EUROCONTROL

ASBU Implementation Monitoring Report

ICAO EUR States

Reference Period 2021

IN PARTNERSHIP WITH

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Addressing Growth and Realizing the Promise of Twenty-first Century Air Traffic Management (ATM)

Air transport today plays a major role in driving sustainable economic and social development. It directly and indirectly supports the employment of 56.6 million people, contributes over $2.2 trillion to global Gross Domestic Product (GDP), and carries over 2.9 billion passengers and $5.3 trillion worth of cargo annually.

A fully harmonised global air navigation system built on modern performance-based procedures and technologies is a solution to the concerns of limited air traffic capacity and unnecessary gas emissions being deposited in the atmosphere.

The Global Air Navigation Plan (GANP) represents a rolling, long term strategic methodology which leverages existing technologies and anticipates future developments based on State/industry agreed operational objectives. The GANP's Aviation System Block Upgrades (ASBU) methodology is a programmatic and flexible global system's engineering approach that allows all Member States to advance their Air Navigation capacities based on their specific operational requirements. The Block Upgrades will enable aviation to realise the global harmonization, increased capacity, and improved environmental efficiency that modern air traffic growth now demands in every region around the world.

The GANP's Block Upgrades have been initially organised in five-year time increments starting in 2013 and continuing through 2028 and beyond. The GANP ASBU planning approach also addresses airspace user needs, regulatory requirements and the needs of Air Navigation Service Providers and Airports. This ensures a single source for comprehensive planning. This structured approach provides a basis for sound investment strategies and will generate commitment from States, equipment manufacturers, operators and service providers. A first updated version of the GANP, with a new planning horizon from 2016 to 2031 and the introduction of 6-year time increments so that they would be aligned with the ICAO Assembly cycles, was endorsed at the 39th ICAO Assembly in October 2016. The significantly revised sixth edition of the GANP was presented at the 13th Air Navigation Conference in 2018 and had been endorsed at the 40th ICAO Assembly in September 2019. The seventh edition of the GANP, which is only a minor update to the ASBU frameworks and Basic Building Blocks (BBBs) was endorsed at the 41th ICAO Assembly in October 2022.

This resultant framework is intended primarily to ensure that the aviation system will be maintained and enhanced, that ATM improvement programmes are effectively harmonised, and that barriers to future aviation efficiency and environmental gains can be removed at a reasonable cost. In this sense, the adoption of the ASBU methodology significantly clarifies how the ANSP and airspace users should plan for future equipage.

Although the GANP has a worldwide perspective, it is not intended that all Block Elements be required to be applied in every State and Region. Many of the Block Upgrade Elements contained in the GANP are specialised packages that should be applied only where the specific operational requirement exists or corresponding benefits can be realistically projected. The inherent flexibility in the ASBU methodology allows States to implement Elements based on their specific operational requirements. Using the GANP, Regional and State planners should identify those Elements which provide any needed operational improvements. Although the Block Upgrades do not dictate when or where a particular Element is to be implemented, this may change in the future should uneven progress hinder the passage of aircraft from one region of airspace to another.

The regular review of implementation progress and the analysis of potential impediments will ultimately ensure the harmonious transition from one region to another following major traffic flows, as well as ease the continuous evolution towards the GANP's performance targets.

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Abstract

The ICAO/EUROCONTROL ASBU Monitoring Report presents an overview of progress achieved so far in the implementation of the ICAO ASBU Elements (Block 0 and Block 1) within the ICAO EUR Region during the reference year 2021. This is the 8th edition of the Report, and it is based on the 6th edition of the Global Air Navigation Plan (GANP), endorsed at the 40th ICAO Assembly in September 2019. The report summarizes the implementation progress of 74 ASBU Block 0 and Block 1 Elements and indicates what has been achieved so far, together with the future perspective of implementation in accordance with planning dates reported by States.

The ICAO EUR Region covers 55 States. Two main data sources have been consulted in order to produce the report: EUROCONTROL LSSIP mechanism for 43 States and a dedicated questionnaire for the remaining 9 states outside the LSSIP mechanism.

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The following table records the complete history of the successive editions of the present document.

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
0.1	10/10/2022	First draft	All
0.2	9/11/2022	Comments from ICAO Paris office integrated	All
0.3	10/11/2022	Final draft (for endorsement by EASPG/4)	All
1.0	12/12/2022	Released version (endorsed by EASPG/4)	All

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Executive Summary

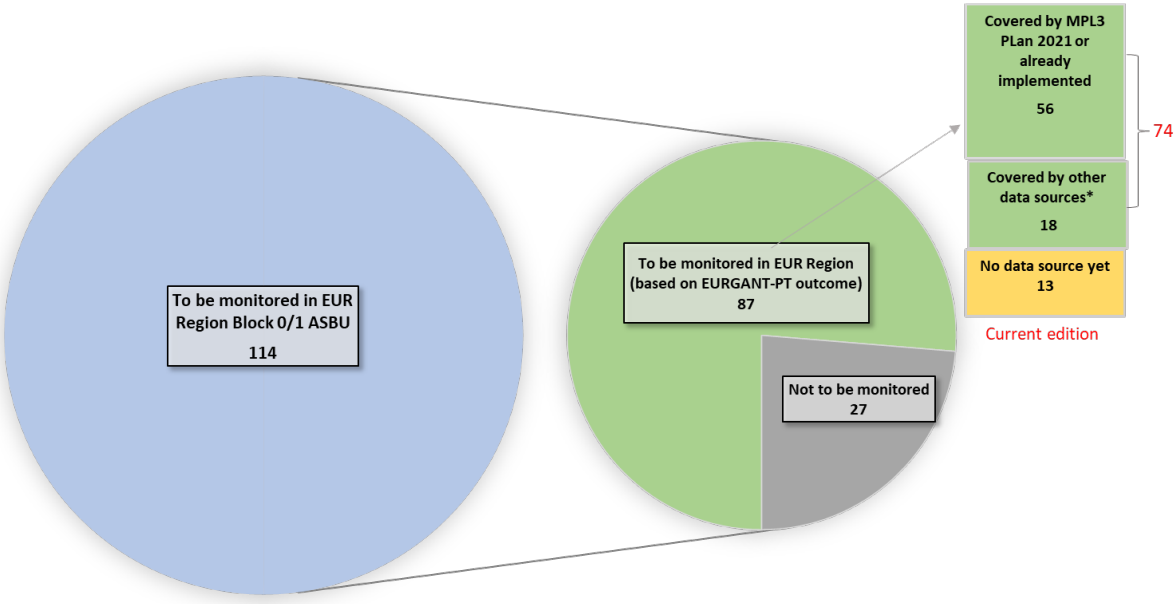
The ICAO/EUROCONTROL ASBU Implementation Monitoring Report represents a key document for the European Aviation System Planning Group (EASPG) to monitor and analyse the implementation within the ICAO EUR Region. It presents an overview of the currently achieved progress, as well as future outlook of the implementation for the ICAO ASBU Block 0 and Block 1 Elements within the entire ICAO EUR Region during the **Reference year 2021**.

The current edition is the 8th edition of the Report in a series of ASBU Implementation Monitoring Reports for the ICAO EUR Region and it **is based on the 6th edition of the Global Air Navigation Plan (GANP)**, endorsed at the 40th ICAO Assembly in September 2019.

Given the scope and complexity of the changes introduced in the 6th edition of the GANP, the **EUR Region GANP Transition Project Team (EURGANT – PT)** has been established by EASPG Decision 2/7 at the EASPG/02 meeting in December 2020 (*see Section 1.3 for more details*). The main task of the PT was to identify the differences between 5th and 6th edition of the GANP and deliver a proposal for ASBU Block 0 & Block 1 Elements which shall be monitored in the upcoming ASBU Implementation Monitoring Reports.

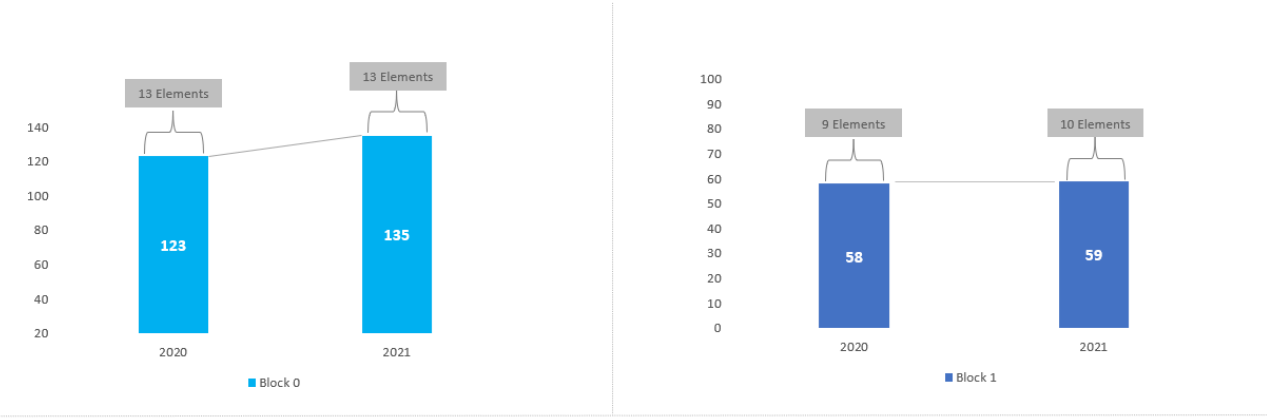
Based on a thorough review of the new GANP ASBU framework, the EURGANT-PT came up with a list of **87 ASBU Elements** (40 for Block 0 and 47 for Block 1) that should be monitored in the ICAO EUR Region. The results and proposals of EURGANT-PT have been submitted and subsequently approved by an EASPG written consultation procedure in April 2021.

Compared with the previous edition, 4 Elements have been added to the scope of the Report, therefore this edition of the Report includes information on **74 out of 87 ASBU Elements** (see figure below) which had been proposed to be monitored by the EURGANT-PT. This is mainly due to data availability reasons, as well as the fact that there are still standardization activities ongoing for some ASBU elements.

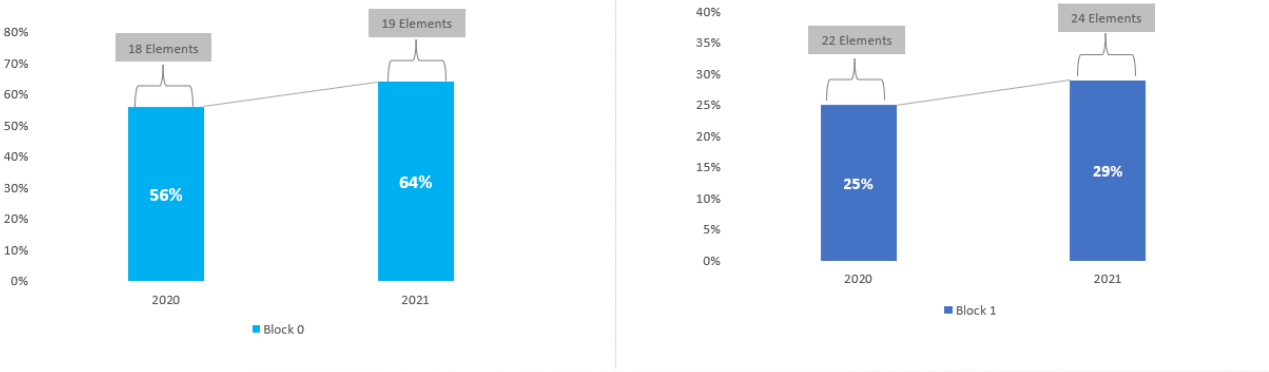


The following pages show a high-level consolidated average completion rate evolution between 2020 and 2021 at Block level (for Airports and for States) as well as a summary of implementation progress achieved so far for individual ASBU elements implemented and reported at airport level, as well as other ASBU elements that are mostly implemented at State level.

Brief and focused summaries per **ASBU Thread** can be found in Chapter 3, while Chapter 4 gives detailed progress assessment and future outlook per individual **ASBU Element**.



Consolidated completion rate – Average (**absolute**) number of **Airports** completion (2021 vs.2020)

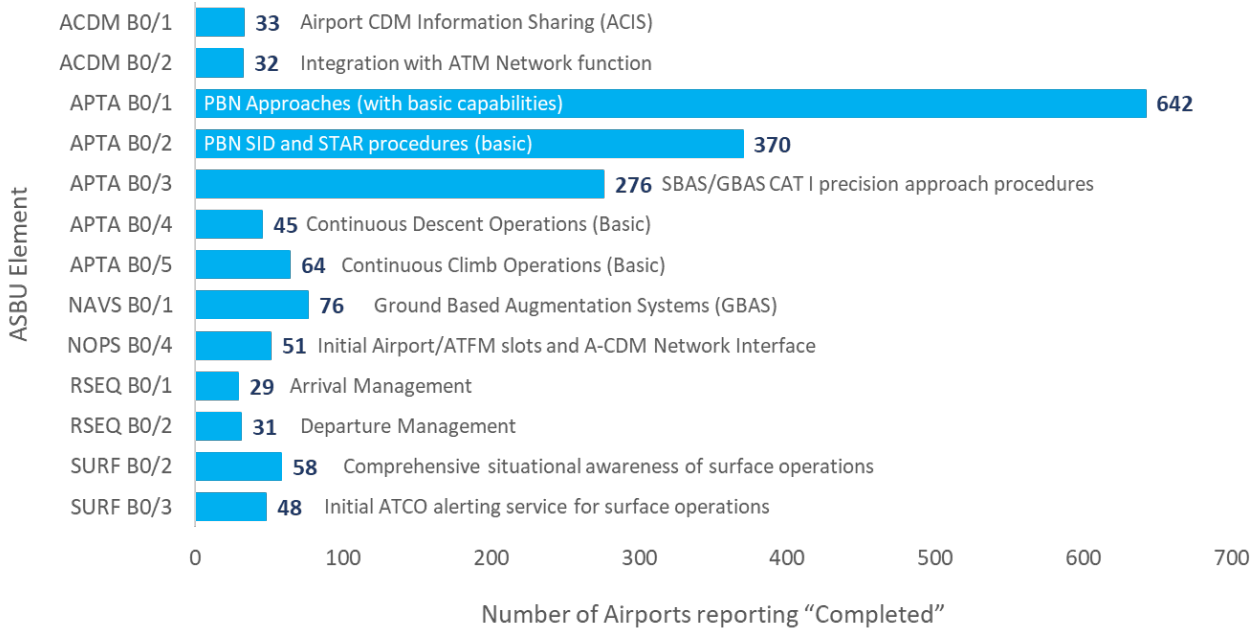


Consolidated completion rate – Average (**relative**) number of **States** completion (2021 vs.2020)

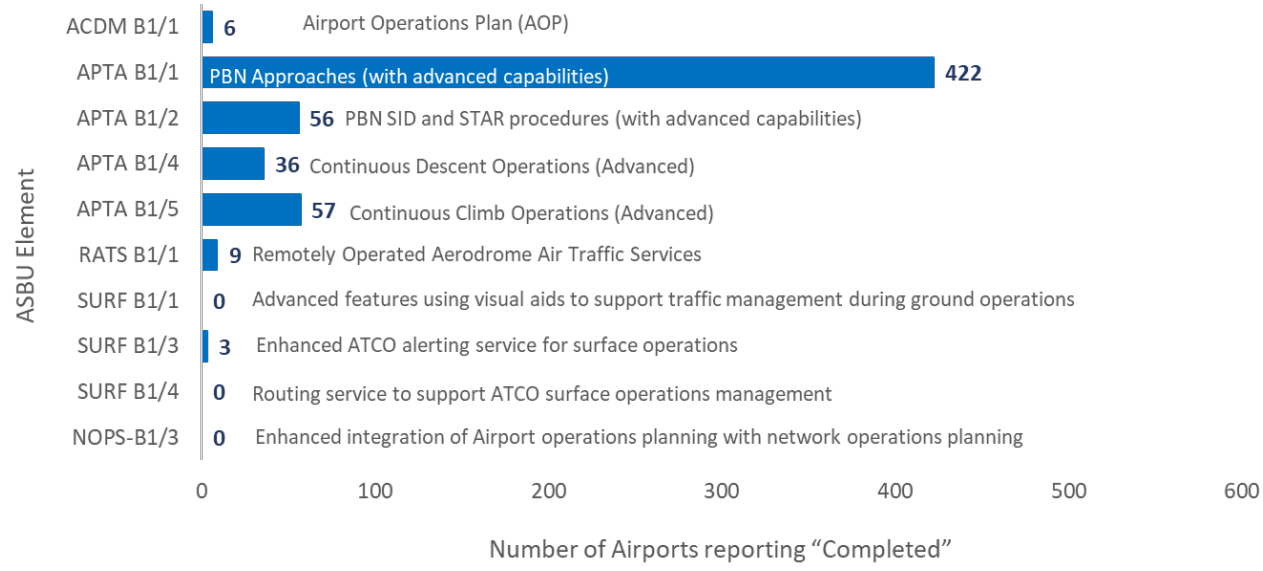
High-level summary (Reference year 2021)*

ASBU Elements implemented at airports

Block 0



Block 1

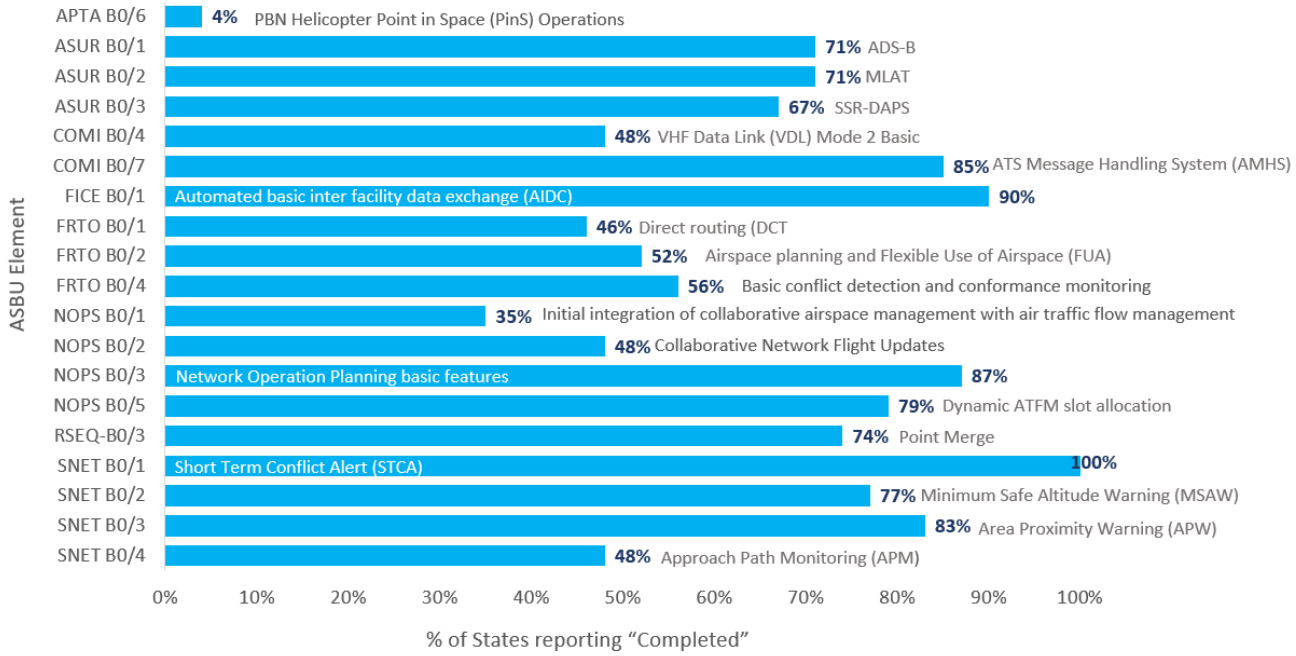


* It should be noted that for some elements (especially those implemented at airports) the actual progress can even be higher than presented, as many States provide information only for their major international airports. Moreover, not all States have submitted their ASBU monitoring questionnaires in this reporting cycle (more info in Chapter 2 – Data sources).

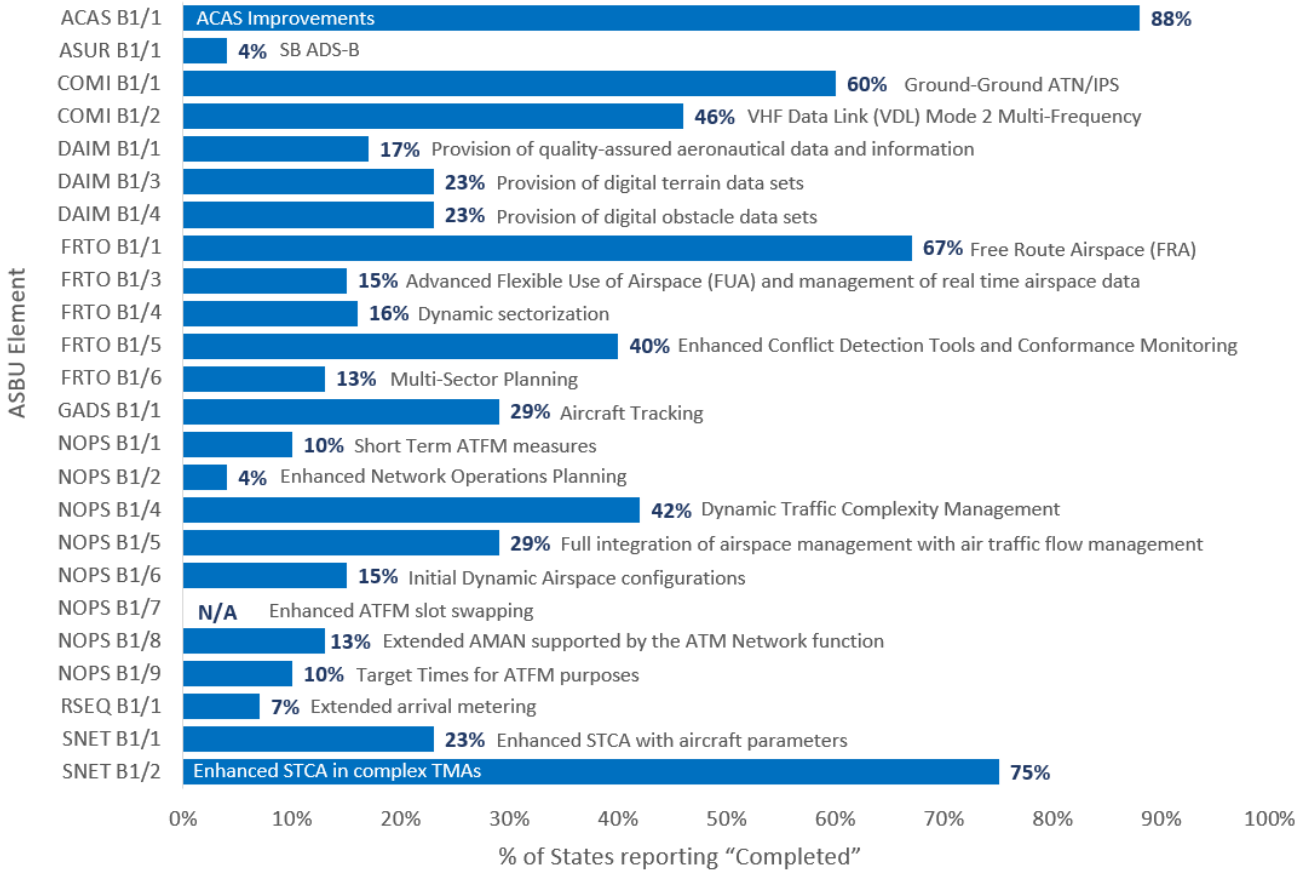
Due to specific data source (METG) and reporting methodology, information for AMET Elements is presented separately at the end of Chapter 4.

Other ASBU Elements (State/ANSP-related)

Block 0



Block 1



1. Introduction

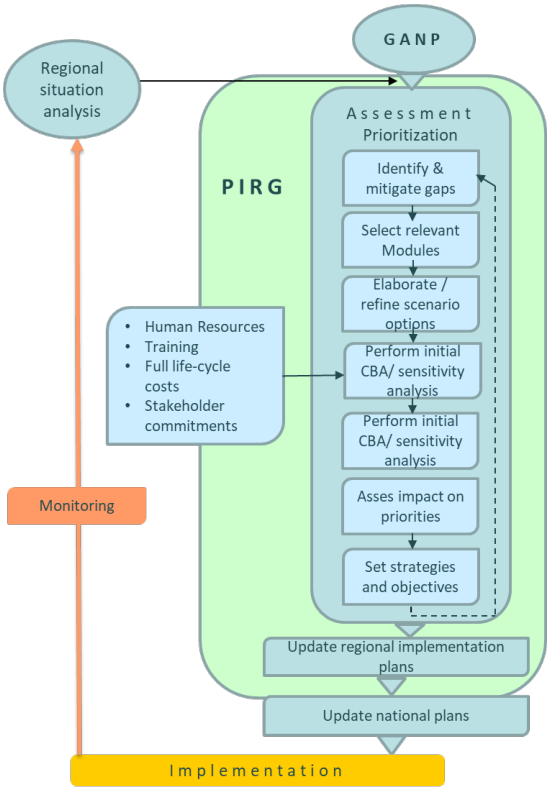
1.1. Objective and intended audience of the report

The ICAO/EUROCONTROL ASBU Implementation Monitoring Report presents an overview of the currently achieved progress, as well as future outlook of the implementation of the ICAO ASBU Block 0 and Block 1 Elements within the entire ICAO EUR Region during the Reference year 2021.

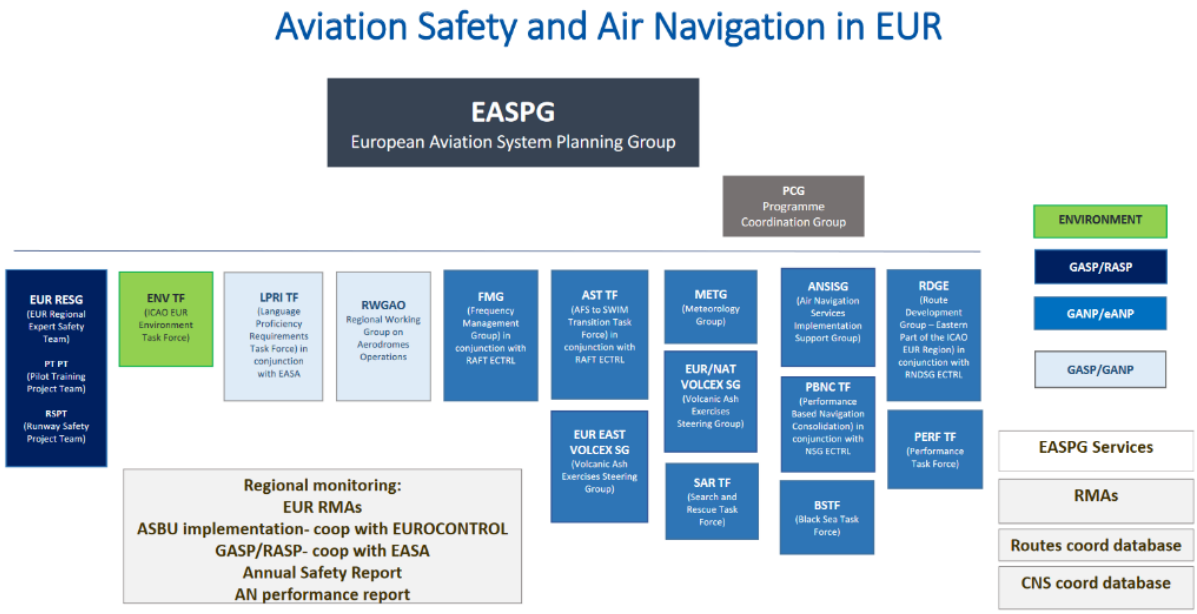
The implementation progress information covers:

- Forty-three (43) States that are part of the EUROCONTROL Local Single Sky Implementation (LSSIP) mechanism, including three States (Andorra, Monaco and San Marino) for which the information is included in another State's implementation progress information;
- Nine (9) States within the ICAO EUR Region that reported their status and plans using a dedicated questionnaire, either included in their regular State Reports for the Air Navigation Services Implementation Support Group of the ICAO EUR Region (ANSISG) meeting or during bilateral GANP ASBU implementation meetings.

Guided by the GANP, the regional national planning process should be aligned and used to identify those modules which best provide solutions to the operational needs identified. Depending on implementation parameters such as the complexity of the operating environment, the constraints and the resources available, regional, and national implementation plans will be developed in alignment with the GANP. Such planning requires interaction between stakeholders including regulators, users of the aviation system, the air navigation service providers (ANSPs), aerodrome operators and supply industry, in order to obtain commitments to implementation.



Accordingly, deployments on a global, regional and sub-regional basis and ultimately at State level should be considered as an integral part of the global and regional planning process through the **Planning and Implementation Regional Groups (PIRGs)**, which is for the ICAO EUR Region the **European Aviation System Planning Group (EASPG)**. The PIRG process will further ensure that all required supporting procedures, regulatory approvals and training capabilities are set in place. These supporting requirements will be reflected in regional online Air Navigation Plans (eANPs) developed by the PIRGs, ensuring strategic transparency, coordinated progress and certainty of investment. In this way, deployment arrangements including applicability dates can also be agreed and collectively applied by all stakeholders involved in the Region.



The ICAO/EUROCONTROL ASBU Implementation Monitoring Report, containing comprehensive and detailed information on the implementation progress of the ICAO ASBU Elements, is therefore **a key document for the EASPG to monitor and analyse the implementation within the ICAO EUR Region.**

1.2. Background

Following the discussions and recommendations from the Twelfth Air Navigation Conference (AN-Conf/12), the Fourth Edition of the Global GANP based on the Aviation Systems Block Upgrades (ASBU) approach was endorsed by the 38th Assembly of ICAO in October 2013. The Assembly Resolution 38-02 which agreed, amongst others, to call upon States, planning and implementation regional groups (PIRGs), and the aviation industry to provide timely information to ICAO (and to each other) regarding the implementation status of the GANP, including the lessons learned from the implementation of its provisions and to invite PIRGs to use ICAO standardised tools or adequate regional tools to monitor and (in collaboration with ICAO) analyse the implementation status of air navigation systems.

At the EANPG meeting/55, which took place in November 2013, the EANPG agreed that in order to enable monitoring and reporting of the current priorities, a cooperative mechanism would be put in place between ICAO and EUROCONTROL. This mechanism would encompass the utilisation of the EUROCONTROL LSSIP process complemented by a specific ICAO EUR ASBU questionnaire. As a first step, this cooperative regional mechanism, with an aim to avoid duplication of reporting, would address the initial high priority modules.

In response to the EANPG/55 conclusions, the regional monitoring of ASBU implementation was announced by a State Letter in September 2014, which invited States to take all necessary measures in order to ensure that a complete overview of the status of ASBU Block 0 implementation (especially on the six ASBU Block 0 modules which had been given the highest priority at EANPG/55, namely, B0-APTA, B0-SURF, B0-FICE, B0-DATM, B0- ACAS and B0-SNET) would become available within the entire ICAO EUR Region.

A first ASBU Implementation Monitoring Report was then prepared during the year 2015 for the reporting/reference period 2014. This report contained information/overviews on the implementation progress of ASBU Block 0 from the 41 ECAC States (direct information and reports through their 2014 LSSIP documents) and from 4 States in the EUR Region which used the specific State Report/questionnaires (in terms

of information on the priorities, status of implementation and any relevant references to national documentation for the listed ASBU modules).The 2014 ICAO/EUROCONTROL ASBU implementation monitoring report was presented, reviewed and endorsed, as the first report regarding the regional monitoring of ASBU implementation in response to EANPG Conclusion 55/03, at the EANPG/57 meeting in November 2015. In order to achieve the aim of a complete overview of the status of ASBU Block 0 implementation from all States within the complete ICAO EUR Region, the EANPG concluded to optimise the reporting process and also invited States to actively support the described ASBU implementation monitoring process, so that the number of responses could be increased and the quality of the reported information could be enhanced in the future.

A revised version of the ASBU implementation questionnaire was developed in 2016 which introduced more detailed guidance material, practical examples and specific explanations on the implementation activities/status that needed to be reported. This new questionnaire was then used for the development of the second report (reference period 2015) in order to increase the number of responses and enhance the quality of the reported information from those States that were not covered by the LSSIP mechanism.

At the 39th ICAO Assembly, the 5th edition of the GANP with updates on the ATM logical infrastructure, the introduction of a minimum path and the performance-based implementation concept was endorsed in October 2016. The ICAO Assembly Resolution A39-12 called upon States, planning and implementation regional groups (PIRGs), and the aviation industry to utilise the guidance provided in the GANP for planning and implementation activities which establish priorities, targets and indicators consistent with globally harmonised objectives, taking into account operational needs. The 5th version of the GANP (2016-2030) included the obligation for States to map their national or regional programmes against the harmonised GANP, the requirement for active collaboration among States through the PIRGs in order to coordinate initiatives within applicable regional Air Navigation Plans, the provision of tools for States and Regions to develop comprehensive business case analyses as they seek to realise their specific operational improvements, as well as the vision of the evolution of the Global ATM system and the potential requirements for the aviation industry.

The 2015 ICAO/EUROCONTROL ASBU implementation monitoring report was presented at the EANPG/58 meeting in November 2016. The EANPG/58 noted that from the 11 States outside the LSSIP process, 8 States replied to the revised monitoring questionnaire with detailed explanations on their status of ASBU implementation. The EANPG/58 also appreciated that the number and quality of the replies received from the questionnaire represented a considerable improvement in relation to the information obtained on the previous year and did allow a considerable enhancement of the 2015 report. The EANPG/58 highlighted that, as the GANP requires States to report the status of their ASBU implementation, this report was a key document for the EANPG to monitor and analyse the ASBU implementation within the EUR Region and endorsed the 2015 report with Statement 58/01. In addition, the inclusion of additional modules (B0-CCO and B0-AMET) which had become ICAO GANP priorities or where implementation has started was supported by the meeting with EANPG Conclusion 58/22. The EANPG/58 also noted that the ICAO/EUROCONTROL ASBU implementation monitoring report would be forwarded as one of the contributions from the ICAO EUR Region to the annual ICAO Global Air Navigation Report and that relevant parts of the report had been used for the ICAO EUR eANP Vol III.

At the combined EANPG/59-RASG/6 meeting which was held at the ICAO EUR/NAT Office in Paris in November 2017, the 2016 ICAO/EUROCONTROL ASBU implementation monitoring report was presented and reviewed. The Meeting noted with satisfaction that the 2016 version of the ASBU Implementation Monitoring Report included implementation status/data from all 55 States in the ICAO EUR Region. The support from all States was highly appreciated together with the improved quality of the information received. Based on the feedback received at the ATMGE meetings a new version of the ASBU questionnaire was prepared and endorsed at the EANPG/59. The Meeting noted as well, that as a follow up to the joint ICAO/Arab Civil Aviation Commission (ACAC) GANP ASBU Symposiums in Algiers (September 2016), and in Tunisia (March 2017), the ASBU questionnaires from Algeria, Morocco and Tunisia had been formally submitted before the end of May 2017. During these joint events, which also included participation of the ICAO MID Office and the WACAF Office,

three dedicated sessions had been organised by ICAO and EUROCONTROL for the 3 North African States. The EANPG/59 appreciated the impressive collaboration, which is required to achieve the timely completion of the 2016 ICAO/EUROCONTROL ASBU implementation monitoring report, and is also avoiding any duplication of efforts.

Furthermore, the EANPG/59 noted that the endorsed ASBU implementation monitoring report would be again forwarded as one of the contributions from the ICAO EUR Region to the annual ICAO Global Air Navigation Report, that relevant parts of the report will be used for the ICAO EUR eANP Vol III and that data from the report will also be included into the Air Navigation Implementation App on the global ICAO iSTARS portal.

An updated version of the GANP was initially presented at the 13th Air Navigation Conference (AN-Conf/13) in October 2018 and further details on the implementation of the new edition of the GANP, as well as the new global GANP portal were prepared for discussion at the 40th ICAO Assembly.

At the combined EANPG/60-RASG/7 meeting which was held at the ICAO EUR/NAT Office in Paris from 26 to 30 November 2018, the 2017 ICAO/EUROCONTROL ASBU implementation monitoring report was presented and reviewed. The Meeting noted that the 2017 version of the ASBU Implementation Monitoring Report included implementation status/data from 54 of the 55 States in the ICAO EUR Region.

