of airports in the SESAR2020 solution PJ.04-W2-28.2 have proven that there is opportunity for the Network Manager to fill the current gap, providing operational benefits and supporting a fully integrated ATM Network. The new, cost-effective solution for secondary airports connectivity will provide a range of attractive value services (automated generation of DPIs, airport performance panel, Airport Transit View), tailored to the needs of secondary airports.

It is proposed that in these airports a reduced set of CDM milestones is implemented and calculated in a quasi-automatic fashion - reducing the need for airline/ground handler inputs. Such an approach relies on the stability and predictability of taxi-times, which is considered feasible in such airports.

This solution is aiming at improving the connectivity between regional airports and the NMOC thanks to the provision of DPI messages based on ADS-B and a reduced set of turnaround milestones compared to the full A-CDM implementation. The applicability to regional airports is reliant on the high degree of predictability of airport parameters including taxi-times, turnaround times and passenger boarding times. Ground handler workload will be reduced as a result of automatic determination of the aircraft-ready time (TOBT) based on the aircraft event-based milestones and the status of the passenger boarding provided by the local airport system.

To this end, NM is developing a low-cost cloud and web-based system called ECRA (European Connected Regional Airports) that will combine different data sources (ETFMS, ADS-B, Airport Operational Data Base (AODB or equivalent) and Demand Data Repository (DDR)) to automate (provision/calculation of) a number of typical milestones such as off-block event detection and DPI sending. ECRA will provide the airport with an "Airport-in-the-Network" HMI view presenting and addressing Airport-Network data exchange and Common Situational Awareness. It will also link the inbound flight with the outbound flight to track the outbound flight departure progress and will update the airports inbound flight with Arrival Flight Update information, enhancing situation awareness and improving predictability.

Project is divided in 3 phases.

- First Phase (2021-2023) considered a proof of concept, where a limited numbers of airports including a wide variety of operational environments (winter operations, summer destinations, civil/military airfields and very busy TMAs) join EUROCONTROL and support development of the solution in several iterations. In this phase ECRA software will reach its readiness for large demonstration, followed by migration to a new, cloud IT environment.
- Second Phase (large demonstration, 2023-2025) will start from achieving technical and operational readiness for demonstrating ECRA at next group of airports. Following target group, with up to 100 locations, will be identified through an open application process and will go through two-step deployment process.
- Third Phase (implementation/deployment, 2025-2027) project management plan defines this phase to start not earlier than the previous phase would reach a milestone of 75% airports operationally ready for demonstration. Airports intending to join deployment project are proposed to follow the same application and approval process as airports in the second phase.

ECRA concept has been successfully implemented at Kos, Thessaloni, Samos, Diagoras and Mitilini Airport in 2022. Kavala, Mikonos, Santorini and Ioannis Kapodistrias are in their final part of their operational evaluation. Additional 11 airports are ready to start their operational evaluation (Skiathos, Preveza, Khania Souda, Ioannis Kapodistrias, Megas/Alexandros, Kefallinia, Zakinthos, Bydgoszcz, Lublin, Luleå) and two of them are working on the system setup (Paris Le Bourget and Base/Mulhouse.

The following list of airports is initially confirmed to join the large demonstration phase that is intended to start in the fourth quarter of the 2023 and 2024: Åre/Östersund, Göteborg-Landvetter, Kiruna, Malmö-Sturup, Ronneby, Bromma Stockholm, Umeå, Radom, Zielona Góra, Jersey, Guernesey, Bucarest-Baneasa, Lanarca, Antwerp, Oostende-Brugge, Bordeaux, Rotterdam, Eindhoven, Nantes, Beauvais, Podgorica and Tivat. The list of airports will grow, since the NM will continue its efforts to connect further regional and small airports to the Network.

In the specific case of the French airports, EUROCONTROL is joining forces with DSNA preparing a solution combining the ECRA tool functions with the CDM@DSNA systems to support the integration of the French regional airports.

6.2.2 Operational capacity and predictability

6.2.2.1 Implementation of the Network Airport Function (Pre-tactical and Tactical)

Collaborative information exchange, recovery procedures and associated predictive and decision support tools are put in place to support the APOC in the anticipation, understanding and collaborative management of large-scale disruptive adverse events. This will reduce the impact and knock-on effect on airports, Airspace Users, ANSP and network stakeholders.

The airport function was originally introduced into the NMOC in 2014 as a trial, limited to the summer and specifically focusing on the Greek islands to better support airports operations

during summer traffic peak. To further support airports integrate as a component part of the network, the Airport Function position is active in NMOC 7 days a week.

These activities start with the strategic analysis service deployed to identify expected airport network issues and prepare solutions from 6 weeks before operation through to D-2. This service will ensure NMOC, the Airport Function and airports are ready to implement or adjust pre-agreed solutions on the day of operations. There are four operational phases defined for the Airport Function as follows:

1) D-6 Weeks to D-2 Weeks

- Individual airports are assessed using tools compiling information such as expected planned network events, long term weather forecasts, schedules and traffic predictions, and notified airport information including planned events and capacity reductions, via Airport Corner.
- Detected issues are discussed with the airport directly to identify possible mitigations and tentative plans. Mitigations and plans recorded in the airport function playbook.

2) D-2 weeks to D-2 Days

- Reassessment of airports Demand and Capacity is continuous and further coordination ensured with a view to formulating a robust plan, including use of different scenarios. Latest NM information, long-term weather forecasts and Airport Corner events are considered.
- Mitigations and plans are revised and the airport function play book is updated.
- Events and plans are briefed to NMOC and mitigations/plans revised based on feedback. Early mitigation is coordinated with the stakeholders concerned for implementation.
- Significant events and playbook plans briefed to NMOC may be revised based on NMOC feedback; simulations can be run for a particular event and analysed, if required.

3) D-2 Days to D-1 Day

- Play book actions are reviewed within NMOC, including any advance Weather info, revised and prepared for implementation. Airports or other stakeholders are informed and Airport Function prepared for implementation of actions allocated to it.
- 4) D-0 (Day of Operations) Airport Function Tasks
- Dedicated 'hotline' for Airport Operators, staffed from 0300 UTC in Summer and 0600 UTC in Winter
- Whilst not expecting major demand/capacity imbalance, there is potential for significant airport traffic peak demand and Airport Function will support the management of resolutions if such issues arise.
- The airport function will monitor and support the top 10 delay airports as they arise during the summer period.
- The airport function will monitor and support seasonally challenged smaller airports e.g. Greek Islands and similar airports impacted by summer tourism demand.
- The airport function will liaise between NMOC and APOC and/or the local airport community, to check if the AOP can still be maintained, what issues may arise and if/what changes can be expected (e.g. diversions, change of runway configuration/capacities etc.).

Enhancements related to the Airport Function cover the following solutions:

Airport Function Dashboard

The airport function dashboard provides a single interface showing DCB issues and general KPIs indicative of airport operations performance that are relevant for the NMOC (arrival/departure on-time performance, local impact of regulations, A-CDM derived KPIs, etc.). It will support the operational exchange between an APOC and NMOC in the pre-tactical and

tactical phases by highlighting the main issues in a consolidated view. This would enhance the common situational awareness and enable better decision-making for the network partners, who can then jointly implement optimal actions/measures that support airport operations, while improving the network performance.

The dashboard consolidates information from different sources in a common view and covers all airports in the network. As it has proven beneficial in the NMOC, the next step would be to enhance it and make it available to operational stakeholders.

A number of Dashboard developments were conducted during 2022 including:

- SNOWTAM integration
- KPIs: TTOT accuracy FAM suspensions
- Extend pre-tactical window to 14 days
- Map view improvements
- Include the flight information in the AFD Pre-tact tab
- Visualisation of alternate destination airports for a filtered airport
- Airport View accessibility upon clicking on the KPIs
- integration of D-1 in the airport function Dashboard

In 2023 we aim at improving the AFD by adding new functionalities such as the advisories to the operator in case of alerts and the generation of reports when needed either in tactical or pre tactical, AFD will be also in the scope of the Digital Airport Network applications and Services project that is proposed for SESAR 3.

Prediction of airport capacity on D-1 for improving network performance

To further support and improve the network situation, NM has created a predictive tool employing data and machine learning techniques. The aim is to use data on events reported via the Airport Corner, NOTAMs, MET forecast and traffic outlook to better predict a network performance deterioration at airports. During the next 3 years, the model will be enriched considering other sources and a wider scope, integrating this tool among the ones available in the NMOC. It will allow a future coordination and exchange of information with operational stakeholders.

API/DPI operational evaluation tool development

The DPI and API Toolset is used for the validation of DPI/API messages of an Airport that is integrating in the Network and intends to connect the data exchange with Network Manager. The Toolset can also be used for the re-evaluation of DPI/API messages on the ETFMS Operational System if required. This could be required after an airport system change or the identification of bugs or problems on the ETFMS OPS system.

The tools used to perform operational evaluation of API and DPI messages are following a major update, with the objective of enabling a more efficient process, thus facilitating the process of airports network integration.

PAX Demand

The Service tackles the necessity from airports to have a better view of the future passenger demand to optimize resource planning and utilization. It is based on machine learning principles looking predominantly at flight ticket prices on respective routes. Complementary features such as day of the week, time of the day, airline ID, airport ID, etc. are also used to further support the passenger demand prediction accuracy.

The service provides users with different information views connected to passenger demand predicted, load factor predicted and even number of flights, connections and cancellations predicted. Apart from high level views on expected passenger and aircraft volumes, the user

can access more detailed information on predicted passenger loads per hour and / or per flight. This provides opportunity to anticipate trends in passenger volumes, which further supports operational planning and on-time performance on the day of operations linked to smooth passenger handling process. This all is available through a Power BI dashboard.

The predictions are currently purely pre-tactical, but it is possible that if a connection with live operational systems (f.e. ETFMS) is made, the service could use benefits from updates on flight trajectories to anticipate shifts in passenger demand between respective rolling windows. It is also possible, that the passenger volume predictions could also be used to support delineation of CO2 emissions on respective routes. Overall, the solution is not meant to replace already existing tools and methodologies developed locally.

In the period between September and December 2022, a beta testing with 7 airports has been conducted. This provided identification of certain shortcomings but also provided opportunity to make the solution robust enough. Therefore, operational release is planned just before S23, once corrective maintenance has fully been completed.

6.2.2.2 Airport Network Digital Data Centre

The "Airports - NM" information exchange via the Airport Corner is an important driver for the integration of airports with the network and inevitable pillar in the process of improving overall network performance. For details, refer to 3.3.7 Airport Corner (Airport Network Digital Data Centre).

A new Airport Corner system was implemented in 2022 and is currently being used by 130 airports. The database and interfaces have been remodelled and prepared for future needs and developments. This transformation of the Airport Corner aims at providing faster delivery of business solutions by improving the efficiency of technical developments, reducing costs, improving performance and user experience. In 2023 and 2024 the new system will be further enhanced with the integration with other data sources and, whenever possible, automating and complementing information that currently requires manual input from airports. Another target for the coming years is to establish some B2B information exchange with airports whenever possible (e.g., events information, diversion capabilities).

In 2023 the strategic information currently requested to airports will be fully reviewed to ensure it still attends to need of NM and external stakeholders (e.g., Airlines, Airports, FMPs).

In parallel, the Airport Corner continues evolving towards an "Airport Network Digital Data Centre", enlarging the scope of services provided to airports. The aim is to increase the benefits to airports in return to their efforts in regularly providing information via the Airport Corner to NM. Many information services are already available, or others will be enabled soon, including:

- Landing and Take-Off Cycle (LTO) Emissions Estimator,
- Environmental Dashboard,
- European Runways Information and Prediction service,
- Airport Function Dashboard,
- Regulations Prediction tool,
- Additional Implementation Maps (e.g.: RECAT, ECRA, AOP/NOP).

Based on the experience gained with the COVID crisis, NM learned a lot about what kind of airport information may be required by NM, Airlines and the EACCC in support of crisis and its recovery phase. Therefore, a Generic Crisis Management interface was implemented in Q4 2022 covering relevant Airport information to be considered for each of the most relevant types of crises. The expected benefit is to allow NM to faster respond to future crisis and quickly activate required information flows between Airports and NM. This new process will be available operationally as of Q2 2023. Further enhancements will be done in 2023 to better cover to the needs of some complex crisis management processes.

These evolutions are a major step in the digitalization of the "Airports - NM" information exchange

6.2.2.3 Airport Capacity and Performance Studies

The airport capacity studies aim at understanding the maximum runway throughput at the airport considering the existing infrastructure and ATC procedures. They also consider apron and taxiway operations.

The results of this analysis can be incorporated into the local capacity declaration process and the resulting figures are used as inputs into the Network Planning process. PIATA Neo can additionally be used in capacity enhancement exercises to determine potential capacity gains when modifications are being considered to existing infrastructure such as the construction of new rapid exit taxiways. The output of PIATA Neo is a set of data and information on how the airport airside system is currently used by ATC Services and Aircraft Operators.

EUROCONTROL undertakes airport capacity studies using its PIATA NEO tool at the request of airports, ANSPs, airlines and States to assess current issues and future growth needs.

NM plans include future (2022 – 2024) airport capacity assessments with:

- Kishinev Airport
- Larnaca Airport
- Paphos Airport
- Warsaw Airport
- Rhodos Airport
- Thessaloniki Airport
- Corfu Airport
- Mykonos Airport
- Santorini Airport
- Athens Airport
- Cork Airport.

6.2.3 Operational improvements

6.2.3.1 Sustainable and optimised runway improvements

NM supports airports for local deployment of SESAR solutions with the aim to increase the runway throughput and operational performance. The Runway Performance Solution Package consists in several solutions for optimising the separation/spacing minima and delivery, aiming at tackling the various runway capacity constraints and potential bottlenecks such as wake turbulence separation, headwind condition, separation buffers on arrival or departures, runway occupancy times, surveillance minima on arrivals or sub-optimal final approach procedures. It also includes the approach separation tool adaption to support to optimised approach profiles for reducing the noise impact and for increasing flight efficiency.

EUROCONTROL supports the deployment of these solutions, based on individual Airport or ANSP requests, through common implementation project, focused analysis of local traffic and weather data to derive the local applicability criteria, or simply through knowledge transfer material and workshops.

The current runway improvements solutions are:

• Wake RECAT (with RECAT-EU and RECAT-EU-Pairwise schemes): already in daily operations at Paris CDG, London Heathrow, Vienna, Barcelona (since May 2022) Leipzig and Koln-Bonn; operations will start at Amsterdam in 2023. Further plans cover:

Copenhagen, Madrid, Rome Fiumicino and Istanbul (IST). Wake Pair-wise separation is planned to be introduced at London Heathrow from 2023;

- ROCAT (Local Runway Occupancy Time Category) / iROT (individual ROT), which can be combined with Reduced Surveillance Separation Minima (RSSM): opportunities for implementation in Amsterdam, Barcelona, Budapest, Istanbul (IST), Prague, Zürich;
- Time-Based Separation (TBS) with ATC tool support: already operated H24 on a daily basis at London Heathrow, planned for operations at Amsterdam in 2023 and for future implementation at Copenhagen, Dublin, London Gatwick, Paris CDG, Stockholm, Vienna, Warsaw, Zagreb, Zürich;
- Optimised Runway Delivery (ORD) tool for Approach, further supported by ML-based Calibration of Approach Spacing Tool (COAST), can also support advanced approach techniques such as PBN-to-ILS or mixed straight-in and curved efficient trajectories. ORD is in operation at Heathrow, and plan for implementation exist at Warsaw (under SESAR DSD HERON project);
- Optimised Spacing Departure tool with Time or Dynamic Distance Indicators (OSD-DDI): no OSD tool solution has yet been deployed, Zürich airport works on the assessment of the operational benefits;
- Optimised wake minima on departure for closely spaced runway entries ('BRETSEP'): a first trial is expected to take place at Paris CDG in 2023. An analysis is expected for Istanbul (IST) with possible subsequent operational deployment;
- Runway Sequencer Management function, connecting AMAM and DMAN: no Runway Sequencer Manager is yet under deployment progress trials are made in Stockholm and work is aimed to be undertaken on standardisation and related guidance material;
- Enhanced Arrival Procedures with Increased Second Glide Slope (ISGS) for noise impact reduction: trials will take place at both Brussels and Istanbul (IST) in 2024 (under SESAR DSD HERON project).

6.2.3.2 Harmonized procedures for airports with similar operational environment

Aerodrome adverse weather remains the main reason for air traffic flow management delay at European airports. While we cannot control the weather, the aviation community can improve the operational response to adverse weather effects on aerodrome operational capacity - improving efficiency and sustainability of air traffic.

SMART Weather

The SMART Weather Task Force working under Airport Operations Team identified harmonised operational best practices that facilitate the handling of adverse weather in a collaborative manner whilst minimising the disruption to airport and network operations. The Task Force concluded its final work in May 2022 and since then has been providing implementation support, in collaboration with the NMOC, for the ATFCM procedure for WX of short duration. The procedure has been implemented for Frankfurt, Zurich, Geneva, Brussels National, with Amsterdam and Oslo Gardermoen and in the period 2023-2027 it is planned to deploy this procedure to new locations.

Sustainable taxiing

In the recent decades the environmental sustainability of ATM operations have been the focus of a number of technological developments. The Ground operations (Start-up, Push-back) and Taxiing are not an exception. Technological advancements, such as Taxibot and Electric Taxiing Systems demonstrated their potential to not only reduce CO2 and NOx emissions, but also to improve off-block punctuality (since the push-back may become independent of the availability of a push-back truck).

The introduction of new, radically different technologies, does call for a change in the current operational procedures and airport infrastructure, which has been consistently one of the main conclusions of trial reports of Taxibot and Electric Taxiing Systems.

While the technology is available to support green Ground and Taxiing operations, one important missing link is a new Harmonized CONOPS that integrates the technological enablers in operations and draws upon the features of new technology to maximise environmental benefits and operational efficiency.

Therefore, a focused Sustainable Taxiing Task Force (ST TF) will be established to elaborate, in wide consultation with all concerned ATM/Airport stakeholders a generic CONOPS that leverages the environmental and operational efficiency improvements brought by several taxiing technologies, such as, but not only, Taxibot and Electrical Taxiing systems. The activities of the TF shall:

- 1. Work Area #1: Identify the most viable technologies for green Ground and Taxiing operations. The operational scope is: Start-up until Holding position;
- 2. Work Area #2: Perform Gap Analysis in regards to the limitation of the current GND and TX operational procedures, and Airport infrastructure, to the deployment of the full benefits from green GND and TX technologies;
- 3. Work Area #3: Outline the main directions for change with reference to current operations, based on the findings of the previous Work Area #2.
- 4. The Sustainable Taxiing Taskforce has started in May 2022 and is currently developing a CONOPS for Sustainable Taxiing operations with the participation of wide forum of operational and technical stakeholders. The work undertaken in the STX TF contributes to the Operational Excellence Programme.

6.2.3.3 Development and validation of APOC-lite solutions

For smaller regional airports, the investment in a full Airport Operatons Centre (APOC) tool has no positive cost/benefit ratio. The NM will specify an HMI and a DCB solution for small airports that will allows them to monitor their operations and establish a basic operations management process based on increased individual stakeholder situational awareness. This will be based on web services and will be scalable, depending on the size and complexity of such airports.

Once the above solution is prototyped and successfully validated, a rollout programme will be established to encourage smaller airports making use of it, potentially combined with the solutions described in 6.2.1.1. The benefits are low cost for the airport, improved management of local operations on a standardised platform, and enhanced network picture and management considering that NM will receive data from a higher number of airports.

The introduction of a centralised, multi-stakeholder command and control facility (APOC) has shown to improve airport resilience in larger airports. It may be possible to provide similar benefits for regional airports or groups of regional airports whose operations are closely related at a lower deployment cost by using automation and innovative approaches of information sharing through a more decentralised approach. Overall concept is designed to address issues that are typical for operations at regional airports. Adverse weather conditions, de-icing operations, massive diversions, or congestions in a terminal building stand for use cases that Lite APOC should enable to better plan for and to manage.

First round of validations of the prototype under SESAR PJ04 has successfully been completed and there are continues endeavours to provide corrective maintenance to the platform that will ensure its stability for consecutive testing.

6.2.3.4 Environment as an integral component of airport network operations

The Network Manager works with airports within SESAR to deliver Solution 29.3 Enhancement of Environmental Performance Management to validate concepts for real-time management of

emissions and noise. The purpose of the solution is to demonstrate that airports can benefit from considering environmental metrics in their operations not only at the strategic level, but also at pre-tactical and tactical level. One of the main objectives is to achieve better adherence to defined environmental constraints on a daily basis to mitigate excessive impacts during peak periods. Several tools are being developed by EUROCONTROL for airports to achieve this objective.

The SESAR work will enable release of the Collaborative Environmental Management (CEM) Dashboard, aiming to provide easy access to accurate environmental metrics. The first part of the Dashboard, the Landing and Take-Off Cycle (LTO) Emissions Estimator, covering all the airports in the NM area, is currently being validated and will be released during the first half of 2023. It calculates CO_2 and NO_x emissions on the ground and up to 3,000 ft Above Ground Level (AGL).

The second part of the dashboard will provide estimated emissions in the airspace around airports, up to top of climb and from top of descent. This will enable airport stakeholders to gain an enhanced view of environmental performance and see impacts of disruptions, special events, and operational trials and changes on airborne fuel burn and emissions.

The third part of the Dashboard that is being developed by the Network Manager is dedicated to noise impact assessment and prediction functionality, utilising EUROCONTROL's automated aircraft noise modelling platform – INTACT.

The CEM Dashboard will have the potential to support airports in daily monitoring of environmental performance and may act as an enabler for easier identification of improvement opportunities and inefficiencies. In addition, the tool should support further post-operational analysis and, where appropriate, mandatory and voluntary reporting mechanisms. Airports participating in the Airport Corner processes will get an automatic access to the Dashboard.

6.2.4 Network Management Priorities and Plans for Individual Airports

The Network Manager assesses on a regular basis airports where Network Manager joint activities may support the decrease of delays (e.g. airports generating significant network delay over a 12-month period or on a seasonal basis).

As the Network Operations Plan looks not only at current operational challenges, but also on the medium-term requirements for the network, the Network Manager when setting its priorities also considers the following factors:

- Airports exposed to significant traffic increase, e.g. major upgrade of infrastructure, tourism boom, permanent traffic transfer between airports, etc.
- Airports with strategic plans to become a hub;
- Airports where major special events are foreseen;
- Airports directly or indirectly impacted by crisis situation at certain regions (ECAC or adjacent);
- Foreseen opening of new airports to be integrated into the Network.

This requires a continuous monitoring task during the entire period.

The Network Manager recommendations (planned or agreed actions) concerning the improvement of operational performance at individual airports during the period 2023-2027 are described in Annex 2 - Airports.

6.2.5 Local Airport Capacity and Efficiency Enhancement Measures

6.2.5.1 Overview of airport local plans currently reported by airports for period 2023–2027

At many airports, there are local initiatives that affect the capacity and/or the efficiency of airport operations. Airports are requested to regularly update NM on their local plans that may affect operations in the short, medium and long term. This information is provided via the Airport Corner process – refer to section 3.3.6 Airport Corner) and enables early identification of issues, so that measures can be coordinated in due time.

This information includes:

- New infrastructure changes
- Systems changes
- Operational procedures changes
- Maintenance work
- Planned equipment outage
- TMA changes impacting the airport capacity
- Traffic switch between airports
- Training impacting staffing availability
- Staff shortage which may constrain capacity, and
- Other capacity or efficiency enabler projects.

The description of each local plan of individual airports can be found in Annex 2 Airports.

An overview of airport local plans currently reported by airports for the period 2023–2027 is shown below. The airport local plans for period beyond 2027 can be found in Annex 2, Airports (6- Ongoing & Planned Activities). Latest updates from the airports are available any time via the Public Airport Corner: <u>https://ext.eurocontrol.int/airport_corner_public/</u>

Where airport capacity is impacted and will be lower than that declared, airports should convene coordination committee meetings including the airlines and slot coordinator, if slot coordinated

EUROPEAN NETWORK OPERATIONS PLAN 2023-2027																				
Local Plans for individual Airports	2023			-		20	24		1	202	5		2026					202	27	
Owner: NMD/NOM/Airport Unit - Last Update: 07/02/2023	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2 (23	Q4	Q1	Q2	Q4	Q4	Q1 (22 0	23 (24
Amsterdam Schiphol (EHAM) Netherlands																				
Runway 18C/36C closed due to major maintenance																				
Taxiway B between taxiway A22 and TWY Z closed due to major maintenance																				
Taxiway C between taxiway Y and aircraft stand U29 closed due to major maintenance																				
Taxiway D between taxiway W5 and taxiway B closed due to major maintenance																				
Taxiway D between taxiway W5 and taxiway C1 closed due to major maintenane																				
Taxiway D closed due to major maintenance																				
Taxiway W5 closed due to major maintenance																				
Ttaxiway Y closed due to major maintenance																				
Antalya (LTAI) Turkey																				
Parking areas 224 to 229 on apron 2 closed due to construction	E)																		_
Runway 18C/36C closed to traffic due to airport enlargement works	E)																		
Budapest (LHBP) Hungary									1						1					
Cargo Apron Phase 2 increase to include two Code E stands	E)																		
Construction of Terminal 3																			(€
Renewing of taxiways B3 and B4																				
Dublin (EIDW) Ireland																				
Introduction of NADP2	E)																	(€
Frankfurt (EDDF) Germany																				
Activation + Application of Local Rule "COVID 19 FRA" resulting in capacity reductions	E)																		
Runway 25R/07L closure due to Surface Refurbishment																				_
Geneve (LSGG) Switzerland													!							
Construction of new rapid exit taxiway for Runway 05	The	sta	rt an	nd er	nd d	ates	are	not y	/et o	deter	min	ed.								
Winter 22 - Ski Charter season	E)																		
Istanbul Sabiha Gokcen (LTFJ) Turkey																				
New runway construction	E)																		
Koln/Bonn (EDDK) Germany																				
Reconstruction of taxiway B segmented Part 1 to 5. Taxiway B will be reconstructed from taxiway A to the threshold of Runway 14R	E)																		
Ljubljana (LJLJ) Slovenia																				
Construction of a new exit taxiway (Taxiway J) Location 250m from the threshold of Runway 12																				
Separation reduction																				
Visual aids for navigation (Signs). Replacement and modification of all signs in the maneuvering and movement area	E)																		
Milano Malpensa (LIMC) Italy																				
Milan Malpensa Airport Terminal 2 closure	E)																		

EUROPEAN NETWORK OPERATIONS PLAN 2023-2027	•				-				-				•				_			
Local Plans for individual Airports		20	23	04	01	20	024	04	01	20	25	04	01	20	26		01	20	27	04
Owner: NMD/NOM/Airport Unit - Last Update: 07/02/2023	Q1	QZ	Q3	Q4	Q1	QZ	Q3	Q4	Q1	QZ	Q3	Q4	Q1	QZ	Q4	Q4	Q1	QZ	Q3	Q4
Nice (LFMN) France																				
Scheduled closure of Runway 04R/22L for winter maintenance.																				
Paris Charles De Gaulle (LFPG) France								•												
Closure of Runway 09R/27L for maintenance																				
Closure of Terminal 2A for upgrade of check in area to Standard 3																		_		
Closure of Terminal 2C for upgrade of check in area to Standard 3	E)																		
Paris Orly (LFPO) France																				
Airside works : Rehabilitation of Runway 02/20																				
Airside works : Taxiway W1 closed for maintenance	E																			
Airside works : Taxiway W2 and Mike area																				
Prague (LKPR) Czech Republic	1 1						1	1	I				I							
Construction of a new Rapid Exit Taxiway for Runway 06/24																	\square			
Rome (LIRF) Italy																			I	
Construction of new runway																				
Sarajevo (LQSA) Bosnia And Herzegovina								1												
Extension of existing apron adding 4 new parking stands.	E)																		
Extension to Terminal B	E)																		
Stockholm (ESSA) Sweden																				
Runway 01L/19R will be closed for maintenance H24 during the entire period																				
Tirana (LATI) Albania						1	1	1	!											
Reconstruction and extension of the runway	The	star	t da	ite is	s 10)/03/	202	2. Tł	ne ei	nd da	ate i	is no	ot ye	t de	term	inec	d.			
Warsaw Chopin (EPWA) Poland																				
Apron renovation and reconfiguration. Repair of Apron 5B pavement along with the redevelopment of mast lighting and reconfiguration into ful Code C stands.																				
RWY shortening. Runway 11/29 will not be available for landings. TODA will be shortened.																				
airport nightly closure. Airport closure due to maintenance works on the runway intersection.																				
Note: More information on the impacts and / or benefits of these events is available	via t	he A	irpo	ort	Cori	ner.	1		I				I	1				1	1	
Legend (colouring and symbols):		Loca	l pla	n is a	activ	e in 1	this p	eriod	I.											
	\odot	Loca	l pla	n sta	art da	ate is	befo	re 20)23.											
	Θ	Loca	l pla	n en	d da	ite is	after	2027												

6.2.5.2 Overview of airport local plans reported by airports for Summer 2023

Brussels National (information provided on 16-01-2023)

• Proposed operational actions

- Launch of Punctuality project to identify (and solve where possible) sources of delay
- Improve collaboration between airport, ATC and hub airline
- Communication of traffic and passenger forecast for Summer 2023 to partners to allow adequate staffing
- Coordination between APOC and recently fully operational Airport Function in NMOC
- Points of attention
 - Possible issue of under-staffing at Border Control. Discussion ongoing with Police

Berlin international (information provided on 10-01-2023)

Proposed operational actions

- Optimization of check-in/security control through pre-booking system and more selfservice
- Regular coordination with all stakeholders with monitoring of KPIs on e.g. punctuality
- Exchange of flight data between airport and ground handler

Frankfurt (information provided on 15-12-2022)

• Proposed operational actions

- Close collaboration with Slot Coordinators, airlines and other partners to ensure deliverability of the plan
- Collaborative projects with all airport stakeholders (SLA, security, etc.)
- General staff planning and related recruitment and training
- Optimization of infrastructure (longer term)
- Coordination with recently fully operational Airport Function in NMOC

Hamburg (information provided on 04-01-2023)

- Proposed operational actions
 - Close collaboration with Slot Co-ordinators, airlines and other partners to ensure deliverability of the plan Communication of traffic forecast to local partners (Ground handlers and security) to allow appropriate staffing.
 - Request permissions to hire non-EU staff for ground handling.
 - Optimization of check-in/security control through e.g. pre-booking system
 - Data exchange with recently fully operational Airport Function in NMOC

Dusseldorf (information provided on 16-03-2023)

• Proposed operational actions

- Action plan developed with ground handlers, security, law enforcement bodies or other airport stakeholders
- Weekly management meetings with the relevant parties to evaluate and decide mitigation measurements
- General staff planning
- Initiating a job fare for staff recruitment.
- Investment in infrastructure/ equipment
- Close collaboration with Slot Co-ordinators to ensure deliverability of the plan
- Providing an additional license for a third ground handling company.
Helsinki/Vantaa (information provided on 10-01-2023)