The meeting also noted that the 2017 report was again based on the information submitted by 42 States via the EUROCONTROL Local Single Sky Implementation (LSSIP) process and information reported through the ASBU Implementation Monitoring Questionnaires for the 10 (ten) States within the ICAO EUR Region that were outside the LSSIP reporting mechanism. In addition, the ICAO Meteorological Group (METG) tables were included for the implementation status on the B0-AMET module. The EANPG/60 was also presented with a revised reporting format (new xls file) that would give more detailed guidance on the implementation status. The meeting approved the 2017 ASBU implementation monitoring report with EANPG/60&RASG-EUR/07 Decision 08, endorsed the new questionnaire with EANPG/60&RASG-EUR/07 Conclusion 07 and appreciated the impressive collaboration, which is required to achieve the timely completion of the 2017 ICAO/EUROCONTROL ASBU implementation monitoring report and providing contributions to the annual ICAO Global Air Navigation Report, as well as updates of the ICAO EUR Air Navigation Plan (eANP) Vol III and the global ICAO iSTARS portal tools.

The 40th ICAO Assembly endorsed the 6th edition of the GANP (as a major update) in October 2019 which recognized that a performance-driven, service orientated and technologically advanced global air navigation system is critical to achieve the sustainability of the aviation sector worldwide. Furthermore, the GANP reaffirmed safety as one of the fundamental principles of aviation performance, together with environment, security and economic sustainability. The 6th edition also introduced the Basic Building Block framework (BBBs) which outlined the foundation of any robust air navigation system by identifying the essential services to be provided for international civil aviation in accordance with ICAO Standards. At the first meeting of the European Aviation System Planning Group (EASPG/1) which was held at the ICAO EUR/NAT Office in Paris from 2 to 5 December 2019, the 2018 ICAO/EUROCONTROL ASBU implementation monitoring report was presented for endorsement. The EASPG appreciated again the participation of all States in the EUR Region and the report was approved with EASPG Conclusion 1/12. As part of this conclusion, the EASPG invited States (outside of LSSIP area) to use the revised EUR ASBU implementation report questionnaires for the reference period 2019 and nominate their national ASBU Monitoring Focal Points.

During the EASPG/2 meeting, which was organised as a series of virtual meetings from 1 to 4 December 2020, the 2019 ICAO/EUROCONTROL ASBU implementation monitoring report was presented for discussion and endorsement. The EASPG/2 was informed that most of the ASBU modules recorded a slight increase in the implementation progress across EUR Region. The EASPG/2 noted with satisfaction the updated progress/status of implementation of ASBU Block 0 modules from all 55 EUR States and approved the report with EASPG Decision 2/6. The EASPG/2 also discussed the necessity to identify the differences between the 5th and the 6th edition of the GANP and deliver a proposal for ASBU Block 0 & Block 1 Elements which shall be monitored (based on the 6th edition of the GANP) in the upcoming reports.

At the EASPG/3 meeting, which was organised as a hybrid meeting from 30 November to 2 December 2021, the 2020 ICAO/EUROCONTROL ASBU implementation monitoring report was presented for discussion and endorsement. This edition of the Report was the first one based on the 6th edition of the Global Air Navigation Plan (GANP) as well as on the proposals made by the EUR Region GANP Transition Project Team (EURGANT – PT) established by the EASPG Decision 2/7. The EURGANT-PT performed a thorough review of the new GANP ASBU framework and developed a list of 87 ASBU Elements (40 for Block 0 and 47 for Block 1) that should be monitored in the ICAO EUR Region from 2020 onwards. The results and proposals of EURGANT-PT were submitted to the EASPG members on 9 April 2021 and were subsequently approved by an EASPG written consultation procedure on 8 May 2021. The 2020 edition of the Report included information on 70 out of 87 ASBU Elements, representing roughly 80% of the total set of elements, which had been proposed for monitoring by the EURGANT-PT. This was mainly due to data availability reasons, as well as the fact that there at that time there were still standardization activities ongoing for some ASBU elements. Due to substantial changes in the structure of the ASBU framework, it was not possible to perform a comparison with the previous reporting cycles. The EASPG/3 meeting stressed the importance of the ASBU implementation monitoring report as a key document for the EASPG to monitor and analyse the ASBU implementation within the EUR Region. The EASPG appreciated the joint work of EUROCONTROL and the ICAO EUR/NAT Office and agreed to endorse the 2020 ICAO/EUROCONTROL ASBU Implementation Monitoring Report.

The 41th ICAO Assembly endorsed (Assembly Resolution A41-6 ICAO global planning for safety and implementation) the 7th edition of the GANP in October 2022, which is a minor revision to the GANP that introduced an update to the safety key performance area of the GANP performance framework, a maintenance process revision and minor updates to the BBBs as well as the ASBU framework. The Assembly also recognized the importance of the GANP as an operational strategy and part of the basket of measures to achieve ICAO`s global aspirational goals on CO2 emissions.

During the EASPG/4 meeting, which took place at the ICAO EUR/NAT Office in Paris, France from 29 November to 1 December 2022, the 2021 ICAO/EUROCONTROL ASBU implementation monitoring report was presented for final endorsement. The EASPG/4 was informed about the steady implementation progress (despite the COVID-19 crisis effects) for the 74 elements across the EUR Region and the detailed findings per thread. The EASPG/4 meeting endorsed the 2021 Report with decision 4/7 and agreed to the proposed actions (e.g. updated mapping of Elements/MPL3 Objectives to be used for the 2022 Report, analysis of the 7th GANP edition changes to the BBBs and ASBU framework, dedicated workshops for States, data collection start in April 2023) for the 2022 version.

1.3. EUR Region GANP Transition Project Team (EURGANT – PT)

The 6th edition of the GANP introduced a revised ASBU framework, which required a new approach to implementation monitoring. Some of the changes include the introduction of the Basic Building Blocks (BBBs) and substitution of the Performance Improvement Areas (PIAs) by three categories (Operational, Information, and CNS technology and services). However, the major update was in the content of the former ASBU Modules and ASBU Threads, including a modified composition of ASBU Blocks and significantly increased granularity by clarifying the definition of **ASBU Elements** - specific changes in operations designed to improve the performance of the air navigation system under specified operational conditions. In addition, a web based version of GANP was created, that can be accessed via https://www4.icao.int/ganpportal/.

Given the complexity of changes, a proposal from the EASPG PGC/01 meeting was shared and discussed at EASPG/02 meeting in December 2020, which lead to the establishment of the **EUR Region GANP Transition Project Team (EURGANT – PT)**. The main high-level task of the PT, with members from ICAO EUR/NAT Office, EUROCONTROL, a limited number of LSSIP Focal Points, a limited number of ANSISG members, ANSISG chairman, IATA, IBAC, IFALPA and IFATCA, was to identify the differences between 5th and 6th edition of the GANP and deliver a proposal for ASBU Block 0 & Block 1 Elements which shall be monitored in the upcoming ASBU implementation monitoring reports. Based on this analysis, further high-level tasks were to propose the inclusion of new objectives to the MPL3 Plan development process and to revise the ASBU monitoring questionnaire for the 9 non-LSSIP States (*see Section 2.2*).

The work of EURGANT-PT was organized around 7 dedicated WebEx meetings taking place between February and April 2021, witnessing high participation that included experts from Algeria, Armenia, Belarus, Georgia, Kyrgyzstan, Spain, Ukraine, United Kingdom, Uzbekistan, EUROCONTROL, ICAO and FAA (observer). A thorough review of the 22 ASBU Threads from the new GANP, together with the associated 52 ASBU Elements for Block 0 and the 62 elements for Block 1, has been performed.

The main outcome and proposal of the evaluation made by the EURGANT-PT was to integrate **87 ASBU Elements (40 for Block 0 and 47 for Block 1)** in subsequent ASBU implementation monitoring reports for the ICAO EUR Region, depending on data availability. The EURGANT-PT review also identified the list of **27 ASBU Elements (12 for Block 0 and 15 for Block 1)** that would not be included into the ASBU implementation monitoring reports as they are either not applicable for the ICAO EUR Region or they are exclusively related to aircraft equipment and/or airborne operations.

The results and proposals of EURGANT-PT have been submitted and subsequently approved by an EASPG written consultation procedure in April 2021.

Detailed information about the ASBU Elements that will be covered by current and future ASBU Implementation Monitoring Reports is presented in Chapter 1.4.

1.4. Scope of the report

ASBU Elements covered*

The following table shows the full list of 87 ASBU Elements from the GANP 6th Edition that will be included in the ICAO ASBU Implementation Monitoring Reports, based on the recommendation of the EURGANT PT. It also shows the corresponding ATM Master Plan Level 3 objective (where applicable and based on ATM MP Level 3 Plan 2021), as well as data sources used to produce the present edition of the Report.

Depending on data availability and regular updates of the ATM Master Plan Level 3 Implementation Plan, remaining Elements will be covered by subsequent editions of the Report.

The colour coding used in the table has the following meaning:

ASBU Elements for which credible data sources have been identified and that are included in this edition of the Report;

ASBU Elements which will be added in subsequent editions of the Report, depending on data availability and necessary maturity level for deployment.

ASBU Thread	ASBU Element	Title	MPL3 Objective	Data sources Used	Page
ACAS	ACAS-B1/1	ACAS Improvements	ATC16	LSSIP + questionnaire	30
ACDM	ACDM-B0/1	Airport CDM Information Sharing (ACIS)	AOP05	LSSIP + questionnaire	31
	ACDM-B0/2	Integration with ATM Network function	AOP05	LSSIP + questionnaire	31
	ACDM-B1/1	Airport Operations Plan (AOP)	AOP11.2	LSSIP + questionnaire	32
	ACDM-B1/2	Airport Operations Centre (APOC)			
AMET	AMET-B0/1	Meteorological observations products	/	METG	92
	AMET-B0/2	Meteorological forecast and warning products	/	METG	92
	AMET-B0/3	Climatological and historical meteorological products	/	METG	92
	AMET-B0/4	Dissemination of meteorological products	/	METG	92
	AMET-B1/1	Meteorological observations information	/	METG	98
	AMET-B1/2	Meteorological forecast and warning information	/	METG	98
	AMET-B1/3	Climatological and historical meteorological information	/	METG	98
	AMET-B1/4	Dissemination of meteorological information	/	METG	98
APTA	APTA-B0/1	PBN Approaches (with basic capabilities)	NAV10	PBN Map Tool + questionnaire	33
	APTA-B0/2	PBN SID and STAR procedures (with basic capabilities)	NAV03.1	PBN Map Tool + questionnaire	34
	APTA-B0/3	SBAS/GBAS CAT I precision approach procedures	/	PBN Map Tool + questionnaire	35
	APTA-B0/4	CDO (Basic)	ENV01	LSSIP + questionnaire	36
	APTA-B0/5	CCO (Basic)	ENV03	LSSIP + questionnaire	37
	APTA-B0/6	PBN Helicopter Point in Space (PinS) Operations	NAV12	LSSIP + questionnaire	38
	APTA-B0/7	Performance based aerodrome operating minima – Advanced aircraft			

* The full list and detailed description of all ASBU Elements according to GANP 6th edition can be found at https://www4.icao.int/ganpportal/ASBU

	APTA-B0/8	Performance based aerodrome operating minima – Basic aircraft			
	APTA-B1/1	PBN Approaches (with advanced capabilities)	NAV10	PBN Map Tool + questionnaire	39
	APTA-B1/2	PBN SID and STAR procedures (with advanced capabilities)	NAV03.2	PBN Map Tool + questionnaire	40
	APTA-B1/3	Performance based aerodrome operating minima – Advanced aircraft with SVGS			
	APTA-B1/4	CDO (Advanced)	ENV01	LSSIP + questionnaire	36
	APTA-B1/5	CCO (Advanced)	ENV03	LSSIP + questionnaire	37
ASUR	ASUR-B0/1	Automatic Dependent Surveillance – Broadcast (ADS-B)	/	LSSIP SUR Annex + questionnaire	41
	ASUR-B0/2	Multilateration cooperative surveillance systems (MLAT)	/	LSSIP SUR Annex + questionnaire	42
	ASUR-B0/3	Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-DAPS)	/	LSSIP SUR Annex + questionnaire	43
	ASUR-B1/1	Reception of aircraft ADS-B signals from space (SB ADS-B)	/	LSSIP SUR Annex + questionnaire	44
COMI	COMI-B0/4	VHF Data Link (VDL) Mode 2 Basic	ITY-AGDL	LSSIP + questionnaire	45
	COMI-B0/7	ATS Message Handling System (AMHS)	COM10.1,	LSSIP + questionnaire	46
	COMI-B1/1	Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS)	COM12	LSSIP + questionnaire	47
	COMI-B1/2	VHF Data Link (VDL) Mode 2 Multi-Frequency	ITY-AGDL	LSSIP + questionnaire	45
DAIM	DAIM-B1/1	Provision of quality-assured aeronautical data and information	ITY-ADQ	LSSIP + questionnaire	48
	DAIM-B1/2	Provision of digital Aeronautical Information Publication (AIP) data sets			
	DAIM-B1/3	Provision of digital terrain data sets	INF07	LSSIP + questionnaire	49
	DAIM-B1/4	Provision of digital obstacle data sets	INF07	LSSIP + questionnaire	49
	DAIM-B1/5	Provision of digital aerodrome mapping data sets			
	DAIM-B1/6	Provision of digital instrument flight procedure data sets			
	DAIM-B1/7	NOTAM improvements			
FICE	FICE-B0/1	Automated basic inter facility data exchange (AIDC)	ITY-COTR	LSSIP + questionnaire	50
FRTO	FRTO-B0/1	Direct routing (DCT)	AOM21.1	LSSIP + questionnaire	51
	FRTO-B0/2	Airspace planning and Flexible Use of Airspace (FUA)	AOM19.5-ASP01 AOM19.5-ASP02	LSSIP + questionnaire	52
	FRTO-B0/4	Basic conflict detection and conformance monitoring	ATC12.1	LSSIP + questionnaire	53
	FRTO-B1/1	Free Route Airspace (FRA)	AOM21.2	LSSIP + questionnaire	54
	FRTO-B1/2	Required Navigation Performance (RNP) routes			
	FRTO-B1/3	Advanced Flexible Use of Airspace (FUA) and management of real time airspace data	AOM19.5-ASP09	LSSIP + questionnaire	55
	FRTO-B1/4	Dynamic sectorization	AOM19.4	LSSIP + questionnaire	56
	FRTO-B1/5	Enhanced Conflict Detection Tools and Conformance Monitoring	ATC12.1	LSSIP + questionnaire	57
	FRTO-B1/6	Multi-Sector Planning	ATC18	LSSIP + questionnaire	58
GADS	GADS-B1/1	Aircraft Tracking	/	Aireon ALERT	59
	GADS-B1/2	Contact directory service			
NAVS	NAVS-B0/1	Ground Based Augmentation Systems (GBAS)	/	PBN Map Tool + national AIPs	60
	NAVS-B0/2	Satellite Based Augmentation Systems (SBAS)			

	NAVS-B1/1	Extended GBAS			
NOPS	NOPS-B0/1	Initial integration of collaborative airspace management with air traffic flow management	AOM19.5-ASP05	LSSIP + questionnaire	61
	NOPS-B0/2	Collaborative Network Flight Updates	FCM03	LSSIP + questionnaire	62
	NOPS-B0/3	Network Operation Planning basic features	/	Network Operations Plan + questionnaire	63
	NOPS-B0/4	Initial Airport/ATFM slots and A-CDM Network Interface	AOP05, AOP17, FCM11.1	LSSIP + questionnaire	64
	NOPS-B0/5	Dynamic ATFM slot allocation	/	NM ATFCM Operations manual + questionnaire	65
	NOPS-B1/1	Short Term ATFM measures	FCM04.2	LSSIP + questionnaire	66
	NOPS-B1/2	Enhanced Network Operations Planning	FCM10-ASP01	LSSIP + questionnaire	67
	NOPS-B1/3	Enhanced integration of Airport operations planning with network operations planning	FCM11.2	LSSIP + questionnaire	68
	NOPS-B1/4	Dynamic Traffic Complexity Management	FCM06.1	LSSIP + questionnaire	69
	NOPS-B1/5	Full integration of airspace management with air traffic flow management	AOM19.5-ASP04	LSSIP + questionnaire	70
	NOPS-B1/6	Initial Dynamic Airspace configurations	AOM19.4	LSSIP + questionnaire	71
	NOPS-B1/7	Enhanced ATFM slot swapping	FCM09	LSSIP + questionnaire	72
	NOPS-B1/8	Extended Arrival Management supported by the ATM Network function	ATC15.2	LSSIP + questionnaire	73
	NOPS-B1/9	Target Times for ATFM purposes	FCM10-ASP03	LSSIP + questionnaire	74
RATS	RATS-B1/1	Remotely Operated Aerodrome Air Traffic Services	AOP14	LSSIP + questionnaire	75
RSEQ	RSEQ-B0/1	Arrival Management	ATC07.1	LSSIP + questionnaire	76
	RSEQ-B0/2	Departure Management	Former AOP05-ASP05, AOP19	LSSIP + questionnaire	77
	RSEQ-B0/3	Point merge	/	EUROCONTROL Innovation Hub + questionnaire	78
	RSEQ-B1/1	Extended arrival metering	ATC15.2	LSSIP + questionnaire	79
SNET	SNET-B0/1	Short Term Conflict Alert (STCA)	ATC02.2	LSSIP + questionnaire	80
	SNET-B0/2	Minimum Safe Altitude Warning (MSAW)	ATC02.8-ASP03	LSSIP + questionnaire	81
	SNET-B0/3	Area Proximity Warning (APW)	ATC02.8-ASP01	LSSIP + questionnaire	82
	SNET-B0/4	Approach Path Monitoring (APM)	ATC02.8-ASP05	LSSIP + questionnaire	83
	SNET-B1/1	Enhanced STCA with aircraft parameters	ATC20	LSSIP + questionnaire	84
	SNET-B1/2	Enhanced STCA in complex TMAs	ATC02.9	LSSIP + questionnaire	85
SURF	SURF-B0/1	Basic ATCO tools to manage traffic during ground operations			
	SURF-B0/2	Comprehensive situational awareness of surface operations	AOP04.1	LSSIP + questionnaire	86
	SURF-B0/3	Initial ATCO alerting service for surface operations	AOP04.2	LSSIP + questionnaire	87
	SURF-B1/1	Advanced features using visual aids to support traffic management during ground operations	AOP16	LSSIP + questionnaire	88
	SURF-B1/3	Enhanced ATCO alerting service for surface operations	AOP12.1	LSSIP + questionnaire	89
	SURF-B1/4	Routing service to support ATCO surface operations management	AOP13	LSSIP + questionnaire	90

In summary, a total of **74 ASBU Elements are covered** by this Report, representing roughly **85%** of the total set of Elements proposed to be monitored by the EURGANT-PT. It should be noted that compared with the previous edition of the Report, 4 Elements (RSEQ-B0/3, ASUR-B1/1, NOPS-B1/3 and NOPS-B1/9) have been added to its scope, reducing the gap between the Elements proposed by the EURGANT-PT and the content of the Report.

As already mentioned, the EURGANT PT also reviewed 27 elements (12 for Block 0 and 15 for Block 1) which will not be included in the monitoring process. Their list is presented in the table below.

ASBU Thread	ASBU Element	Title	Justification
COMI	COMI-B0/1	Aircraft Communication Addressing and Reporting System (ACARS)	Airspace user related
	COMI-B0/2	Aeronautical Telecommunication Network/Open System Interconnection (ATN/OSI)	Not applicable for EUR Region
	COMI-B0/3	VHF Data Link (VDL) Mode 0/A	Not applicable for EUR Region
	COMI-B0/5	Satellite communications (SATCOM) Class C Data	Not applicable for EUR Region
	COMI-B0/6	High Frequency Data Link (HFDL)	Not applicable for EUR Region
	COMI-B1/3	SATCOM Class B Voice and Data	Not applicable for EUR Region
	COMI-B1/4	Aeronautical Mobile Airport Communication System (AeroMACS) Ground-Ground	Local implementation only
COMS	COMS-B0/1	CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace	Not applicable for EUR
	COMS-B0/2	ADS-C (FANS 1/A) for procedural airspace	Not applicable for EUR Region
	COMS-B1/1	PBCS approved CPDLC (FANS 1/A+) for domestic and procedural airspace	Not applicable for EUR Region
	COMS-B1/2	PBCS approved ADS-C (FANS 1/A+) for procedural airspace	Not applicable for EUR Region
	COMS-B1/3	SATVOICE (incl. routine communications) for procedural airspace	Not applicable for EUR Region
CSEP	CSEP-B1/1	Basic airborne situational awareness during flight operations (AIRB)	Airspace user related
	CSEP-B1/2	Visual Separation on Approach (VSA)	Airspace user related
	CSEP-B1/3	Performance Based Longitudinal Separation Minima	Not applicable for EUR Region
	CSEP-B1/4	Performance Based Lateral Separation Minima	Not applicable for EUR Region
FRTO	FRTO-B0/3	Pre-validated and coordinated ATS routes to support flight and flow	Not applicable for EUR Region
	FRTO-B1/7	Trajectory Options Set (TOS)	Not applicable for EUR Region
NAVS	NAVS-B0/3	Aircraft Based Augmentation Systems (ABAS)	Airspace user related
NAVS	NAVS-B0/4	Navigation Minimal Operating Networks (Nav. MON)	Conceptual element, ensured by other elements
NOPS	NOPS-B1/10	Collaborative Trajectory Options Program (CTOP)	Not applicable for EUR Region
OPFL	OPFL-B0/1	In Trail Procedure (ITP)	Not applicable for EUR Region
	OPFL-B1/1	Climb and Descend Procedure (CDP)	Not applicable for EUR Region
SURF	SURF-B1/2	Comprehensive pilot situational awareness on the airport surface	Airspace user related
SURF	SURF-B1/5	Enhanced vision systems for taxi operations	Airspace user related
TBO	TBO-B0/1	Introduction of time-based management within a flow centric approach.	Conceptual element, reported through other elements
	TBO-B1/1	Initial Integration of time-based decision making processes	Conceptual element, reported through other elements

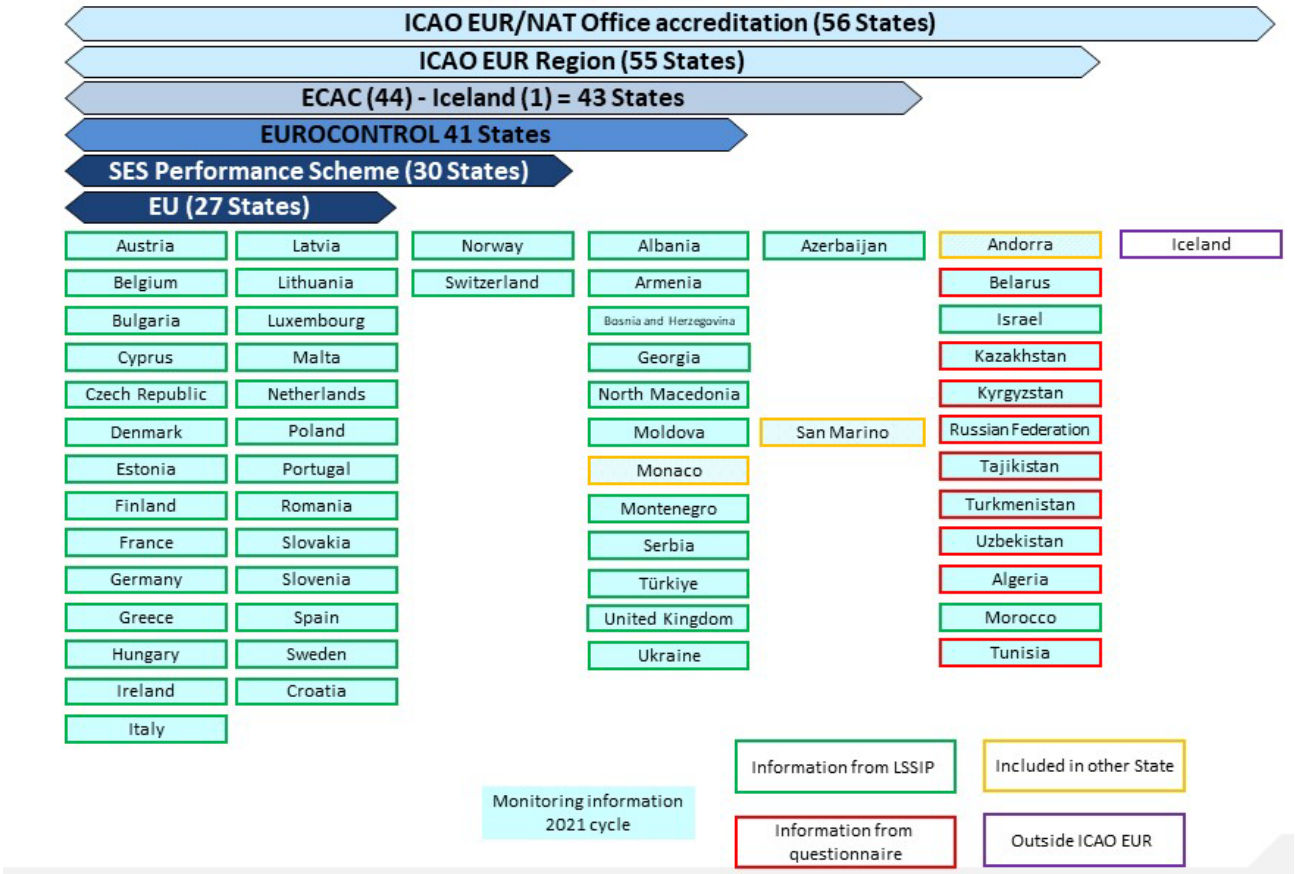
Geographical scope

This report addresses the implementation progress of ASBU Block 0 and Block 1 Elements with reference date December 2021.

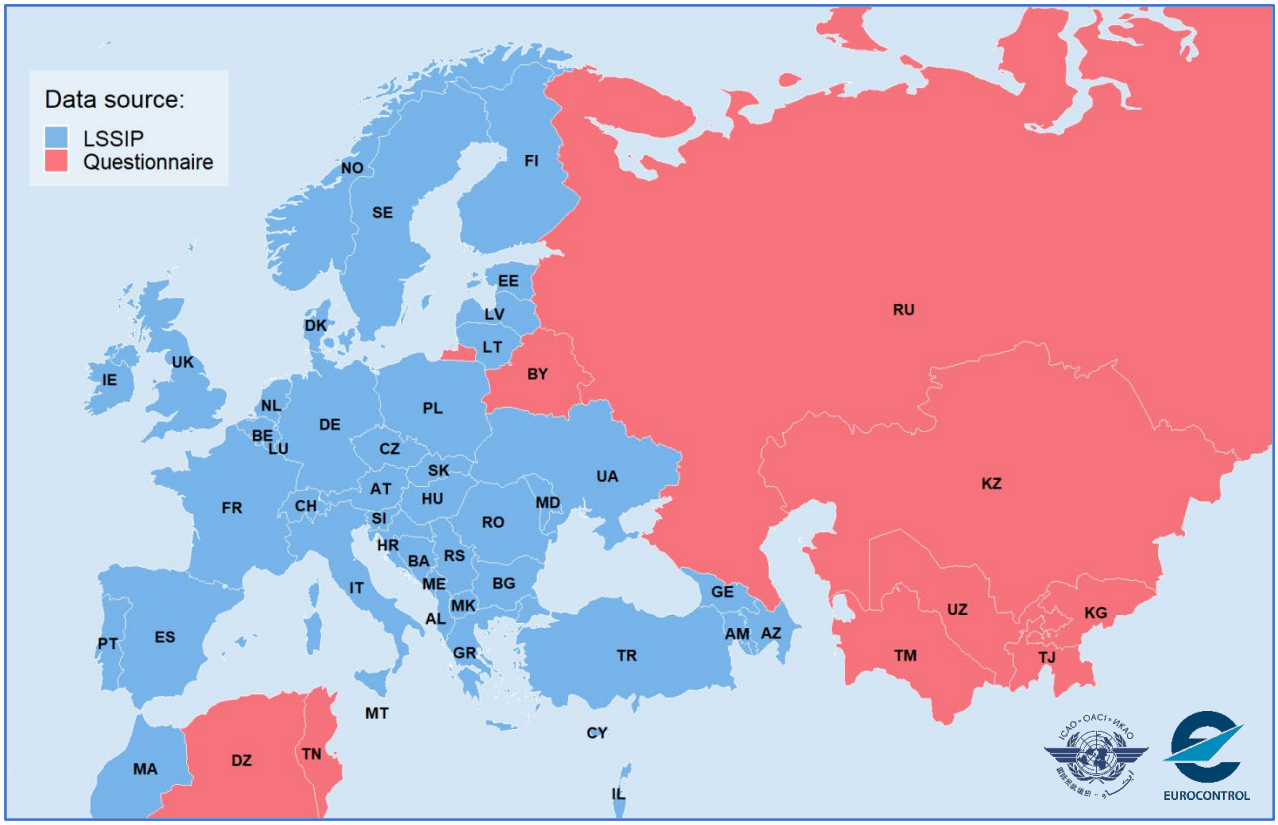
The report is primarily based on the information submitted by the 43 States participating in the LSSIP mechanism (referred to in the document as “LSSIP States”), as well as the information reported through the ASBU implementation monitoring questionnaires for the 9 States within the ICAO EUR Region that are outside the LSSIP reporting mechanism (“non-LSSIP States"). It should also be noted that that Monaco, San Marino and Andorra are not addressed separately in this report, neither in related statistics, because for monitoring purposes they are included in other hosting States. Therefore there are 52 Member States considered individually in the following chapters.

The questionnaire is fully aligned with the implementation objectives as defined in ATM Master Plan Level 3 Implementation Plan (formerly ESSIP objectives) and has been continuously updated and improved for every edition of the report.

A schematic view on the States covered by this report and their affiliation to relevant organisations and/or regions is presented below:



In order to obtain a better picture of the region covered by this report, the map below shows its geographical scope:



2. Data sources

Two main complementary processes are in place to collect the monitoring data required for the preparation of this report:

1. The EUROCONTROL LSSIP mechanism with 43 participating States (See section 2.1);
2. A questionnaire specifically targeted and designed for the remaining 9 States that are accredited to the ICAO EUR Region (See section 2.2).

Furthermore, due to comprehensiveness of ASBU Elements introduced by GANP 6th Edition and for the sake of improving data quality and granularity, several more sources have been consulted in order to obtain information for this edition of the Report, such as:

- EUROCONTROL PBN Map Tool;

  https://www.eurocontrol.int/platform/performance-based-navigation-map-tool
- National Aeronautical Information Publications (AIPs);
- LSSIP – Surveillance Questionnaire;
- Relevant NM documents and manuals (e.g. Network Operations Plan, ATFCM Operations Manual etc.);
- Information collected by the EUROCONTROL Innovation Hub through other channels (e.g. on Point Merge);
- Other sources (e.g. AIREON Alert);
- For AMET elements the information was collected and endorsed by the ICAO Meteorology Group (METG) of the EASPG at their latest meeting (METG/32).

2.1. EUROCONTROL LSSIP Process

EUROCONTROL Local Single Sky ImPlementation (LSSIP) process is a robust mechanism to support Single European Sky (SES) and SESAR deployment planning and reporting. At the moment it covers 43 States plus the EUROCONTROL Maastricht Upper Area Control Centre (MUAC). The process sits at the crossroads of multiple performance improvement initiatives synergising the planning and monitoring activities of all stakeholders involved: State civil and military authorities, ANSPs and airport operators, all categories of airspace users. This cyclic process comprises three main components (see figure below):

1. Deployment planning: European ATM Master Plan Level 3 Implementation Plan:

   https://www.eurocontrol.int/publication/european-atm-master-plan-implementation-plan-level-3
2. Deployment reporting and monitoring at local level (LSSIP documents):

   https://www.eurocontrol.int/service/local-single-sky-implementation-monitoring
3. Deployment reporting and monitoring at European level: Master Plan Level 3 Implementation Report:

   https://www.eurocontrol.int/publication/european-atm-master-plan-implementation-report-level-3

The European ATM Master Plan Level 3 Implementation Plan (formerly ESSIP Plan) and the European ATM Master Plan Level 3 Implementation Report (formerly ESSIP Report) together constitute the Level 3 of the ATM Master Plan as indicated in the figure.

The European ATM Master Plan Level 3 Implementation Plan contains the detailed implementation objectives

and Stakeholder Lines of Action (SLoA) to be achieved within coordinated time scales. Its target audience includes planning staff from the various stakeholders participating in the process, both at European and National level. It is produced on a yearly basis.

The European ATM Master Plan Level 3 Implementation Report assesses the level of progress in implementation of objectives at ECAC+ level for the benefit of all aviation stakeholders. For each of the objectives it highlights critical issues, main reasons for delays, (positive) progress and proposes remedial actions at network level. It is based on information gathered from the LSSIP documents and closes the loop between the monitoring and planning phases of the LSSIP yearly cycle.

Understanding what happened during the reporting period puts into perspective the investments and actions needed to achieve real benefits and enables to steer implementation results.

2.2. ICAO Questionnaire

With the objective to obtain monitoring information and facilitate reporting activities required by the ICAO EUR Region States outside the LSSIP mechanism, an ICAO ASBU Implementation Monitoring Questionnaire was first developed in 2014 and sent out with the State Letter which launched the regional ASBU implementation reporting in September 2014.

After review of the first reports at the ATMGE/21 meeting, and together with the lessons learned/way forward, an updated and comprehensive version of the questionnaire was developed at the ATMGE/22 meeting in order to increase the number of responses and enhance the quality of the reported information. This version (v.3) was presented and endorsed at EANPG/57, so that States could use it for the 2015 reference period of the ASBU implementation monitoring report.

Following the discussions from the ATMGE/23 meeting, an updated version of the ASBU implementation questionnaire was developed which introduced more detailed guidance material, practical examples and specific explanations on the implementation activities/status that needed to be reported. The further revised ASBU implementation report questionnaire (v.4) was presented to the EANPG/58 that agreed the new version of the questionnaire would be attached to the ATMGE State Report format.

The EANPG/58 also recommended that the progress/status of implementation of ASBU Block 0 modules is reported, for monitoring purposes, by States regardless of their assigned priority in the EANPG/55 conclusions.

During the ATMGE/24 meeting another feedback discussion resulted in new/revised version of the ASBU implementation report questionnaire. The EANPG/59 approved an improved version of the questionnaire (v.5 from 20.10.2017), for the monitoring cycle 2017.

In order to better harmonize the calculation of the implementation percentages, as well as the level of granularity and details for non-ECAC States inputs with the LSSIP mechanism, discussions took place during the ATMGE/26 meeting where an updated version of the ICAO ASBU Implementation Monitoring Questionnaire in Excel format was presented and accepted by the ATMGE participants. This revised State Report format (as v.6 from 15.11.2018) presented, discussed and approved by the EANPG with EANPG/60 & RASG-EUR/07 Conclusion 07 (ICAO ASBU Implementation Monitoring within the ICAO EUR Region), together with the updated mapping between ICAO ASBU modules and European ATM Master Plan Implementation Objectives, has been used for the monitoring of the 2018 cycle. An updated version of the questionnaire was developed (v.7 from 17.10.2019) with similar mapping which was then used for reference year 2019.

Given the changes brought by the GANP 6th Edition and substantially increased granularity of ASBU Elements, the questionnaire for non-LSSIP States has been completely redesigned and simplified, allowing the States to report separately on State/ANSP-related and airport-related ASBU elements. The new questionnaire was presented and discussed at the Air Navigation Services Implementation and Support Group (ANSISG/04) meeting in May 2021 and sent to States on 11 June 2021.

In order to facilitate the provision of information and to minimise the burden on the reporting parties, all the Elements of the questionnaire (apart the 4 Elements ASUR-B1/1 (Space based ADS-B), NOPS-B1/3 and NOPS-B1/9 (FCM), RSEQ-B0/3 (Point merge) newly added this year) have been prefilled with the information submitted during the previous reporting cycle. The updated questionnaire, (individually prefilled template for each State, version May 2022) was presented to a dedicated ANSISG ASBU Implementation Monitoring Workshop which took place on 19 May 2022 and wassubsequently distributed to the non-LSSIP States on 31 May 2022.