• Proposed operational actions

- Coordination between airport and service providers to build scenarios and rosters for S23 season
- Close monitoring of security and border control performances
- Close collaboration with Slot Co-ordinators and Airlines to ensure deliverability of the plan
- Close cooperation with main airlines, ground handlers and border guards through meetings and dedicated mobile platform
- Points of attention
 - Renovation of Runway 15-33 during Summer 2023 that should not limit airport capacity in normal conditions but could be at risk in difficult weather conditions

London Gatwick (information provided on 14-01-2023)

• Proposed operational actions

- Improvement of runway operations to avoid traffic disruption (switch of runway, A380 operations)
- Development of improved departure manager allowing more accurate TTOT calculation
- Planning contingency ground handling resources in case of failure/schedule slippage
- LTMA FMP presence in tower to educate on optimal strategy to maximize runway performance

London Heathrow (information provided on 09-01-2023)

• Proposed operational actions

- Programme of work in place that is entitled Build Back Capacity focussed on delivering tangible improvements in our capacity, resilience and service
- Creation of punctuality task force to build a roadmap to recover 2019 punctuality level
- Creation of Joint Heathrow Resilience Plan involving all stakeholders
- Investigate how to enhance coordination between APOC and NM Airports Function through meetings with EUROCONTROL
- Deployment of Enhanced Time-Based Separation using Pairwise separation
- Develop the ability to provide ATFM by terminal

London Stansted (information provided on 18-01-2023)

- Retention of staff from winter season and uplift recruitment from winter to summer
- Vast majority of self-handling ensuring predictable and punctual operation as in Summer 2022.
- Planning process ensuring all stakeholders understand the demand and the plans to deliver
- Schedules defined by clear capacity parameters and shared with scheduling provider
- Collaboration with airlines to review and improve airport operations
- Stansted to become A-CDM compliant by Summer 2023

Amsterdam Schiphol (information provided on 10-01-2023)

• Proposed operational actions

- Recovery plan developed and communicated to airlines
- Improvement of security checks through large scale recruitment plan of airport security staff and overall process improvement
- Assessment of staffing availabilities in collaboration with all stakeholders (ATC, ground handlers, airlines) to determine attainable capacity
- Provision of secondment position from APOC to NM to improve coordination

Dublin (information provided on 01-02-2023)

- Proposed operational actions
 - Coordination with 3rd party ground handlers:
 - Weekly meeting dedicated to resources and performances
 - Staff planning and retention strategies considered in all areas
 - Increase Dublin Airport number of slots thanks to introduction of the new North Runway
 - Coordination with PRM service provider to guarantee appropriate staffing
 - Coordination with State bodies to ensure appropriate staffing and sharing of data
 - Implementation of an enhanced process for significant events, which may cause demand/capacity imbalances, informing stakeholder on the demand profile.
 - Implementation of reporting into EUROCONTROL's Airport Corner.
 - Improvement of security infrastructure:
 - Addition of a 16th security lane to Terminal1
 - new staff security entry point in Terminal 1 allowing conversion of current security lane to fast-lane increasing the capacity.
 - Installation of more queue tracking sensors allowing prediction and response to queuing events more quickly.
 - Robust multi-level Business Continuity framework ready.
- Points of attention
 - Move of key infrastructure constraint from runway to stands
 - Close collaboration with Slot Co-ordinators, airlines and other partners to ensure deliverability of the plan

Copenhagen/Kastrup (information provided on 10-01-2023)

• Proposed operational actions

- Reporting in Airport Corner of events that impacts our ability to deliver/accept flights to/from the network before summer 2023
- Collaboration with local stakeholders to improve global performances

Oslo Gardermoen (information provided on 09-01-2023)

- Maintain 2022 staffing measures but days with large number of passengers will be given extra attention
- Cap of the number of aircraft movements
- Expansion of luggage storage capability
- Consultation with ground handler for suggestions of improvement

Warsaw Chopin (information provided on 19-12-2022)

• Proposed operational actions

- Intensive recruitment process before start of Summer 2023
- Increase training team
- Improve ground handler equipment's
- Close collaboration with Slot Co-ordinators, airlines and other partners to ensure deliverability of the plan

Stockholm Arlanda (information provided on 12-01-2023)

• Proposed operational actions

- Collaboration with all stakeholders (incl. Police) to prepare for the summer 2023 in several taskforces.
- New centralized security control to open in July at Terminal 5 allowing higher throughput
- Coordination between APOC and Airport Function
- Improvement of general staff planning
- Point of attention
 - Under-staff at border without e-gates

Gran Canaria (information provided on 16-12-2022)

- Proposed operational actions
 - Improved coordination with ATC
 - Improvement of facilities, resources and procedures dedicated to the processing of flights from/to non-Schengen origin/destination.
 - Improved coordination with airlines and handling agents for PRM services

Barcelona (information provided on 13-01-2023)

- Proposed operational actions
 - Cooperation with airlines and ground handling agents to achieve operational improvement minimizing impact on the S23 and future seasons.
 - Constant improvement in collaboration with air traffic control

Madrid Barajas (information provided on 13-01-2023)

- No additional special measures expected for airline scheduling as not detected as an issue
 - Existing committee made up of the Airport, the Slot Coordination Agency, major commercial airlines in the airport, the main ground handlers and cargo operators,
 - Airlines ground handlers require to share planned scheduled with airport at D-1 and coordination with airlines and Handlers in case of discrepancy
- No additional special measures expected with the different stakeholders, as no possible disruption currently detected
 - Before the beginning of every summer season, an Operative Committee with all the different stakeholders is carried out, in which the expected operation is explained by the Airport, and the Ground handlers present their preparations regarding resources and procedures

- A meeting involving the Airport and all Handling Agents is carried out monthly in which KPIs are monitored, and any operational issued is discussed
- Ground handler will increase its staff
- Maintain existing coordination with security and law enforcement agencies
- Airport Operator staff is fully available
- Investment in new infrastructures and equipment's improving security and check-in efficiency
- ANSP, in coordination with AENA, will implement new arrival procedures increasing ATC Capacity
- Improve coordination with the NM

Malaga (information provided on 13-01-2023)

- Proposed operational actions
 - Improvement of facilities, resources and procedures dedicated to the processing of flights from/to non-Schengen origin/destination.
 - Improved coordination with airlines and handling agents for PRM services
 - Improved coordination with ATC
 - Increase the number of remote boarding gates
 - Close coordination with national authorities
 - Scheduling of activities, repairs, and upgrades to infrastructure during periods of minimal operational interference,

Palma De Mallorca (information provided on 13-01-2023)

• Proposed operational actions

- Collaboration with all the stakeholders to improve the figures in terms of ground delays.
- Close collaboration with Slot Co-ordinators, airlines and other partners to ensure deliverability of the plan
- Constant improvement in collaboration with air traffic control

Nice (information provided on 13-01-2023)

- Proposed operational actions
 - Continue the collaboration with all local partners
 - Reinforce link with network through use of EUROCONTROL tools including Airport function
 - Sharing of data with airports partners related to number of expected passengers

Paris Charles De Gaulle (information provided on 24-01-2023)

- Building of a renewed airport model focused on performance and sustainability with dedicated KPIs dedicated to operational process improvement and creation of a Task force with representative airlines to improve punctuality, of a dedicated punctuality office and of a Big Data division.
- Working on schemes to mitigate impact of potential industrial actions from staff.
- Security shall not cause issue thanks to renewed contracts with the service provider
- Fruitful Discussion with authorities regarding Border Control.

- Temporally measures to mitigate COVID spread could be applied yet the impact should be minor.
- Additional staff and new and more flexible rules to recruit border control personnel
- o Working group to extend eligible passports at e-Gates
- Presentation to the airport community of the plan to be implemented, potential operational risks and mitigation measures before start of the season
- Close collaboration with Slot Co-ordinators, airlines and other partners to ensure deliverability of the plan Coordination with the airport community through APOC.
- Discussion with EUROCONTROL to enhance coordination processes between NMOC and APOC
- Commissioning of iAOP / iAPAMS / iAOP-NOP.

• Points of attention

- Current level of inflation putting pressure on pay slips and plan to reform the pension scheme in France leading to national calls for strikes by Trade Unions
- Impact of infrastructure works airside (Runways and taxiways) as well as unavailability of facilities landside (closure of Terminal 2A & 2C but compensated by reopening of Terminal 1, RWY 09R/27L closed from 17/07/23 to 06/11/23, RWY 08L/26R planned closure for about 2 weeks around)
- Special events to be held during the summer: Paris Air show (end June), Bastille day mid-July, Rugby World Cup sept-Oct

Paris Orly (information provided on 24-01-2023)

• Proposed operational actions

- Building of a renewed airport model focused on performance and sustainability with dedicated KPIs dedicated to operational process improvement and creation of a Task force with representative airlines to improve punctuality, of a dedicated punctuality office and of a Big Data division.
- Fruitful Discussion with authorities regarding Border Control.
 - Temporally measures to mitigate COVID spread could be applied yet the impact should be minor.
 - Additional staff and new and more flexible rules to recruit border control personnel
 - Working group to extend eligible passports at e-Gates
- Presentation to the airport community of the plan to be implemented, potential operational risks and mitigation measures before start of the season
- Close collaboration with Slot Co-ordinators to ensure deliverability of the plan
- Coordination with the airport community through APOC.
- Discussion with EUROCONTROL to enhance coordination processes between NMOC and APOC
- Commissioning of iAOP / iAPAMS / iAOP-NOP

• Points of attention

- Risk of national calls for strikes by Trade Unions
- Impact of infrastructure works airside (Runways and taxiways) as well as unavailability of facilities landside (unavailability of 80 airline registering counters at ORY Terminal 4 with forecast reduction of up to 10 to 20% of the check-in capacity, various TWY, RWY and ILS works)
- Staffing issues at ORY will continue, in particular early morning, and impact significantly the robust first wave planned and therefore affect the whole daily

schedule. No possibility for mitigating measures to be put in place by DSNA. Declared capacity will be limited to 15 dep/h - 15 arr/h when the actual hourly demand will be of 25 dep.

- Special events to be held during the summer: Bastille day mid-July.

Athens International / Eleftherios Venizelos (information provided on 19-01-2023)

- Proposed operational actions
 - Preliminary scheduling simulation and planning of operational resources revealing no major issues
 - Close collaboration with Slot Co-ordinators, airlines and other partners to ensure deliverability of the plan
 - Collaboration with operational actors to align action plans and related resources
 - Gradual deployment of new infrastructures (for baggage handling, new boarding gates, new Apron)

Collaboration with NM and ANSP on pre-tactical planning.

Milano Malpensa (information provided on 10-01-2023)

• Proposed operational actions

- Action Plan for Summer 2023 has been defined and shared including recruitment process, renovations to improved operations, etc.
- Increased meetings with airlines and ground handlers
- Identification with airport community of core processes affecting delays
- Release of AOP
- Anticipative recruitment campaign in all domains (handlers, PRM, security, etc.)
- Investment in infrastructure (re-opening of Terminal 2, modification of concourses, refurbishment of security checkpoint)

<u>Milano Linate</u> (information provided on 10-01-2023)

- Proposed operational actions
 - Action Plan for Summer 2023 has been defined and shared including recruitment process, renovations to improved operations, etc.
 - Increased meetings with airlines and ground handlers
 - Identification with airport community of core processes affecting delays
 - Activation of daily cooperation between Control Centre and main carrier Operation Control Centre
 - Release of AOP
 - Generalized implementation of biometric boarding solution
 - Accessibility enhancement through new fast subway connection

Rome Fiumicino (information provided on 12-01-2023)

- On-going reparation activities for Summer 2023 as permanent feature of the "rolling planning methodology"
- Preparations under the supervision of the Italian Civil Aviation Authority
- Coordination between ground handlers, ENAC and airport operations management
- Monitoring of handler operational performances through APOC dashboard
- Monitoring the issuance of airport badges
- Close coordination with police forces to ensure adequate staffing
- On-going recruitment and training of the staff for next summer
- Improvements of infrastructure (refurbishment of the old Pier B, new baggage belts)

- Established plan for coordination between airport, ENAC, ENAV, airlines and handlers in the event of contingency or disruption
- Close collaboration with EUROCONTROL through sharing network capacity forecasts and updating the operating conditions through the Airport Corner and through feedbacks on EUROCONTROL's new systems such as "Passenger demand support service" and "Mirror".

Vienna International (information provided on 09-01-2023)

• Proposed operational actions

Maintain Summer 2022 strategy:

- Most Ground handling, security and PRM services provided by Vienna airport itself or subsidiary company
- Collaborative coordination of resource allocation both short- and long-term by airport operations department

Lisboa (information provided on 23-01-2023)

• Proposed operational actions

- Creation of a Punctuality Committee involving all relevant stakeholders
- Conclusion of implementation of CCPM tool to collect information regarding runway performance
- Relaunch the Runway Performance Committee involving all relevant stakeholders
- Upgrade of Delay Clearing Tool
- Start systematic clearing of delay code 89 by ANSP
- TSAT allocation improvement by ANSP
- Ensure stability of interfaces TWR/CDM
- Increase cooperation between AOCC and the Network Manager Airport Function
- Update the Contingency Plan to accommodate irregularity and operations

• Points of attention

- Parking constraints due to a high demand for bigger aircraft models and a very short buffer for irregularities
- World Youth Days from the 1st to the 6th of August which is expected to bring 2 million participants

Bucharest Henri Coanda (information provided on 09-01-2023)

- Increase staff for ground handling, security, PRM and push-back and towing
- Improve infrastructure with new Apron positions and stands for next summer and new passenger terminal (longer-term)
- Improve vehicle technical inspection
- Develop software for apron control and management
- Close collaboration with Slot Co-ordinators, airlines and other partners to ensure deliverability of the plan
- Coordination with ground handler for services in line with airlines and airport needs
- The entry into Schengen area will increase efficiency.

Geneve (information provided on 04-01-2023)

- Proposed operational actions
 - Confirmation of the availability of resources to cope with the demand expected so far
 - Training sessions for security scheduled
 - Sharing of airport forecasts with ground handlers
 - Alignment of plans and resources with local ATC
- Points of attention
 - Physical check-in infrastructure capacity often exceeded by demand. Collaborate with AOs around passenger processing times
 - Potential security training impairment due to general working force shortage and change of supplier contracts end of 2023
 - Potential ground handling impairment due to the general workforce shortage and assignment of ground handling licenses for the next 7 years in March 2023
 - Work collaboratively with AOs with issues caused by waiting beyond normal timeframe for Late passengers

Antalya (information provided on 01-02-2023)

- Proposed operational actions
 - Antalya Airport expansion project in progress with new aprons, taxiways and systems.

Istanbul Airport (information provided on 21-12-2022)

- Proposed operational actions
 - Collaboration with main airline to ensure sufficient airport staffing

6.3 ANSP Technical Enhancement Plans

The European Network is in continuous need of change in order to improve. Coordination amongst all actors (ANSPs, Airports Operators, MIL services, NM, Airspace Users, etc.) remains crucial. Therefore, technical enhancements are required to fulfil the requirements in aviation. The Local Single Sky ImPlementation (LSSIP) process is monitoring these technical enhancements, as they are translated into Master Plan Level 3 Implementation Objectives in the LSSIP+ monitoring tool and are updated each year by all concerned ATM stakeholders. The origin of a requirement can be different (e.g. European Regulation / SESAR Solution, local need, etc.). The details of these Implementation Objectives can be found through different documentation sets in order to see to whom an Objective is applicable:

- European ATM Portal
- LSSIP Map Tool
- SESAR Deployment Programme
- Commission Implementing Regulation (EU) 2021/116 (CP1)

The LSSIP+ process is monitoring and reporting on the implementation of these Objectives resulting in a national document (LSSIP Implementation Overview), published on a yearly base.