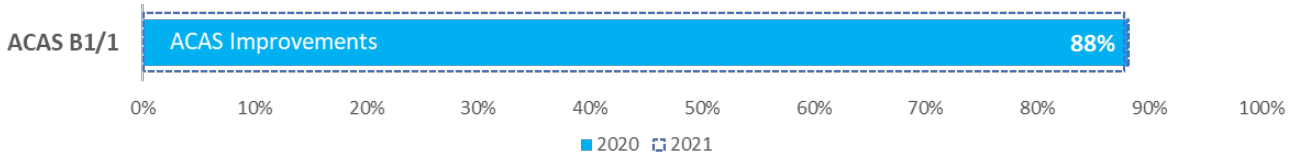
It should be noted that for this edition of the Report **8 out of 9 non-LSSIP States submitted their ASBU implementation questionnaire to the ICAO EUR/NAT Office and EUROCONTROL** before the deadline of 16th September 2022. **Turkmenistan** has again not submitted the questionnaire and only very limited data (only functionalities for which completion was confirmed in previous editions of the Report are counted as such in the current edition) which had been based on previous reporting information from Turkmenistan is now included into this report.

3. Implementation summary per ASBU Thread

This chapter summarizes the implementation progress achieved for the different elements belonging to a particular ASBU Thread. It should be noted that not all elements have been included in these focused summaries, as for some of them data is not presently available (*more info in Section 1.4*). Detailed assessments per ASBU Element are given in Chapter 4.

ACAS - Airborne Collision Avoidance System

There is a substantial completion rate of 88% (45 States) for **ACAS-B1/1** which is very positive from the perspective of the safety contribution. Moreover, among the States that have not finalized implementation yet, the Air Navigation Service Providers and the Regulatory Authorities have all fulfilled their tasks. The reason for delay in these States is the equipage of military transport-type aircraft, considering that for this category of airspace users the carriage/upgrade is voluntary, therefore it takes longer. The planned implementation dates in these States range from 2022 to 2023.



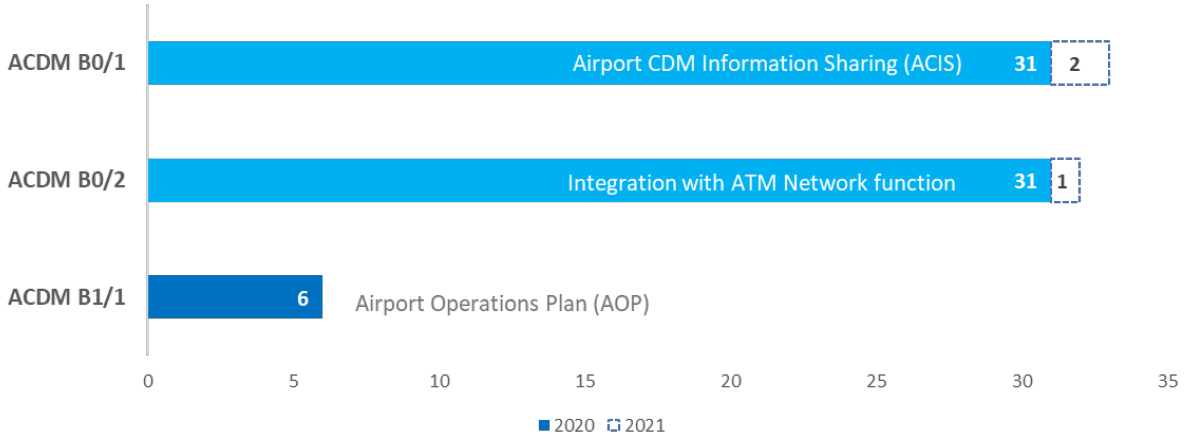
ACDM - Airport Collaborative Decision Making

Even if the implementation of A-CDM in the EUR Region is amongst the most impacted by the COVID-19 pandemic, with almost 20% of the implementers reporting delays caused by it, it still shows a constant progress over the years.

Currently the Element **A-CDM B0/1** on A-CDM Information sharing is reported as deployed at 33 locations, 2 more than in the previous Report, while 17 other airports expect to achieve completion by end 2024. The more advanced Element addressing the integration of A-CDM with the ATM Network function (**A-CDM B0/2)**, is only slightly behind in terms of completion rate, as it is deployed at 32 locations.

With regard the deployment of the Airport Operations Plan Element (**A-CDM B1/1)**, the completion rate has been heavily impacted by the realignment between the Element and the ATM Master Plan Level 3 corresponding Implementation Objective which in its turn is reflecting the requirements of the CP1 Regulation (EU 116/2021), binding to 28 airports in the applicability area, by end 2027. Due to this realignment, the completion rate went to zero, with a massive increase expected in 2027 (22 locations).

Among the remaining airports in the EUR Region, these elements are mostly considered “not applicable” or “not yet planned” due to the lack of operational needs.



APTA - Improve arrival and departure operations

The implementation of the Thread shows good progress across all its constitutive Elements.

The leading ASBU Element in terms of completion within the EUR region is the one addressing PBN approaches (with basic functionalities - down to LNAV or LNAV/VNAV minima), **APTA-B0/1**, with almost 650 airports (airports with at least one runway-end served by approach procedures to LNAV or LNAV/VNAV minima) while more than 130 airports intend to publish LPV or RNP AR approach procedures before end 2023.

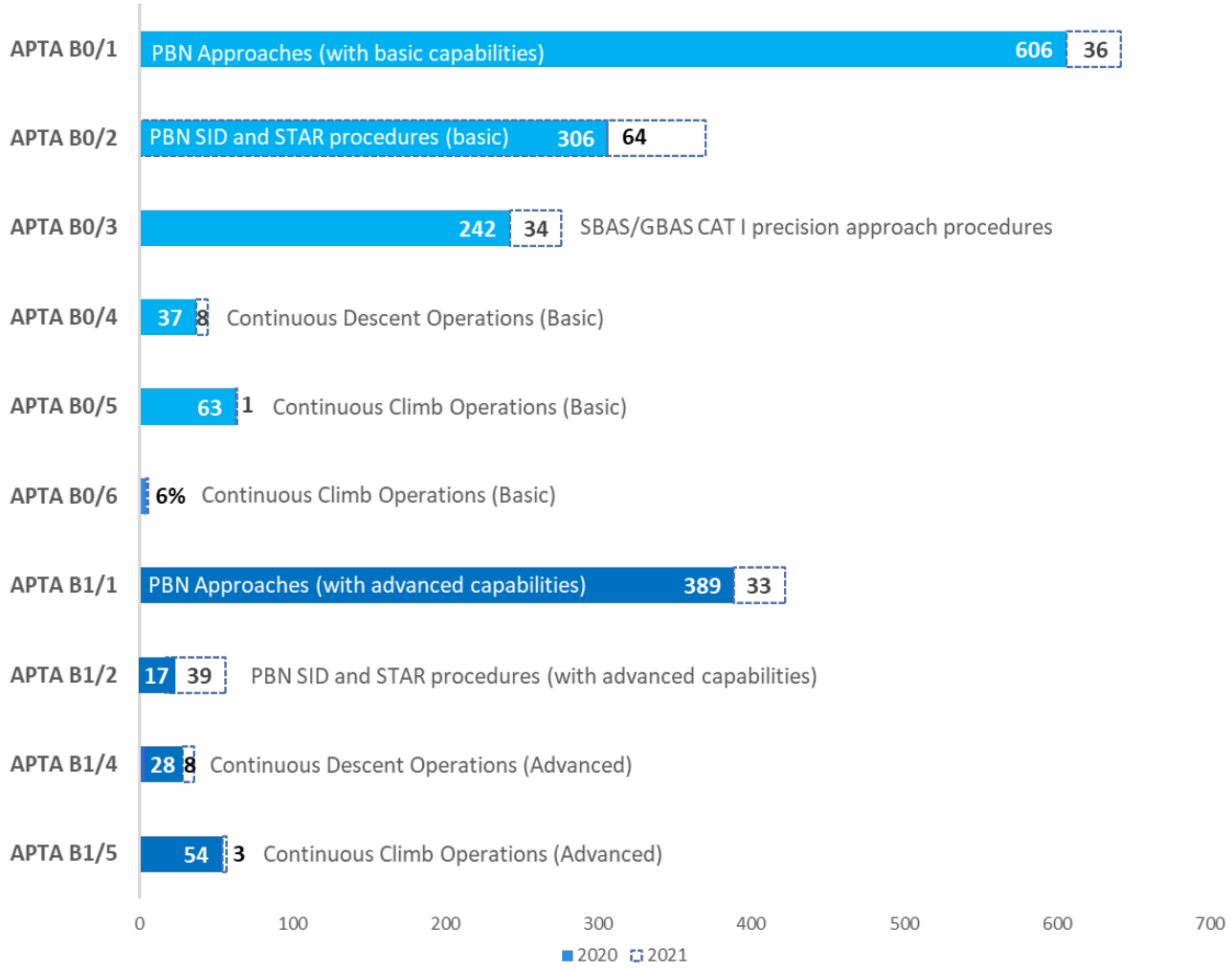
The interest in deploying advanced RNP approach procedures (**APTA-B1/1**) is also high across the EUR Region, with more than 420 airports reporting completion (airports with at least one runway-end served by LPV or RNP AR approach procedures) with more than 130 airports expected to follow by the end of 2023.

The appeal of RNP1 SIDs and STARs with RF legs (**APTA-B1/2**) is still relatively low across the EUR Region (only 56 airports have finalized deployment) because the less demanding requirements of PBN SID and STAR procedures based on RNAV1 (**APTA-B0/2**) are considered fit for purpose in most of the operating environments within the Region (Element deployed at 370 airports).

The Element addressing PBN Helicopter Point in Space (PinS) operations (**APTA-B0/6**) raises a very limited interest among the States. Almost 80% of the States report no plans to implement or consider the Element as not applicable. The main reason for not implementing the element is the lack of business or operational needs, as well as the characteristics of the operational environments. Only 3 States have implemented it, with 4 other expected to complete implementation by end 2024.

The deployment of SBAS and GBAS CAT 1 precision approaches (**APTA-B0/3**) minima is quite large across the entire Region. At least 270 airports have so far published such approaches for at least one runway end in the national AIPs. The vast majority of these are based on SBAS, while GLS approaches are currently implemented or planned at more than 70 airports throughout the EUR Region, most of which in Norway and Russian Federation (see **NAVS-B0/1**).

Even if the implementation of Continuous Descent Operations (CDO) Elements have been among the ones for which several stakeholders have reported delays caused by the COVID-19 pandemic, they have achieved good progress with 8 airports having completed implementation in 2021. Basic CDO, (**APTA-B0/4**) is now operated at 45 airports in the EUR Region. There is slightly lower progress of the Advanced CDO Element (**APTA-B1/4**) enabled by PBN, with only 36 airports having reported completion. Continuous Climb Operation (CCO) have a slightly better completion rate, with the basic Element (**APTA-B0/5**) being implemented at 64 locations while the advanced one (**APTA-B1/5**) being operational at 57 locations.



ASUR - Surveillance systems

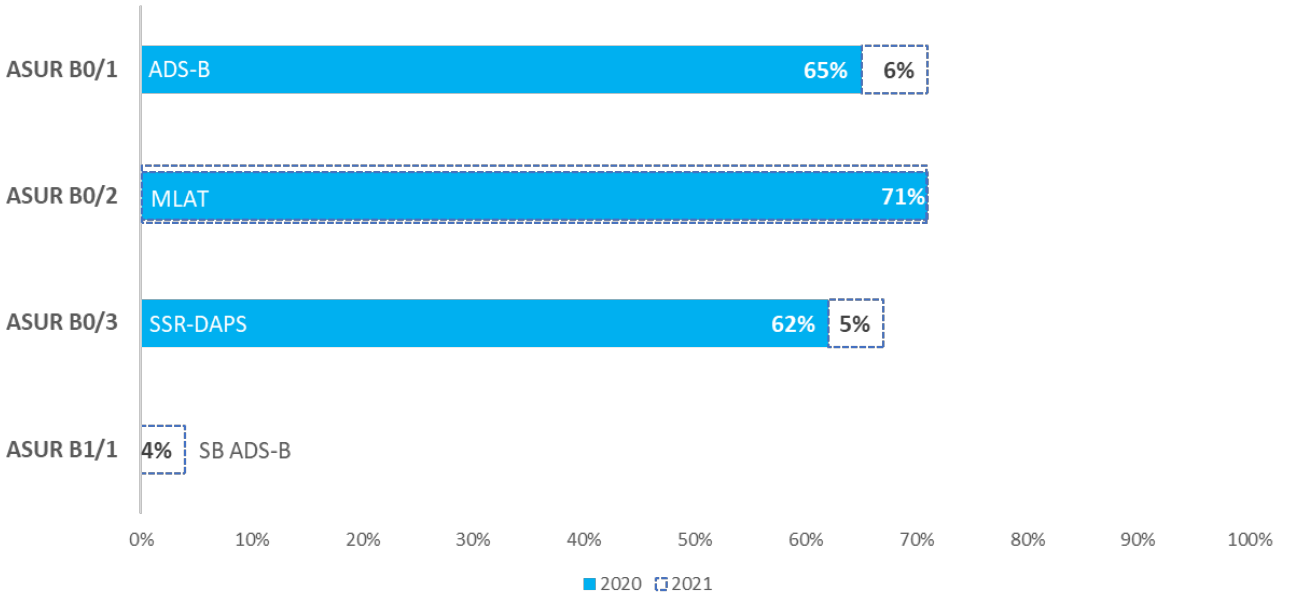
The deployment of the capability to use ADS-B data (**ASUR-B0/1**) is progressing across the Region, with 37 States reporting completion. It is encouraging to notice that ADS-B stations are constantly being deployed and that even in States which have not yet fully finalised deployment, ADS-B infrastructure has already been installed and is growing. In most of the cases ADS-B (either as standalone or integrated with LAM/WAM systems – ASUR-B0/2) is deployed in order to fill gaps in the surveillance coverage, to replace aging infrastructure or to provide a supplementary layer of surveillance.

The interest in using multilateration (MLAT), **ASUR-B0/2**, for providing surveillance at airports (LAM - Local Area Multilateration) or over wide areas (WAM - Wide Area Multilateration) is quite high within the EUR Region and especially in the LSSIP States. It is estimated that slightly more than 70% of the States (37) in the Region are already using MLAT. LAM is already widely used to enable airport surface surveillance, allowing the implementation of Advanced Surface Movement Guidance and Control Systems (A-SMGCS).

The capability to receive at least one of the downlinked aircraft parameters - DAPs (**ASUR-B0/3**) is widely deployed, however the number of the parameters and the operational use varies extensively among the States. In most of the cases the parameters are displayed for information, for monitoring and for the issuance of warnings. Among the available DAPs, the Selected Altitude is the one having the widest usage.

The Element addressing Space Based ADS-B (**ASUR-B1/1**) has been monitored for the first time during this cycle therefore it is not possible yet to establish implementation trends. For the time being the interest in deployment is limited mostly to the States providing air navigation services over the high seas, where

surveillance is not available. For the vast majority of the remaining States the Element is considered as "Not Applicable" because of the lack of a business/operational need as these States already have a robust ground surveillance infrastructure.

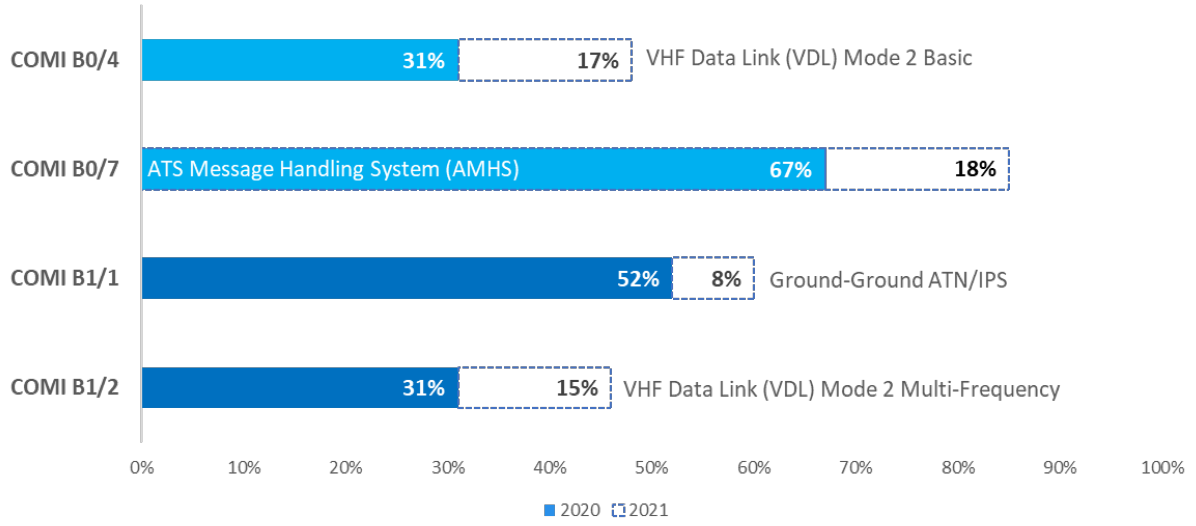


COMI - Communication infrastructure

The deployment of VDL Mode 2 communications (**COMI-B0/4**) recorded a substantial progress, with 25 States (8 more than in the previous edition of the Report) using it for the provision of Controller Pilot Data Link Communications services above Flight Level 285 and for the replacement of voice communication for routine, non-time critical messages. For the time being, the analysis does not differentiate between "Basic" (**COMI-B0/4**) and "Multi-Frequency" (**COMI-B1/2**), as the choice is a local decision depending on the specific local needs.

The implementation of AMHS (**COMI-B0/7**) confirmed the very good pace already noticed in the previous years. The "basic" AMHS service, already providing the vast majority of AMHS benefits and fulfilling the requirements of the Element, has been implemented by 44 States. It is important to note that for some of the States still reporting the implementation as "ongoing" (FR, IT) the main service providers have already implemented the basic AMHS features. Most of the remaining States expect to finalise implementation before the end of 2023.

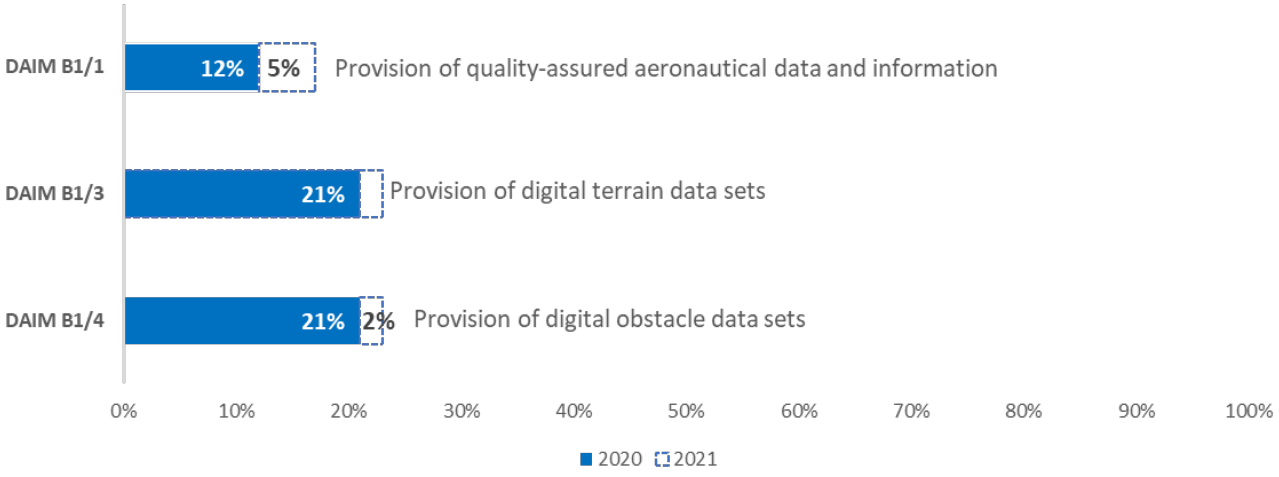
The Ground-Ground ATN/IPS (**COMI-B1/1**) Element has already been implemented by 31 States, all of them using NewPENS (New Pan-European Network Services). In general, the provision of connectivity infrastructure and the migration to NewPENS at ANSP/ACC level is more advanced (35 States have reported completion) compared with the migration of Airports which is rather limited, as only 5 Sates have reported implementations or plans for implementation at airports.



DAIM - Digital Aeronautical Information Management

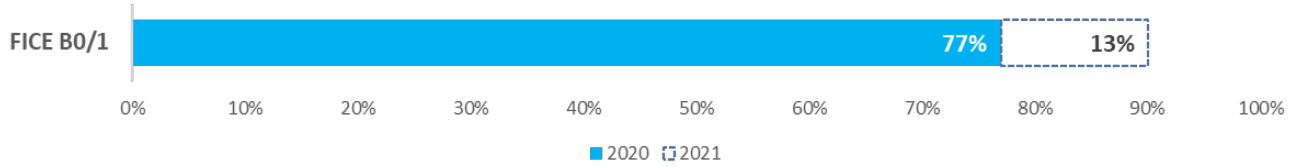
The completion rate for the provision of (**DAIM-B1/1**) Element remained quite limited with only 3 additional States reporting finalisation in 2021. Currently the Element is implemented by 9 States within the Region, with a substantial implementation spike expected in 2022, with another 20 States anticipating completion. However, as the EU Regulation underlying the Master Plan Level 3 Implementation Objective has been repealed in 2022 there is a possibility that the EU Member States will reconsider their deployment plans. A realignment of these plans with the new regulatory requirements might have a potential impact on the timeframes for the deployment of the Element.

The progress of the Elements on digital terrain data sets (**DAIM-B1/3**) and on digital obstacle data sets (**DAIM-B1/4**) remains in the lower quartile, with only 12 States having completed them. However, the establishment of a National Terrain and Obstacle Data Policy, which is a critical enabler for implementation is much more advanced (26 States). This progress is expected to unlock the implementation, with another 30 States expected to implement the Elements before the end of 2023.



FICE - Flight and Flow Information for a Collaborative Environment

The information exchanges addressed by the Element (**FICE-B0/1**) are widely implemented in the Region, based on the EUROCONTROL's OLDI (On-Line Data Interchange) Specification. The "basic procedure" addressing the notification and the coordination of flights is implemented by 90% of the States in the Region. It should be noted that even among the States which have not fully completed the deployment, the "basic procedure" messages are implemented with at least one of the neighbouring States. It can be considered therefore that the implementation of the Element is very close to 100% completion across the EUR Region. The focus is now on enriching the set of exchanged messages, as well as on the establishment of new bilateral connections.



FRTO - Improved operations through enhanced en-route trajectories

During the reporting year, no other States have implemented the Element on Direct Routing (**FRTO-B0/1**) which remains with a high percentage of States (40%) reporting it as "Not Applicable". This is because most of these States have decided to skip this intermediate step and to proceed directly with the implementation of Free Route Airspace (FRA) addressed by the Element **FRTO-B1/1**. The deployment of FRA has continued at a sustained pace with another 4 States having finalised deployment in 2021. This led to an overall 35 States within the Region which have completed the implementation.

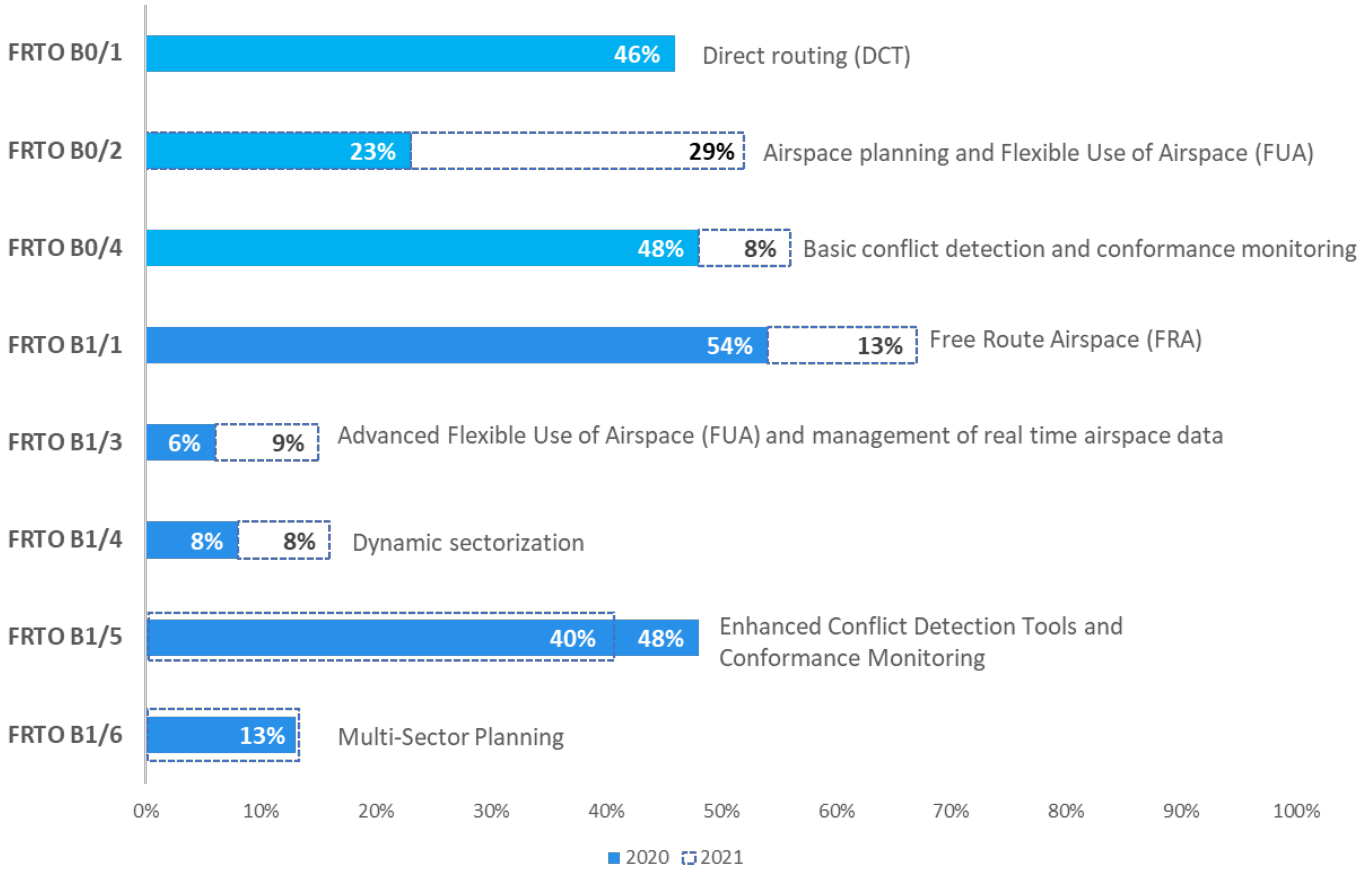
The deployment of the Flexible Use of Airspace (FUA) and Advanced FUA Elements (**FRTO-B0/2** and **FRTO-B1/3**) have both recorded progresses, with the Block 0 Element being the most advanced amongst the two. FUA has been implemented by 27 States, the majority of them (20) relying on the LARA (Local and sub-regional airspace management support system) tool developed by EUROCONTROL. The Advanced FUA Element scores a lower progress, with only 8 States in the EUR Region having reported completion. However, a substantial increase (13 States) is expected in 2022.

The Controller support tools (conflict detection and conformance monitoring) are addressed by 2 Elements, one for the basic features (**FRTO-B0/4**) and the other including more advanced capabilities (**FRTO-B1/5**). As expected, the basic features (Medium Term Conflict Detection-MTCD and Monitoring Aids-MONA) have a better progress with 29 States having deployed the Element. For a number of States which have not yet finalised deployment, the Element is partly implemented as either MTCD or MONA are in place. The Element addressing enhanced capabilities (e.g. Tactical Controller Tool) has a slightly lower progress, as only 21 States have finalised deployment. However, 14 more States are expected to complete the Element before the end of 2023.

The dynamic sectorisation Element (**FRTO-B1/4**) has also recorded progress, but to a less extent than the other Elements within the Thread. Five other States have finalised deployment in 2021, leading to a total of 8 States within the Region. A substantial increase (15 States) is expected in 2022, mainly driven by the obligations imposed by the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) on the EU Member States.

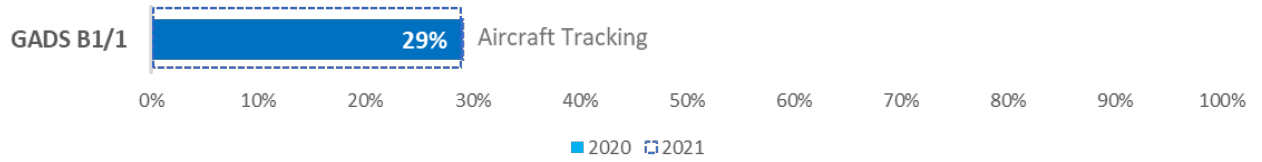
Finally, for the Multi-Sector Planning Element (**FRTO-B1/6**) the interest in deployment remains rather limited with only 7 States having completed the implementation (none of them in 2021). Almost 70% of the States in

the Region consider the Element as either “Not Applicable” or “Not yet planned”. This is mostly due to their existing ATM system capabilities/limitations, number of sectors and/or configurations, or lack of perceived operational benefits compared to current operations.



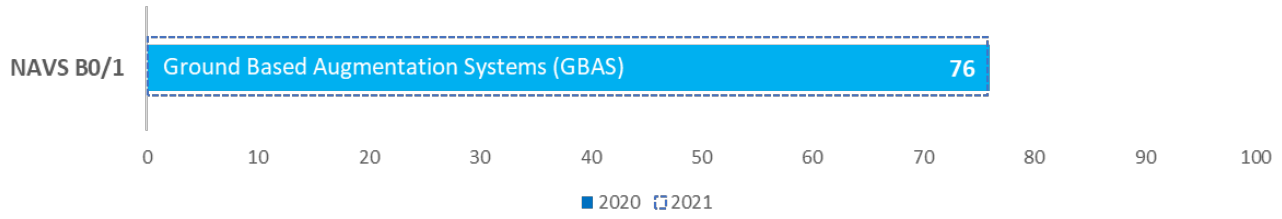
GADS - Global Aeronautical Distress and Safety System (GADSS)

Due to a lack of comprehensive and structured data sources on the implementation of this ASBU Element (**GADS-B1/1**), in this edition of the Report only limited and currently available information is presented. Namely, the figure below indicates the share of States whose Civil Aviation Authorities or Air Navigation Service Providers have previously subscribed for the **Aireon Aircraft Locating and Emergency Response Tracking (Aireon ALERT)** service. Depending on data availability and the implementation of Autonomous Distress Tracking (ADT), further editions of the Report will include more comprehensive overview of the implementation.



NAVS - Navigation systems

Within the Region, GBAS (**NAVS-B0/1**) is currently in use at 76 airports (no progress in 2021), majority of which are located in Norway (17 locations) and Russian Federation (55 locations) while the Element is expected to be implemented at another 5 locations (1 in Spain, 4 in the Russian Federation) before the end of 2023.



NOPS - Network Operations

The deployment of the Element addressing the Initial integration of collaborative ASM with ATFM, (**NOPS-B0/1**) is building up speed, with 18 States reporting the functionality in place. This step is to be followed by a full integration of ASM with ATFCM (**NOPS-B1/5**) which is reported as completed by 14 States. For both Elements, 11 other States expect to finalise implementation in 2022. This expected spike is mainly driven by the obligations imposed by the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) on the EU Member States.

The Collaborative Network Flight Updates (**NOPS-B0/2**) keep progressing although at a slow pace (only one State has completed the Element in 2021). Overall 24 States have achieved completion. However, it should be noted that the basic (and most beneficial) features of the Element (the provision of position reports or of flight activation messages) are virtually implemented in all the ECAC States. Within the more advanced features of the Element, it is observed that the more beneficial (e.g. provision of flight plan data in case of missing flight plans) show a good level of implementation, almost as good as the basic features.

The Elements addressing basic Network Operations Planning (**NOPS-B0/3**) as well as Dynamic ATFM slot allocation (**NOPS-B0/5**) are well established within the Region and in particular within the Air Traffic Flow and Capacity Management (ATFCM) Area (all ECAC Member States apart Azerbaijan and Iceland + Morocco) where the EUROCONTROL Network Manager (NM) is responsible for the provision of ATFCM, including the dynamic ATFM slot (CTOT) allocation. Moreover, certain States are cooperating with the NM by exchanging data with the NM and participating in the NM ATFCM service. These States are described as cooperating States and are referred as “ATFCM Adjacent Area” (Algeria, Belarus, Tunisia, Iceland, Israel, Egypt). Flow managers (FMPs) of Adjacent Areas may request the NM to apply ATFCM measures for the airports within their FIR or for significant points at the interface between the FIR and the NM Area of operations.

Two Elements within the Thread are addressing the integration of Airports with the Air Traffic Flow Management, in a gradual way, starting with initial airport/ATFM slots and ACDM Network Interface (**NOPS-B0/4**) followed by the enhanced integration between the Airports Operations Planning and Network Operations Planning (**NOPS-B1/3**). In the EUR Region the initial functionality is implemented only within the ATFCM area where 51 airports have already established certain levels of information exchanges with NM. Most of these airports (32) have implemented the full A-CDM process, while additional 19 airports (typically medium and small-sized ones) provide Departure Planning Information (DPI) messages to NM. The Element addressing enhanced integration is still in very early planning phases with no airports having deployed it and with a slow progress expected in the next years as only 3 airports plan to finalise deployment before 2025.

The implementation of short term ATFM measures (**NOPS-B1/1**) is still at early stages as well, with only 5 States reporting completion. Yet a substantial spike is expected in 2022 mainly driven by the obligations imposed by the CP1 Regulation (EU 116/2021 - Sub-AF 4.1.1 on enhanced short term ATFCM measures) on the EU Member States. Outside the EU, most of the States consider the functionality as "Not applicable" or do not have concrete implementation plans, mostly because of the levels of traffic not justifying deployment.

Within the ATFCM Area, the enhanced Network Operations Planning (**NOPS-B1/2**) is deployed through the implementation of interactive rolling NOP, made available by the Network Manager. Currently 9 States have reported completion while 16 expect completion before end 2023 (however, the number of "completed" States should be considered as conservative as evidence exist that more States have certain levels of interaction with the NOP). It should be noted that in some instances, the B2B connection to the NOP is considered as not necessary as the manual access to NM platform is fit for the local needs.