As part of the Unified Planning and Monitoring process, an extract of the monitoring tool is available in Annex 3. It is showing the planning of the applicable ATM implementations (regulated or not) for the next few years for each State, per ACC, and per Objective that is not yet completed.

6.4 Safety

In 2022+ based on the conclusions of the incident data analysis, it is suggested to retain as a safety priority:

- "Controller Blind Spot".
- "Flight without transponder or with dysfunctional one".
- "ACAS RA not followed".
- "Controlled airspace infringement".
- "Controller detection of potential RWY conflict".

Additionally, based on the conclusions of the incident data analysis, it is suggested to monitor the risk associated with:

- "Restricted airspace infringement".
- "Synchronisation of arriving to land and of arriving to land and departing aircraft".
- "Non-commercial and VFR flights in TMA/CTR airspace".
- "Involvement of drones in incidents"
- "Incorrect presence of landing aircraft".
- "Sudden, high energy runway conflict".
- "Vehicle involvement in incidents of incorrect presence on runway"
- "Events that could have been prevented by stop bars

It is also suggested to monitor the **availability and use of SMGCS** and analyse further its potential in runway collision prevention.

6.5 **FAB integration into the Network planning process**

The NM established a close cooperation with all the FABs from the start of the development of their Feasibility Studies. This close cooperation enabled the development of a number of harmonised operational projects with the potential to contribute to future network performance, when implemented. They respond to the requirements set forth in the Article 9a of the (EC) Reg. No 550/2004 specifically for the FABs, Namely, those requirements are:

- enable optimum use of airspace, taking into account air traffic flows;
- ensure consistency with the European route network established in accordance with Article 6 of the airspace Regulation;
- ensure compatibility between the different airspace configurations, optimising, inter alia, the current flight information regions;
- facilitate consistency with Community-wide performance targets.

Regulation (EU) 2019/123, article 13, set a framework for an alignment of FAB operation plans with the Network Operations Plan by ensuring the compatibility of the FAB – level measures with those adopted, through the cooperative decision making process, at the Network level.

Further to that, the Performance Scheme established by Commission Implementing Regulation (EU) 2019/317, requires that the Performance Plans for RP3 are produced at FAB level. In addition, it requires [Article 5 (c) in 2019/317] that the NM:

shall support the air navigation service providers in reaching their national performance targets or FAB performance targets through, in particular, the development and implementation of the Network Operations Plan...

Even though the Network Manager had established cooperation with most of the FABs, before the start of RP1, and included a FAB perspective in the operational improvement planning processes during the RP1 and RP2, this cooperation intensified within the course of the third reference period (RP3). The NM facilitates the synchronisation between the FAB Performance Plans, the Network Strategy Plan and the Network Operations Plan, including the European Route Network Improvement Plan – Part 2 – ARN Version 2023-2030.

The NM capacity planning process has involved FABs by organising combined capacity planning meetings at FAB level, or by having FAB representative participate in bi-lateral capacity planning meetings for the FAB concerned.

Particular attention has also been paid to the environment / flight efficiency improvement planning that is treated in more detail in the ERNIP Part 2 – ARN Version 2023-2030.

The FABs, depending on the level of their maturity, have developed inter FAB planning processes to facilitate various improvement projects. So far the FAB planning processes have identified areas for improvements and links with the Network Strategy Plan. The links with the Network Strategy Plan are reflected in the individual ACC Plans of this NOP or in the ERNIP Part 2 – ARN Version 2023-2030.

FAB	2023	2024	2025	2026	2027
BALTIC					
Stepped cross border FRA by Poland					
BLUE MED					
FRA Cyprus, phases 1 & 2					
Enhanced FRA by Malta					
Greece stepped implementation of FRA					
Italy airspace assessment and improvement meassures Bluemed implementation					
DANUBE					
BG airspace improvements (ERNIP)					
Extension of SEE FRA & x-border by Romania					
DK-SE					
ATS route network improvements and FRA sectorisation by DK and SE					
FRA usage optimisation when military areas are active by DK and SE					
Cross-border FRA with EPWW by SE					
FAB CE					
Enhanced sectorisation as per FAB CE Airspace Plan and the European restructuring program by Austria					
FRA extensions as per ERNIP part II by Croatia					
Cross-border FRA with SEE and BALTIC by Czech R.					
Extension of SEE FRA & x-border by Hungary					
FRA stepped implementation for FAB CE by Slovenia					
SAXFRA, SECSI FRA by Slovenia					
FABEC					
FRA implementation by French ACCs					
FRA cross-border with MUAC by Karsruhe UAC					
Implementation of FRA FL 200-UNL by Munchen ACC					
FRA Switzerland					
Cross-border FRA with Reims and Paris ACCs by Switzerland					
NE FAB					
Dynamic cross-border sectorisation Estonia-Finland					
ATCO sharing with Finland by Tallin					
Capacity sharing with Finland by Tallin					
Cross-border FMP activity betw een Tallin and Helsinki					
Common ATC Proc betw een Tallin and Helsinki					
Cross-border FUA and ASM betw een Tallin and Helsinki					
SW					
Cross-border FRA by Spain and Portugal					
FRA by Barcelona, Canarias, Madrid and Sevilla					
UK-IRELAND					
FRA Deployment 2 by London ACC					
UK/Ireland initiatives					

6.6 Relationship with 'Third Countries'

In the context of the ATM Network Functions Implementing Regulation, the 'Third Countries' consist of two main groups of states, those who participate in the work of the NM in accordance with Union law, subject to and in accordance with agreements with the Union (Norway and Switzerland), and those who may contribute to the work of the NM. The latter forming a group of 'Associated Countries'.

In addition to the two basic groups, a group of countries with their respective ANSPs, in particular those who have a direct impact on the performance of the network ensuring

appropriate regional interoperability and connectivity, also may enter into cooperative arrangements with the NM or already have done so.

Majority of the 'Associated Countries' are members of EUROCONTROL thus have already been involved in and are committed to the activities directly related to meeting the EU-wide performance targets. Israel and Morocco are also considered the part of this group based on the special agreement with EUROCONTROL.

The relationship with these States and their contribution to the Network Operations planning process are embedded in the working arrangements of Network Manager. All these States are represented in the airspace design enhancement and air traffic flow and capacity management processes.

The operational planning processes, including airspace design and capacity planning, already involve all the EUROCONTROL Member States and many of those adjacent. Appointment of the EUROCONTROL Organisation as the Network Manager for the next two Reference periods (RP3 and RP4) means that the conditions for the exercise of the network functions will, in principle, apply to the entire EUROCONTROL membership.

The NM geographical borders do not confine network management activities and the Network Manager will work with the operational stakeholders in the areas interfacing the NM area, to prevent capacity shortfalls due to systems and procedure incompatibility with the adjacent ANSPs. To this end, EUROCONTROL/Network Manager has undertaken a series of activities to reinforce cooperation with the North African and Middle East states in the fields of airspace and route network enhancements, capacity determinations and ATFM.

Most of the adjacent ANSPs have already established operational relations with Network ATFM Operations.

The European Aeronautical Information System Database (EAD), as a supporting function of the Network Manager, is a centralised repository of worldwide NOTAM information, ECAC AIP documents library and quality assured AIP data in AIXM 4.5 & 5.1 format. EAD aims to make high-quality, harmonised electronic aeronautical information constantly available and to meet users' requirements for data quality and timeliness. The service allows other AIS Providers to enter and maintain their data in a central repository; users can retrieve and download AIS data in real time. In December 2018 EUROCONTROL was re-certified as a pan-European Aeronautical Information Service Provider under the Single European Sky legislation. This certification was awarded after a positive evaluation by EASA.

EAD has been providing AIS services for more than 15 years. To date, 49 States have fully aligned themselves with the EAD processes and systems in their Aeronautical Information Management solutions. EAD users include European States, but also countries such as Canada, the Philippines and South Africa.

6.7 Relationship with ICAO

The relationship with ICAO covers two fields: a) participating in work of specific groups that have significant relevance to the functions of the Network Management; and b) coordinating proposals for amendments to the ICAO documents relevant to the European Network Management functions.

The NM is participating in the following main working arrangements being part of European Air Navigation Planning Group (EANPG):

- RDGE Route Network Development Group East
- ATMGE ATM Group East
- AWOG All Weather Operations Group
- FMG Frequency Management Group

- COG EANPG Programme Coordinating Group
- BSTF Black Sea Task Force
- AIRARDTF Advanced Inter-Regional ATS Route Development Task Force
- ICARD 5LNC TF ICAO EUR/NAT Regional Database_5 Letter Name Code Task Force.

The coordination of the proposals for amendment focuses on the documents with the relevance to the European network, such as:

- Regional Supplementary procedures Doc.7030
- Air Traffic Management Doc. 4444
- Airport Planning Manual Doc. 9184
- European Air Navigation Plan Doc. 7544.

The Network Manager also participates in the preparation of the Air Navigation Conferences and in the ICAO Global Air Navigation Plan (GANP) Multidisciplinary Vision Team.

The NM is using applications developed and managed by ICAO, such as ICARD (International Codes and Route Designators), and SAFIRE (Spectrum and Frequency Information Resource) in the execution of some of the functions. ICAO is using the ERNIP Database to ensure coherent airspace planning at the interfaces.

The Network Manager also follows the European Regional Aviation Safety Group (RASG-EUR). The annual SMS Standard of Excellence measurement conducted by EUROCONTROL/CANSO on behalf of ICAO for the EUR Region is presented to the EUR-RASG and COG.

7 Special Events

7.1 Overview of Special Events with significant ATM impact

Major projects and special events pose a significant challenge to the smooth operation of ATM in Europe. A high level of cooperation and preparation at ATM network level is essential, starting with the medium term, annual and seasonal planning phases, through to tactical operations. An integrated planning, encompassing all phases, will be in place to ensure that operational performance is maintained at acceptable levels. In some cases, changes to the transition plans or to the implementation period may be negotiated.

The following steps are followed in this planning process:

Early notification

There is a need for an early notification, coordination and preparation of such events. The ANSPs are requested to regularly update the NM on any events that may affect normal operations in the short, medium and long term as soon as an event becomes known. More emphasis is put on the development of rigorous capacity plans and on the development of an efficient early notification process, in a partnership approach between the NM and the ANSPs.

Impact analysis

This requires full commitment from all the ANSPs on the provision of advanced detailed information on the special events, the phases throughout their lifecycle and the transition to the normal operations.

The main aim is to limit the impact on Network performance of all special events to the largest extent possible.

<u>ANSPs to work together and with the Network Manager to mitigate the impact, including</u>
<u>the FABs</u>

The Network Manager supports ANSPs involved in the implementation of these major projects and special events, in terms of simulation, coordination, technical expertise, airspace & capacity planning, and ATFCM during the transition period, and the full involvement and cooperation of all ATM operational stakeholders is essential.

<u>Synchronisation</u>

This enables a full awareness of all the network operational stakeholders, improved planning and management and de-confliction of the implementation of different projects, the identification of temporary bottlenecks and of agreed mitigation actions at network and local level. As a result, more accurate network and local plans will be developed

Airports

Special events may significantly influence normal airport operations. Airports are requested to regularly update the Network Manager on any events that may affect airport operations in the short, medium and long term as soon as an event is known.

A description of the special events impacting each individual airport can be found in the Annex 2 - Airports, section 6.2 including a description of the expected operational impact of a special event (e.g. high increase in demand, impact of General Aviation (GA), partial closure of the airport, temporary traffic transfer).

Special events expected in the short-term (in the next 6 months) are regularly followed up by a multi-disciplinary team of NM experts. The aim is to enforce early notification of any relevant special event, enabling identification of potential network impact, so that the necessary measures can be identified through Cooperative Decision Making and planned in due time, minimising the impact to the network.

7.2 Individual Special Events and their handling from a network perspective

The Network Manager recognises two types of special events:

- Special events where traffic demand is increased or where traffic flows are shifted for a period due to an external event, for example sports games, etc.
- Special events which could lead to a temporary reduction of capacity and that may require mitigation measures agreed in a partnership approach at Network level. Examples of such events are: implementation of new ATM system, move to new ACC Ops room, major airspace reorganisation, opening of new airports, etc.

The Network Manager has developed the Transition Plan for major projects in Europe, a document which describes the processes, the activities, the plans and measures that will be applied by the NM and the operational stakeholders, to minimise the impact on the network performance caused by major airspace or ATM system improvement projects. The Transition Plan is a living document that forms part of the NOP and is accessible via the Network Operations Portal. The current version of the Transition Plan and the corresponding Roadmap are also available on the OneSky Teams, Capacity Planning Sub-Group (CAPLANSG) portlet.

The Network Manager provides operational and technical expertise to model and simulate the demand and different traffic patterns for each special event, to enable ANSPs to optimally configure their airspace and to identify and develop, as far in advance as possible, strategic ATFCM measures that could be implemented to mitigate any problems. Initially identified measures are further developed, coordinated via well-developed CDM processes, validated and implemented during the strategic, pre-tactical, and tactical ATFCM phases.

A number of ANSPs are implementing new or upgraded ATM systems and/or a major airspace reorganisation. Temporary reductions in capacity are planned for and managed accordingly, with the Network Management function in a coordinating role to ensure full awareness and facilitate a coherent preparation by the States concerned, their neighbours, the airspace users and the Network Manager.

Special events are shown in the Network Operations Portal calendar (Network Events portlet). Detailed descriptions, including foreseen measures for each event are published and updated in the portlet.

A number of special events (new ATM systems, ops rooms, airspace reorganisation projects, new airports, etc.) are scheduled for the period 2023 until the end of 2027. These will need coordination and, in some instances, careful planning by the Network Manager to avoid network disruptions.