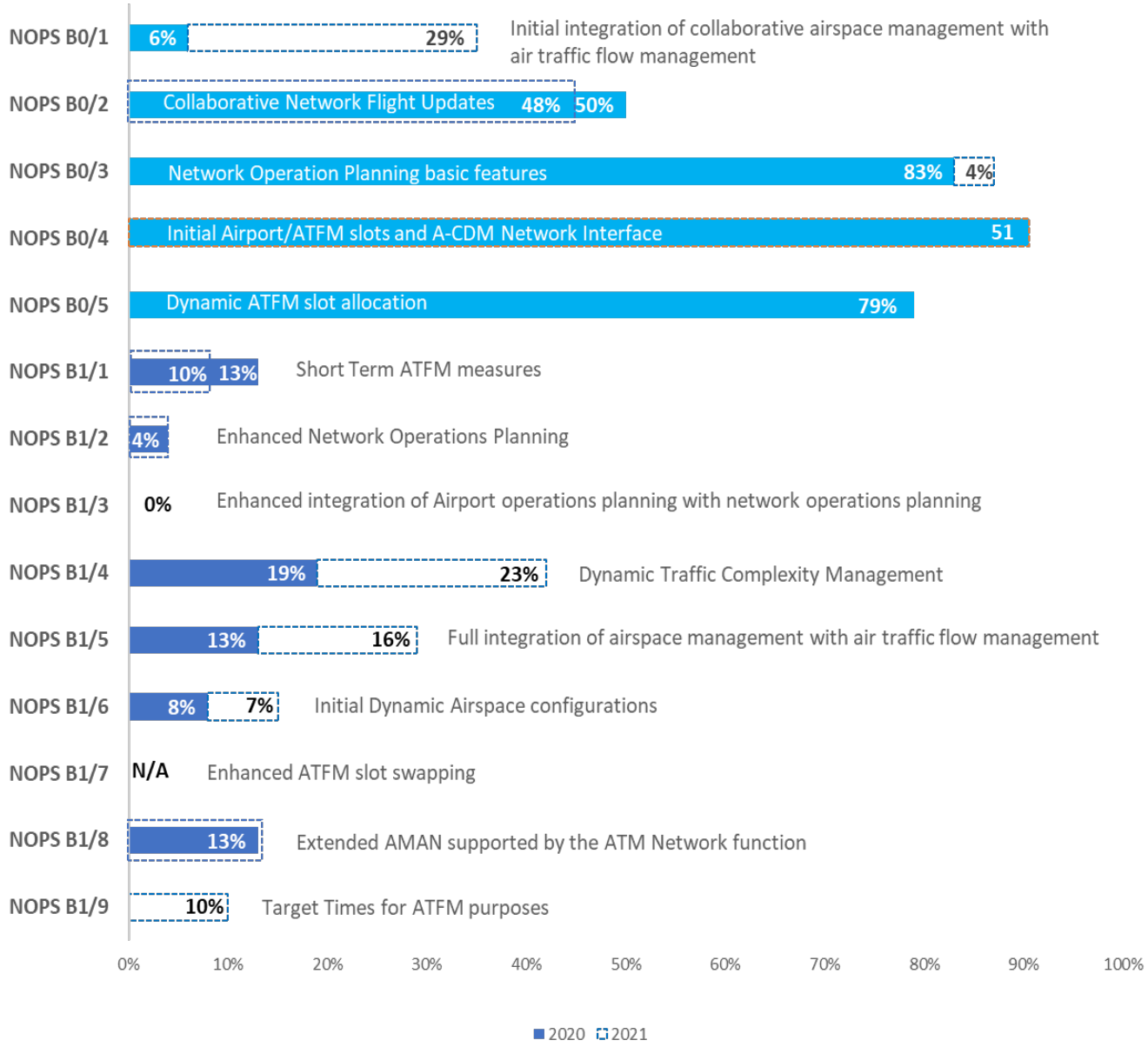
The dynamic traffic complexity management (**NOPS-B1/4**) has already been deployed by 22 States in the Region, another 14 States expecting completion in 2022. Among the implementers, 11 States have chosen to implement the tool which is provided by the NM while 10 have deployed local tools which are either exchanging or planned to exchange data with NM. It should be noted that, considering the levels of traffic, several States consider traffic load monitoring as sufficient to fulfil the requirements of the Element.

Only 8 States have implemented the initial dynamic airspace configurations (**NOPS-B1/6**) so far. However a substantial increase (14 States) is expected in 2022, mainly driven by the obligations imposed by the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) on the EU Member States.

The Element on slot swapping (**NOPS-B1/7**) involves the Centralised Flow Management Unit(s) and the Airspace Users during ATFM constrained situations as it allows the Airspace Users to balance the priorities of flights subject to the same ATFM regulation. This functionality has already been implemented by EUROCONTROL's NM in the ATFCM area, while it is mostly reported as not yet planned for the other States of the EUR Region.

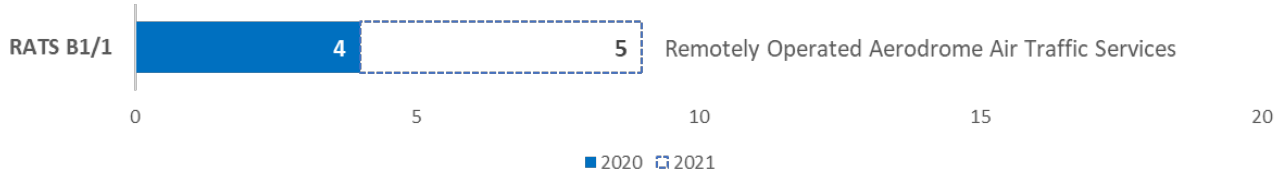
The implementation of Extended AMAN supported by the ATM Network Function (**NOPS-B1/8**) proves to be particularly challenging as it requires coordination with several ANSPs, sometimes going beyond the neighbouring ones as well as, within the ATFCM area, information exchanges with NM. For the time being, AMAN advisories from 6 airports in the Region are propagated to up to 180NM. More airports are expected to join as this feature is also driven by the CP1 Regulation (EU 116/2021 - Sub-AF 1.1.1 on AMAN extended to en-route) mandating the functionalities of the Element to a sub-set of 20 airports in the Region, by end 2024. However, more than half of the States in the EUR Region consider the Element as "Not applicable" or "Not yet planned" due to the lack of operational needs.

The deployment of target times for ATFCM purposes (**NOPS-B1/9**) has been monitored for the first time during this reporting cycle. For the time being the implementation is quite limited with only 5 States reporting completion and only one planning to deploy in 2022. Most of the implementers report plans for 2023 which is in line with the requirements of the CP1 Regulation (EU 116/2021 - Sub-AF 4.1.2 on Collaborative NOP) mandating the functionalities of the Element within the EU Member States. However, more than half of the States in the EUR Region consider the Element as "Not applicable" or "Not yet planned" due to the lack of perceived operational needs, considering the traffic levels and patterns.



RATS - Remote Aerodrome Air Traffic Services

Implementation of the Element addressing Remotely Operated Aerodrome Air Traffic Services (**RATS-B1/1**) is building up speed, with Remote/Digital Towers already used in operations at 9 locations in the EUR Region. Particularly encouraging is the growing interest in the deployment of Remote Tower Centres, with at least 17 other locations expected to enter operations before end 2023, indicating the first steps towards the virtualisation of service provision.

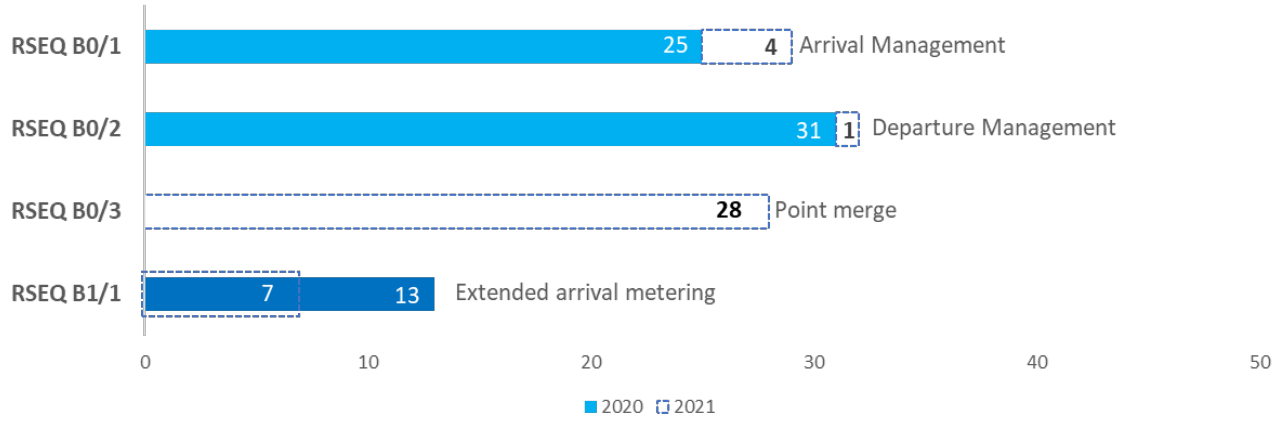


RSEQ - Improved traffic flow through runway sequencing

The implementation of (basic) Arrival management tools (**RSEQ-B0/1**) is well spread across the entire Region, with the Element already deployed at 29 locations while another 24 are expected to follow before end 2024. Still the Element is considered as "not applicable" by many airports where the amount and distribution of traffic does not justify the implementation of such tool. For maximal operational benefits, deployment of RSEQ-B0/1 should be followed by the more advanced functionality of **RSEQ-B1/1** dealing with extended arrival metering. As already mentioned in the context of NOPS-B1/8, the implementation of this advanced feature proves to be particularly challenging as it requires coordination with several ANSPs, sometimes going beyond the neighbouring ones. At the moment AMAN advisories from Vienna (LOWW), Frankfurt (EDDF), München (EDDM), Copenhagen (EKCH), Warsaw (EPWA), London Heathrow (EGLL) are extended to up to 180 NM while more than half of the States in the Region consider the Element as "Not applicable" or "Not yet planned" due to the lack of operational needs.

The Departure Management tools (**RSEQ-B0/2**) are already operational at 32 locations, in most of the cases as part of the A-CDM functionality. Completion is expected at another 16 locations by the end of 2024, still many airports consider the Element as "Not applicable" as the levels of traffic do not justify the investments.

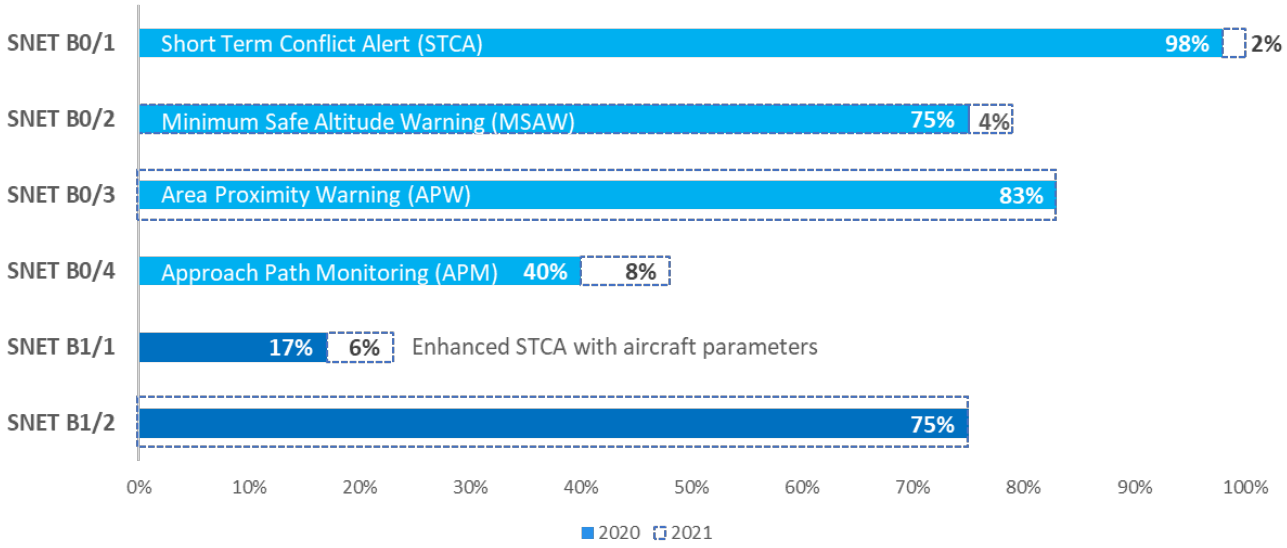
Point Merge (**RSEQ-B0/3**) was monitored for the first time during this reporting cycle therefore it is not yet possible to establish clear implementation trends, with regard the plans for deployment. For the time being the Element is implemented at 28 locations across the Region.



SNET - Ground-based Safety Nets

Overall, the safety nets are widely deployed within the Region. By far the most successful deployment is recorded by the Short Term Conflict Alert-STCA (**SNET-B0/1**) which has been implemented by all States in the Region. In terms of implementation progress, STCA is followed closely by the Area Proximity Warning (**SNET-B0/3**) already deployed by 43 States and expected to be deployed by another 5 States by end 2023. It should be noted that even among States which have not finalised implementation yet, the functionality is already deployed in parts of the airspace. The Minimum Safe Altitude Warning – MSAW (**SNET-B0/2**) function has also reached a very good level of implementation, with 40 States having reported completion. Implementation is expected by 7 other States by the end of 2023. A slightly lower completion rate has been reached by the Approach Path Monitor (**SNET-B0/4**) functionality with 25 States having completed the deployment. This is in particular because the implementation is seen as slightly less beneficial in fulfilling the operational needs in comparison with the other safety nets. Still, 12 States are expecting completion before the end of 2023.

The Block 1 Elements within the Thread are also progressing. The Enhancement of STCA with downlinked aircraft parameters (**SNET-B1/1**) is deployed by 12 States, while 5 States expect to finalise deployment by end 2023. Among all the available parameters, in order to enhance the STCA, all implementations use the Selected Altitude. It should be noted that for many other States (at least 21), the downlinked Selected Altitude parameter is available and shown for information on the controller screen, but it is not yet integrated with the safety tools (STCA). The deployment of (enhanced) STCA in (complex) TMAs (**SNET-B1/2**) has a high completion rate as it is already deployed by 38 States. However, this value includes the States which have implemented in TMAs the same STCA (linear) algorithms as in their en-route environments. Out of this overall completion, not more than 40% of the States have explicitly reported the implementation of enhanced STCA algorithms (in general based on multi-hypothesis).



SURF - Surface operations

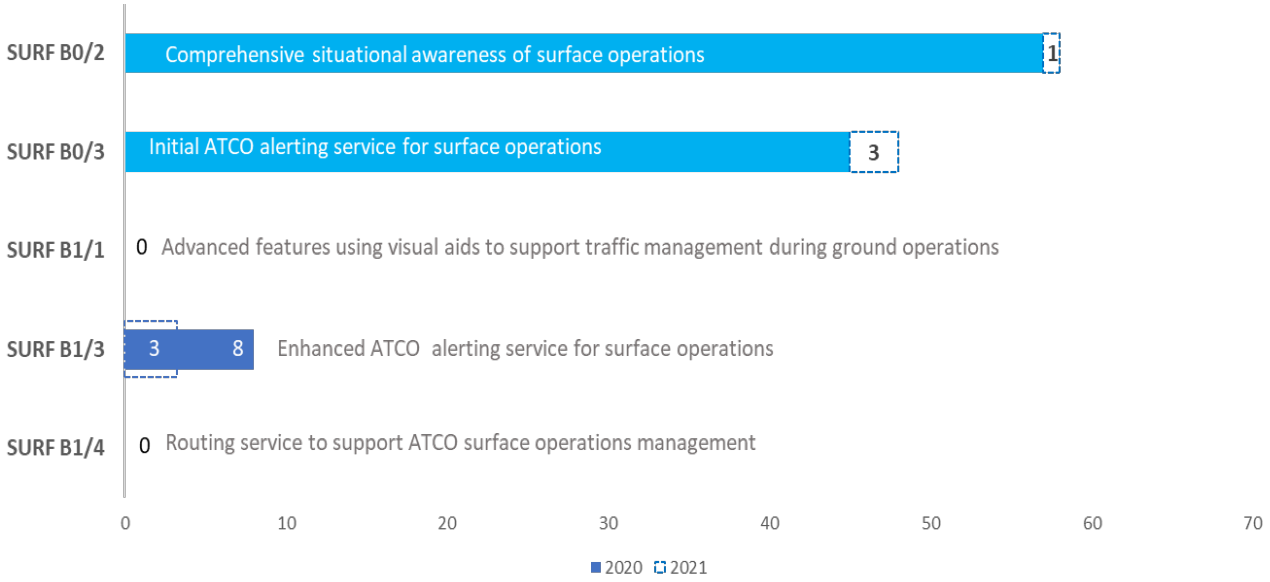
The implementation of the Elements within the Thread is progressing, not only in terms of completion rates (airports which have finalised deployment) but also in terms of airports joining the applicability areas (airports which decide to implement the Elements). The set of Elements provide for an incremental evolution of functionalities, starting from a basic surveillance service (**SURF-B0/2**) up to enhanced alerting (**SURF-B1/3**) and routing (**SURF-B1/4**) services.

The basic functionality provided by the A-SMGCS Surveillance Service (**SURF-B0/2**) is already operational at 58 locations while 10 others are expected to deploy it by end 2023. This is very encouraging as this functionality is essential as the fundament unlocking more advanced A-SMGCS features. The more advanced feature providing an initial alerting service for surface operations (**SURF-B0/3**) is already operational at 48 locations while 14 others are expected to finalise deployment by end 2023.

Meanwhile the more advanced A-SMGCS features included in Block 1, as the enhanced alerting service for surface operations (**SURF-B1/3**) and the routing service (**SURF-B1/4**) show a lower completion rate and a lower interest. This is mostly because many airports in the Region consider that the Bock 0 features are enough and fit for purpose for the foreseeable future and that an upgrade will be performed when the operational needs will require it. For the time being, SURF-B1/3 is implemented at 3 locations while no airport has implemented yet SURF-B1/4.

The functionality related to advanced features using visual aids to support traffic management during ground operations (**SURF-B1/1**) is not yet implemented anywhere in the EUR Region and for the time being it has an

extremely limited appeal for deployment as only one implementation is expected to take place between now and 2024. This low interest is justified by the complexity of the implementation requiring an advanced A-SMGCS system providing the guidance function, linked with the aerodrome lighting infrastructure.



4. Detailed progress assessment per ASBU Element

The following pages show a detailed assessment of implementation progress for each of the ASBU Elements within the scope of this Report. Below is the explanation of the different items and charts shown in these dedicated pages.

ACAS-B1/1	ACAS Improvements	B1

ATM Master Plan Level 3:	ATC16 – Implement ACAS II compliant with TCAS II change 7.1

ACAS

Description:

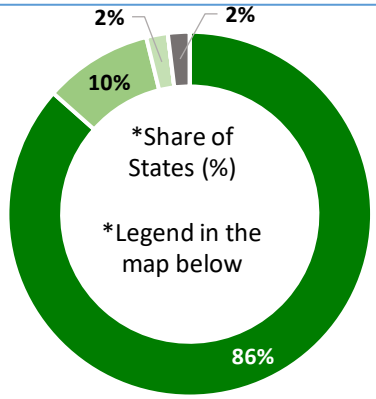
Traffic alert and Collision Avoidance System (TCAS) version 7.1 provides short-term improvements to existing Airborne Collision Avoidance Systems (ACAS) to reduce nuisance alerts, as well as to enhance the logic for some geometries. This will reduce trajectory deviations and increase safety in cases where there is a breakdown of separation.
TCAS systems selectively interrogate nearby aircraft to determine their position and velocity (using Mode C/S replies). This information is passed through "threat logic" to determine proximate traffic, issue traffic alerts, and issue collision avoidance "resolution advisories" to flight crews. Resolution advisories provide flight crews with vertical guidance (climb, descend, remain level, do not descend/climb) as appropriate to avoid collisions.

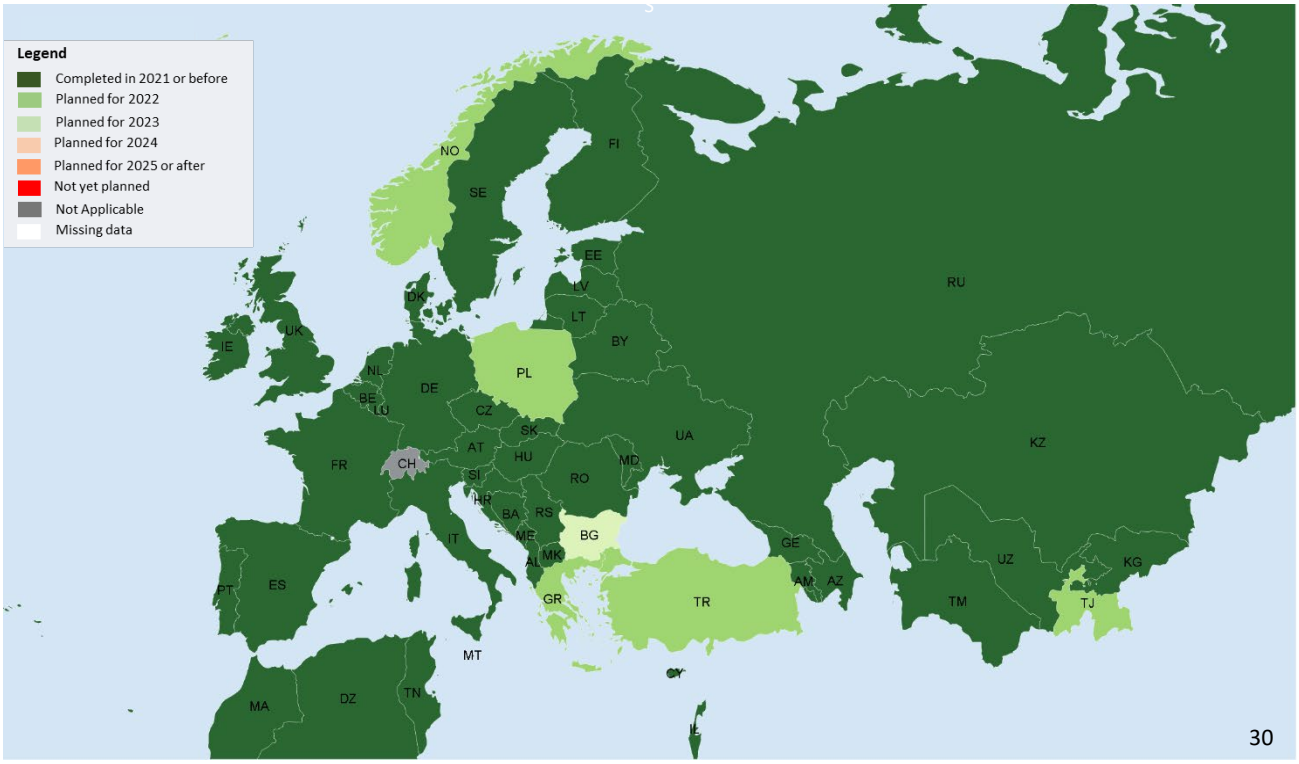
Implementation summary (end 2021):

There is a substantial completion rate of 88% (45 States) which is very positive from the perspective of the safety contribution of the Element.
It should be noted that among the States that have not finalized implementation yet, the Air Navigation Service Providers and the Regulatory Authorities have all fulfilled their tasks. The reason for delay in these States is the equipage of military transport-type aircraft, taking into account that for this category of airspace users the carriage/upgrade is voluntary, therefore it takes longer. The planned implementation dates in these States range from 2022 to 2023.
Even if Switzerland declared this objective/Element as not applicable the carriage of TCAS version 7.1 is enforced in the Swiss airspace.

New implementers in 2021:

None





ACDM-B0/1	Airport CDM Information Sharing (ACIS)	B0
ACDM-B0/2	Integration with ATM Network function	

ATM Master Plan Level 3:	AOP05 - Airport Collaborative Decision Making (A-CDM)

ACDM

Description:

Airport Collaborative Decision Making (A-CDM) is a concept that aims to improve the efficiency and resilience of airport operations by optimizing the use of resources and improving the predictability of air traffic. ACDM-B0/1 represents the first collaboration step among stakeholders involved in aerodrome operations. It consists in the definition of common specific milestones for several flight events taking place during surface operations. ACDM-B0/2 consists in feeding arrival information from the network into A-CDM and, at the same time, coordination of specific departure milestones.

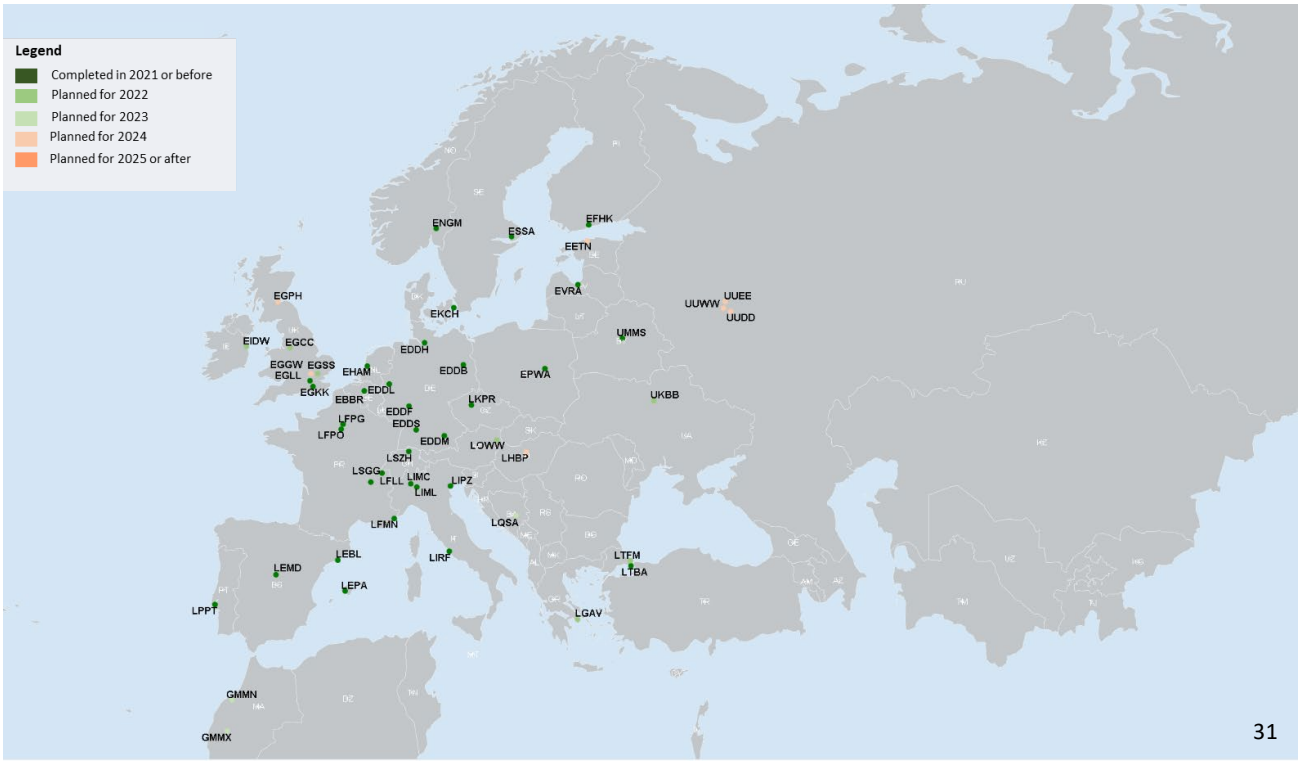
Implementation summary (end 2021):

The implementation of A-CDM in ICAO EUR Region continued, with one airport (EVRA) having reached completion in 2021 (2 other airports, EDDH and EDDS, have joined the applicability area as "Completed", with completion dates before 2021). However, the element is one of the heaviest impacted by the COVID-19 pandemic with some 20% of the implementers reporting delays caused by the pandemic. Implementation is planned at another 17 airports before the end of 2024.

For most of the non-LSSIP States of the Region, this element is considered "not applicable" or "not yet planned" because of the lack of operational need. Among these States, A-CDM is currently implemented at Minsk (UMMS) airport while the work is ongoing at Vnukovo (UUWW), Domodedovo (UUDD) and Sheremetyevo (UUEE) airports with implementation expected in 2024. The only difference in the progress of the 2 elements is shown by UMMS which has implemented ACDM-B0/1 while ACDM-B0/2 is expected for 2025.

New implementers in 2021:

EVRA



ACDM-B1/1	Airport Operations Plan (AOP)	B1

ATM Master Plan Level 3:	AOP11.2 - Extended Airport Operations Plan

ACDM

Description:

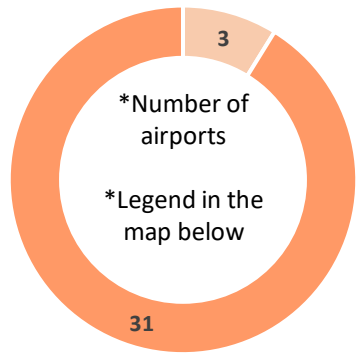
This element consists of a collaborative Airport Operations Plan (AOP) which encompasses "local" airport information and shared information with the ATM network in order to develop a synchronized view for the integration of local airport operations as well as aircraft operations into the overall ATM network.
The AOP includes an airport performance framework and steers with specific performance indicators and targets aligned with the regional/national performance frameworks, building upon ACDM.
Information on resources and aircraft operation plans is available to the different operational units on the airport and elsewhere in ATM.

Implementation summary (end 2021):

Since the previous edition of the Report, the link between the Element and the ATM Master Plan Level 3 has been reviewed and the Element is linked now to the "Extended Airport Operation Plan" Implementation Objective. This change had an impact on the implementation progress as this functionality is not yet implemented anywhere in the EUR Region. The first implementations are expected in 2024 (Vnukovo (UUWW), Domodedovo (UUDD) and Sheremetyevo (UUEE) airports in Russian Federation) to be followed by Minsk (UMMS) in 2025 and by a massive expansion in 2027 which is the date mandated by the CP1 Regulation (EU 116/2021), binding to 28 airports in the applicability area. Among the remaining airports in the EUR Region, this element is mostly considered "not applicable" or "not yet planned" due to the lack of operational needs.

New implementers in 2021:

Info not available – first monitoring cycle of the Implementation Objective



APTA-B0/1	PBN Approaches (with basic capabilities)	B0

ATM Master Plan Level 3:	NAV10 - RNP Approach Procedures to instrument RWY

APTA

Description:

This element represents the use of PBN in design of approach procedures to provide more flexibility to airspace planners to manage the use of airspace, and to facilitate access to airports. It includes the provision of instrument approach procedures with vertical guidance in support of stabilized approaches.

PBN approaches allow for guided lateral paths (LNAV) and (optionally) with associated advisory vertical paths based on Baro-VNAV functionality for equipped aircraft (LNAV/VNAV).

Implementation summary (end 2021):

The implementation of Performance-Based Navigation (PBN), relying on GNSS as the primary navigation means, is well under way in the EUR Region. It represents one of the cornerstones for the CNS rationalization (in particular that of the ground-based navigation aids (navaids)). In EU Member States it is mandated by the PBN Implementing Rule (2018/1048).

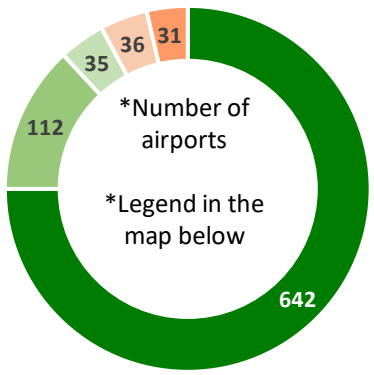
More than 640 airports have already published their PBN approach procedures down to LNAV or LNAV/VNAV minima for at least one runway-end across the EUR Region, with many more in the pipeline for implementation in the next few years (some 150 locations by the end of 2023). This number should be considered rather conservative, as the situation is constantly evolving and new procedures are being published in AIPs.

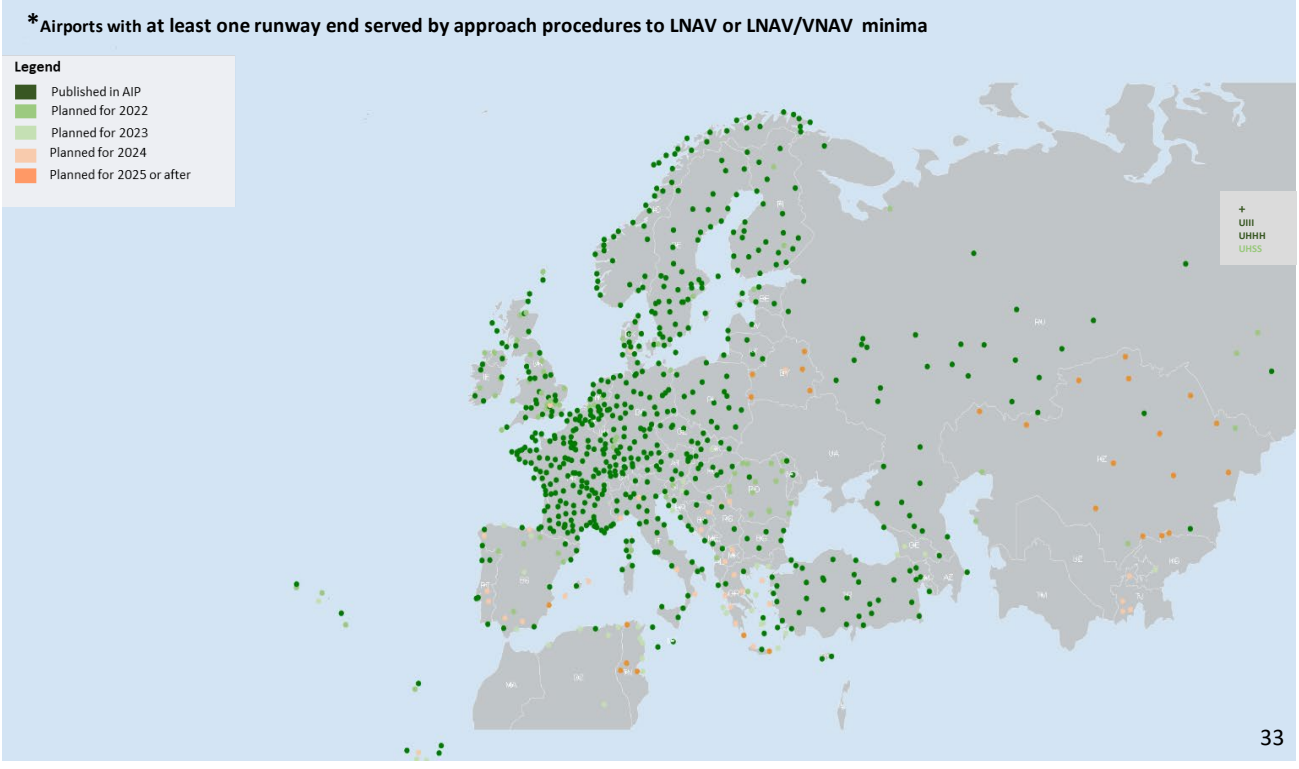
Note1: LPV and RNP AR approaches are covered by APTA-B1/1.

Note2: the information presented is extracted from the EUROCONTROL PBN MapTool as well as from the questionnaire addressed to the non-LSSIP States.

New implementers in 2021:

36 airports





APTA-B0/2	PBN SID and STAR procedures (with basic capabilities)	B0

ATM Master Plan Level 3:	NAV03.1 – RNAV 1 in TMA Operations

APTA

Description:

This Element represents the use of PBN in design of arrival and departure procedures to provide more flexibility to airspace planners to manage the use of airspace for enhancing arrival and departures in terminal areas. It provides the basic capability to support the implementation of CDO and CCO operations.

The flexibility of arrival path design supports the ability to connect en-route to the approach in an optimal manner, enabling better airspace management, reduced path distance, and reduced noise footprint. A precisely defined arrival path supports more optimum descent planning in operations and provides a building block for reducing ATC intervention during descent.

Implementation summary (end 2021):

The implementation of Performance-Based Navigation (PBN), relying on GNSS as the primary navigation means, is well under way in the EUR Region. It represents one of the cornerstones for the CNS rationalization (in particular that of the ground-based navigation aids (navaids)). In EU Member States it is mandated by the PBN Implementing Rule (2018/1048).

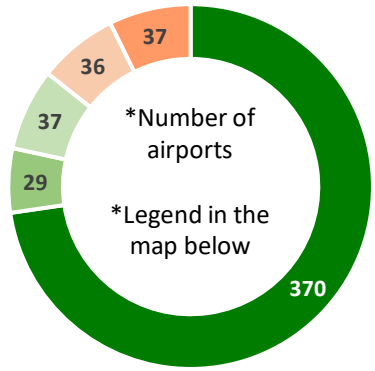
At least 370 airports throughout the Region are already served with PBN SID and STAR procedures based on RNAV1 performance requirements. Another 66 are expected to achieve completion before the end of 2023. Among the non-LSSIP States the interest is also high, with the Russian Federation leading the way with 64 airports having this Element already completed or planned in the very short term.

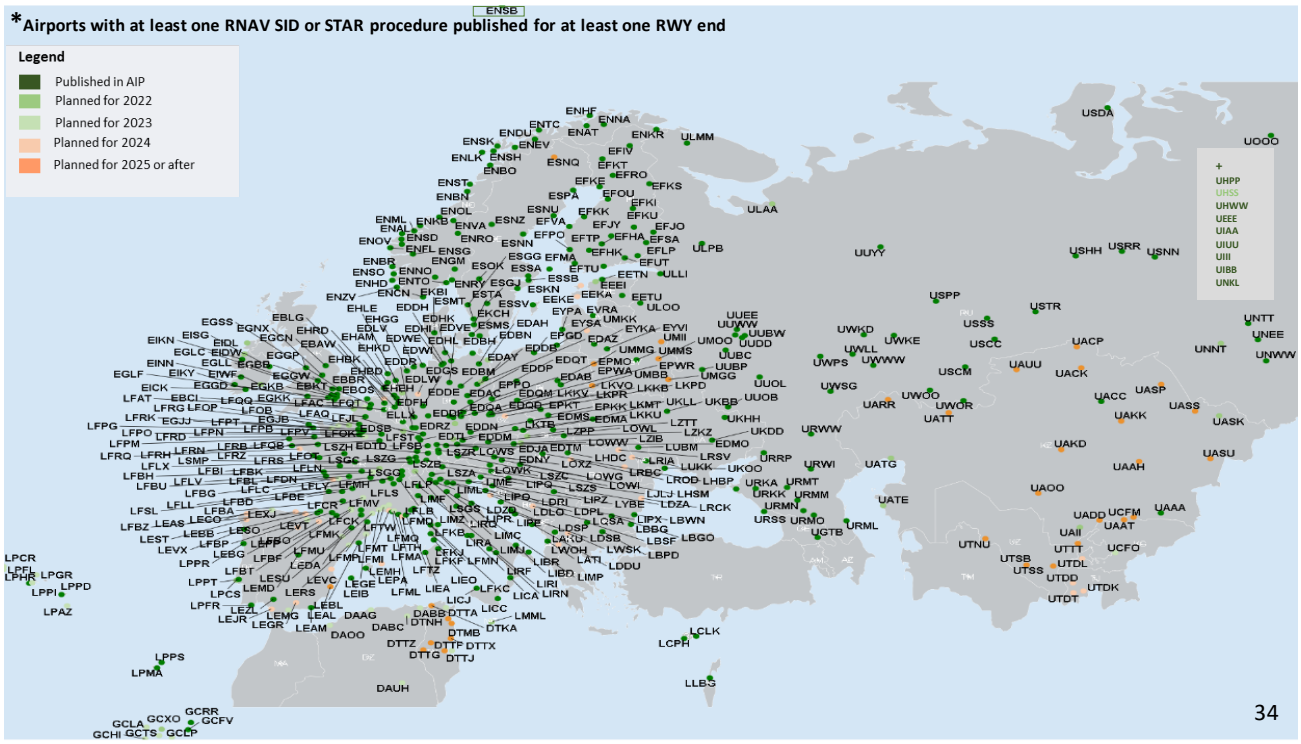
Note1: the PBN IR gives choice to the stakeholders to decide on the need for SID and STAR procedures, as well as on the applicable specifications - RNAV1 or RNP1.

Note2: the information presented is extracted from the EUROCONTROL PBN MapTool as well as from the questionnaire addressed to the non-LSSIP States

New implementers in 2021:

64 airports





APTA-B0/3	SBAS/GBAS CAT I precision approach procedures	B0

ATM Master Plan Level 3:	/

APTA

Description:

This element represents the use of augmented GNSS systems to allow aircraft operation with a more precise vertical and lateral navigation capability. Introduction of SBAS and GBAS CAT I procedures allow for reduced minima at aerodromes situated in areas of significant terrain, where ILS is not possible. It also provides a building block for aircraft with equipment such as SVS, EVS HGS to operate to decision altitudes below standard CAT I Minimums using special operational authorizations. For aircraft with such approvals, this increases airport availability in weather conditions that would otherwise preclude operations.

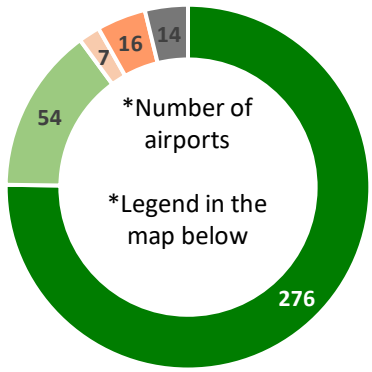
Implementation summary (end 2021):

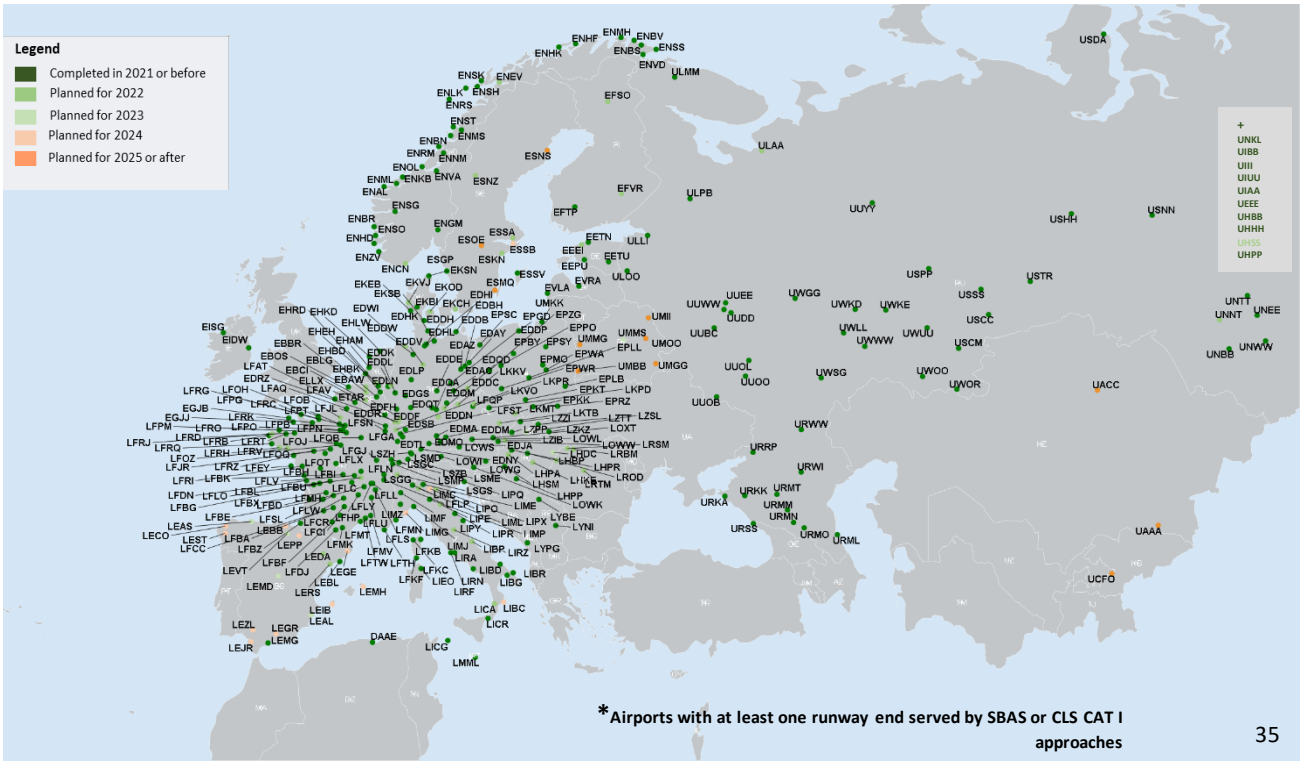
The interest in SBAS and GBAS approaches to CAT I minima is quite large among airports within the EUR Region. At least 272 airports have so far published such approaches for at least one runway-end in the national AIPs. Vast majority of these are LPV CAT I (SBAS), while GLS approaches are currently implemented or planned at more than 70 airports throughout the EUR Region, most of which in Norway and Russian Federation (see NAVS-B0/1).The implementation is continuous and more airports are likely to deploy the Element. Among them, 61 airports expect to finalise deployment by the end of 2023.Among the non-LSSIP States, the Element is implemented, or planned, to be implemented in Algeria, Belarus, Kazakhstan, Kyrgyzstan and Russian Federation (which has already implemented the Element at 55 locations).

Note: the information presented is extracted from the EUROCONTROL PBN MapTool as well as from the questionnaire addressed to the non-LSSIP States.

New implementers in 2021:

34 airports





APTA-B0/4	CDO (Basic)	B0
APTA-B1/4	CDO (Advanced)	B1

ATM Master Plan Level 3:	**ENV01** - Continuous Descent Operations (CDO)

APTA

Description:

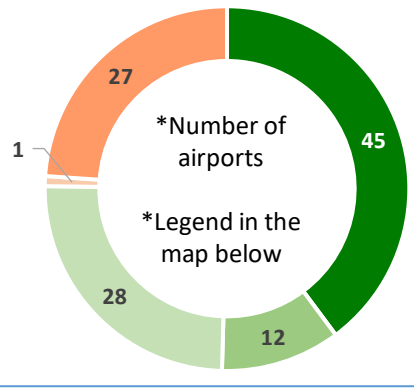
CDO represent ATC procedures to facilitate uninterrupted descent, reducing fuel burn and ATC/Pilot interaction. Arriving aircraft are allowed to descend continuously from top of descent by employing minimum engine thrust, ideally in a low drag configuration, prior to the Initial Approach Fix (IAF).
Advanced CDO builds on the basic CDO capabilities and adds advanced vertical path management. PBN with vertical navigation (VNAV) which is an altimetry-based capability is used, allowing equipped aircraft to precisely descend on a vertical path, as computed by avionics equipment, while providing the flight crew with navigation performance information.

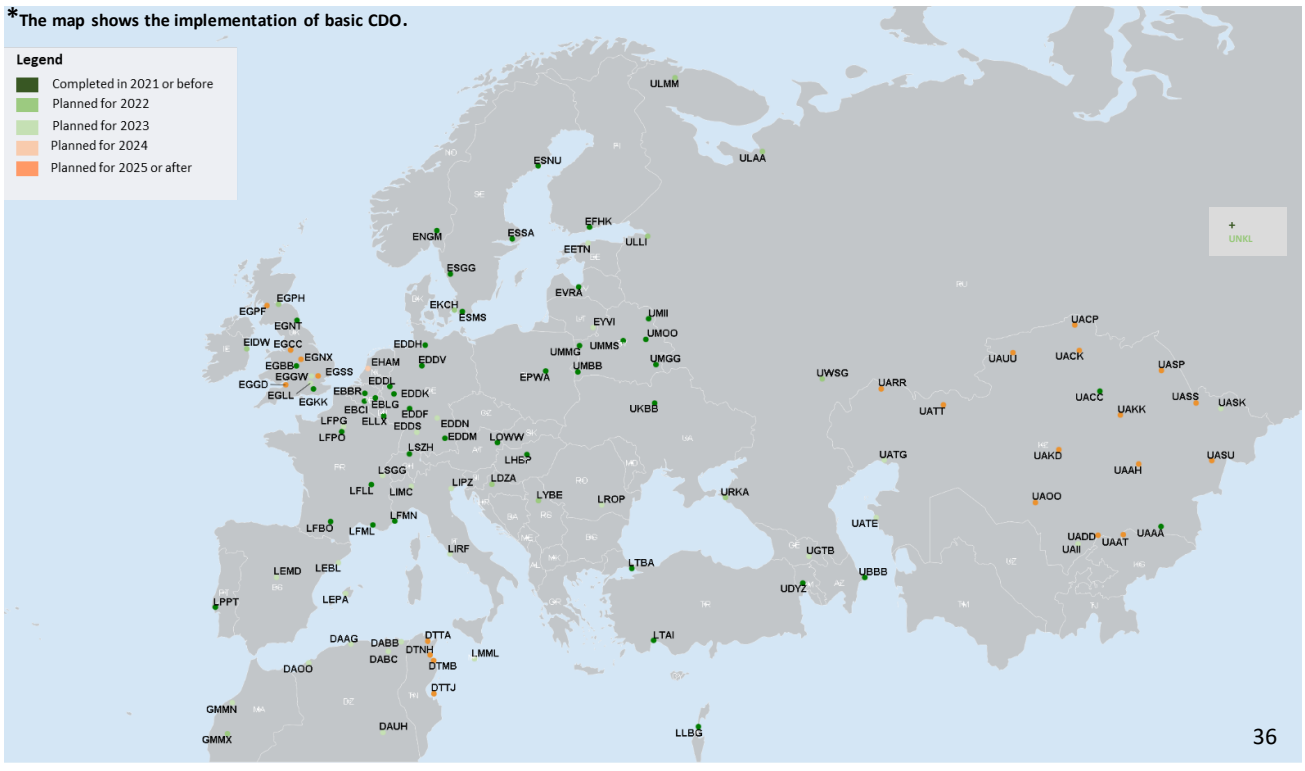
Implementation summary (end 2021):

Even if the implementation of Continuous Descent Operations (CDO) has been among the ones for which several stakeholders have reported delays caused by the COVID-19 pandemic, it has achieved good progress with 8 airports having completed implementation in 2021. Basic CDO (at least) is now operated at 45 airports in the EUR Region, while 40 others are expected to join by 2023. Among LSSIP States within the Region, Basic CDO has been already implemented at 7 airports in Belarus and 2 more in Kazakhstan, while the implementation is planned at a number of airports in Algeria, Kazakhstan, Russian Federation and Tunisia, most of them expecting completion by 2023. There is slightly lower progress of the Advanced CDO Element, with only 36 airports having reported completion while other 24 expect to finalise deployment by 2023. The non-LSSIP States show less interest in the Advanced CDO, the Element being planned for implementation only in Belarus (2030) and Kazakhstan (2025).

New implementers in 2021:

EFHK, LFML, LFPO, ELLX, EVRA, LTAI, LTBA and EGKK





APTA-B0/5	CCO (Basic)	B0
APTA-B1/5	CCO (Advanced)	B1

ATM Master Plan Level 3:	**ENV03** - Continuous Climb Operations (CCO)

APTA

Description:

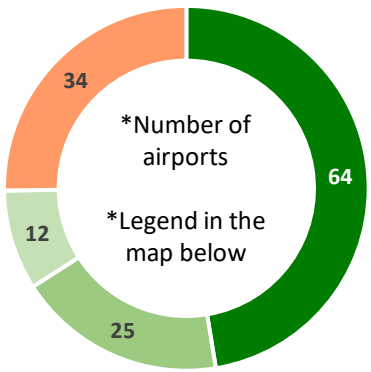
CCO represent ATC procedures to facilitate uninterrupted climb, reducing fuel burn and ATC/Pilot interaction. Departing aircraft are allowed to climb continuously, to the greatest possible extent, by employing optimum engine thrust. An optimal continuous climb should start on take-off and allow the aircraft to climb efficiently using climb profiles that reduce controller pilot communications and segments of level flight until the top of climb. Advanced CCO builds on the basic CCO capabilities and adds advanced vertical path management. PBN with vertical navigation (VNAV) allows equipped aircraft to precisely ascend on a vertical path, while providing the flight crew with navigation performance information.

Implementation summary (end 2021):

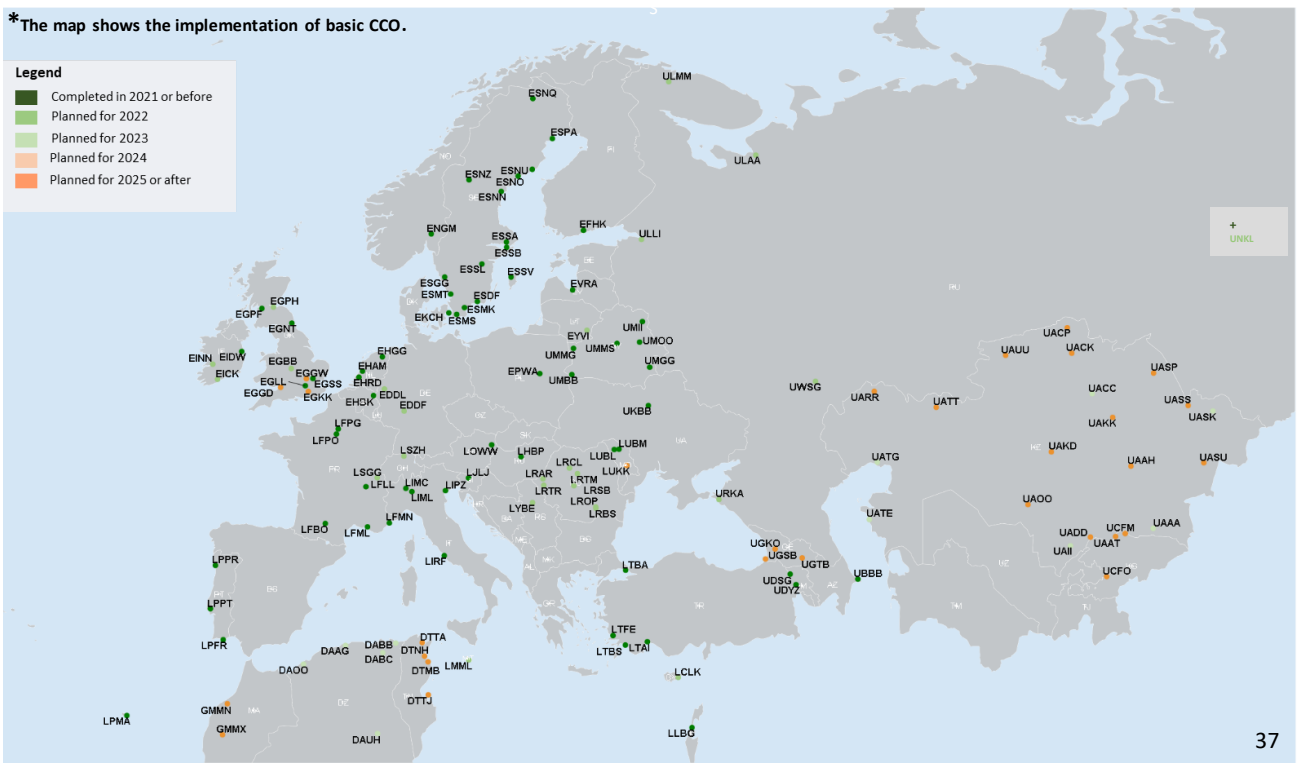
Continuous Climb Operations (CCO) are widely implemented throughout the ICAO EUR Region, with a total of 64 airports already applying (at least) Basic CCOs and 38 having plans for deployment before end 2023.Among the non-LSSIP States within the Region, basic CCOs are applied at 7 airports in Belarus and 2 in Kazakhstan , while the implementation is planned in Algeria, Kyrgyzstan, Kazakhstan, Russian Federation and Tunisia, most of them expecting completion by 2023. There is slightly lower progress of the Advanced CDO Element, in the Region, with only 57 airports having reported completion while other 19 expect to finalize deployment by end 2022. The non-LSSIP States show less interest in the Advanced CDO, the Element being planned for implementation only in Belarus, Kyrgyzstan and Kazakhstan but not before 2025 .

New implementers in 2021:

EVRA, EPWA and UKBB



*The map shows the implementation of basic CCO.



APTA-B0/6	PBN Helicopter Point in Space (PinS) Operations	B0

ATM Master Plan Level 3:	NAV12 – ATS IFR Routes for Rotorcraft Operations

APTA

Description:

PBN Point in Space (PinS) operations include arrivals and departure procedures, specific to helicopters, that allow visual landing and take-off operations from heliports or other landing locations.
Helicopter unique capabilities allow IFR operations that start or terminate from any suitable point in space (PinS), as long as visual conditions support take-off/landing capability from that point.

Implementation summary (end 20201:

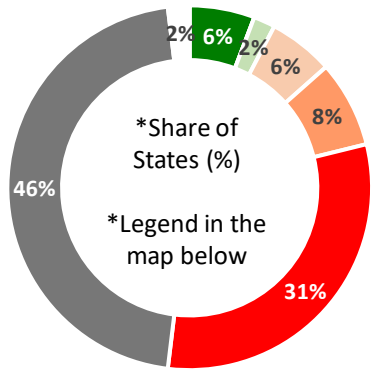
The interest for the deployment of the element remains modest, with the vast majority of States (almost 80%) having no plans to implement or considering the element as not applicable. The main reason for not implementing the Element is the lack of business or operational needs, as well as the characteristics of the operational environments. Only 3 States (EE, CH, NO) have implemented the Element another one (IE) expecting to finalise deployment by end 2023.

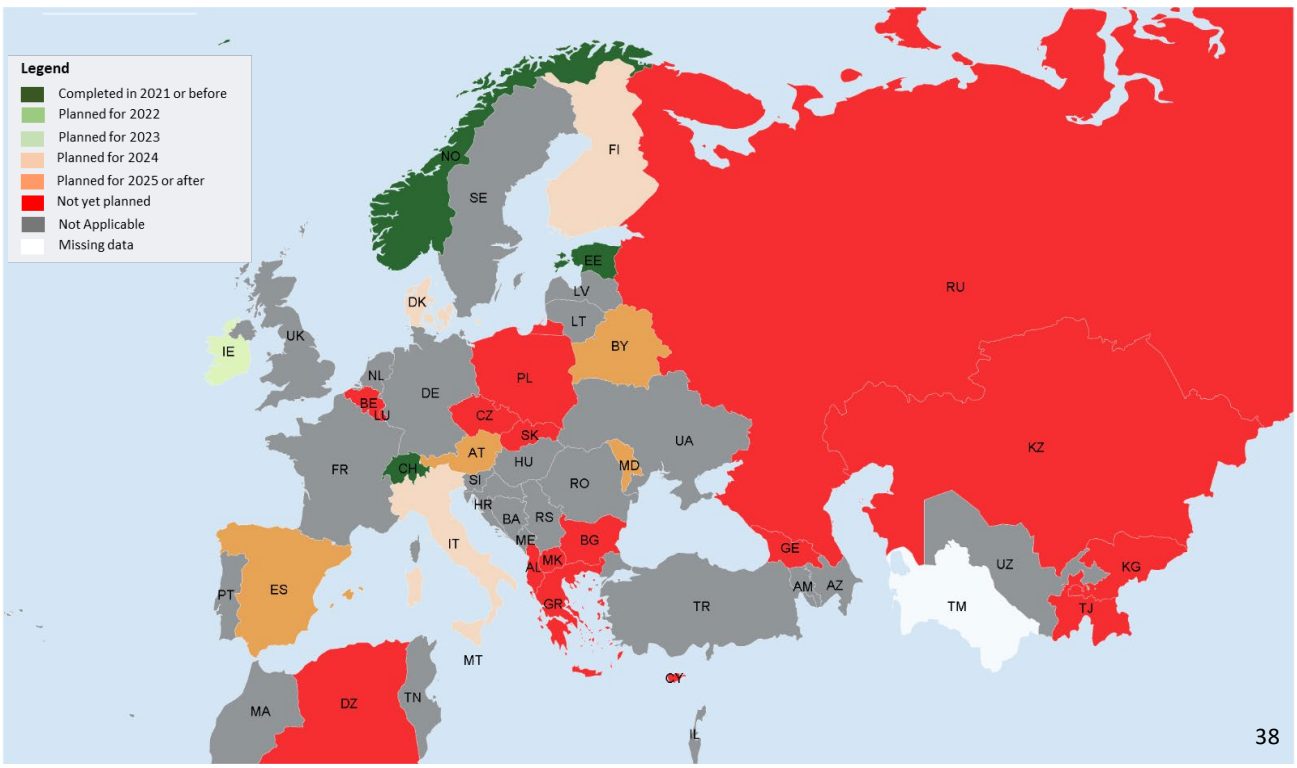
Among the non-LSSIP States within the Region, only Belarus plansto implement the Element, by 2030.

In Norway, Avinor has published IFR routes for helicopters in several TMAs. Furthermore, Low Flight Network (LFN) has been implemented in Switzerland for helicopter IFR flights based on RNP0.3 while Estonia has deployed LLR procedures only in Tallinn CTR .

New implementers in 2021:

EE





APTA-B1/1	PBN Approaches (with advanced capabilities)	B1

ATM Master Plan Level 3:	NAV10 - RNP Approach Procedures to instrument RWY

APTA

Description:

This element represents the use advanced features of PBN in design of approach procedures to provide more access to airports in challenging environments, where conventional procedures are unsuitable.

PBN approaches with advanced functionality allow for the introduction of more flexible approaches including the use of RF legs within the Final Approach Segment (FAS) and RNP. Advanced RNP is the navigation specification which encompasses all elements of PBN (excluding RNP AR APCH). RNP AR APCH requires a Specific Approval.

Implementation summary (end 2021):

The implementation of Performance-Based Navigation (PBN), relying on GNSS as the primary navigation means, is well under way in the EUR Region. It represents one of the cornerstones for the CNS rationalization (in particular that of the ground-based navigation aids (navaids)). In EU Member States it is mandated by the PBN Implementing Rule (2018/1048).

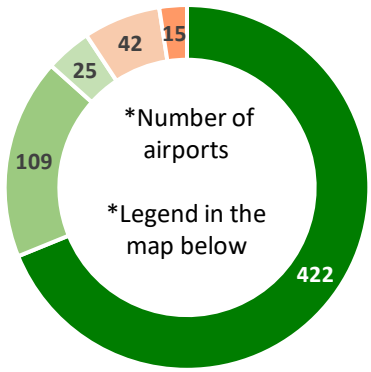
The interest in deploying advanced RNP approach procedures remains high across the Region, with at least 422 airports having such procedures already published in AIP for at least one of its runway-ends. Another 134 airports intend to publish LPV or RNP AR approach procedures before end 2023. It should be noted that for a number of airports the main constraint to implement this ASBU element is insufficient EGNOS coverage.

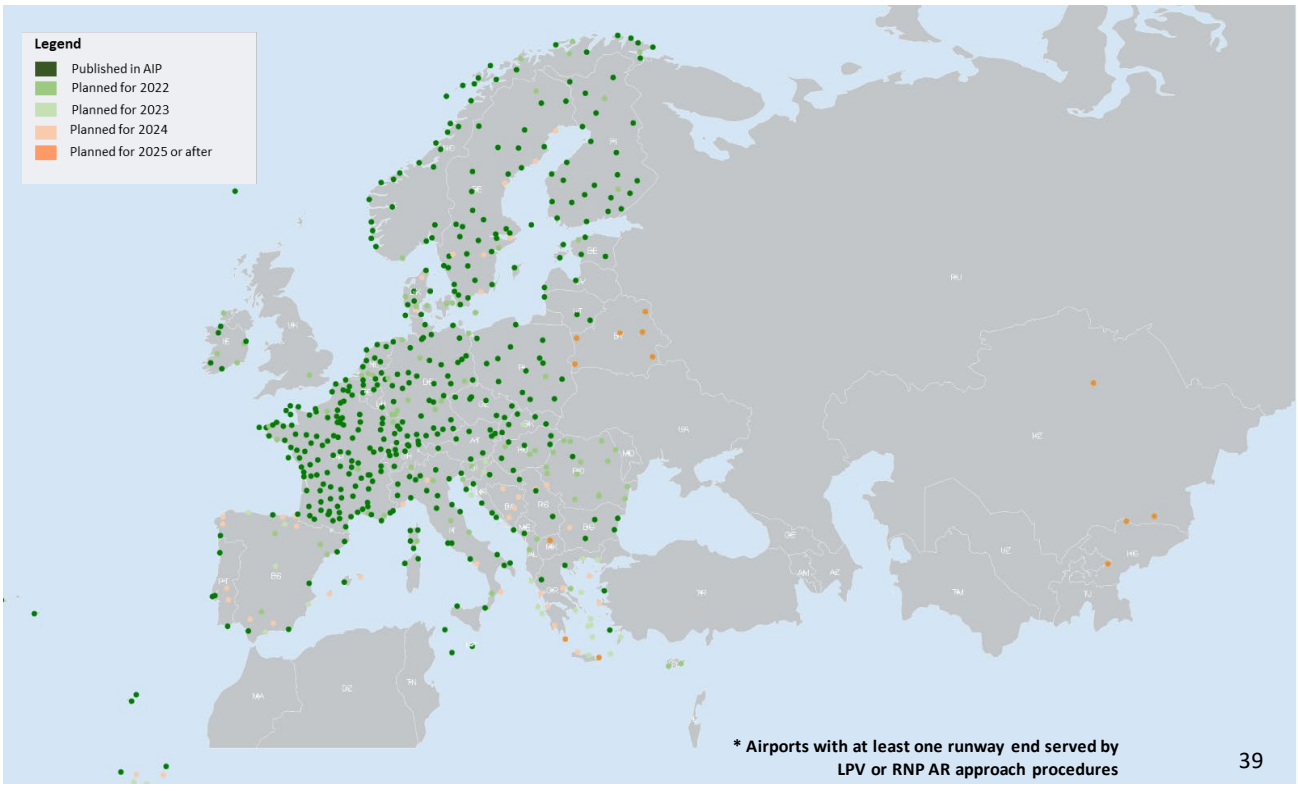
Among the non-LSSIP States the Element is only planned by Belarus, Kazakhstan and Kyrgyzstan.

Note: the information presented is extracted from the EUROCONTROL PBN MapTool as well as from the questionnaire addressed to the non-LSSIP States.

New implementers in 2021:

33 airports





APTA-B1/2	PBN SID and STAR procedures (with advanced capabilities)	B1

ATM Master Plan Level 3:	NAV03.2 – RNP 1 in TMA Operations

APTA

Description:

This element represents the use advanced features of PBN in design of arrival procedures to provide more flexibility in airspace design (e.g., RF legs outside of the Final Approach Segment), leading to greater efficiency in the terminal area and increased capacity.

Advanced RNP is the navigation specification which encompasses all elements of PBN (but excluding RNP AR APCH). It requires an FMS based on a TSO-C115d.

Implementation summary (end 2021):

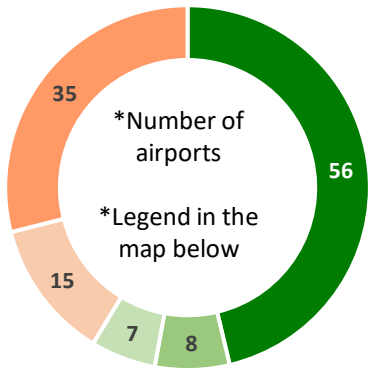
The implementation of Performance-Based Navigation (PBN), relying on GNSS as the primary navigation means, is well under way in the EUR Region. It represents one of the cornerstones for the CNS rationalization (in particular that of the ground-based navigation aids (navaids)). In EU Member States it is mandated by the PBN Implementing Rule (2018/1048). However the interest in RNP1 SIDs and STARs with RF legs is still limited within the Region as many States indicate lack of business (operational) needs for RNP1 implementation, stating that RNAV1 is sufficient at the moment. Still 56 airports have implemented the Element, 15 other expecting to complete it by end 2023. Among the non-LSSIP States, interest in deployment is expressed by Belarus, Kazakhstan and Kyrgyzstan, all reporting plans within 2025-2028 timeframe.

Note1: It should be noted that the PBN IR gives choice to the stakeholders to decide on the need for SID and STAR procedures, as well as on the applicable specifications - RNAV1 or RNP1.

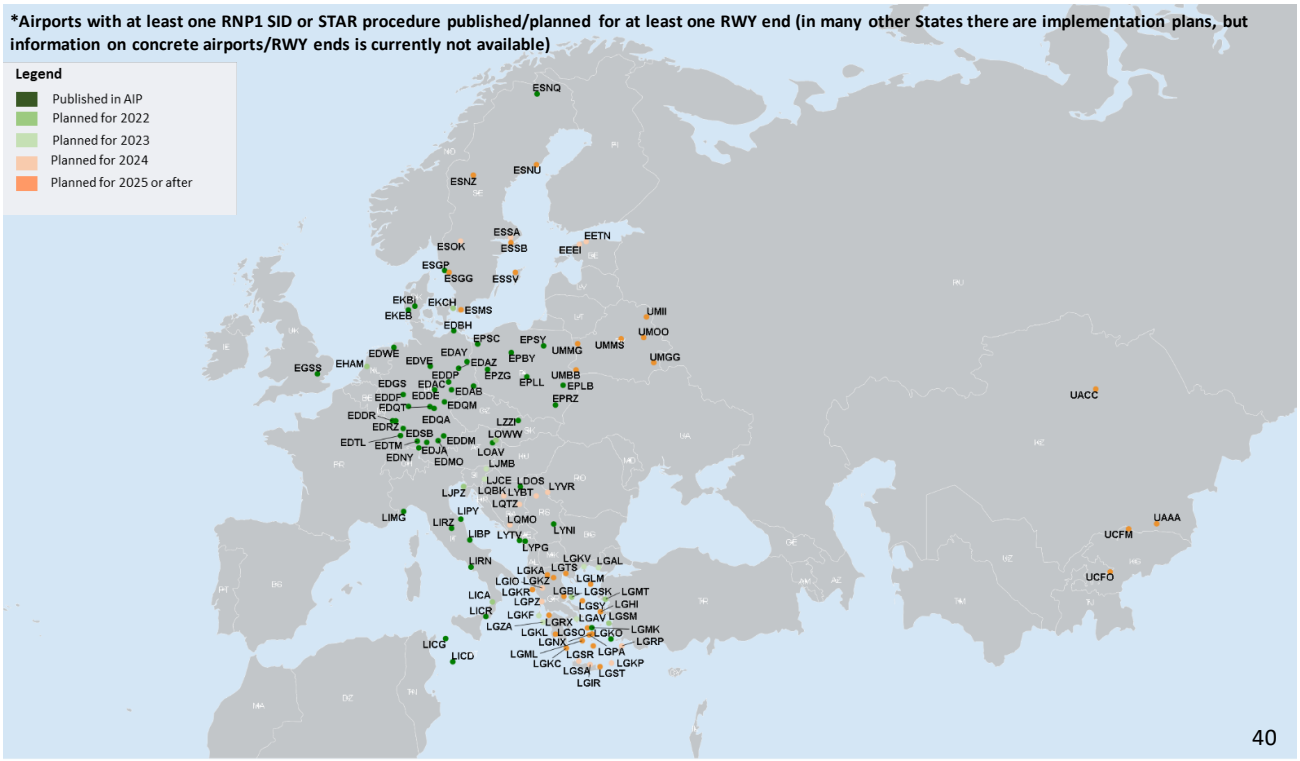
Note2: the information presented is extracted from the EUROCONTROL PBN MapTool as well as from the questionnaire addressed to the non-LSSIP States.

New implementers in 2021:

39 airports



***Airports with at least one RNP1 SID or STAR procedure published/planned for at least one RWY end (in many other States there are implementation plans, but information on concrete airports/RWY ends is currently not available)**



ASUR-B0/1	Automatic Dependent Surveillance – Broadcast (ADS-B)	B0

ATM Master Plan Level 3:	/

ASUR

Description:

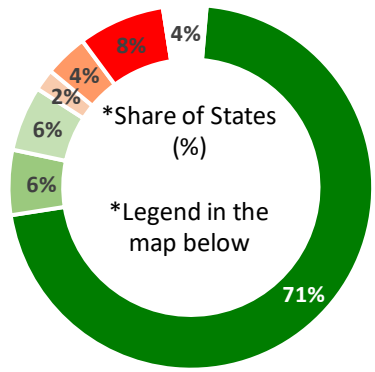
Automatic Dependent Surveillance – Broadcast (ADS-B) provides an aircraft's identification, position, altitude, velocity, and other information to any receiver (airborne or ground) within range. The broadcasted aircraft position/velocity is normally based on the global navigation satellite system (GNSS) and transmitted at least once per second.
As such, ADS-B supports the provision of Air Traffic Services and operational applications at reduced cost and increased surveillance coverage.