- <u>Albania</u> Tirana ACC Lower airspace reorganisation (2024/2025); ATM system improvement (2025); New airport - Vlora (2024)
- <u>Belgium</u> Brussels ACC ATM system upgrade (2024)
- <u>Bulgaria</u> Sofia ACC Modernisation of the OPS room (2024/2025)
- <u>Croatia</u> Zagreb ACC Backup ATM system enhancements (2023)
- <u>Cyprus</u> Nicosia ACC Night FRA implementation (2023); Transition to new ACC building (2023); New HMI and functionalities (2025); FRA phase 2 (2025)
- <u>Finland</u> Helsinki ACC VCS update (2023)
- <u>Estonia</u> Tallin ACC VCS update (2023)

- France
 - Bordeaux ACC Training for 4Flight ATM system and implementation (2024/2026); NVCS implementation (2026)
 - Brest ACC NVCS implementation (2023); FRA implementation (2025); Training for 4Flight ATM system and implementation (2024/2026)
 - Marseille ACC 4Flight ATM system implementation (2023); FRA implementation (2024;2025)
 - Paris ACC Training and implementation of 4Flight ATM system (2023/2024); Reorganisation of lower airspace (2024); Olympic games (2024); FRA implementation (2025)
 - Reims ACC FRA implementation (2024; 2025); Reorganisation of lower airspace (2025)
- <u>Georgia</u> Tbilisi ACC Route network optimisation (2023)
- <u>Germany</u>
 - Bremen ACC Training for iCAS ATM system (2026/2027)
 - Karlsruhe ACC Erlangen: Vertical split into 3 sectors (2025)
 - Munich ACC Implementation of new iCAS ATM system (2023)
- <u>Greece</u> Athinai and Makedonia ACCs Implementation of new VCRS (2023); Hellas FRA (2023); Training and implementation of a new ATM system (2025)
- <u>Hungary</u> Budapest ACC ATM system upgrade (2024)
- Ireland
 - Dublin ACC New sectorisation (2023)
 - Shannon ACC Airspace reorganisation (2023)
- <u>Israel</u> Tel Aviv ACC Surveillance system upgrade (2023/2024); New ATM system implementation (2027)
- <u>Italy</u>
 - Milano ACC 4Flight system implementation (2026)
 - Roma ACC 4Flight system implementation (2025)
- Malta Malta ACC INTRAC Phase 2 (2024)
- <u>Moldova</u> Chisinau ACC VCS upgrade (2024)
- <u>Morocco</u>
 - Agadir ACC FRA implementation and system adaptations (2024)
 - Casablanca ACC TMA reorganisation (2023/2024); New ATM system implementation (2023); Full FRA implementation (2024)
- <u>Netherlands</u> Amsterdam ACC Training and implementation of a new iCAS ATM system and new OPS room (2023/2024)
- <u>North Macedonia</u> Skopje ACC New VCS implementation (2023); New ATM system implementation (2024); Back-up VCS implementation (2025)
- <u>Norway</u>
 - Bodo ACC New VCS implementation (2023)
 - Oslo and Stavanger ACCs New VCS (2024); Training and implementation of a new ATM system (2024/2025)

- <u>Poland</u> Warszawa ACC Krakow TMA redesign (2023); Cross-border FRA with Sweden and Czech Republic (2024)
- <u>Portugal</u> Lisbon ACC New back-up system (2023); Lisbon TMA Point merge (2024)
- <u>Romania</u> Bucuresti ACC New sectorisation (2023); New Brasov airport (2023)
- <u>Serbia</u> / <u>Montenegro</u> Beograd ACC ATM system upgrade step 2 (2023); New sectorisation (2023); ATM system upgrade step 3 (2024); New IP VCS (2026); Training for a new ATM system (2027)
- <u>Slovakia</u> Bratislava ACC Improved sectorisation (2023;2026)
- Spain

- Barcelona ACC – FRA (2023-2025); iTEC 4.1 TTM (2024-2025); iTEC 4.1 MTCD (2026); Stripless en-route (2026)

- Canarias ACC - FRA (2023-2025); iTEC 4.1 TTM (2024-2025); iTEC 4.1 MTCD (2026); Stripless en-route (2026)

- Madrid ACC - FRA (2023-2024); Cross border FRA with Lisboa (2025); iTEC 4.1 TTM (2024-2025); iTEC 4.1 MTCD (2026); Stripless en-route (2026)

- Palma ACC – iTEC 4.1 TTM (2024-2025); iTEC 4.1 MTCD (2026); Stripless en-route (2026)

- Sevilla ACC – FRA (2023-2025); iTEC 4.1 TTM (2024-2025); iTEC 4.1 MTCD (2026); Stripless en-route (2026)

- <u>Sweden</u>
 - Malmo ACC Cross-border FRA with Poland (2024); SWEA Phase 1 (2026); SWEA Phase 2 (2027)
 - Stockholm ACC SWEA Phase 1 (2026); SWEA Phase 2 (2027)
- <u>Switzerland</u>
 - Geneva ACC FRA CH implementation (2023); Cross-border FRA with Reims (2024); Cross-border FRA with Paris (2025)
 - Zurich ACC Cross-border FRA with Reims (2024); Cross-border FRA with Paris (2025)
- <u>Türkiye</u> Ankara ACC Istanbul airport SIDs and STARs (2023); FRA implementation (2023/2024)
- United Kingdom
 - London ACC FRA deployment 2 and West Airspace Deployment LD1 (2023); DP ER training (2027)
 - London TC West Airspace Deployment LD1 (2023); LTMA modernisation phase 1 (2026)
 - Prestwick ACC DP ER training and implementation (2023/2025); Scottish TMA modernisation (2026); Manchester TMA modernisation (2027)

New airports 2023-2027

- Brașov-Ghimbav International Airport (Romania) June 2023
- Vlorë International Airport (Albania) April 2024

New runways 2023-2027

- Rome Construction of a new runway is expected to start in 2027
- Istanbul Sabiha Gokcen Construction of a new runway will be completed during May 2023

A detailed plan for the mentioned projects with a distinctive transition to operation phase will be described in the Transition Plan for major projects in Europe for autumn/winter/spring 2023/2024 and subsequent editions for the following seasons.

The map below presents ACCs with the plans to undertake major projects for the forthcoming 2023/2024 season. Projects planned for the first half of 2023 are not presented on the map.



The following maps present planned major projects across ECAC for the period between 2023 and 2027. The planning process is continuous, and more projects are expected to be scheduled during the second half of the reference period of this NOP (2023-2027).





7.3 ATM system changes, special events and major projects

The list below depicts the outstanding events from the local capacity plans, which may be further detailed during the transition planning processes for the respective years.

ATM System (new) - ATM System (upgrade) Event ATM OPS Proc TMA and/or Airport			rt 📃	Airsp &	Proc	Major E	uropean	Project			
Major Projects & Special Events		202	23	202	4	20	25	20	26	20	27
Albania - Tirana ACC											
ATM system improvements											
Low airspace reorganisation											
Belgium - Brussels ACC											
CANAC 2 system upgrade		1 1			1						
Bulgaria - Sofia ACC											
OPS room modernisation											
Croatia - Zagreb ACC	-			r - r							
ARES backup system enhancement			_								
Transition to the new ACC	-	1	_	-	T	1				-	
New HMI and new functionalities											
Night FRA phase 1											
FRA phase 2											
Estonia - Tallinn ACC											
VCS update											
Finland - Helsinki ACC	-	 _		-						-	
France - Bordeaux ACC		<u> </u>									
Training 4-Flight		I I								-	
4-Flight system implementation											
NVCS implementation											
France - Brest ACC	_			. .							
FRA implementation											
NVCS implementation											
4-Flight system implementation											
France - Marseille ACC					1						
FRA implementation											
4-Flight system implementation											
France - Paris ACC					-	-			1	1	
Training 4-Flight											
4-Flight implementation											
Reorganisation of lower airspace											
FRA implementation											
France - Reims ACC											
FRA implementation											
Reorganisation of lower airspace											
Georgia - I billist ACC	-	-		<u>г г</u>	- T	1					-
Germany - Bremen ACC											
Training iCAS		1 1			1						[
New ATM System iCAS											
Germany - Karlsruhe ACC										-	·
Erlangen: Vertical split into 3 sectors											
Germany- Munchen ACC	-			<u>г г</u>						1	-
New ATM System ICAS											l
Hellas ERA - Free Route Airspace Greece - Phase 4b			_			1	-				
New VCRS										<u> </u>	
Training for the new ATM System											
New ATM System implementation											
Greece - Makedonia ACC	-									1	-
Hellas FRA - Free Route Airspace Greece - Phase 4b											
Training for the new ATM System											
New ATM System implementation											
Hungary - Budapest ACC											
ATM system upgrade											
Ireland - Dublin ACC											
New sectorisation										1	
				<u>г</u> г		1					
Israel - Tel Aviv ACC											
Surveillance system upgrade					Ι						
ATM system implementation											
Italy- Milano ACC											
4Flight ATM System											
Italy- Roma ACC	_	1 1		r			- 1				
Arlight ATM System		<u> </u>			_						
INTRAC Phase 2 (new TMA. SIDs and STARs)					Т	[

ATM SYSTEM CHANGES, SPECIAL EVENTS AND MAJOR PROJECTS

ATM System (new) – ATM System (upgrade) – Event	AT	MOPS F	Proc	TMA an	d/or Airp	ort	Airsp &	Proc	Major E	uropean	Project
Major Projects & Special Events		20	23	20	24	20	25	20	26	20	27
Moldova - Chisinau ACC											
VCS update											
Morocco - Agadir ACC						_					
FRA H24 implementation											
ATM system upgrade (FRA functionalities)											
Morocco - Casablanca ACC								1	1	1	1
Netherlands - Amsterdam ACC											
Training for iCAS											
iCAS implementation & new OPS room											
North Macedonia - Skopje ACC											
New ATM System											
New VCS											
Back-up VCS											
Norway - Bodo ACC	_			1	١	1	٩	1	I	1	1
New VCS											
Norway - Oslo ACC					1	1		1	1	1	1
New VCS											
Fraining for new ATM System											
	_										I
New VCS						· · · · ·		· · · · ·		· · · · ·	
Training for the new ATM System											
Future ATM System											
Poland - Warsaw ACC											
Krakow TMA redesign											
Cross-border FRA with Sweden and Czech Republic											
Portugal - Lisbon ACC	_			I	١	1	٩	1	I	1	1
New backup system	_										
Point merge at Lisbon TMA											
Romania - București ACC			1	1	-	1	[1	1	1	
New airport (Brasov)											
Serbia / Montenegro - Beograd ACC									1		1
ATM system upgrade, step 2											
ATM system upgrade, step 3											
New sectorisation											
New IP VCS											
Training for the new ATM System											
Slovakia - Bratislava ACC			-	1 1		1	-			1	1
Improved sectorisation											
Spain - Barcelona ACC											
ITEC 4.1 MTCD											
Stripless en-route											
Spain - Canarias ACC											
FRA											
ITEC 4.1 TTM											
ITEC 4.1 MTCD											
Stripless en-route											
Spain - Madrid ACC	_								1		
FRA											
Stripless en-route											
Spain - Palma ACC											
ITEC 4.1 TTM											
ITEC 4.1 MTCD											
Stripless en-route											
Spain - Sevilla ACC											
FRA											
ITEC 4.1 TTM											
IIEC 4.1 MTCD											
Stripless en-route											

ATM System (new) ATM System (upgrade) Event	System (new) 🧧 ATM System (upgrade) 📕 Event 👘 ATM OPS Proc 📄 TMA and/or Airport 📕 Airsp & Proc						Proc	Major European Project			
Major Projects & Special Events		20	23	20	2024 2025		2026		20	27	
Sweden - Malmo ACC	-			<u>.</u>							
Cross-border FRA with EPWW											
SWEA (Swedish Airspace Project) Phase 1											
SWEA (Swedish Airspace Project) Phase 2											
Sweden - Stockholm ACC											
SWEA (Swedish Airspace Project) Phase 1											
SWEA (Swedish Airspace Project) Phase 2											
Switzerland - Geneva ACC											
FRA CH implementation											
Cross-border FRA with Reims ACC											
Cross-border FRA with Paris ACC											
Switzerland - Zurich ACC											
Cross-border FRA with Reims ACC											
Cross-border FRA with Paris ACC											
Turkiye - Ankara ACC											
FRA implementation											
New SIDs and STARs for Istanbul airport											
UK- London ACC											
FRA deployment 2											
West Airspace Deployment (LD1)											
DP ER training											
UK- London TC											
West airspace deployment (LD1)											
LTMA Modernisation phase 1											
UK- Prestwick ACC											
DP ER training											
DP ER implementation											
Scottish TMA modernisation											
Manchester TMA modernisation											

7.4 Major Military Exercises

Military exercises/activities requiring a special reservation/segregation of airspace may have significant impact on the available routes and capacity within the European ATM network. However, by early notification of such events, advanced assessment of the likely impact, and collaborative planning to define the appropriate ATFCM measures, such events can be accommodated while minimising the effects on other airspace users. As they are a major actor in the ATM environment, Military Authorities are requested to participate in the NOP by providing information on military exercises or major flight activities having an impact on the route network structure and its best use. By this, the Military community will further contribute to the overall ATM progress and at the same time benefit from the increased visibility given to the need of airspace for Military operations.

National Military representatives at the MILHAG (Military Harmonisation Group) meeting held on 5th October 2006 agreed to support the Military participation in the NOP. Participating States nominated their point of contact responsible for the provision of required data. MILO has been nominated within EUROCONTROL/NMOC as central point of contact, responsible for the establishment and the management of data collection procedures and the coordination with the NOP management.

A procedure to collect information on Military activities requiring airspace reservation/segregation affecting the route network structure was established in order to obtain and update relevant data.

More specifically, a two-phase data collection process was agreed:

- Initial notification of the yearly plan for Military exercises/activities
- Notification of official publication (AIP/NOTAM), including any additional information (e.g restrictions implemented, traffic analysis etc.).

NM achieved an extensive cooperation with NATO for the coordination of large scale exercises. Harmonised procedures have been identified and published in the ERNIP Part 3 – ASM Handbook, Annex 12. These procedures are covering the entire preparation phase of large scale activity/military exercise requiring multi-agency (civil/military coordination) and/or cross-border coordination potentially requiring temporary ASM measures that have an impact on the network performance.

Details on all information received to date concerning major military exercises, covering the period for the current year, are published, updated, and accessible on the EUROCONTROL Network Manager Operations Portal (NOP) through Network Events Portlet.

(https://www.public.nm.eurocontrol.int/PUBPORTAL/gateway/spec/index.html)

CMC Point of Contact: MILO (Military Liaison Officer) Cell Phone: +32 2 7299844 Fax: +32 2 7293008 E-mail: <u>nm.milo@eurocontrol.int</u>

8 Military Airspace Requirements

The Military considers the ATM system as an enabler for defence and security missions. Whatever are the evolutions of the ATM system, it must ensure that military aviation will continue to provide, and further improve effective security and defence in Europe while due regard to the safety of navigation of civil Aircraft remains paramount.

Therefore, the airspace design and utilisation processes shall take into account the requirement to conduct military training and operations, including exercises effectively and efficiently. In addition, in order to protect operational security and mission requirements, any ATM changes must take into account seamless and unlimited airspace access and air movement across national and ECAC airspace and must accept that military assets may not provide the level of data exchange and/or cooperative surveillance as expected from civil aviation.

To optimise training mission effectiveness by reducing transit time and adherence to horizontal and vertical flight efficiency profiles while taking into account impact on environments and traffic flows, any reserved airspace must ideally be located close to airbases. Such airspaces should also be suitable for military training in volume, shape and location, notably to accommodate new operational doctrines, next generation aircraft and other military weapon systems. New weapons systems will have an impact on military operations and may result in additional military airspace requirements.

An overall capacity optimisation is not possible unless airspace planners are aware of the operational requirements of military and civil users. Contrary to civil requirements, military requirements are often very complex, diverse and difficult to quantify. They differ from State to State and are directly related to the task of the national armed forces and the types of platforms and weapons in their inventory. Airspace design and management shall be able to fully address these requirements within the application of FUA.

In order to meet military requirements in a congested ATM environment, a specific balanced Cooperative Decision Making (CDM) process able to accommodate military needs at network level should be developed and implemented. This CDM process at national and network level must ensure the satisfaction of military requirements, specifically:

- Freedom to operate both manned and unmanned aircraft, in all weather conditions in all areas of the European airspace where national regulations allow to do so to execute all variety of assigned national and/or international missions;
- Incorporating a suitable level of flexibility to accommodate short term changes to mission
- Provision of ATM system capabilities, including civil ones, to support military deployment, in particular for priority flights and for time-critical missions, but also for military aircraft not fully equipped to the civil standard.
- The establishment of temporary airspace reservations situated as close as practicable to the appropriate operating areas, including airspace restrictions for non-flight-related Activities;
- The implementation of a transparent process supported by commonly agreed modalities and monitoring scheme is considered a key enabler.

Therefore, it is essential to ensure military involvement from the beginning of any new development that might affect training, exercise and deployment of military force. This is particularly relevant for the activities of the Network Manager (NM), namely in the definition of the Network Strategy Plan, the Network Operations Plan (NOP) and the more specific the European Route Network Improvement Plan (ERNIP).

Civil-military coordination and cooperation shall be based on a seamless CDM process, starting from the capture of all civil and military airspace requirements for the definition and

management of Airspace Configurations. This must be supported by continuous information sharing amongst all ATM partners; however, there will be situations where information cannot be shared amongst all ATM partners due to national security restrictions.

The introduction of the "rolling NOP" will allow for changes to airspace use to be uploaded and shared with users in real-time, using existing ASM support systems like LARA. It provides the processes and procedures required to improve the dynamicity of the current process in order to achieve a continuous updating of the airspace status. Interfaces to local systems have already been developed and validated to support rolling NOP functionalities. Support will be given to the civil and military stakeholders in deploying and implementation of interoperable support systems.

The rolling NOP should be based on clear agreed performance criteria for flexible use of airspace and its related B2B services in order to increase capacity, flight efficiency and military mission effectiveness.

A systematic and organised collection of planned civil and military airspace use via automated systems could significantly contribute to improved airspace utilisation efficiency by both civil and military users. Default days/times of availability, ad hoc requests for unplanned use of reserved airspace and release of such reserved airspace when not used are among the data that needs to be provided.

To reflect the rolling nature of the NOP, data needs to be provided by using ASM support systems on any necessary time-period. On an annual basis, military airspace requirements refers to expected use of the different parts of reserved airspaces under their jurisdiction, plus any major activities that may require additional reserved airspaces.

It is expected that this annual plan will be updated on a monthly/weekly basis, providing a much more stable picture of greater granularity for the pre-tactical planning of the network.

On a daily basis, using ASM support systems, data concerning actual use of reserved airspace needs to be shared, as well as any ad hoc requests for unplanned use of reserved airspace. This information of airspace status is currently provided according to defined regular snapshots. A gradual evolution towards a continuous exchange of information whenever required is foreseen; validation activities are planned.

ASM/FUA performance monitoring systems such as PRISMIL should be used for post operations analysis and the development of further enhancements.

8.1 Airspace Availability

8.1.1 Strategic Activities

Focusing on strategic activities, the major areas where the CDM process is expected to enhance civil/military coordination are:

- Revision of existing areas;
- Large scale exercises;
- New areas;

New operational doctrines, next aircraft generations or significant upgrades, other aerial platforms, new weapon systems, the introduction of new concepts (e.g. free routes) are all elements, which should be considered for a revision of current airspace structures. This revision should also consider major traffic flows in order to balance civil/military requirements.

In accordance with the ICAO Chicago Convention, specifically pursuant to article 1 thereof, Member States have complete and exclusive sovereignty over their airspace, which implies that they need to be in a position to exercise the ultimate decision making powers within their airspace, in order to safeguard public order, public security and defense matters. This is also reflected in Implementing Regulation 2019/123, Article 12.

The recommendation is to exploit the introduction of modularity of the areas with an adequate associated CDR network or waypoints for free-route airspace in order to improve the options available for coordination at pre-tactical and tactical level. It is also highly recommended to investigate the possibility to establish CBAs, wherever feasible, in order to enhance the variety of options for coordination.

This process involves national authorities, at local and/or FAB level. The NM provides information regarding the major traffic flows, including major axis, quantification of traffic involved and peak hours. All this information is available to support the design as well as to establish at strategic level major priority rules to be used at pre-tactical and tactical level (e.g. consider peak hours, mutual priorities).

Based on the above-mentioned principles, the establishment of new areas or ad-hoc areas for large-scale exercises/special events in addition to the nominal system, a CDM process should be considered that coordinates with adjacent centres, ideally at FAB level, as well as with NM in order to verify the impact on the major traffic flows. The application of FUA principles and the use of ASM support systems is highly recommended in order to improve the flexibility and to achieve a more efficient use of the airspace.

The involvement of international working arrangements, at FAB or network level is highly recommended to support the final decision that remains a national responsibility as Member States have complete and exclusive sovereignty over their airspace.

All the decisions resulting from the CDM process are used to populate the NOP, in the different phases of the process.

To ensure this, the military authorities from each of the Member States are encouraged to provide the following information:

- Areas description, including large scale exercises
- Foreseen time occupancy on yearly/monthly/weekly or ad hoc basis
- Wherever possible the above-mentioned information should consider the modularity of the areas where FUA is applied.

Automated local ASM support systems (e.g. LARA) should be used that are providing information to and enabling the NM to establish a Network map-view of planned military airspace reservations/areas as basis for the CDM process.

8.1.2 **Pre-tactical and Tactical Activities**

Pre-tactical and tactical activities should rely on a balanced CDM process, which enables to accommodate both civil and military requirements.

MAB/25 approved the document "Civil Military Collaborative Decision-making⁹ in the Future European ATM", Harmonized military views". Although addressing the future European ATM developed by SESAR, relevant provisions of the document are applicable within the scope of this plan.

The overall principle applicable to civil-military CDM throughout ASM/ATFM processes is to balance the ATM network performance needs, civil AU business preferences, and military AU mission requirements by optimizing their preferences and requirements throughout common solutions and/or application of pre-agreed priorities.

⁹ Collaborative decision-making is called cooperative decision-making in the context of NM.

A framework/agreement to ensure expeditious civil-military CDM is mandatory. State civil and military aviation authorities in coordination with the European NM should elaborate a national or international (bi- or multilateral) strategic framework document for ASM and ATFM, which will include CDM.

The framework document will define the civil and military actors, roles, responsibilities, airspace configuration and trajectory management principles and priority rules as well as the processes associated to CDM. It should be regularly reviewed and updated in accordance with the expected scope of military missions and the evolutions of air traffic management.

The Military will engage in consultation and negotiation in order to reach an agreement on a proposed solution for optimizing airspace configurations and traffic flows in accordance with pre-defined flexibility or airspace activation scenarios defined for each ATM request.

Considering the variety of CDM actors as well as their cross-border interactions, an escalation process towards upper level authorities to solve conflicting situation may not be possible. An alternative way stays in pre-defined priority criteria/rules. A 'system of priorities' that encompasses both civil and military priority criteria will be defined and periodically updated by civil and military authorities at State level in coordination with NM as part of a CDM strategic framework document. However, the ultimate decision on the use of national airspace remains a decision of the individual States' military authority.

The pre-tactical process starts at D-6, providing a fine tuning of military plans in terms of foreseen occupancy of the areas (Time and volume), finalised at D-1 with the EAUP publication.

Automated local ASM support systems providing information to and enabling the NM to establish a Network map-view of planned military airspace reservations/areas should be used as basis for the CDM process.

The application of coordinated priority rules as well as the provision of acceptable options from the military authorities is strongly recommended in order to promote the CDM process at pretactical level. More specifically, the identification of different modularity will facilitate the coordination among the different partners to accommodate military requests with solutions minimising the impact on civil traffic flows.

After the EAUP publication (preferably visualised with a map-view provided by ASM support systems), a dynamic pre-tactical process is ensured through the rolling map-view visualised UUPs that will support the fine tuning of the plans during the D-OPS, granting the full utilisation of airspace in case of release as well as to satisfy ad hoc requests.

More specific, this process enables the military to ask for additional booking of airspace as part of UUP process to provide a minimum of 3 hours' notice of activation of airspace, or other timescales according to internal national agreements. This process enables a more accurate prediction of the weather, aircraft serviceability, crew availability, and the training requirement that would previously have required airspace to have been booked at D-1 in case it was needed; moreover it will contribute to avoiding overbooking therefore will provide increased availability of CDRs as well as airspace volumes in FRA. The sharing of information among all interested partners is essential to support coordination for a most efficient airspace utilisation. The involvement of the NM is required to provide feedback to local/FAB units in order to support them for the final decisions. It's enhanced implementation with rolling UUP snapshots every 30 minutes provide high degree of flexibility to manage any ad hoc request.

Coordination with ATFCM components is required to exploit capacity resources and to evaluate properly the impact of new requests.

The rolling UUPs provides up to date information to the NOP, allowing the users to update their flight plans accordingly.

All changes are uploaded in the NOP via appropriate tools, in order to provide real time information to the users.

Different means of notification (e.g. NOP portal, B2B) are utilised to ensure adequate information to all relevant stakeholders.

The UUP process supports a more dynamic pre-tactical management, closer to the time of operation. Nevertheless, the tactical management remains relevant to accommodate the last minute changes, able to improve ATC operations.

Tactical ASM Level 3 consists of the real-time activation, deactivation or reallocation of the airspace allocated at ASM Level 2 and the resolution of specific airspace problems and/or traffic situations between civil and military ATS units, controllers and/or controlling military units as appropriate.

The real time access to all necessary flight data, including controller's intentions, with or without system support, permits the optimised use of airspace and reduces the need to segregate airspace.

Adequate real time coordination facilities and procedures are required to fully exploit the FUA Concept at ASM Levels 1 and 2. Flexibility in the use of airspace is enhanced by real-time civil/military coordination capability. This flexibility depends on the potential offered by the joint use of airspace by civil and military traffic. Local ASM tools already offer functionalities to manage real-time airspace status and coordinate airspace activations and deactivations in a highly flexible manner. Implementation options range from supervisor-supervisor coordination to system interfaces between ASM Tool and ATC System, making the availability of airspace accessible directly on the controllers working positions.

9 Forecast of Network Operational Performance

The following paragraphs give an outlook of the expected performance of the European enroute ATM network for the period 2023-2027. This prognosis is based on capacity plans agreed with all ANSPs during the period November 2022 – January 2023 and the EUROCONTROL seven-year forecast update 2022-2028 (October 2022). It is the result of simulations performed with the tools used in the capacity planning process, combined with operational analysis made by the Network Manager Operations Planning Unit.

The network and local environment/flight efficiency performance targets and forecast and their analysis are addressed in ERNIP Part 2-ARN Version 2022-2030.

9.1 2023-2027 Delay Forecast

9.1.1 Delay Forecast at Network level

The following table and graph present the delay forecast for the period 2023-2027.

The delay forecast is based on capacity plans agreed with all ANSPs during the period November 2022 – January 2023 and the EUROCONTROL seven-year forecast update 2022-2028 (October 2022), scenario Baseline.

The performance targets for RP3 are also presented.

	Delay Forecast (mi		
	Without disruptions such as industrial actions and technical failures	With estimations of industrial actions and technical failures included at a statistical level of 0.15 min/flight	Targets (min/flight) Full year
	Traffic Scenario Baseline	Traffic Scenario Baseline	
2023	1.63	1.78	0.5
2023 with measures	1.32	1.47	0.5
2024	1.32	1.47	0.5
2025	1.13	1.28	
2026	1.04	1.19	
2027	0.82	0.97	



<u>Note</u>: Weather delay has been included at statistical level of 0.22 min/flight based on 2013 to 2019 and 2022 data.

This delay forecast does not include the effects of the network orientated ATFM and weather related measures as included in the EUROCONTROL NM Improvement Package. It does not include either the effects of the daily activities of the Network Manager Operation Centre aimed at delay reductions.

9.1.2 Delay Forecast at FAB level

The following table presents the delay forecast at FAB level for the period 2023-2027.

The delay forecast is based on capacity plans agreed with all ANSPs during the period November 2022 – January 2023 and the EUROCONTROL seven-year forecast update 2022-2028 (October 2022), scenario Baseline.

The performance targets for RP3 are also presented.

<u>Note</u>: Weather delay has been included at statistical level of 0.22 min/flight based on 2013 to 2019 and 2022. It excludes delays for disruptions such as industrial actions and technical failures.

FAB	Delays in min/flight	2023	2024	2025	2026	2027
	Reference value	0.12	0.12			
BALIIC	Delay forecast Baseline scenario	0.54	0.48	0.41	0.38	0.36
	Reference value	0.14	0.14			
BLUEINED	Delay forecast Baseline scenario	0.18	0.18	0.17	0.15	0.05
DANUE	Reference value	0.09	0.09			
DANUBE	Delay forecast Baseline scenario	0.02	0.03	0.03	0.03	0.05
	Reference value	0.09	0.08			
DENMARN/SWEDEN	Delay forecast Baseline scenario	0.02	0.02	0.02	0.02	0.01
	Reference value	0.26	0.25			
FABCE	Delay forecast Baseline scenario without network measures	1.30	1.27	1.1	0.76	0.72
	Delay forecast Baseline scenario with network measures	1.32				
	Reference value	0.37	0.37			
FABEC	Delay forecast Baseline scenario without network measures	1.82	1.33	1.12	1.13	0.82
	Delay forecast Baseline scenario with network measures	1.27				
	Reference value	0.09	0.08			
NEFAD	Delay forecast Baseline scenario	0.01	0.01	0.01	0.01	0.01
SOUTHWEST	Reference value	0.22	0.22			
300100231	Delay forecast Baseline scenario	0.31	0.24	0.18	0.13	0.12
	Reference value	0.26	0.27			
UNIRELAND	Delay forecast Baseline scenario	0.26	0.27	0.34	0.32	0.33

Based on the Baseline scenario for the traffic growth:

- FABs expected to meet the reference values:
 - DANUBE
 - DENMARK/SWEDEN
 - NEFAB
 - UK/IRELAND
- FABs expected to be close to the reference values:
 - BLUEMED
 - SOUTHWEST
- FABs not expected to meet the reference values:
 - BALTIC
 - FABCE
 - FABEC

9.1.3 Delay Forecast at ANSP level

The following table presents the delay forecast at ANSP level for the period 2023-2027.

The delay forecast is based on capacity plans agreed with all ANSPs during the period November 2022 – January 2023 and the EUROCONTROL seven-year forecast update 2022-2028 (October 2022), scenario Baseline.

The performance targets for RP3 are also presented.

Note: Weather delay has been included at statistical level of 0.22 min/flight based on 2013 to 2019 and 2022. It excludes delays for disruptions such as industrial actions and technical failures.