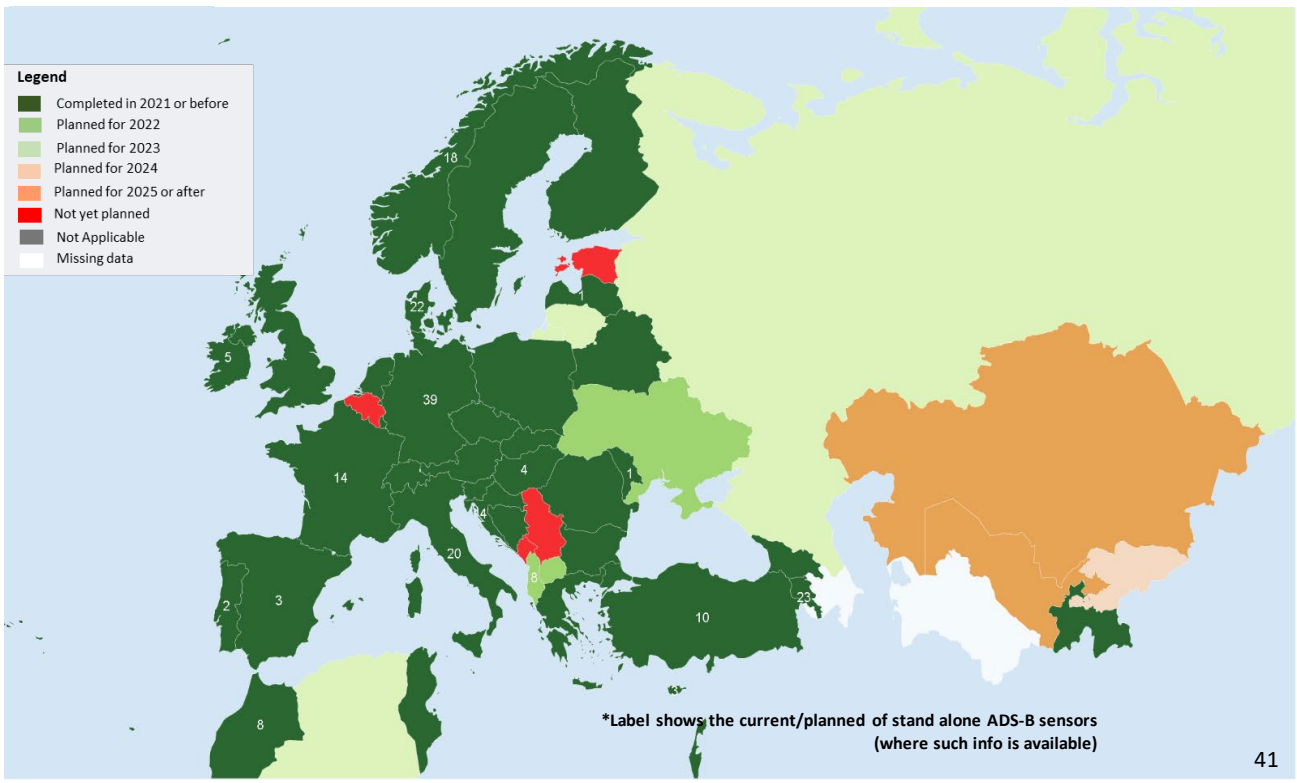
Implementation summary (end 2021):

Deployment of the Element continues within the EUR Region with more and more ADS-B stations deployed either as stand alone and/or integrated within MLAT/WAM systems. In most of the cases the Element is deployed in order to fill gaps in the surveillance coverage, to replace aging infrastructure or to provide a supplementary layer of surveillance.
It should be noted that even among the States which have not yet reported the completion of the Element (e.g. Kazakhstan, Russian Federation), ADS-B stations have already been installed, however they may not have been integrated yet in the surveillance systems.

New implementers in 2021:

BA
(but new sensors constantly being installed across ICAO EUR Region)





ASUR-B0/2	Multilateration cooperative surveillance systems (MLAT)	B0
ATM Master Plan Level 3:	/	ASUR

Description:

MLAT is a new technique providing independent cooperative surveillance. The MLAT system interrogates an aircraft and the transponder reply is received by multiple receivers located in different places. The reply's times of arrival difference at the receivers allows the position of the source of signals to be determined, with an accuracy that is dependent on the number of receivers and their location relative to the aircraft. MLAT allows cooperative surveillance in rough terrain such as in mountainous regions or on airport surfaces where surveillance systems requiring a rotating radar dish had performance difficulties. The technique is now also used to provide surveillance over wide area (wide area MLAT system - WAM).

Implementation summary (end 2021):

The interest in using multilateration (MLAT) technique for providing surveillance at airports (LAM - Local Area Multilateration) or over wide areas (WAM - Wide Area Multilateration) is quite high within the EUR Region and especially in the LSSIP States.

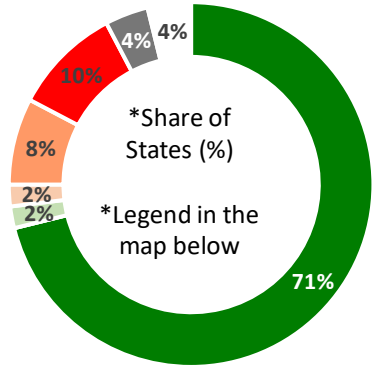
It is estimated that slightly more than 70% of the States in the Region are already using MLAT. In most of the cases the Element is deployed in order to fill gaps in the surveillance coverage, to replace aging infrastructure or to provide a supplementary layer of surveillance. In most of the cases, the MLAT systems also have an ADS-B capability as receivers are collocated.

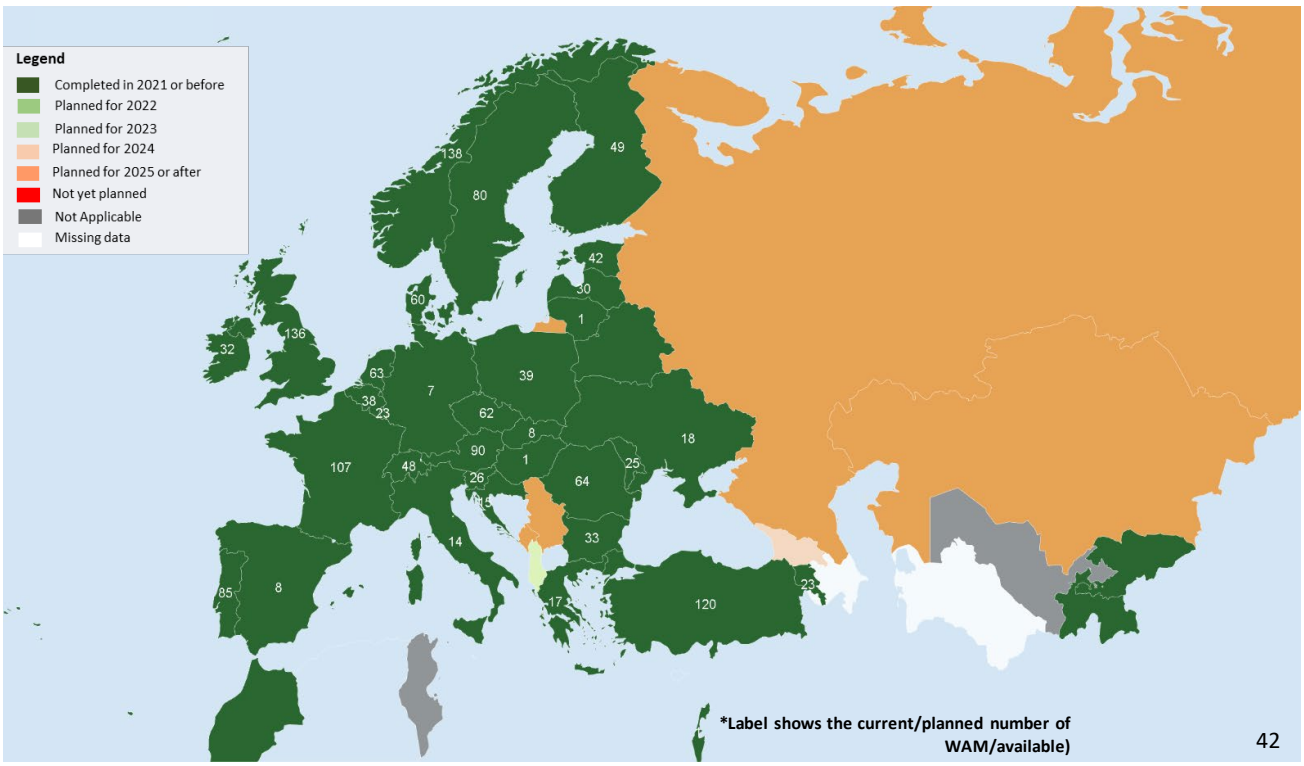
LAM is already widely used to enable airport surface surveillance, allowing the implementation of Advanced Surface Movement Guidance and Control Systems (A-SMGCS).

New implementers in 2021:

None

(However new sensors constantly being installed across ICAO EUR Region)





ASUR-B0/3	Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-DAPS)	B0

ATM Master Plan Level 3:	/

ASUR

Description:

Downlink of Aircraft Parameters (DAPS) includes both Controller Access Parameters (CAPs) and System Access Parameters (SAPs). Possible CAPs include Magnetic Heading, Indicated Airspeed / Mach Number, Barometric rate of climb/descent, and Selected Altitude (which can also be consider a SAP). SAPs include Roll Angle, Track Angle Rate, True Track Angle, and Barometric Pressure Setting. SSR-DAPS enables ATM systems to obtain additional information from an aircraft transponder, via interrogation by a cooperative surveillance system (Mode S radar or MLAT). This additional information can be used to increase controller awareness and reduce the volume of air-ground voice communications, and/or to improve the performance of tracking systems or safety net systems such as STCA and MSAW.

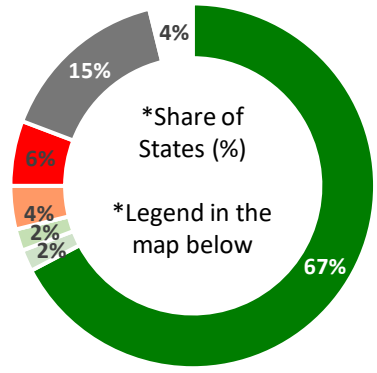
Implementation summary (end 2021):

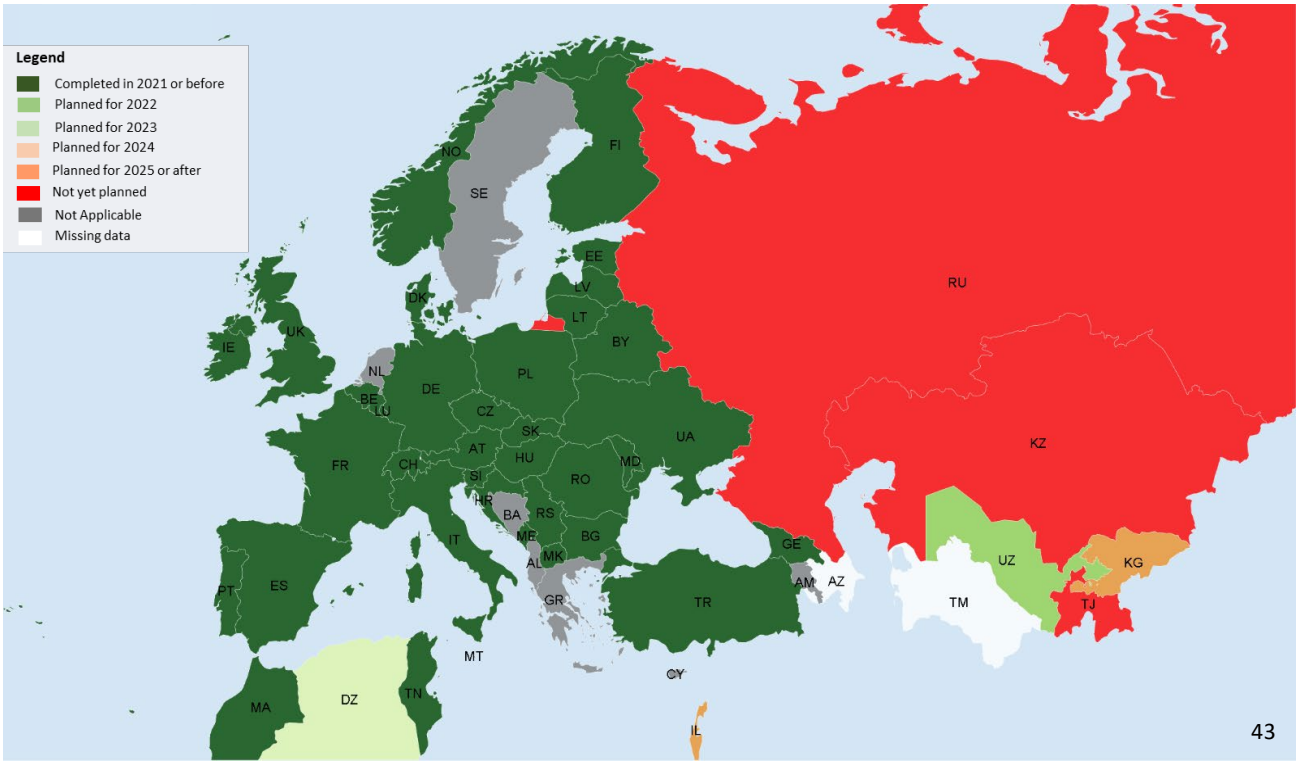
The vast majority of States in the ICAO EUR Region (almost 70%) have the technical capability to receive and process at least one of the downlinked aircraft parameters (DAPS). However, the number of processed parameters and the extent of operational use varies extensively. In most of the cases the parameters are displayed for information, for monitoring and for the issuance of warnings.

The most widely used aircraft parameter is the **Selected Altitude**, which is used in at least 33 States, primarily for enhancing the performance of safety nets. This is followed by the **Magnetic Heading** and by the **Indicated Airspeed**, mostly used for information on ATCO ODS (Operator Input and Display Systems).

New implementers in 2021:

FI, LU, MA





ASUR-B1/1	Reception of aircraft ADS-B signals from space (SB ADS-B)	B1

ATM Master Plan Level 3:	/

ASUR

Description:

ADS-B provides an aircraft's identification, position, altitude, velocity, and other information to a receiver on an orbiting satellite. The broadcasted aircraft position/velocity is normally based on the global navigation satellite system (GNSS) and transmitted at least once per second.

Aircraft ADS-B signals are received on one or more orbiting satellites, and this information is passed through a data network to a Service Delivery Point at an Air Traffic Service facility (or facilities).

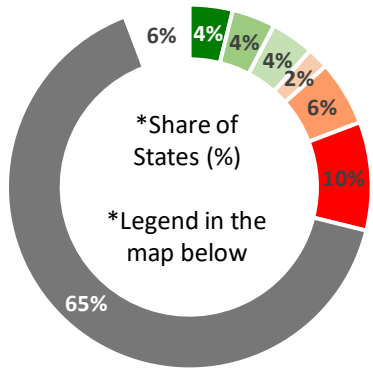
Implementation summary (end 2021):

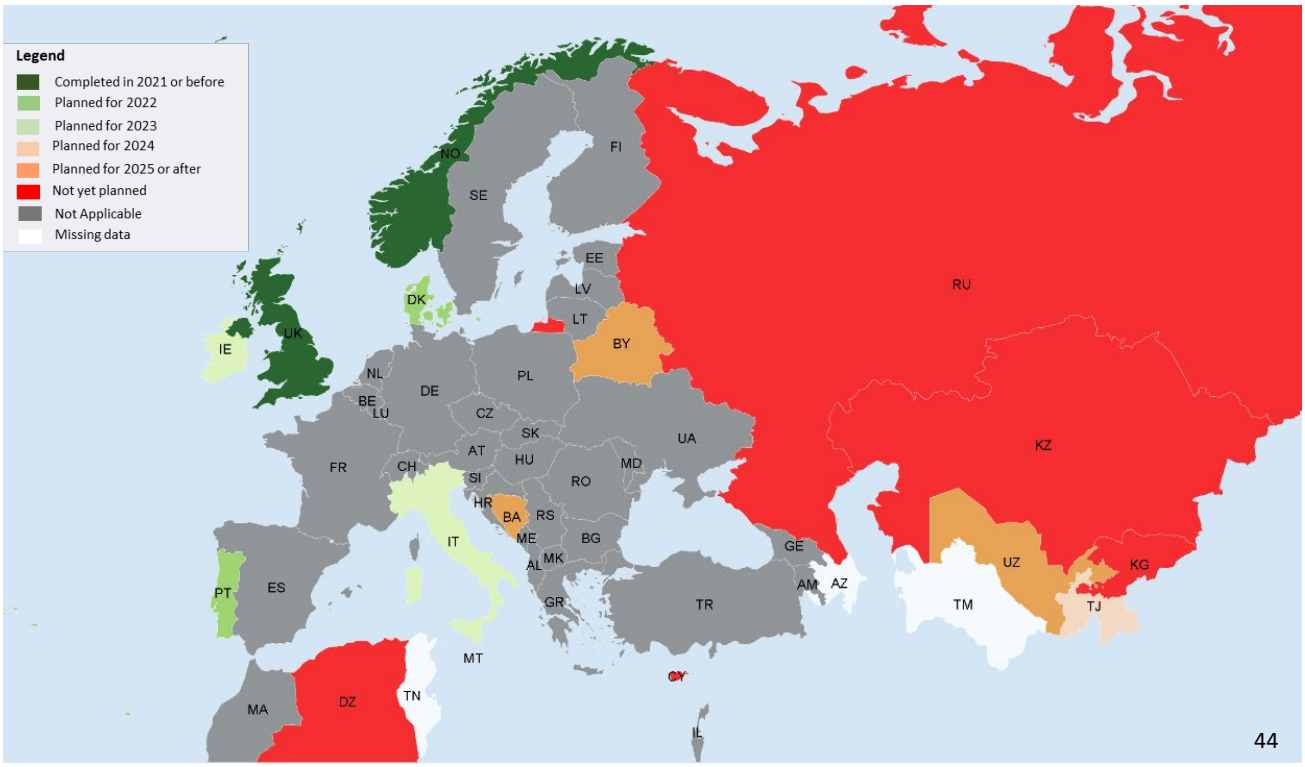
For the time being there is a very limited interest in the deployment of the Element. As expected, the Element appeals to the States providing air navigation services over the high seas, for which Space Based ADS-B would allow the provision of surveillance services, with an obvious safety and efficiency benefit.

For the vast majority of the remaining States the Element is considered as "Not Applicable" because of the lack of a business/operational need as these States already have a robust ground surveillance infrastructure.

New implementers in 2021:

Info not available – first monitoring cycle





COMI-B0/4	VHF Data Link (VDL) Mode 2 Basic	B0 B1
COMI-B1/2	VHF Data Link (VDL) Mode 2 Multi-Frequency	
ATM Master Plan Level 3:	ITY-AGDL - Initial ATC air-ground datalink services	COMI

Description:

VDL Mode 2 is narrow-band transceiver operating in the VHF aviation protected spectrum band, which will transmit data to support data communications between the aircraft and ground. VDL Mode 2 Multi-Frequency consists of a set of air-ground protocols that increase the data rate to 31.5 kbits. It allows transmission from a character-oriented protocols to digital or bit-based protocols while using VHF air and ground narrow-band transceiver operating in the VHF aviation protected spectrum band, which will transmit textual data to and from the cockpit to support data communications between the pilot and the air traffic controller.

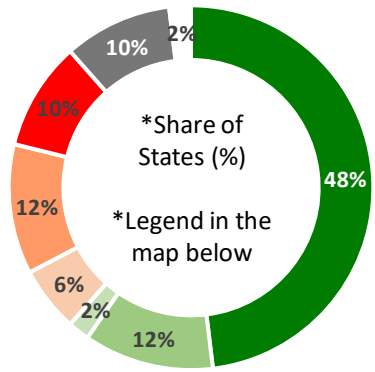
Implementation summary (end 2021):

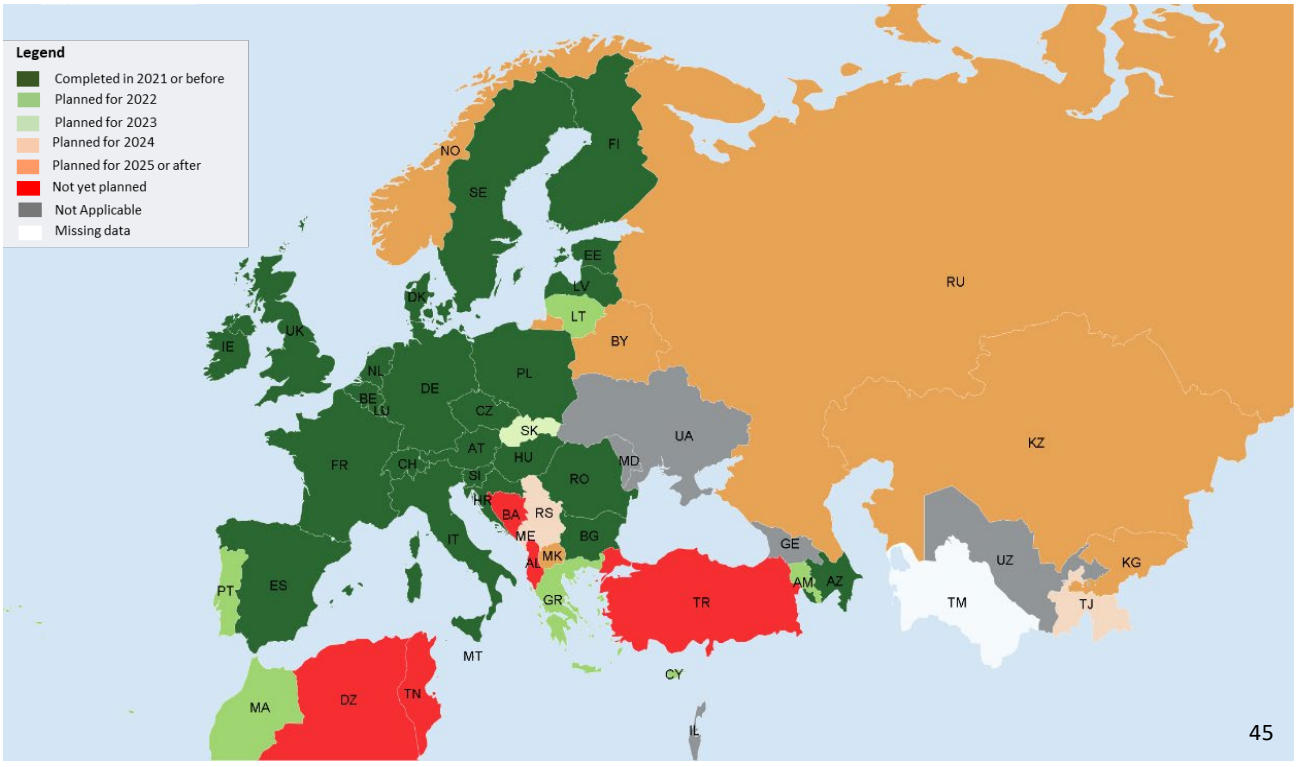
The deployment of VDL Mode 2 communications continues, in particular in the western half of the EUR Region, with 25 States already using it for the provision of Controller Pilot Data Link Communications services above Flight Level 285. This functionality should be seen only as a first step towards more integration of ground and airborne systems on the way towards Trajectory Based Operations. For the time being, the analysis does not differentiate between "Basic" and "Multi-Frequency", as the choice is a local decision depending on the specific local needs. However, in the medium term it is expected that the "MultiFrequency" will become the solution of choice, capable to accommodate the growing number of equipped aircraft and the increase in the number of exchanged data link messages.

Note: For BE, LU and NL, VDL2 is deployed in the airspace where the service is provided by the Maastricht Upper Area Centre.

New implementers in 2021:

AZ, BG, DK, EE, FR, LV, MT, NL





COMI-B0/7	ATS Message Handling System (AMHS)	B0

ATM Master Plan Level 3:	COM10.1 – Migrate from AFTN to AMHS (Basic service)

COMI

Description:

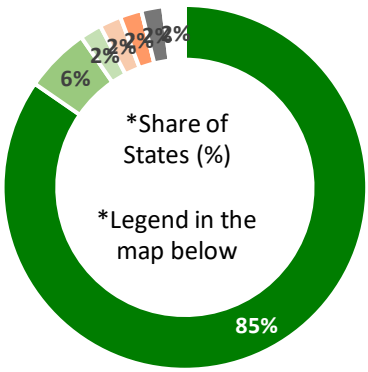
Aeronautical Fixed Telecommunications Network (AFTN) has provided an effective store-and-forward messaging service for the conveyance of text messages, using character-oriented procedures, for many years.
ATS Message Handling System (AMHS) makes use of higher speed communication than AFTN. It also allows the use of bit-oriented communications allowing greater flexibility in message types. Attachments to messages can also be supported, thus allowing the exchange of graphics.
The AMHS is served as ICAO mandated communication for data exchange between ANSPs (ICAO Doc. 9880 and Annex X) and is expected to be utilized to carry traffic for AIDC/Flight Plan/MET until SWIM is ready in Block 2.

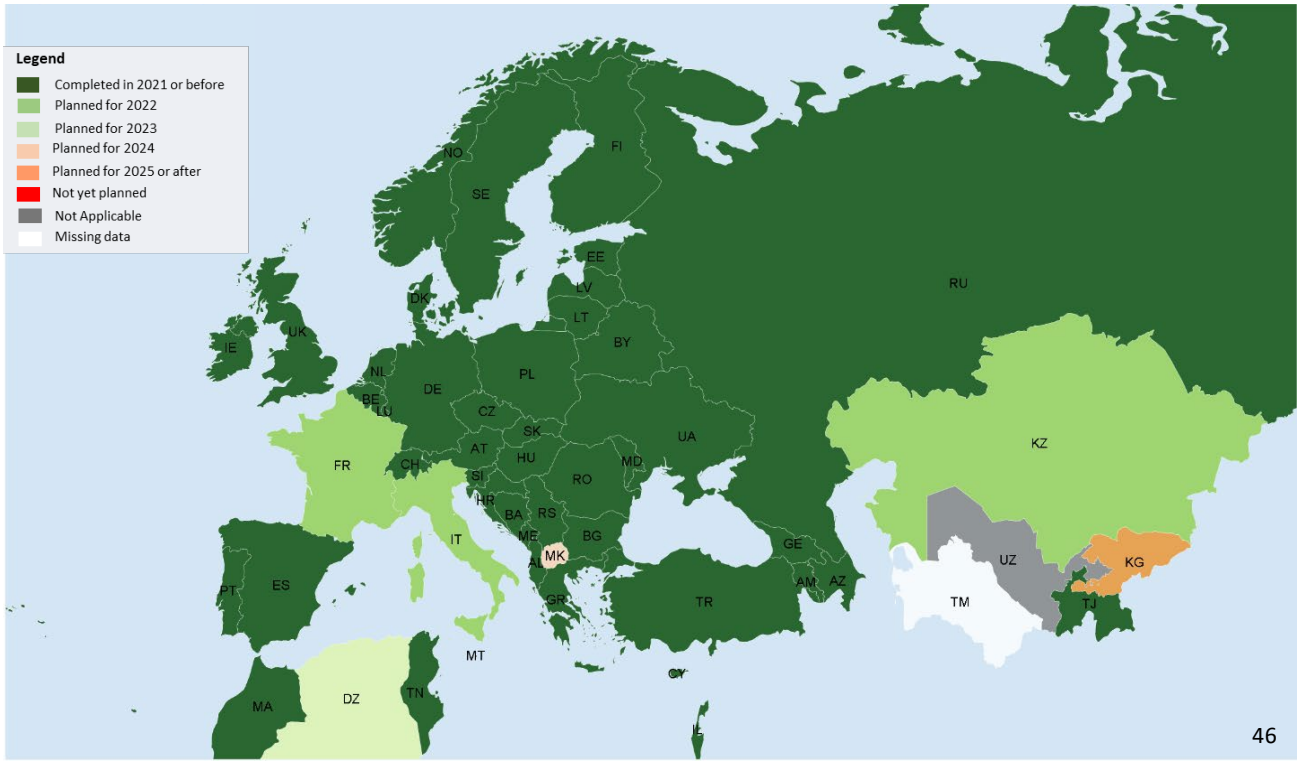
Implementation summary (end 2021):

The implementation of the functionality confirmed the very good pace already noticed in the previous years (through the monitoring of the former COM10 Implementation Objective which has been replaced this cycle by COM10.1).
The "basic" AMHS service, already providing the vast majority of AMHS benefits and fulfilling the requirements of the Element, has been implemented by 44 States.
For some of the States reporting the implementation as "ongoing" (FR, IT) the main service providers (DSNA, ENAV) have already implemented the basic AMHS features while the military stakeholders expect to be ready in 2022. Most of the remaining States expect to finalize implementation before the end of 2023.

New implementers in 2021:

Info not available – first monitoring cycle of the Implementation Objective





COMI-B1/1	Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS)	B1

ATM Master Plan Level 3:	COM12 - New Pan-European Network Service (NewPENS)

COMI

Description:

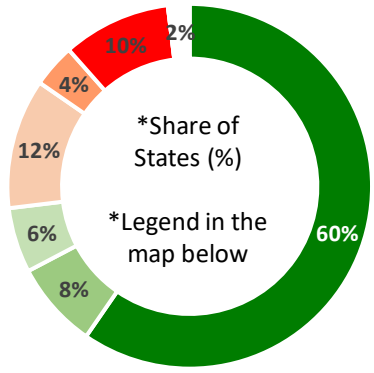
ATN/IPS enables the efficient integration of technologies with improved integrity to support air to ground aeronautical safety services and regularity of flight communications.
It consists of IPS nodes and networks operating in a multinational environment in support of Air Traffic Service Communication (ATSC) as well as Aeronautical Industry Service Communication (AINSC), such as Aeronautical Administrative Communications (AAC) and Aeronautical Operational Communications.
This evolution will support enhanced civil-military cooperation and coordination functions, if interoperability and military information security aspects are considered.

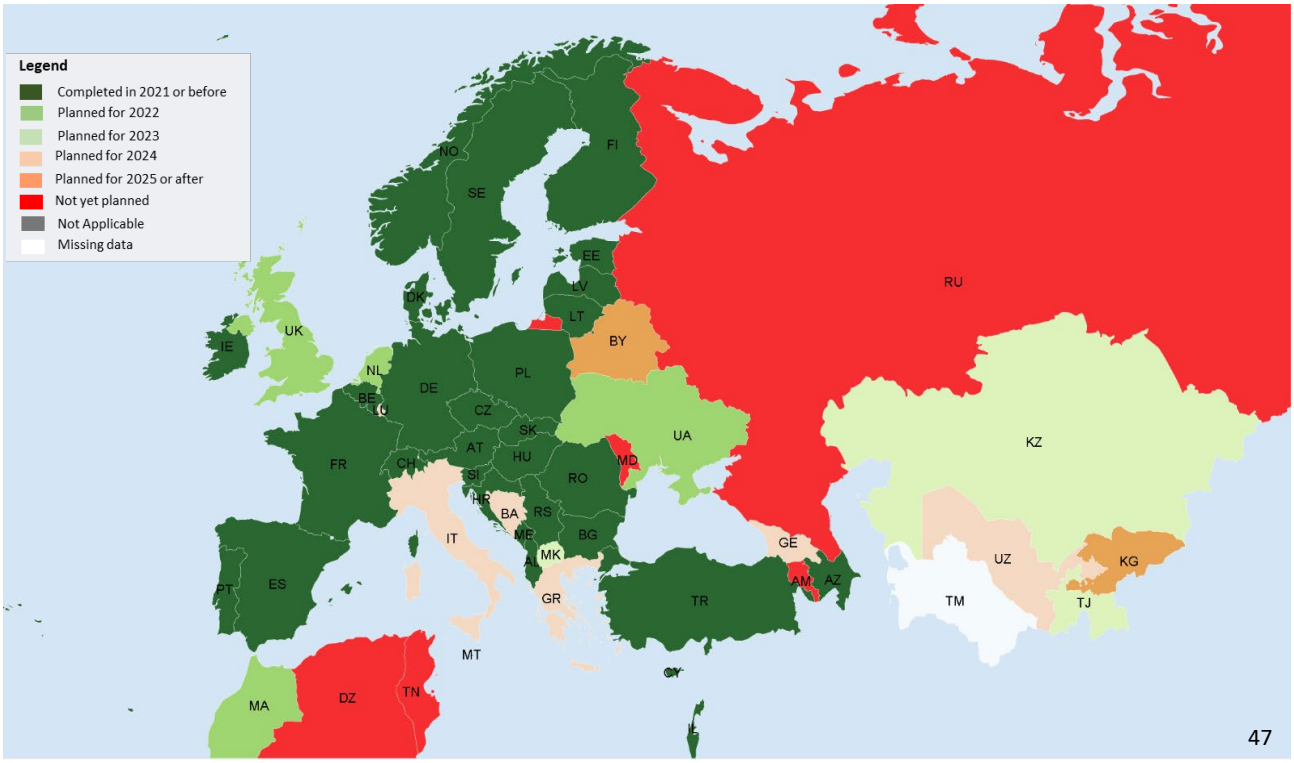
Implementation summary (end 2021):

The implementation of the Element has already witnessed an impressive spike in 2020, with 20 States having finalised implementation during the year, followed by another 5 States in 2021. Overall, 31 States (all LSSIP States) have fully implemented the Element, all of them through the use of NewPENS (New Pan-European Network Services). In general, the provision of connectivity infrastructure and the migration to NewPENS at ANSP/ACC level is more advanced (35 States have reported completion) compared with the migration of Airports for which the pace is slower. It should also be noted that for the vast majority of States, the migration to NewPENS at airports is not considered beneficial at this point due to the lack of operational or business needs. Therefore only 5 Sates have reported implementations or plans for implementation at airports. Amongst the non-LSSIP States, the earliest implementations are expected in Kazakhstan and Tajikistan, in 2023.

New implementers in 2021:

AL, BG, ME, MT, RS





DAIM-B1/1	Provision of quality-assured aeronautical data and information	B1

ATM Master Plan Level 3:	ITY-ADQ - Ensure Quality of Aeronautical Data and Aeronautical Information

DAIM

Description:

This element ensures that processes, procedures and systems are improved to allow for an enhanced quality of aeronautical information products and services. It includes:

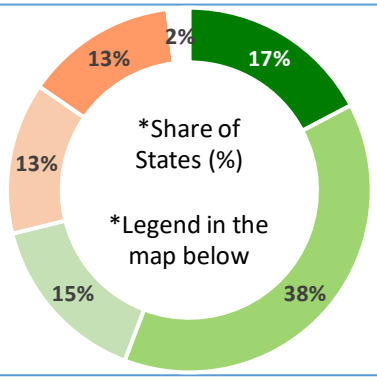
- Implementation of quality management systems to ensure that aeronautical data and information comply with the required standards;
- Use of common reference systems (spatial – WGS84 and temporal - AIRAC) to facilitate consistent interpretation of aeronautical data and information and facilitate their timely exchange;
- Full move into an automated data-centric environment so that the management, processing, verification, usage and exchange can be done in a structured, automatic manner and human intervention is reduced;
- Aeronautical data and information is of high quality if it is aggregated and provided by authoritative sources. This requires to properly control relationships along the whole data chain from the origination to the distribution to the next intended user.

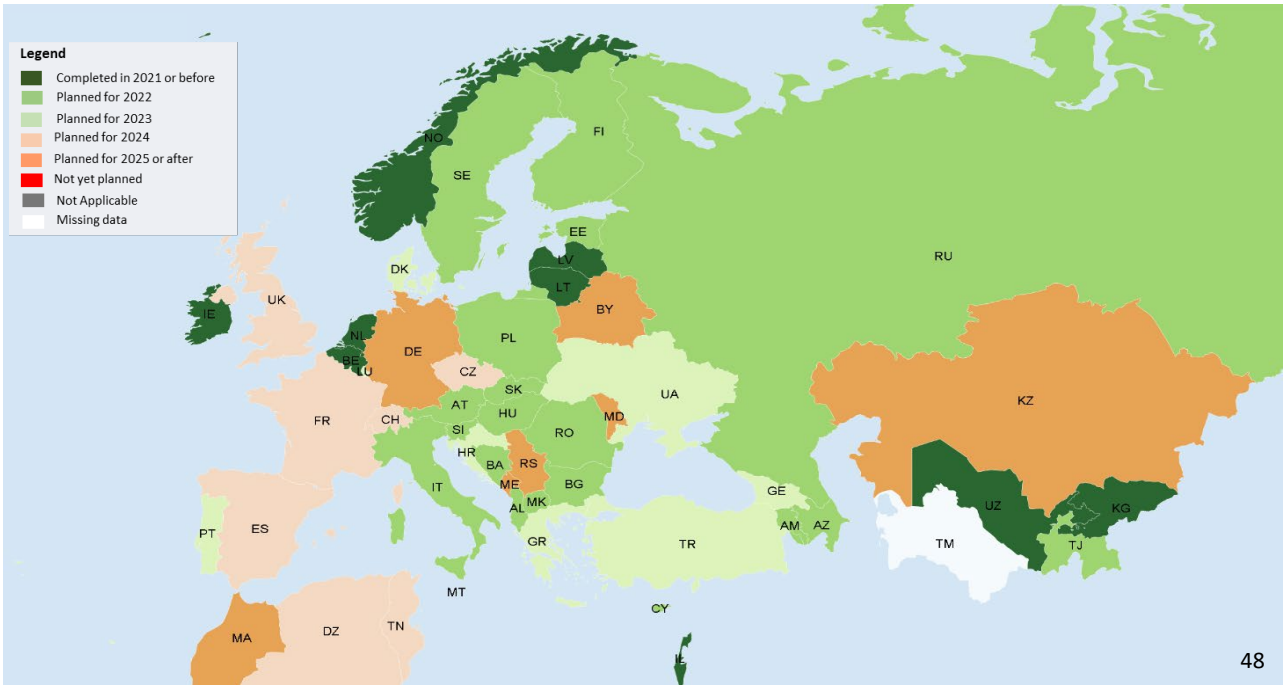
Implementation summary (end 2021):

In 2021, 3 additional States have completed this element, leading to an overall of 9 States in the Region having implemented the Element. A substantial implementation spike is to be expected in 2022 with another 20 States anticipating completion. The establishment of formal arrangements along the data chain, which is a major enabler for the Element has a much better progress rate with at least 29 States having reported completion. As the EU Regulation underlying the Master Plan Level 3 Implementation Objective has been repealed in 2022 there is a possibility that the EU Member States will reconsider their deployment plans to realign them with the new regulatory requirements applicable to them, with a potential impact on the timeframes for the deployment of the Element. Within the non-LSSIP States, Kirghizstan and Uzbekistan have finalised deployment while Russian Federation and Tajikistan expect completion in 2022.