		2023	2024	2025	2026	2027
	Reference value	0.13	0.12			
SKEYES	Delay forecast Baseline scenario	0.16	0.26	0.21	0.17	0.16
	Reference value	0.25	0.24			
DFS	Delay forecast Baseline scenario without network measures	2.74	1.59	0.90	0.86	0.55
	Delay forecast Baseline scenario with network measures	1.61				
	Reference value	0.19	0.19			
EUROCONTROL	Delay forecast Baseline scenario	0.17	0.20	0.17	0.14	0.13

		2023	2024	2025	2026	2027
FANO	Reference value	0.03	0.03			
EANS	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.05	0.05			
FINTRAFFIC ANS	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
NATO	Reference value	0.26	0.27			
NATS	Delay forecast Baseline scenario	0.27	0.27	0.34	0.32	0.34
	Reference value	0.09	0.10			
	Delay forecast Baseline scenario	0.05	0.18	0.05	0.04	0.04
IAA - Irish Aviation	Reference value	0.03	0.03			
Authority	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.06	0.05			
NAVIAIR	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.11	0.11			
AVINOR	Delay forecast Baseline scenario	0.02	0.01	0.01	0.01	0.01
PANSA	Reference value	0.12	0.12			
	Delay forecast Baseline scenario	0.58	0.52	0.44	0.41	0.39
	Reference value	0.08	0.08			
	Delay forecast Baseline scenario	0.03	0.03	0.03	0.02	0.02
	Reference value	0.03	0.03			
LGS	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.03	0.03			
OKU NAVIGACIJA	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00

		2023	2024	2025	2026	2027
	Reference value	0.01	0.01			
ONDA	Delay forecast Baseline scenario	0.05	0.01	0.01	0.01	0.01
	Reference value	0.07	0.06			
ALBCONTROL	Delay forecast Baseline scenario	0.06	0.06	0.06	0.05	0.04
	Reference value	0.07	0.08			
BULATSA	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.15	0.15			
CYPRUS DCA	Delay forecast Baseline scenario	0.20	0.14	0.09	0.09	0.08
	Reference value	0.17	0.17			
CROATIA CONTROL	Delay forecast Baseline scenario	0.91	1.00	0.70	0.45	0.40
ENAIRE	Reference value	0.19	0.19			
	Delay forecast Baseline scenario	0.29	0.22	0.15	0.10	0.09
	Reference value	0.25	0.25			
DSNA	Delay forecast Baseline scenario without network measures	0.70	0.69	0.98	0.99	0.67
	Delay forecast Baseline scenario with network measures	0.72				
	Reference value	0.15	0.15			
HASP	Delay forecast Baseline scenario	0.36	0.38	0.26	0.21	0.02

		2023	2024	2025	2026	2027
	Reference value	0.11	0.11			
HUNGAROCONTROL	Delay forecast Baseline scenario without network measures	1.47	1.06	1.02	0.63	0.58
	Delay forecast Baseline scenario with network measures	1.53				
	Reference value	0.11	0.11			
ENAV	Delay forecast Baseline scenario	0.04	0.04	0.10	0.10	0.05
	Reference value	0.09	0.09			
SLUVEINIA CUINTRUL	Delay forecast Baseline scenario	0.07	0.06	0.07	0.07	0.09
ANS CZECH	Reference value	0.11	0.11			
REPUBLIC	Delay forecast Baseline scenario	0.05	0.06	0.06	0.07	0.07
IAA - Israel Aviation	Reference value	0.01	0.01			
Authority	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.05
MATO	Reference value	0.01	0.01			
MATS	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.17	0.16			
AUSTRO CONTROL	Delay forecast Baseline scenario	0.57	0.83	0.73	0.56	0.55
	Reference value	0.13	0.13			
NAV PORTUGAL	Delay forecast Baseline scenario	0.12	0.12	0.12	0.13	0.13
	Reference value	0.06	0.06			
βμανρα	Delay forecast Baseline scenario	0.05	0.05	0.05	0.05	0.05
DOMATOA	Reference value	0.04	0.04			
RUIVIAISA	Delay forecast Baseline scenario	0.03	0.04	0.04	0.05	0.07
		2023	2024	2025	2026	2027
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	Reference value	0.19	0.19			
SKYGUIDE	Delay forecast Baseline scenario	0.15	0.36	0.38	0.55	0.63
	Reference value	0.05	0.05			
DHMI	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.01	0.01			
MOLDATSA	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.06	0.06			
M-NAV	Delay forecast Baseline scenario	0.42	0.94	0.44	0.42	0.41
0111701	Reference value	0.08	0.07			
SMATSA	Delay forecast Baseline scenario	1.21	0.92	0.69	0.67	0.58
	Reference value	0.08	0.07			
LPS SR	Delay forecast Baseline scenario	0.06	0.06	0.05	0.04	0.04
	Reference value	0.01	0.01			
ARMATS	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.01	0.01			
SAKAEKUNAVIGATSIA	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00
	Reference value	0.02	0.02			
UKSAISE	Delay forecast Baseline scenario	0.00	0.00	0.00	0.00	0.00

9.1.4 Delay Forecast at ACC level

The following maps show the annual delay forecast per ACC for the years 2023 to 2027.

The delay forecast is based on capacity plans agreed with all ANSPs during the period November 2022 – January 2023 and the EUROCONTROL seven-year forecast update 2022-2028 (October 2022), scenario Baseline.

<u>Note</u>: Weather delay has been included at statistical level of 0.22 min/flight based on 2013 to 2019 and 2022. It excludes delays for disruptions such as industrial actions and technical failures.









9.2 Expected Performance of the European ATM Network

9.2.1 Overall Network Performance

According to the current ANSP capacity plans and latest traffic forecast Baseline scenario, it is expected that the European targets will not be met any year of RP3.

It is urgent to address the capacity issues in the relevant ACCs, as the delays are expected to remain high during the full planning period.

Given the current variability in the traffic demand, from a network perspective, it is important that, in areas where performance looks good, all efforts are maintained to continue the capacity delivery to ensure that the network remains prepared for a sudden increase in traffic. In areas where performance needs to significantly improve, a serious effort needs to be envisaged as delays are expected to keep growing exponentially.

9.2.2 En-route: ACC Performance

Despite the large number of operational improvements that will be deployed, staffing issues continue to be a problem for many European ACCs. Staff availability, flexible deployment of staff and flexible sector opening schemes are key to the full exploitation of the benefits expected from all other operational improvements and to respond to the operational performance targets.

If current plans are maintained, based on the Baseline scenario for the traffic growth:

- 40 ACCs out of the 67 ACCs covered by the NOP are expected to bring a positive contribution to the network.
- 4 ACCs are expected to bring a positive contribution to the network during RP3, except for one year due to the implementation of a major project:
 - Cyprus Nicosia ACC in 2023
 - Germany München ACC in 2023
 - Morocco Casablanca ACC in 2023
 - Netherlands Amsterdam ACC in 2024
- 3 ACCs are expected to bring a positive contribution to the network during the period 2025-2027, except for one year due to the implementation of a major project:
 - Italy Milano ACC in 2026
 - Italy Roma ACC in 2025
 - UK Prestwick ACC in 2025
- 20 ACCs are expected to generate delays at higher levels than the network capacity requirements:
 - Austria Wien ACC
 - Belgium Brussels ACC
 - Croatia Zagreb ACC
 - France Bordeaux ACC from 2024
 - France Brest ACC from 2024
 - France Marseille ACC until 2024
 - France Paris ACC until 2024
 - France Reims ACC until 2024
 - Germany Bremen ACC
 - Germany Karlsruhe UAC
 - Germany Langen ACC
 - Greece Athinai ACC until 2026
 - Greece Makedonia ACC until 2026
 - Hungary Budapest ACC
 - North Macedonia Skopje ACC
 - Poland Warszawa ACC
 - Serbia Beograd ACC
 - Spain Barcelona ACC until 2024
 - Spain Madrid ACC in 2024
 - Switzerland Zurich ACC from 2024
- 7 ACCs are expected to generate delays at a level greater than one minute per flight during the planning period:
 - Croatia Zagreb ACC in 2024
 - Germany Bremen ACC in 2023 and 2024
 - Germany Karlsruhe UAC in 2023 and 2024
 - France Bordeaux ACC in 2025 and 2026, partly due to the implementation of a major project

- France Brest ACC in 2025 and 2026, partly due to the implementation of a major project
- Hungary Budapest ACC in 2023, 2024 and 2025
- Serbia Beograd ACC in 2023

9.2.3 Special Events

A number of special events (major ATM system upgrades, airspace structure reorganisation etc.) are scheduled for the period 2023-2027. Due to these events, some ACCs could generate delays at higher levels than the network capacity requirements for some of the years of the planning period. In those ACCs, temporary reductions of capacity are planned during the training and implementation phases, but the improvements will bring significant medium/long term capacity benefits. For those ACCs, the Network Manager will develop a Transition Plan for Major Projects in Europe detailing all implementation steps and the local and network measures aimed at reducing the overall network operational performance impact. This Transition Plan and its application will contribute to the reduction of the expected delay in the concerned areas.

9.2.4 Expected Airport Performance of the European ATM Network

The Network Manager has launched a Request for Information in Q4 2023 to request the airports to provide their capacity plans and constraints for the period 2023-2027 through the Airport Corner. The information provided is very useful for NM to assess possible future scenarios and become aware of the issues that the airports will face in the coming years. In this section we focus on highlighting possible performance issues at airport level. Due to confidentiality issues, the detailed information cannot be disclosed, however we include some aggregated built-in visualisations and conclusions with a view on providing relevant information to our stakeholders.

9.2.4.1 Constraining factors

The following figure shows the number of airports reporting each constraining factor for the year 2023.



The top three constraining factors are: Passengers at the terminal (34), Parking positions (34) and Type and location of taxiway exists from the runway or ROT (30). Other constraints affecting a significant number of airports (between 15 and 29) are: Airspace, Number and geometric layout of the runways, Noise-abatement and other environmental parameters, Mix of movements on each runway and sequencing of movements, Separation requirements between aircraft imposed by the local operating procedures, Other meteorological conditions and Mix of aircraft using the airport and Environment. Finally, the less reported constraints are: Wind direction and strength (14), State and performance of the ATM systems and personnel (13), Curfew Hours (11), Terrain (10) and Opening Hours (5). Eight airports reported no capacity constraints.

The following picture shows the constraints reported by the airports for the mid-term.



The main difference with 2023 is the more importance of the Airspace and the Number and geometric layout of the runways factors and the decrease in ranking of Type and location of taxiways exit from the runway or ROT and Parking positions. In addition, Opening hours and Curfew hours have a bigger share of airports concerned for the period 2024-2030 than for 2023. Finally, Environment added to Noise-abatement and other environmental parameters also increase in the long-term plan.

10 Bottleneck Areas and Mitigation Solutions

10.1 Mitigation Solutions and Measures at Local and Network Level

For each of the potential bottleneck areas identified in chapter 9, mitigation solutions and measures are required at local or network level.

ATM bottlenecks can be connected to:

- Inefficient airspace design, including sectorisation
- Unnecessary restrictions (e.g. RAD)
- Less than optimum ATC sectors configurations and opening schemes caused by:
 - Lack of ATC staff
 - Inflexible use of ATC staff
 - Limitations of ATM system and/or infrastructure
- Inadequate sector capacity/traffic volume monitoring values.

The network and local environment/flight efficiency performance targets and forecast and the analysis of the bottlenecks are addressed in ERNIP Part 2-ARN Version 2023-2030.

10.2 EUROCONTROL/NM Improvement Package for Summer 2023

For the preparations for the Summer 2023, EUROCONTROL/NM will further enhance the actions taken to date. They are aimed at mitigating the capacity gap currently identified in the Network Operations Plan. The main actions foreseen are:

• Preparation of the weekly seasonal rolling NOP with possible extension to 8 weeks

The European Network Operations Plan (NOP) – Rolling Seasonal Plan is a special version of the NOP focusing on the planning of the next six weeks and in managing the execution and implementation of the 5-years NOP. It provides for a consolidated European network view of the evolution of air traffic and facilitates ANSPs and airports planning to match traffic demand in a safe, efficient and coordinated manner. It is developed by EUROCONTROL NM in cooperation with operational stakeholders ensuring a rolling outlook, published on the NM Network Operations Portal and updated weekly.

• Network measures for Summer 2023

The preparations of network measures for Summer 2023 was initiated in January 2023 to address the foreseen unbalance between traffic and demand during the Summer period.

As for 2019 and 2022, the initiative aims to develop a set of RE RAD network measures to significantly reduce delays and stabilise the network while ensuring a balanced approach to horizontal and vertical flight efficiency.

The additional en-route ATFM delay generated by the ACCs that will handle additional traffic due to this initiative will be re-attributed, as in 2022.

• Re-enforcement of Network CDM ATFM, FUA and Weather Processes

The proactive role played by the NMOC together with the ANSPs and the airspace users, as well as a more network-orientated approach was key in ensuring the stability and predictability of operations during the summer period. A similar approach will be followed during the Summer 2023.

The civil/military cooperation has made significant progress over the past years and all the necessary instruments are already available through the procedures described in the ERNIP

Part 3 - ASM Handbook. Particular attention will be given to the preparation of the military exercises where earlier information will be required and network assessments and mitigation measures prepared. In case of major weather or other disruptions in the network usual cooperation with military partners will be in place to address possible mitigation measures.

The weather delays mitigation process will be in place with further extended coverage compared to previous years.

 Preparation of NOP 2023-2027, including specific sector opening schemes and rostering (2023 emphasis)

During the preparation of the NOP a particular attention will continue to be given to the following aspects:

- Accurate information on the staffing situation and opening schemes
- Weather impact in areas with limited capacity delivery
- Airspace saturation in some parts of the core area
- High number of un-necessary regulations
- A new network-orientated approach required
- Commitment to deliver the NOP Plans
- Commitment to deliver to the network targets
- Week days and week-end days planning to avoid the high discrepancies in capacity performance recorded during previous Summer seasons
- Planning of major projects and of special events
- Projects arising from FABs
- Identification of additional measures for the ACCs that have been identified as being critical in the previous editions of the NOP.

• Airspace Re-structuring Programme (2022/2030)

The main goal is the Development of an Optimised Airspace Structure as a Target Plan that includes the design of an optimum airspace structure, Free Route Airspace (FRA) with an ATS route network below FRA, the definition of optimum sectorisation (including cross-border sectorisation) and identifying the operational resources needed to deliver the required network performance.

The projects will include cross-border FRA and consider long-term military and other national requirements. The design will be aligned with the ERNIP Part 1 Technical specifications for airspace design. Smaller airspace projects will be re-grouped into the bigger projects to ensure proper coordination and more efficient utilisation of resources.

• Operational Excellence Programme

The Operational Excellence Programme is created to complement the development and implementation of the Airspace Re-configuration Programme. Its aim is to identify and implement best-in-class operational and system support evolutions to deliver harmonised common operational capabilities among all operational stakeholders. This will ensure the achievement of operational and technical harmonisation aligning on best-in-class performance and delivering the expected operational performance.

The Operational Excellence Programme will deliver gradual improvements and will take into consideration other major projects under development and implementation. The need to progress towards seamless cross-border operations will also address systems connectivity and interoperability and improvement of operational procedures.

• Airport related actions

For the preparations for the Summer 2023, EUROCONTROL/NM will include the following airport related actions focused on network recovery and further integration of the airports into the network:

- Actions are considered to improve the situation in Greek islands (e.g., capacity studies to evaluate available added capacity, surveillance of actual operations to increase NM situation awareness (ECRA), increase efficiency of regulations, conversion of 50% of Greek airport in Advanced ATC Tower);
- Regulation Outlook predictive tool to better anticipate and coordinate airports' regulations;
- Permanent activation of the Airport Function support by operational airport staff in collaboration with ACI;
- Prioritisation of strategic flights to avoid night curfew infringement or flight diversion;
- Generalise the use of MIRROR to optimise local airport operations;
- Share enhanced passenger demand predictive tool for supporting efficient airport planning;
- Anticipate possible degraded punctuality, turnaround times and ground delay, focusing on preventive measures to avoid bottlenecks;
- Identify airport with operational constraints;
- Identify airlines with systematic unfeasible scheduled turnaround times.

10.3 Network capacity enhancement measures

Other actions foreseen at network level to improve performance are:

- A coordinated approach between the Network Manager and the ANSPs to propose network solutions to minimise the impact of the bottleneck areas on the network
- A partnership approach between the Network Manager and the operational stakeholders, and especially the ANSPs, to ensure the evaluation and revision of the individual local plans based on the suggestions made by the Network Manager
- Reinforcement of the capacity planning processes, airspace design and utilisation, coordination of airport operations improvements, actions and activities at local and network level
- Daily monitoring of operational performance indicators resulting in the identification of required local and network actions and measures (at pre-tactical and tactical level) to further enhance operational performance
- Post operations reporting and analysis for feedback
- Development and full implementation of the European Route Network Improvement Plan over the period 2023-2030
- Integrating airports into the network
- Preparation of special events to mitigate impact on the network performance
- Preparation of system changes to ensure minimum impact on the network
- Identification of actions, including a repository of procedures, to mitigate industrial action impact

- Development and implementation of new ATS procedures at network level aiming at increasing operational performance
- The development of enhanced airspace management/flexible use of airspace processes and procedures must continue and must be applied both at local and network levels. These processes must then be fully exploited in airspace design, airspace utilisation and ATFCM actions
- Identification and evaluation of additional local measures aiming at increasing operational performance:
 - Route network and sectorisation changes
 - Evaluation of sector capacities, configurations and opening schemes
 - Evaluation of human resources.

10.4 En-route: ACC capacity remedial measures

This section describes the main contributors to the capacity imbalance, and the remedial measures proposed by the Network Manager to further enhance operational performance or to mitigate capacity demand imbalance at local level.

<u> Austria – Vienna ACC</u>

Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.17	0.16			
Delay forecast - Baseline scenario	0.57	0.83	0.73	0.56	0.55

• Reasons for lack of capacity

- High and fast traffic recovery compared to 2019, high traffic growth expected
- Weather impact

- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Network weather mitigation measures
- Central/South East Europe airspace restructuring
- Austrian lower airspace re-organisation
- Operational excellence

Belgium – Brussels ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.13	0.12			
Delay forecast - Baseline scenario	0.16	0.26	0.21	0.17	0.16

• Reasons for lack of capacity

- Slight capacity gap in 2023
- ATM system upgrade in 2024

• Proposed remedial measures

- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Re-evaluation of ATC sector capacities
- Adequate planning for the ATM system upgrade
- Airspace restructuring
- Operational excellence

Croatia – Zagreb ACC

Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.17	0.17			
Delay forecast - Baseline scenario	0.91	1.00	0.70	0.45	0.40

• Reasons for lack of capacity

- High and fast traffic recovery compared to 2019, high traffic growth expected
- Staffing situation
- Planned sector openings not in line with expected demand
- Weather

- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Network weather mitigation measures
- Re-evaluation of ATC sector capacities
- Central/South East Europe airspace restructuring
- Operational excellence

Cyprus – Nicosia ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.15	0.15			
Delay forecast - Baseline scenario	0.20	0.14	0.09	0.09	0.08

• Reasons for lack of capacity

- Implementation of new ACC in 2023

• Proposed remedial measures

- Adequate planning for the ATM system upgrade and new ACC

France – Bordeaux ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.13	0.13			
Delay forecast - Baseline scenario	0.12	0.56	1.26	1.43	0.93

• Reasons for lack of capacity

- Stagnation of capacity from 2024, at the planned level for 2023
- Implementation of new ATM system in 2026
- Staff availability
- Planned sector openings not in line with expected demand
- Proposed remedial measures
 - Continued effort to increase staffing levels and/or availability
 - Flexible rostering allowing better alignment between traffic demand and sector opening times, including for week-ends and peak days
 - Adaptation of the ATCO recruitment levels
 - Adequate planning for the transition to the new ATM system
 - Revision of sector capacities after the implementation of the new ATM system
 - Implementation of airspace changes proposals
 - France/Spain airspace restructuring
 - Operational excellence

France – Brest ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.14	0.14			
Delay forecast - Baseline scenario	0.09	0.39	1.25	1.14	0.64

• Reasons for lack of capacity

- Stagnation of capacity from 2024, at the planned level for 2023
- Implementation of new ATM system in 2026
- Staff availability
- Planned sector openings not in line with expected demand

- Continued effort to increase staffing levels and/or availability
- Flexible rostering allowing better alignment between traffic demand and sector opening times, including for week-ends and peak days
- Adaptation of the ATCO recruitment levels
- Adequate planning for the transition to the new ATM system
- Revision of sector capacities after the implementation of the new ATM system
- Implementation of airspace changes proposals
- France/Spain airspace restructuring
- Operational excellence

France – Marseille ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.18	0.18			
Delay forecast - Baseline scenario	0.96	0.23	0.19	0.18	0.18

• Reasons for lack of capacity

- Planned sector openings not in line with expected demand
- Staff availability
- Implementation of a new system in 2022/2023
- Weather

• Proposed remedial measures

- Continued effort to increase staffing levels and/or availability
- Flexible rostering allowing better alignment between traffic demand and sector opening times, including for week-ends and peak days
- Adaptation of the ATCO recruitment levels
- Adequate planning and roll-out of the transition to the new ATM system
- Revision of sector capacities after the implementation of the new ATM system
- Network weather mitigation measures
- Implementation of airspace changes proposals
- France/Spain airspace restructuring
- Operational excellence project

France – Paris ACC

Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.08	0.08			
Delay forecast - Baseline scenario	0.14	0.57	0.10	0.10	0.10

• Reasons for lack of capacity

- Capacity below the levels of 2019 in RP3
- Planned sector openings not in line with expected demand
- Staff availability
- Implementation of a new system in 2023/2024

• Proposed remedial measures

- Continued effort to increase staffing levels and/or availability
- Flexible rostering allowing better alignment between traffic demand and sector opening times, including for week-ends and peak days
- Adaptation of the ATCO recruitment levels
- Adequate planning for the transition to the new ATM system
- Revision of sector capacities after the implementation of the new ATM system
- Implementation of airspace changes proposals
- Airspace restructuring
- Operational excellence

France – Reims ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.19	0.19			
Delay forecast - Baseline scenario without network measures	0.75	0.28	0.22	0.22	0.19
Delay forecast - Baseline scenario with network measures	0.81				

Reasons for lack of capacity

- Staff availability
- Planned sector openings not in line with expected demand
- Structural issues High traffic levels in some elementary sectors
- Capacity gains from the new system gradually visible as from 2024

- Continued effort to increase staffing levels and/or availability
- Flexible rostering allowing better alignment between traffic demand and sector opening times, including for week-ends and peak days
- Adaptation of the ATCO recruitment levels
- Revision of sector capacities after the implementation of the new ATM system
- Implementation of airspace changes proposals
- Airspace restructuring
- Operational excellence

Germany – Bremen ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.11	0.11			
Delay forecast - Baseline scenario	1.64	2.09	2.12	3.11	1.61

• Reasons for lack of capacity

- Staff availability
- Planned sector openings not in line with expected demand
- Implementation of a new system in 2027-2028

• Proposed remedial measures

- Continued effort to increase staffing levels and/or availability
- Flexible rostering allowing better alignment between traffic demand and sector opening times, including for week-ends and peak days
- Adaptation of the ATCO recruitment levels
- Adequate planning for the transition to the new ATM system
- Revision of sector capacities after the implementation of the new ATM system
- Implementation of airspace changes proposals
- Airspace restructuring
- Operational excellence

<u> Germany – Karlsruhe UAC</u>

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.20	0.20			
Delay forecast - Baseline scenario without network measures	3.49	1.46	0.31	0.27	0.26
Delay forecast - Baseline scenario with network measures	1.63				

• Reasons for lack of capacity

- Staff availability
- Weather
- High and fast traffic recovery compared to 2019, high traffic growth expected

- Implementation of Summer 2023 network measures
- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times at sector group level

- Adaptation of the ATCO recruitment levels
- Network weather mitigation measures
- Implementation of airspace changes proposals
- Airspace restructuring
- Operational excellence

Germany – Langen ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.15	0.15			
Delay forecast - Baseline scenario	0.19	0.72	0.71	0.24	0.19

• Reasons for lack of capacity

- Staff availability
- Planned sector openings not in line with expected demand

• Proposed remedial measures

- Continued effort to increase staffing levels and/or availability
- Flexible rostering allowing better alignment between traffic demand and sector opening times, including for week-ends and peak days
- Adaptation of the ATCO recruitment levels
- Implementation of airspace changes proposals
- Airspace restructuring
- Operational excellence

Germany – München ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.11	0.11			
Delay forecast - Baseline scenario	0.68	0.09	0.08	0.08	0.07

Reasons for lack of capacity

Implementation of a new system in 2023

• Proposed remedial measures

- Adequate planning and roll-out of the transition to the new ATM system

Greece – Athinai ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.13	0.13			
Delay forecast - Baseline scenario	0.27	0.23	0.15	0.15	0.01

• Reasons for lack of capacity

- Staff availability
- Planned sector openings not in line with expected demand
- High and fast traffic recovery compared to 2019, high traffic growth expected
- Implementation of a new system in 2025 and 2026

• Proposed remedial measures

- Intensive recruitment
- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Adequate planning for the transition to the new system
- Revision of sector capacities after the implementation of the new ATM system
- Central/South East Europe airspace restructuring and re-sectorisation
- Operational excellence

Greece – Makedonia ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.11	0.11			
Delay forecast - Baseline scenario	0.31	0.39	0.28	0.19	0.02

• Reasons for lack of capacity

- Staff availability
- Planned sector openings not in line with expected demand
- High and fast traffic recovery compared to 2019, high traffic growth expected
- Implementation of a new system in 2025 and 2026

- Intensive recruitment
- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Adequate planning for the transition to the new syste

- Revision of sector capacities after the implementation of the new ATM system Central/South East Europe airspace restructuring and re-sectorisation
- Operational excellence

Hungary - Budapest ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.11	0.11			
Delay forecast - Baseline scenario without network measures	1.47	1.06	1.02	0.63	0.58
Delay forecast - Baseline scenario with network measures	1.53				

• Reasons for lack of capacity

- High and fast traffic recovery compared to 2019, high traffic growth expected
- Additional traffic flows due to crisis in Ukraine
- Intensified military activity
- Staff availability
- Planned sector openings not in line with expected demand
- Upgrade of the ATM system in 2024

• Proposed remedial measures

- Intensive recruitment
- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Adequate planning for the upgrade of the ATM system
- Revision of sector capacities after the upgrade of the ATM system
- Central/South East Europe airspace restructuring and re-sectorisation
- Operational excellence

Italy - Milano ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.08	0.08			
Delay forecast - Baseline scenario	0.06	0.06	0.07	0.18	0.08

Reasons for lack of capacity

- Implementation of a new system in 2026

• Proposed remedial measures

- Adequate planning for the transition to the new system

Italy – Roma ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.06	0.07			
Delay forecast - Baseline scenario	0.00	0.00	0.11	0.00	0.00

• Reasons for lack of capacity

- Implementation of a new system in 2025

• Proposed remedial measures

- Adequate planning for the transition to the new system

Morocco – Casablanca ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.01	0.01			
Delay forecast - Baseline scenario	0.08	0.00	0.00	0.00	0.00

Reasons for lack of capacity

- Implementation of a new system in 2023

• Proposed remedial measures

- Adequate planning for the transition to the new system

Netherlands – Amsterdam ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.09	0.10			
Delay forecast - Baseline scenario	0.05	0.18	0.05	0.04	0.04

• Reasons for lack of capacity

- Implementation of a new system in 2024

Proposed remedial measures

- Adequate planning for the transition to the new system

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North Macedonia – Skopje ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.06	0.06			
Delay forecast - Baseline scenario	0.42	0.94	0.44	0.42	0.41

• Reasons for lack of capacity

- Structural issues High traffic levels in some elementary sectors
- Implementation of a new system in 2024
- High and fast traffic recovery compared to 2019, high traffic growth expected

Proposed remedial measures

- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Adequate planning for the transition to the new system
- Revision of sector capacities after the implementation of the new ATM system
- Central/South East Europe airspace restructuring and re-sectorisation
- Operational excellence

Poland – Warszawa ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.12	0.12			
Delay forecast - Baseline scenario	0.58	0.52	0.44	0.41	0.39

• Reasons for lack of capacity

- Impact of the Ukrainian crisis
- Staff availability

- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Airspace restructuring and re-sectorisation in the context of Cross-border FRA initiatives
- Operational excellence

Serbia – Beograd ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.08	0.07			
Delay forecast - Baseline scenario	1.21	0.92	0.69	0.67	0.58

• Reasons for lack of capacity

- High and fast traffic recovery compared to 2019, high traffic growth expected
- Structural issues High traffic levels in some elementary sectors
- Staff availability

• Proposed remedial measures

- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Central/South East Europe airspace restructuring and re-sectorisation
- Operational excellence

Spain – Barcelona ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.18	0.18			
Delay forecast - Baseline scenario	0.45	0.20	0.14	0.13	0.13

• Reasons for lack of capacity

- Staff availability
- Weather

- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Revision of sector capacities
- Network weather mitigation measures
- France/Spain airspace restructuring project and re-sectorisation
- Operational excellence

Spain – Madrid ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.13	0.13			
Delay forecast - Baseline scenario	0.14	0.16	0.09	0.03	0.02

Reasons for lack of capacity

- Slight capacity gap

• Proposed remedial measures

- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Revision of sector capacities
- France/Spain airspace restructuring project and re-sectorisation
- Operational excellence

Switzerland – Zurich ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.16	0.16			
Delay forecast - Baseline scenario	0.15	0.44	0.47	0.71	0.81

• Reasons for lack of capacity

- Staff availability as from 2024
- Weather

- Continued effort to increase staffing levels and/or availability
- Continued alignment of traffic demand and sector opening times
- Network weather mitigation measures
- Airspace restructuring
- Operational excellence

UK – Prestwick ACC

• Delay forecast vs Reference values

Years	2023	2024	2025	2026	2027
Reference values	0.11	0.11			
Delay forecast - Baseline scenario	0.09	0.09	0.22	0.12	0.13

• Reasons for lack of capacity

- Implementation of a new system in 2025

• Proposed remedial measures

- Adequate planning for the transition to the new system

10.5 Proposed Actions at Network Level

As a result of the above, the following **Action Plan** is proposed:

ACTION 1

- Fully implement the actions defined in the EUROCONTROL NM Improvement Package for Summer 2023
 - Concerned ANSPs to address the aspects identified in the Chapter 10 of the NOP, possibly at FAB level
 - All concerned ANSPs to identify further actions, possibly at FAB level, to address staffing issues
 - Concerned ANSPs to work with the Network Manager to further develop these actions NM to monitor the availability of the opening schemes included in the NOP for Summer 2023

ACTION 2

- ANSPs to work with the Network Manager for the inclusion in an updated NOP of additional measures at local level
 - Additional actions following the identification of the reasons for lack of capacity to be envisaged between concerned ANSPs and NM.
 - These actions to be addressed by the DOP of the concerned ANSPs
 - The Network Manager to include the actions in the NOP 2023-2027

ACTION 3

- Concerned ANSPs to work in partnership with the Network Manager to plan at an early stage transition for major projects
 - All ANSPs must initiate in close partnership with the Network Manager, a detailed planning of the transition for major projects planned
 - The Network Manager to ensure appropriate synchronisation and measures at network level

ACTION 4

- All ANSPs to implement the agreed plans and actions as identified in the Network Operations Plan and in the European Route Network Improvement Plan
 - The Network Manager and the NDOP to ensure the close monitoring of the implementation of all agreed actions.

10.6 <u>Airport capacity enhancement measures</u>

Considering not all airport capacity challenges overserved in 2022 might not be resolved during 2023, the NM will put in place a weekly monitoring of the Prioritise first rotation to allow for on time departure and the delivery of the agreed capacity.

The proposed approaches for the "first rotation" is to:

- 1. Use NM tools and NMOC support to ensure prioritisation
- 2. Ensure timely readiness of first rotation flights
- 3. Avoid reactionary delays to maintain predictability
- 4. Inform NM about recurrent issues

The proposed approaches for the "agreed capacities" is to:

- 1. Make conservative passenger prediction to ensure sufficient landside capacity
- 2. Ensure sufficient ground staffing to allow on time departure
- 3. Make best use of NM support: tools and services
 - In case major deviation compared to the plan are observed, NM will consider potential remedial measures in concertation with the concern airport or airport stakeholders

11 Conclusion

Further actions are required to ensure the achievement of the capacity targets for RP3. **The implementation of the proposed remedial measures** is of paramount importance.

This requires cooperative processes at both local and network level, ensuring a rolling and consolidated development of the network operations plans. These processes will need to start from strategic structural planning and continue through to the tactical phases.

The Network Manager will offer direct, open and consolidated support through a smooth partnership approach from planning into operations. A direct link will be ensured between network capacity planning, airspace improvements, updated airport planning, integrated data and tool availability for all planning phases, enhanced ATFCM, as well as for the planning and coordination of significant events

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