New implementers in 2021:

BE,IE, NO





DAIM-B1/3	Provision of digital terrain data sets	B1
DAIM-B1/4	Provision of digital obstacle data sets	

ATM Master Plan Level 3:	INF07 - Electronic Terrain and Obstacle Data (eTOD)

DAIM

Description:

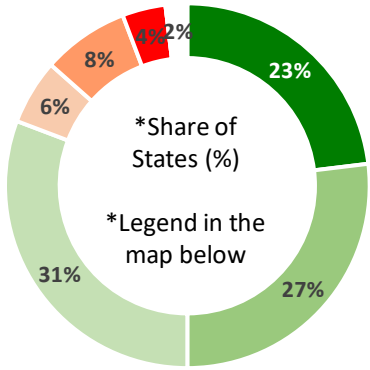
The need for interoperable exchange of terrain and obstacle data requires providing the data in digital form and complying with digital data exchange requirements.
These elements ensure the replacement of existing terrain (DAIM-B1/3) and obstacle (DAIM-B1/4) data by digital data sets. Therefore, they support the migration to a data centric environment where terrain and obstacle data will be provided in a structured and digital form, through the use of information exchange models (e.g. AIXM).
The provision of digital datasets will facilitate the exchange of terrain and obstacle data that becomes easy to integrate and filter, thus increasing cost effectiveness and efficiency.

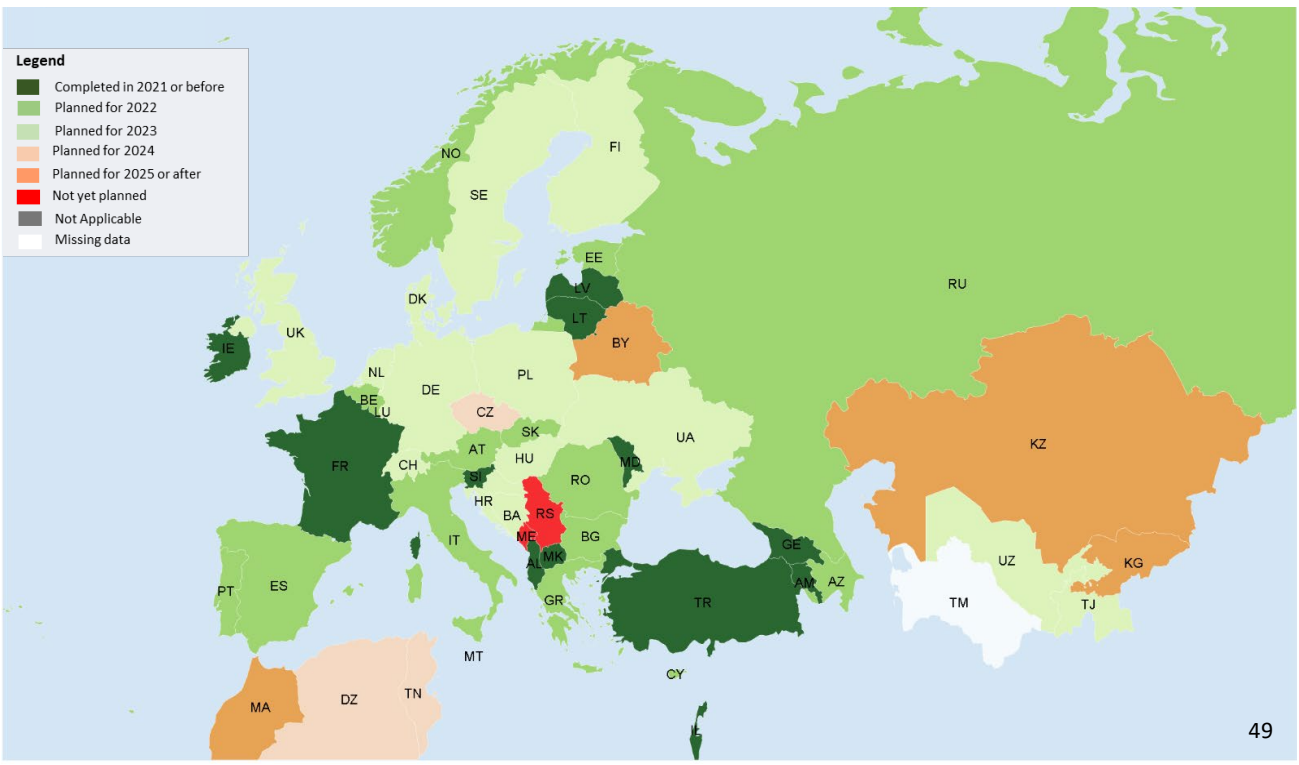
Implementation summary (end 2021):

One additional State (MK) has completed these Elements in 2021, raising the total number of implementers to 12 and the overall completion rate to 23%.
However, it should be noted that the establishment of a National TOD Policy, which is a cornerstone for the implementation of the Elements is much more advanced, with at least 26 States in the Region having implemented it. This is expected to unlock the implementation, with another 30 States expected to implement the Elements before the end of 2023. Among the non-LSSIP States, the first implementation (Element DAIM-B1/3) is to be seen in the Russian Federation, in 2022.

New implementers in 2021:

MK





FICE-B0/1	Automated basic inter facility data exchange (AIDC)	B0

ATM Master Plan Level 3:	ITY-COTR – Implementation of ground-ground automated coordination processes

FICE

Description:

This element represents a first automation step in the evolution of the coordination and transfer of control between neighboring ATS units to guarantee that all related and necessary flight information will be available to the other unit as per agreement. It is meant to replace voice communication between ATS units by automatic message exchange.

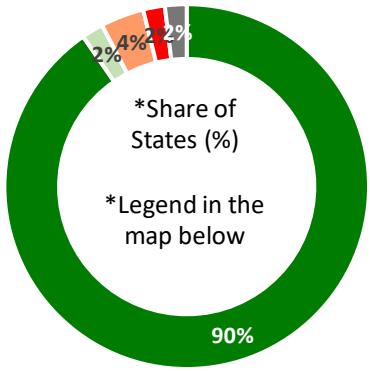
Implementation summary (end 2021):

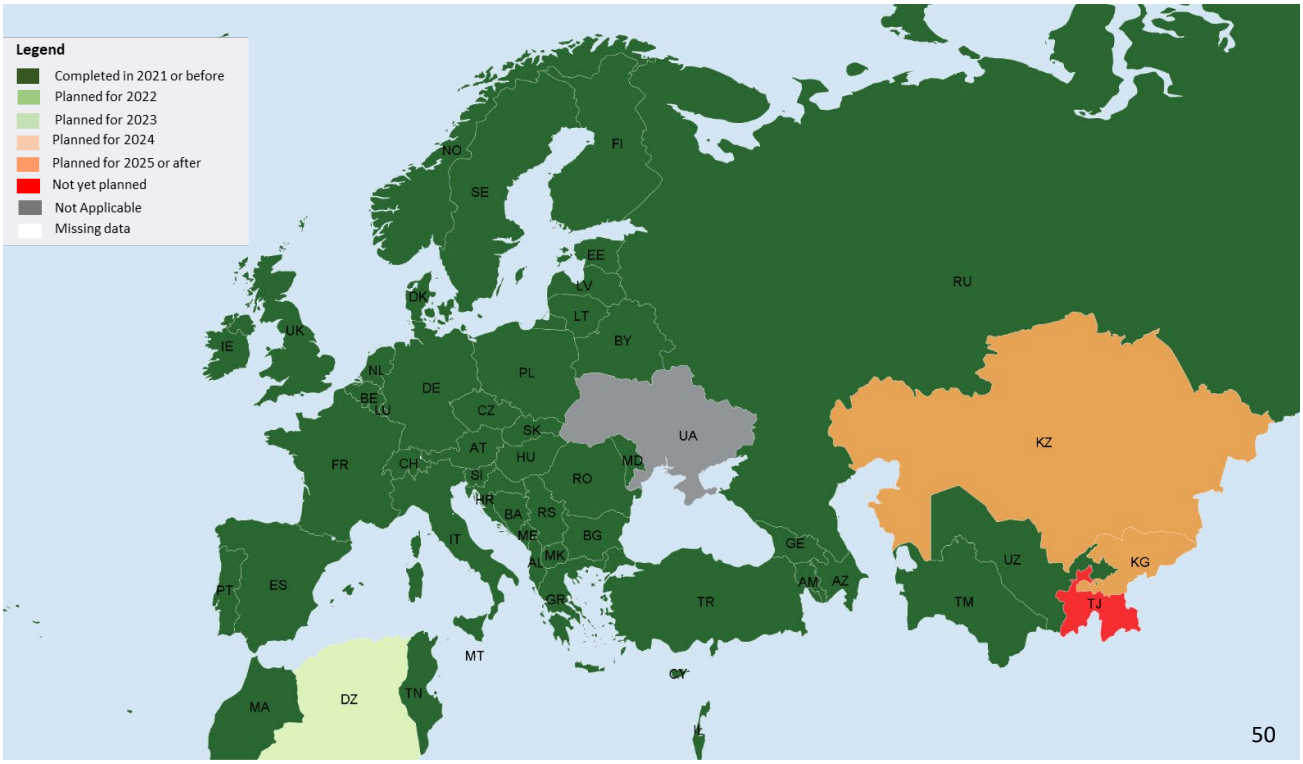
Information exchanges for the process of coordination and transfer based on EUROCONTROL's OLDI (On-Line Data Interchange) Specification, in particular the messages addressing the notification and the coordination of flights (the "basic procedure") are widely implemented across the entire EUR Region, with 90% of the States having reported completion.

Even in the States which still report implementation as being "Ongoing" (DZ, KG, KZ) or even "Not Applicable" (UA) the basic procedure and the associated messages are implemented with at least one of the neighboring States. It can be considered therefore that the implementation of the Element is very close to 100% completion all across the EUR Region.

New implementers in 2021:

None





FRTO-B0/1	Direct routing (DCT)	B0

ATM Master Plan Level 3:	AOM21.1 – Direct routing

FRTO

Description:

Direct routings (DCTs) are established with the aim of providing airspace users with additional flight planning route options on a larger scale across FIRs, such that the overall planned leg distances are reduced in comparison with the fixed route network. They are implemented at national and regional levels and made available for flight planning (with published conditions of use). DCTs should be considered as an early iteration of the Free Route Airspace (FRA) concept.
The extension of DCTs within and across the FIR boundaries also requires Network and ANSPs ground system upgrades for airspace management and flight data processing.

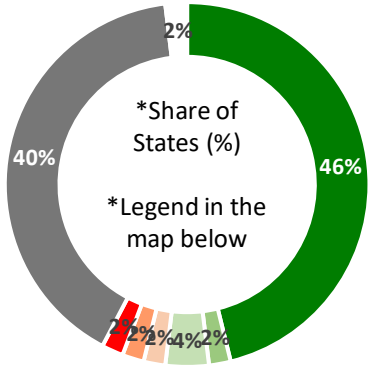
Implementation summary (end 2021):

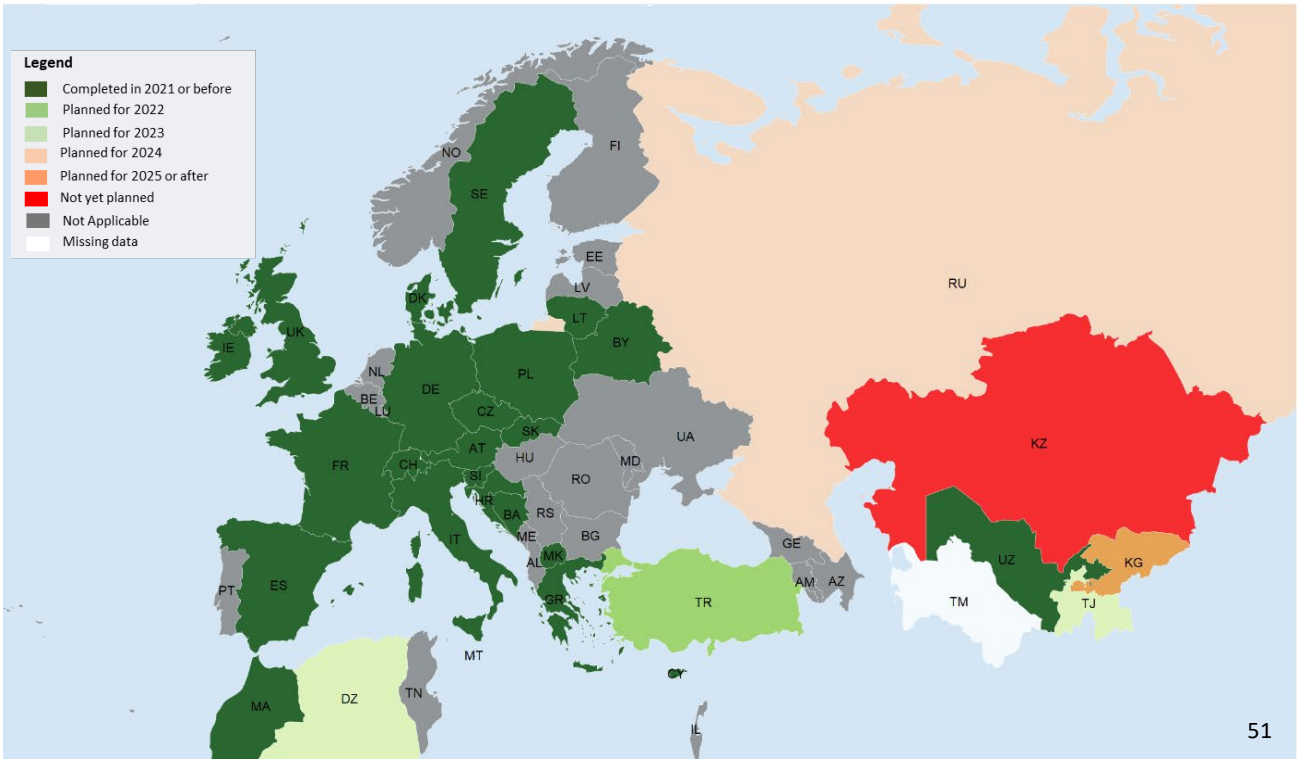
In 2021, no additional State has completed this Element, so the completion rate remains at 46% (completion in particular in the LSSIP States), with a high rate (40%) of States reporting the Element as "Not applicable".

It is very important to note that the deployment of DCT is only an interim step towards the deployment of Free Route Airspace (FRA) and that all the LSSIP States reporting "Not Applicable" have decided to skip this interim step and to deploy FRA directly. Therefore the "Not Applicable" indicates that a more advanced functionality is in place.
Most of the States within the Region which have not yet implemented DCT (nor FRA) have reported plans do implement the Element between 2022 (Türkiye) and 2025 (Kyrgyzstan).

New implementers in 2021:

None





FRTO-B0/2	Airspace planning and Flexible Use of Airspace (FUA)	B0

ATM Master Plan Level 3:	AOM19.5* – ASM and A-FUA

FRTO

Description:

This element addresses strategic/long term airspace management, pre-tactical planning and tactical operations. Automated ASM support systems improve airspace management processes and flexible airspace planning including time horizon specifications in all flight phases (strategic, pre-tactical and tactical time horizon) by providing mutual visibility on civil and military requirements. They also support flexible airspace planning according to civil and military ANSPs and airspace user requirements, including permit cross border and use of segregated areas operations regardless of national boundaries.

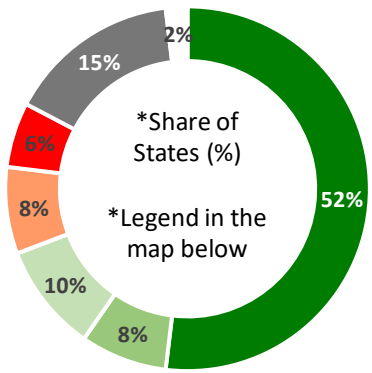
Implementation summary (end 2021):

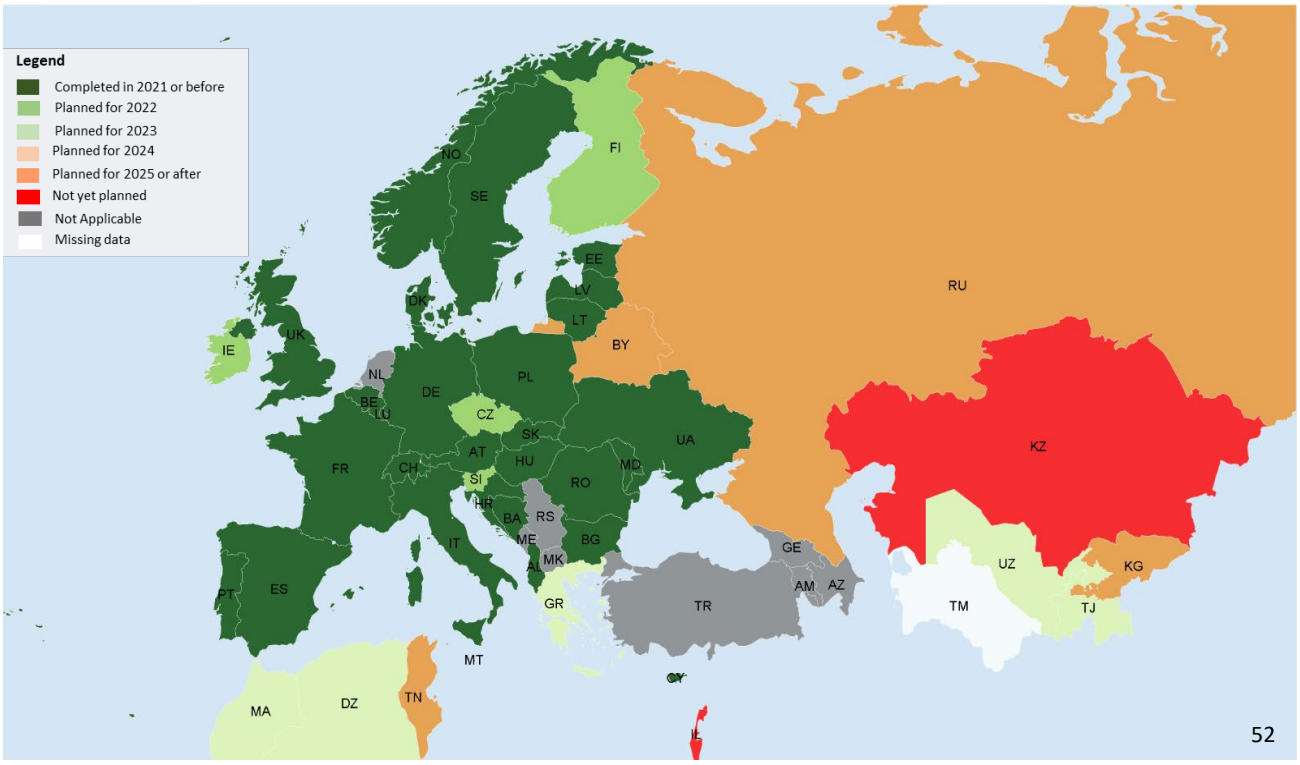
The Element has already been implemented by 27 States, another 9 expecting implementation before the end of 2023. Among those having deployed, the majority (20 States) are relying on the LARA (Local and sub-regional airspace management support system) tool developed by EUROCONTROL. Within the EU Member States the implementation of the Element is driven by the provisions of the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) requiring the availability of this functionality by 12/2022. No State outside the LSSIP area has implemented the Element yet. Algeria, Tajikistan and Uzbekistan are the first ones to expect deployment in 2023, to be followed by most of the other States.

**Note: for better granularity, the analysis is performed based on the evolution of Stakeholder Lines of Action AOM19.5-ASP01 "Deploy automated ASM support systems (LARA or equivalent)" or AOM19.5-ASP02 "Adopt the NM system (CIAM) for ASM capabilities" (whichever of the two is deployed).*

New implementers in 2021:

Info not available – first monitoring cycle of the Implementation Objective





FRTO-B0/4	Basic conflict detection and conformance monitoring	B0

ATM Master Plan Level 3:	ATC12.1 - Automated Support for Conflict Detection, Resolution Support Information and Conformance Monitoring (only the MTCD and MONA elements)

FRTO

Description:

MTCD assists the controller in conflict identification and planning tasks by providing automated early detection of potential conflicts; facilitating identification of flexible routing/conflict free trajectories; identifying aircraft constraining the resolution of a conflict or occupying a flight level requested by another aircraft.

The monitoring aids (MONA) function provides the controller with warnings if aircraft deviate from a clearance or planned trajectories and reminders related to the ATCO instructions to be issued. MONA might include the flight progress monitoring as well as the lateral, longitudinal, vertical and Cleared Flight Level (CFL) deviations.

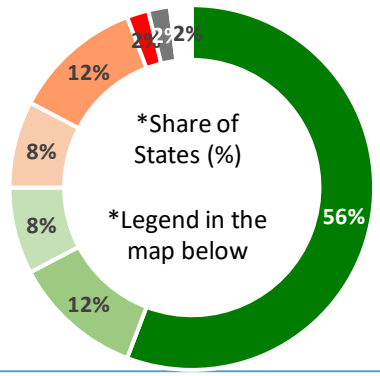
Implementation summary (end 2021):

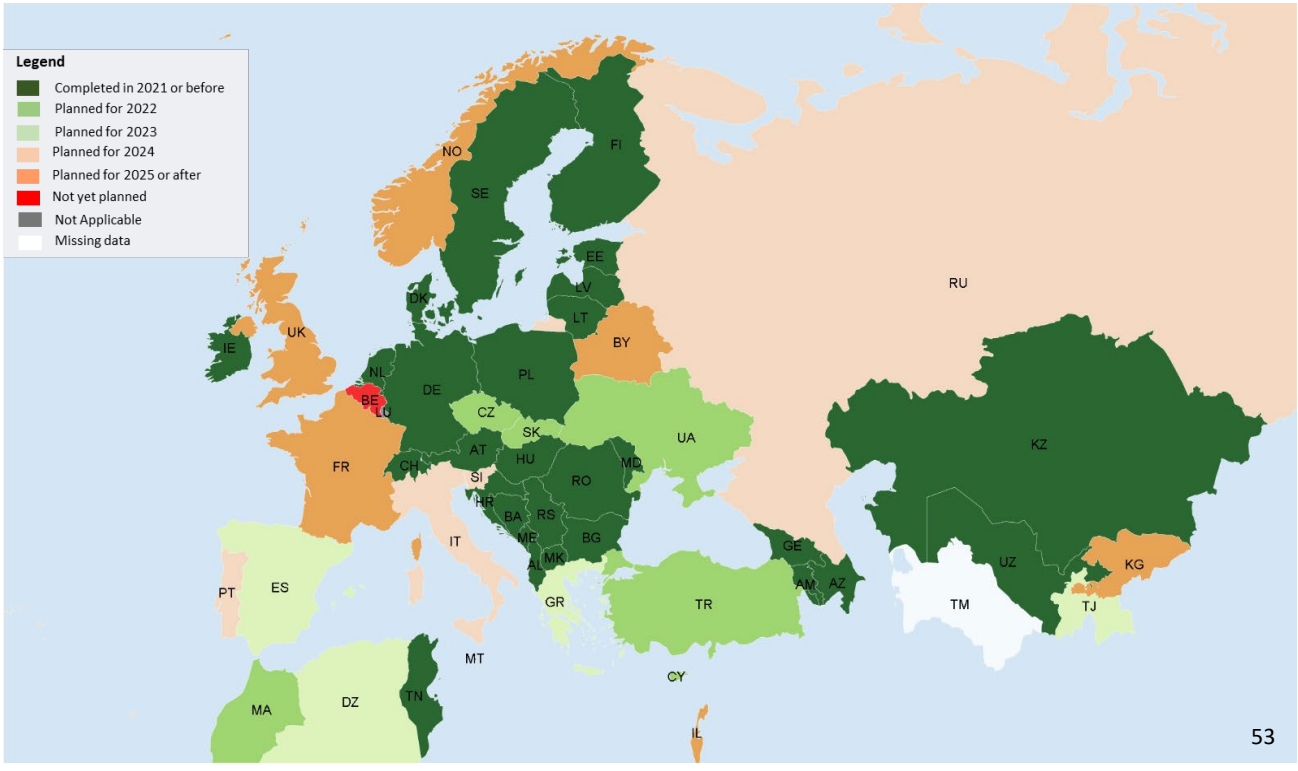
The implementation of conflict detection and conformance monitoring tools is progressing well within the ICAO EUR Region with both functionalities (MTCD and MONA) being deployed in 29 States of the Region. It should be noted that among the States reporting implementation still in progress (e.g. CY, IT, SK, SI, UA) one of the 2 functionalities (MTCD or MONA) is already implemented.

Among the non-LSSIP States, the Element has been fully implemented by Tunisia, Kazakhstan and Uzbekistan while the Russian Federation reports the virtual completion of MTCD deployment. The other States reporting deployment plans between 2023 and 2025.

New implementers in 2021:

LT





FRTO-B1/1	Free Route Airspace (FRA)	B1

ATM Master Plan Level 3:	AOM21.2 – Initial Free Route Airspace

FRTO

Description:

The Free Route Airspace (FRA) is a specified volume of 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) waypoints, without reference to the ATS route network, subject to airspace availability. Within this airspace, flights remain subject to air traffic control.
FRA implementation can be customized for instance: laterally and vertically; during specific periods; with a set of entry/exit conditions; with initial system upgrades. The extension of FRA within and across the FIR boundaries also requires upgrades of the ATM network function system and the ANSPs ground system for airspace management and flight data processing.
FRA concept brings significant flight efficiency benefits and a choice of user preferred routes to airspace users.

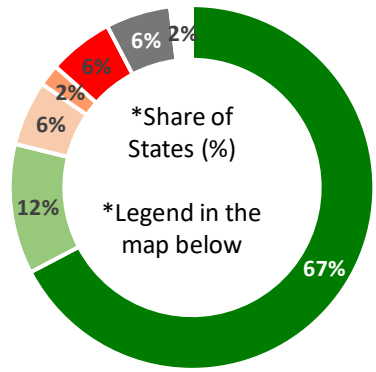
Implementation summary (end 2021):

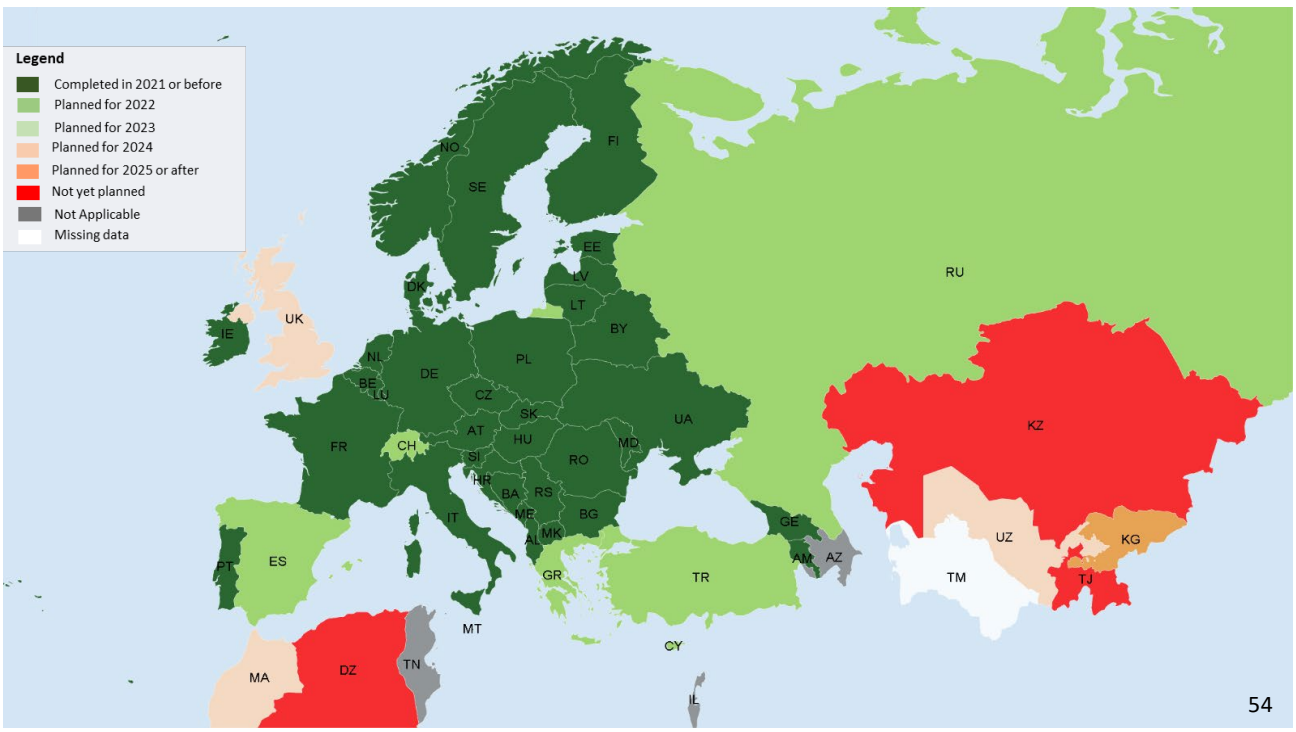
The FRA implementation in the ICAO EUR Region continued at a sustained pace (in particular among the LSSIP States) with 4 States having finalised deployment in 2021. Overall, at EUR Region level, the Element is deployed in 35 States, 6 other expecting completion in 2022. In many instances the implementation goes beyond the national Flight Information Region's as FRA is deployed in more and more cross-border areas.
Among non-LSSIP States, Belarus is the only State which has finalised completion. The Russian Federation expects to be the next one, with implementation to be completed in 2022, to be followed by Uzbekistan in 2024.

Note: For Belgium, Luxemburg and Netherlands, FRA is deployed in the airspace where the service is provided by the Maastricht Upper Area Centre.

New implementers in 2021:

FR, DE, CZ ,LT





FRTO-B1/3	Advanced Flexible Use of Airspace (FUA) and management of real time airspace data	B1

ATM Master Plan Level 3:	AOM19.5* –ASM and A-FUA

FRTO

Description:

This element enhances Airspace Management (ASM) by automated data exchange services during the pre-tactical and tactical execution phases continuously in real time. ASM information is shared between ASM systems and ATS units/systems, and communicated to the ATM network function in the tactical and execution phases. Such data, consisting of pre-notification of activation, notification of activation, de-activation, modification and release are collected, saved and processed. Furthermore, data needs to be exchanged between ASM stakeholders and made available to other actors and relevant airspace users not involved in ASM processes.

Implementation summary (end 2021):

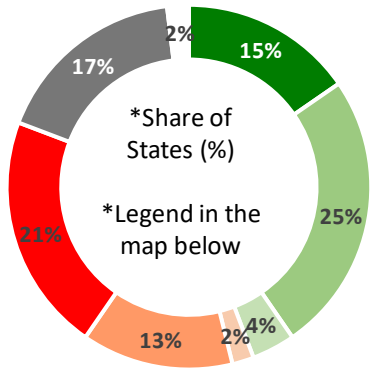
The implementation of the Element is still in its early stages, with only 8 States in the EUR Region having reported completion. A substantial increase (13 States) is expected in 2022, mainly driven by the obligations imposed by the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) on the EU Member States.

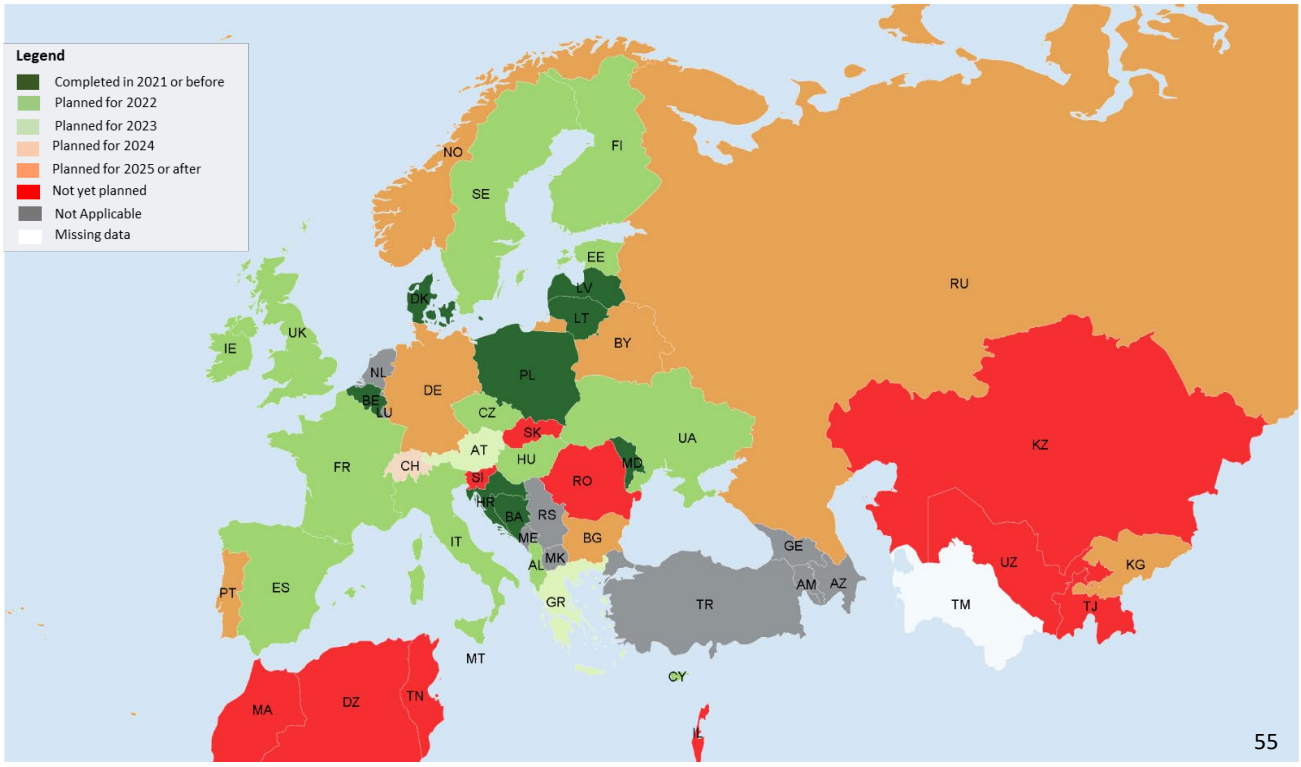
Among the non-LSSIP States, no implementation is to be expected before 2025 (Belarus, Kirghizstan, Russian Federation) with the other States not having deployment plans yet, in particular due to the lack of operational needs.

**Note: for better granularity, the analysis is performed based on the evolution of Stakeholder Line of Action AOM19.5-ASP09 "Adapt ASM and ATC systems for automatic ASM data exchanges".*

New implementers in 2021:

Info not available – first monitoring cycle of the Implementation Objective





FRTO-B1/4	Dynamic sectorization	B1

ATM Master Plan Level 3:	AOM19.4 – Management of Predefined Airspace Configurations

FRTO

Description:

Dynamic sectorization represents dynamic adaptation of the ATC sectorization in order to respond to traffic demand without increasing the number of controllers working position in use.
The sectorization tool enables the dynamic management of a large number of possible sector configurations. Based on the volume of pre-defined ATC sector configurations, the automated system continuously evaluates traffic demand and complexity in the future and proposes optimum sectorization solutions. This tool supports real-time shaping of the airspace volumes allocated to the physical controller working position by adding/removing elementary sectors in order to respond to the predicted traffic demand and complexity.

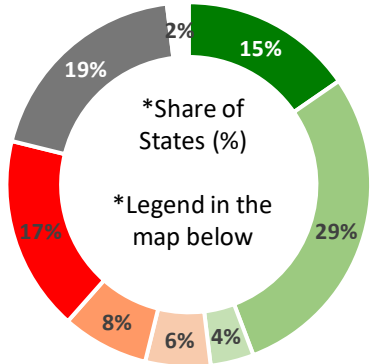
Implementation summary (end 2021):

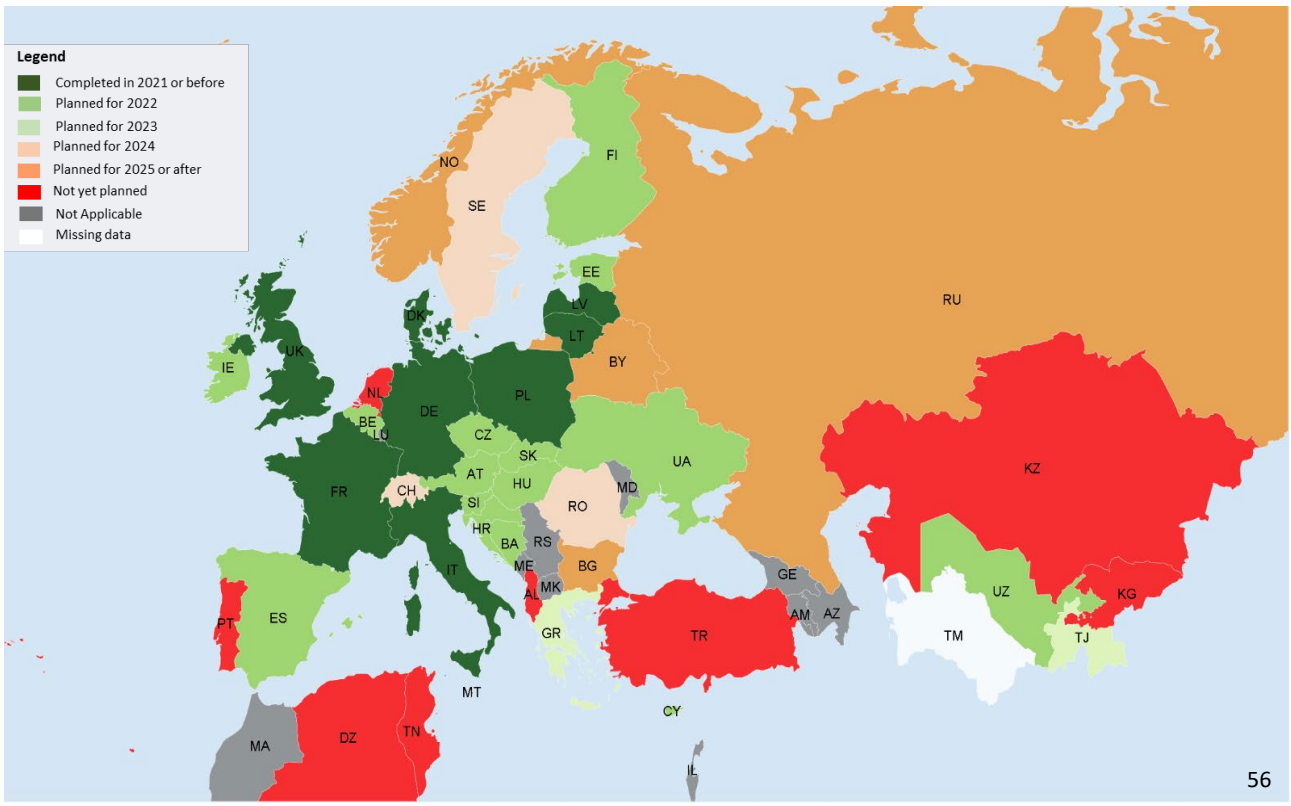
The implementation of the Element has progressed in 2021, with 5 States having reported completion, reaching a total of 8 States within the Region. A substantial increase (15 States) is expected in 2022, mainly driven by the obligations imposed by the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) on the EU Member States.

There is a lower interest within the non-LSSIP States (4 of these States do not have deployment plans yet), in particular due to the lack of operational needs. The first State expected to implement will be Uzbekistan, in 2022, to be followed by Tajikistan in 2023.

New implementers in 2021:

FR, DE, IT, LT, LV and UK





FRTO-B1/5	Enhanced Conflict Detection Tools and Conformance Monitoring	B1

ATM Master Plan Level 3:	ATC12.1 - Automated Support for Conflict Detection, Resolution Support Information and Conformance Monitoring

FRTO

Description:

CDT provides real-time assistance to the en-route controllers (both planning and tactical) in conflict detection and resolution. It is based on new approaches that enhance and refine the existing tools yielding more efficient and usable services. MTCD aids the planning ATCO by showing only the most probable conflicts within the predefined look-ahead time, discarding detected conflicts with lower probabilities. The MTCD includes the what if probe function showing the problems that would occur if the given clearances is applied and identify the contextual traffic that may impair the manual identified conflict resolution. The tactical tool is based on the tactical trajectories and identifies the conflicts within the sectors, including the what-if capabilities. MONA provides the en-route controller with warnings if aircraft deviate from the calculated ground system trajectory or the ATCOs tactical clearances (e.g. heading, vertical rate).

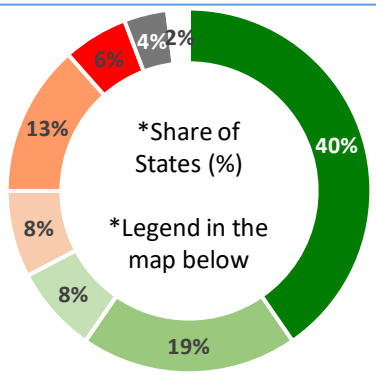
Implementation summary (end 2021):

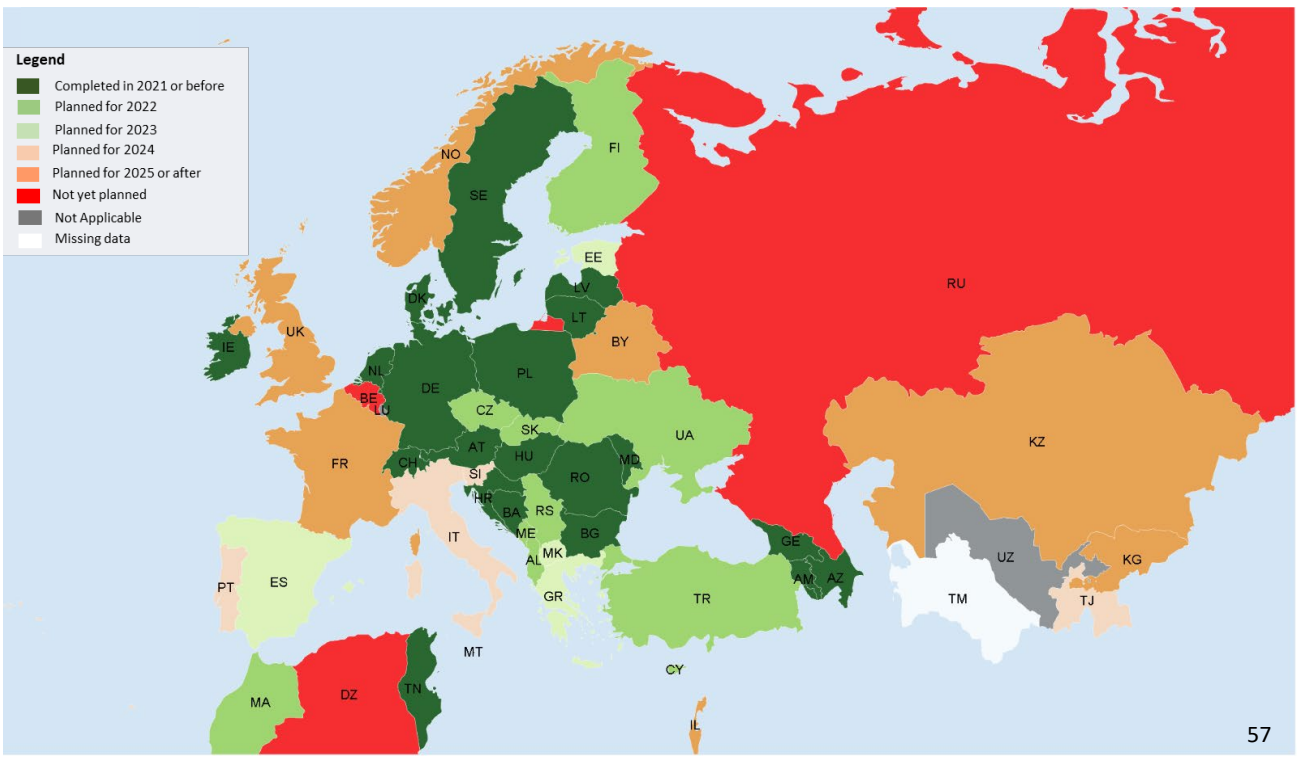
The implementation of the Element has reached 40% (21 States) within the Region, slightly lower than the corresponding Block 0 Element (FRTO-B0/4). This is caused by the more advanced functionalities (e.g. Tactical Controller Tools) which are part of the Block 1 Element. Still MTCD and MONA functionalities are already deployed to a wider extent. Good progress is expected over the next 2 years, with 14 more States expected to complete the Element.

Among the non-LSSIP States, the Element has been implemented by Tunisia, while the other States expect deployment in a longer term (between 2024 in Tajikistan and 2030 in Belarus).

New implementers in 2021:

LT





FRTO-B1/6	Multi-Sector Planning	B1

ATM Master Plan Level 3:	ATC18 – Multi-Sector Planning En-route - 1P2T

FRTO

Description:

The Multi-Sector Planning (MSP) function defines a new organization of controller team(s) and new operating procedures to enable the planning controller to provide support to several tactical controllers operating in different adjacent sectors. MSP controller ensures suitable coordination agreements between sectors and assists in managing the workload of the tactical controllers.
This function might reduce the ATCO workload related to intra/inter centre coordination. The workload conversion to potential capacity gains might vary considerably depending on the sector.
New tools and operating procedures are needed for the planning controller to provide support to several tactical controllers operating in different sectors. The multi-sector planner needs to have access to flight data, system tracks, trajectory, warnings and tools for the airspace of several ATC sectors allocated to him.

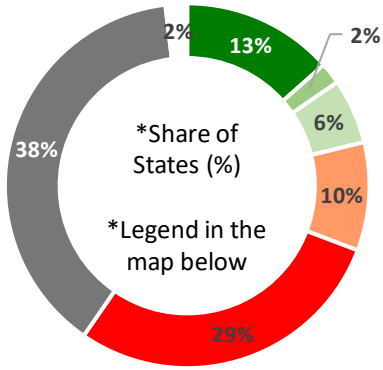
Implementation summary (end 2021):

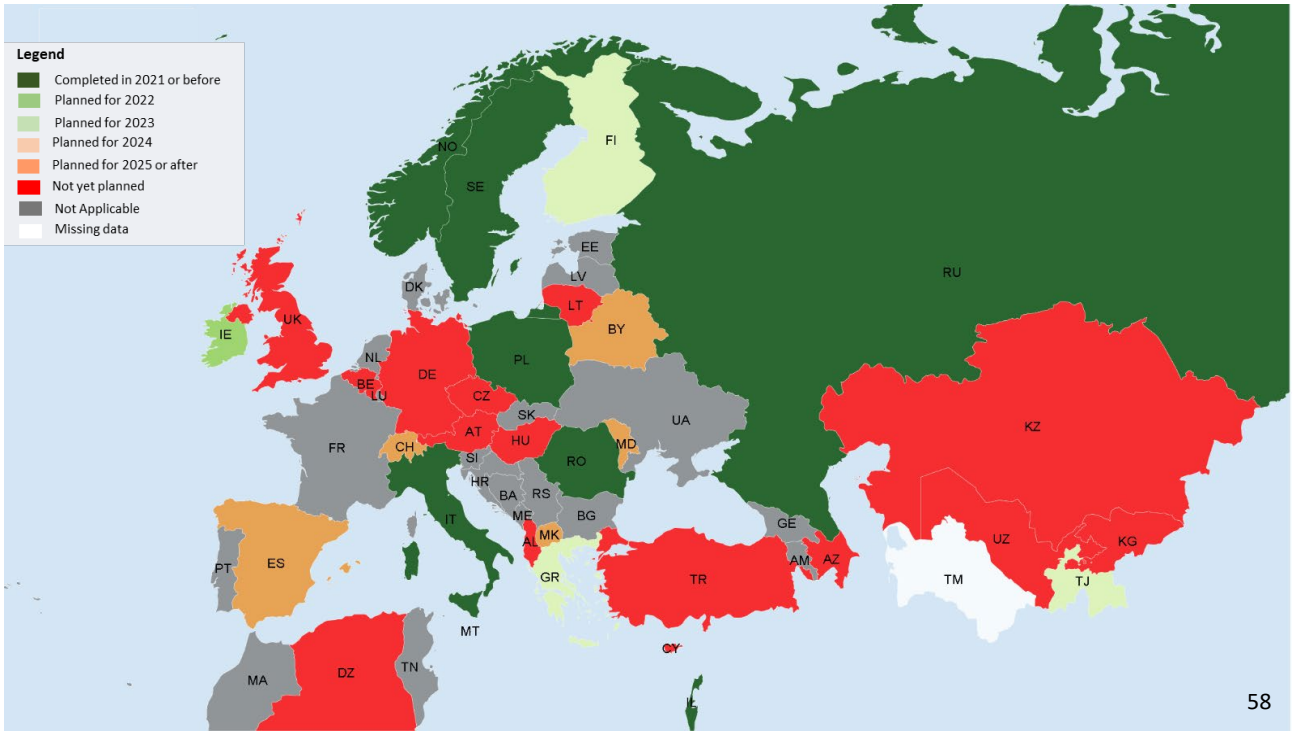
The interest in deploying the Element remains rather limited, with no State reporting completion in 2021.
Only 1 State (Ireland) expect to finalise implementation in 2022, to be followed by 3 other in 2023. Almost 70% of the States consider the Element as either "Not Applicable" or "Not yet planned". This is mostly due to their existing ATM system capabilities/limitations, number of sectors and/or configurations, or lack of perceived operational benefits compared to current operations.

Among the non-LSSIP States, only the Russian Federation declared completion while Tajikistan expects completion in 2023 and Belarus in 2027. The remaining States consider the Element as "Not applicable" (Tunisia) or do not have implementation plans yet.

New implementers in 2021:

None





GADS-B1/1	Aircraft Tracking	B1

ATM Master Plan Level 3:	/

GADS

Description:

Aircraft tracking is one of the Global Aeronautical Distress and Safety System (GADSS) functions (ref. GADSS ConOPS V6). Aircraft tracking is a process, established by the operator, that maintains and updates, at standardized intervals, a ground-based record of the four dimensional position of individual aircraft in flight (ICAO Annex 6).
Aircraft operator will be able to track the aircraft, detect missing position reports, notify if necessary the relevant ATSUs and timely share relevant information including last known position(s).

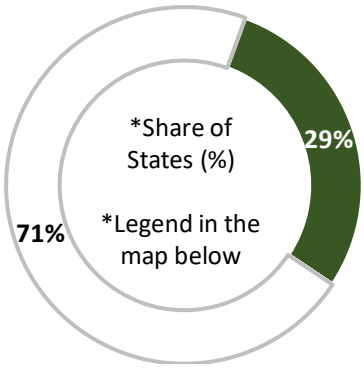
Implementation summary (end 2021):

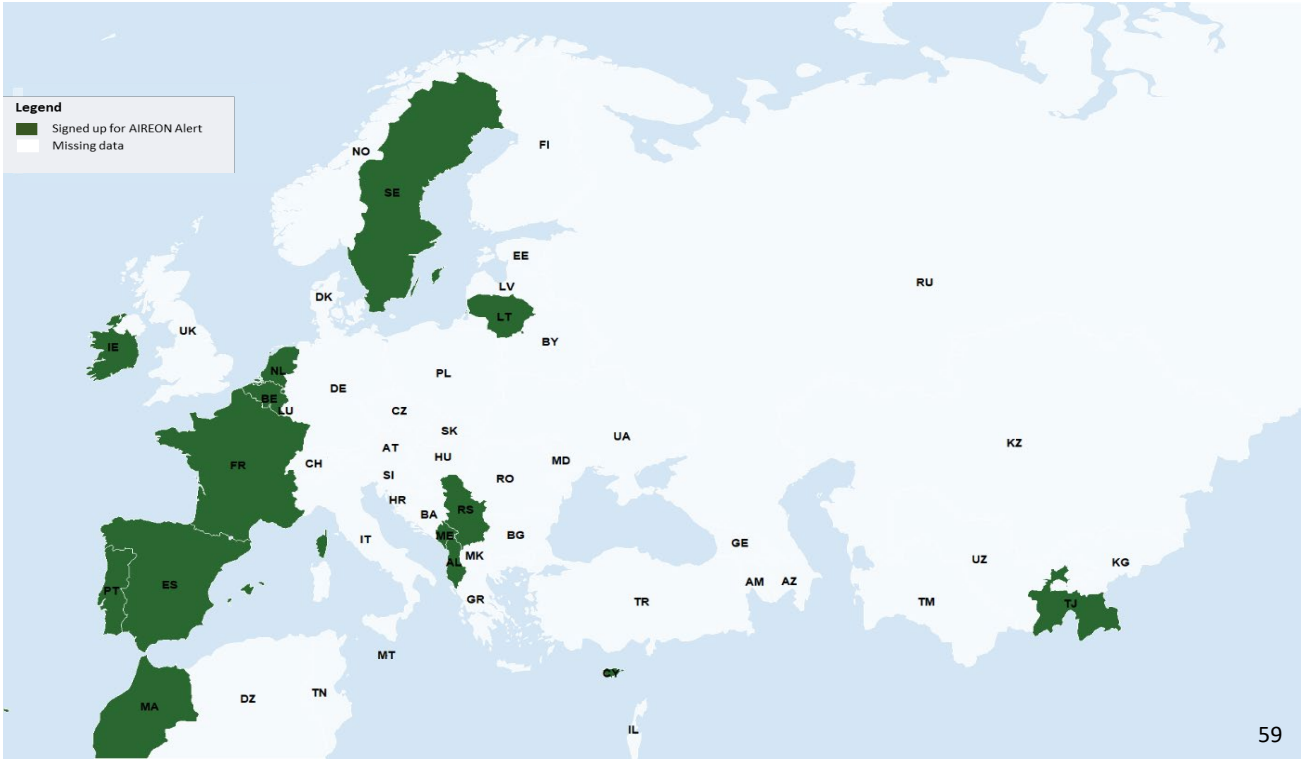
Due to a lack of comprehensive and structured data sources on the implementation of this ASBU Element, in this edition of the Report only limited and currently available information is presented. Namely, the map below shows States (in green) whose Civil Aviation Authorities or Air Navigation Service Providers have subscribed for the **Aireon Aircraft Locating and Emergency Response Tracking (Aireon ALERT)** service. Depending on data availability, further editions of the Report will include more comprehensive overview of implementation.

Important Note: *Aireon ALERT does not make aviation stakeholders GADSS compliant. Aireon ALERT simply helps ANSPs, commercial aircraft operators/airlines, regulators and search and rescue organizations get the last-known position of an aircraft in an uncertainty phase, alert phase or distress phase.*
For more information visit: https://aireonalert.com/

New implementers in 2021:

Info not available





NAVS-B0/1	Ground Based Augmentation Systems (GBAS)	B0

ATM Master Plan Level 3:	/

NAVS

Description:

This element introduces improved accuracy, integrity and availability through a local airport based differential satellite navigation and monitoring system. A local network of reference receivers is deployed at or near an airport. Observations from these reference receivers are used to compute corrections for each satellite as well as to monitor for system integrity. The information is broadcast to users via a VHF Data Broadcast link (operating in the 108 to 118 MHz band).

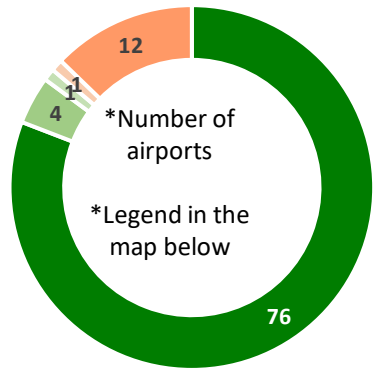
Category I performance is enabled by using GBAS Approach Service Type C (GAST-C). As an option, PBN in terminal area (RNAV 1 and RNP 1 operations) can also be supported using GBAS positioning service.

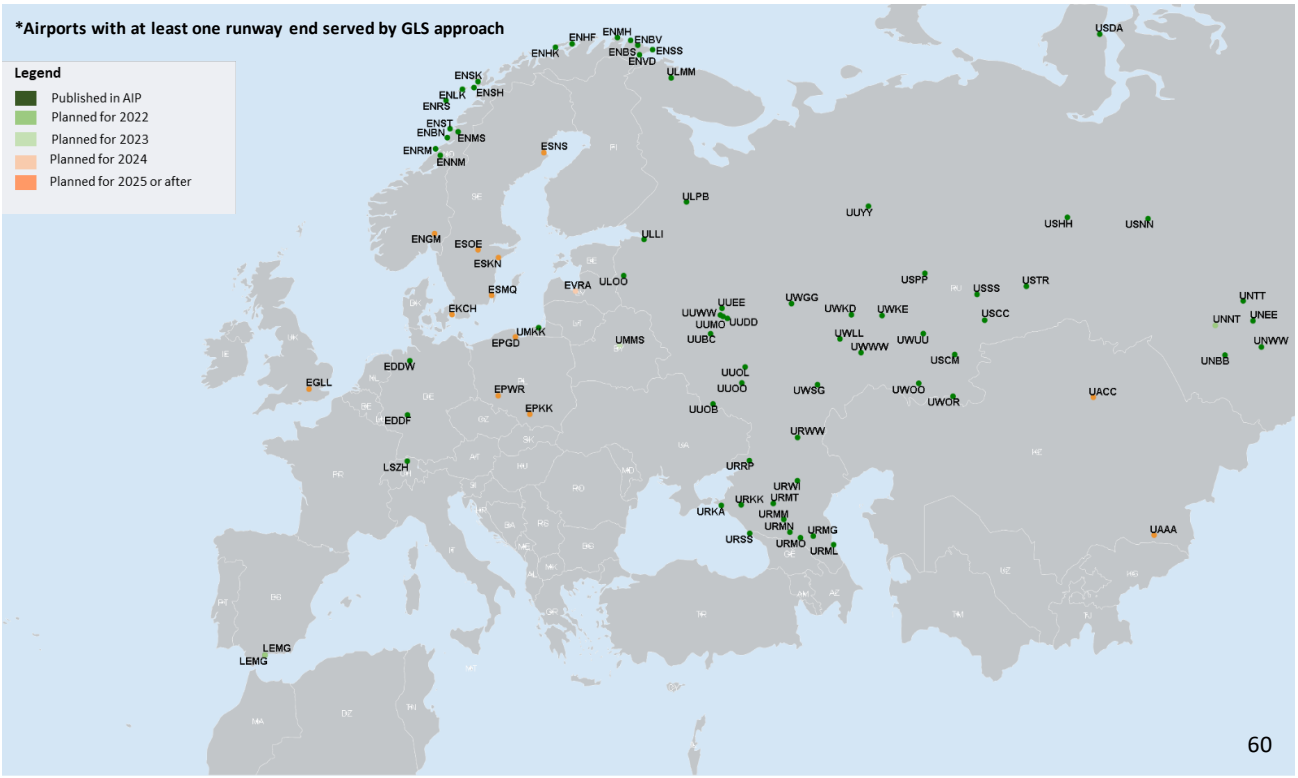
Implementation summary (end 2021):

The primary advantage of using GBAS-enabled approaches are the associated cost-efficiency gains, as one single ground station is sufficient to serve multiple approaches to different runway ends at one airport. As such, together with SBAS it is often seen as an enabler for ILS decommissioning and/or for providing precision approaches at airports currently not equipped with ILS systems.
Within the EUR Region, GBAS is currently in use at 76 airports, majority of which are located in Norway (17 locations) and Russian Federation (55 locations) while the Element is expected to be implemented at another 5 locations (1 in Spain, 4 in the Russian Federation) before the end of 2023.
Note: the information presented is extracted from the EUROCONTROL PBN MapTool as well as from the national AIPs.

New implementers in 2021:

None





NOPS-B0/1	Initial integration of collaborative airspace management with air traffic flow management	B0

ATM Master Plan Level 3:	AOM19.5* –ASM and A-FUA

NOPS

Description:

This element introduces ASM/ATFM techniques, procedures and tools for the initial establishment of an integrated collaborative airspace management and air traffic flow and capacity management process applicable to the strategic through to the tactical phases of operations. It represents the initial step to enhancing the common situational awareness supporting optimum availability of airspace and ATC capacity to meet air traffic demand and it will result in a dynamic/rolling process supporting the enhancement of network operations. It will improve the cross border operations and optimize network operations based on the richest and more accurate information.

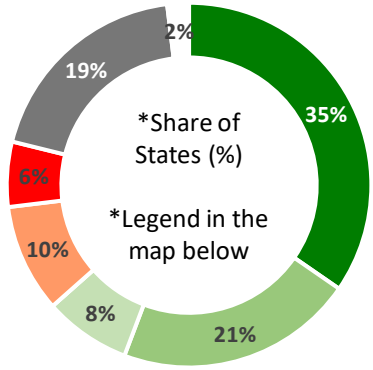
Implementation summary (end 2021):

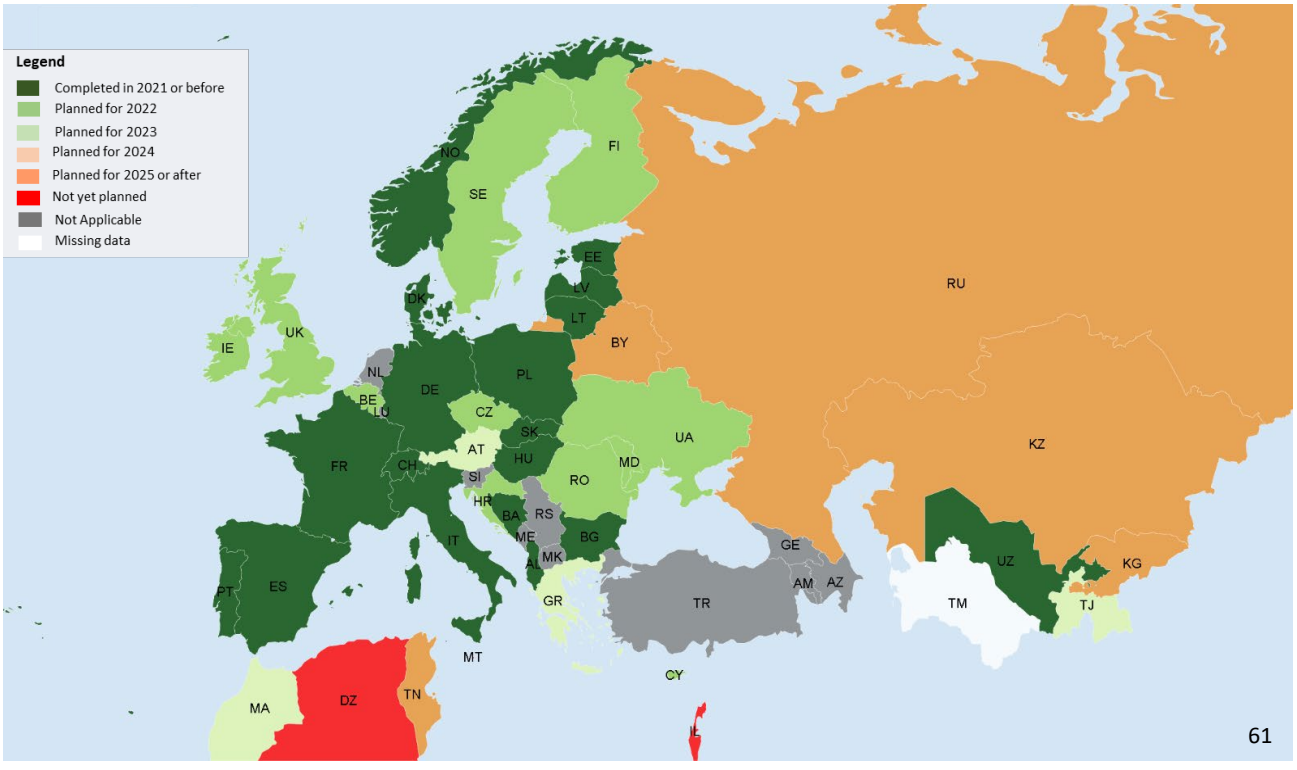
There is good progress within the Region, with 18 States having already finalised implementation of the Element, while 11 others are expected to achieve completion in 2022.The expected spike in implementation in 2022 is mainly driven by the obligations imposed by the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) on the EU Member States.
Among non-LSSIP States, only Uzbekistan reports the Element as completed and is expected to be followed by Tajikistan in 2023. With the exception of Algeria which has no implementation plans yet, the other States expect to finalise the implementation of the Element between 2026 and 2027.

**Note: for better granularity, the analysis is performed based on the evolution of Stakeholder Line of Action AOM19.5-ASP05 "Implement interoperability of ASM support systems with NM system".*

New implementers in 2021:

Info not available – first monitoring cycle of the Implementation Objective





NOPS-B0/2	Collaborative Network Flight Updates	B0

ATM Master Plan Level 3:	**FCM03** – Collaborative Flight Planning

NOPS

Description:

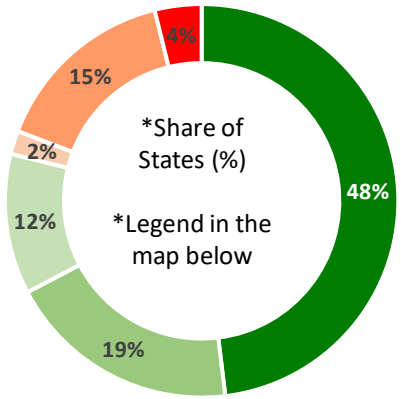
This element will ensure effective interface between ATC and ATFM with regard to deviations from the current flight plan, as well as enhanced tactical flow management service based on real-time aircraft position data and flight activation information, resulting to more accurate ATFM measures and thus better use of scarce airspace resources.
It includes seamless exchange and processing of correlated position information, flight activation status and up to date flight plan information for airborne flights. Such data are required within the Area of Responsibility (AOR) of the ATFM unit, but also within the Area of Interest (AOI) of the ATFM unit for all flights entering the ATFM area.

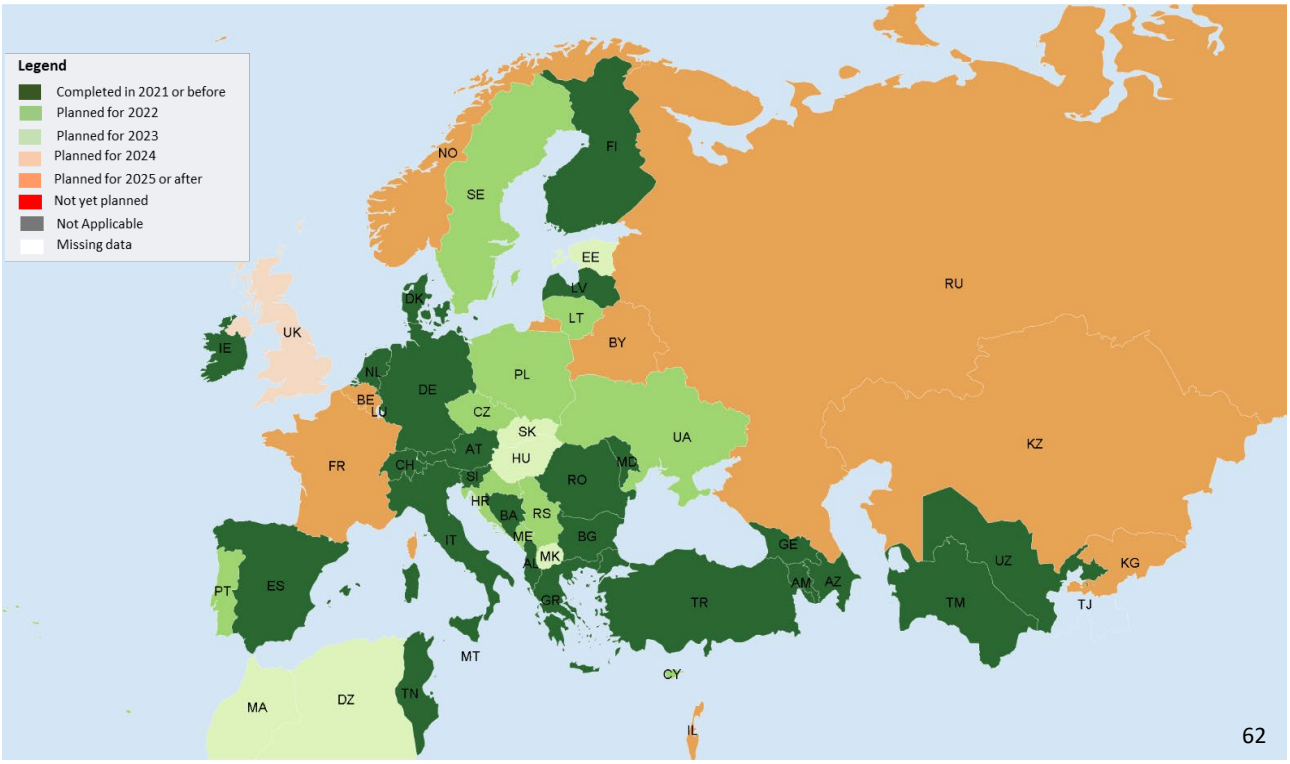
Implementation summary (end 2021):

The Element is implemented by almost half of the States in the EUR Region (25 States have reported completion) while another 16 expect to finalise deployment by the end of 2023. The progress is slightly better within the LSSIP States (22 are completed and 15 expecting completion by 2023). The basic features of the Element (the provision of position reports or of flight activation messages) are virtually implemented in all the ECAC States. The level of implementation of the more advanced features (e.g. provision of updated flight plan information post-departure) is slightly lower, however it shows a constant progress over time. Within these more advanced features it is observed that the more beneficial (e.g. provision of flight plan data in case of missing flight plans) show a good level of implementation, almost as good as the basic features. Among the non-LSSIP States, Tunisia and Uzbekistan have finalised the implementation while Algeria expects to be ready by 2023.

New implementers in 2021:

AT





NOPS-B0/3	Network Operation Planning basic features	B0

ATM Master Plan Level 3:	/

NOPS

Description:

Network Operation Planning provides an overview of the situation from strategic planning through real time operations with ever increasing accuracy up to and including the day of operations by a common situational awareness for all ATFM actors within and adjacent to the ATFM area and allowing network wide demand and capacity balancing. It is based on enhanced participation in a dynamically updated collaborative planning process. This requires the sharing of the latest flight status and intentions, airport and airspace component, associated demand and capacity balancing measures in a frequently updated plan which is aimed to be realized as target by all actors.

Implementation summary (end 2021):

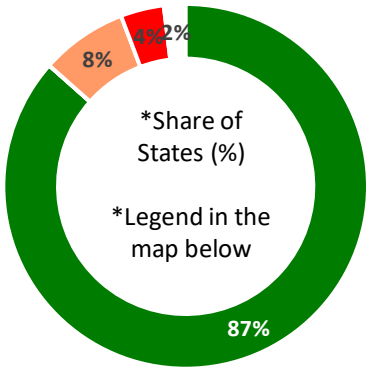
Network Operations Planning is already a well-established process within the EUROCONTROL Member States and it is coordinated by the Network Manager, representing one of its ATM network functions. In this context, the **Network Operations Plan** is regularly produced and published after approval by the Network Management Board. It implements the Network Strategy Plan and the Network Performance Plan at an operational level and provides a short to medium-term outlook of how the ATM Network will operate, including expected performance at network and local level.

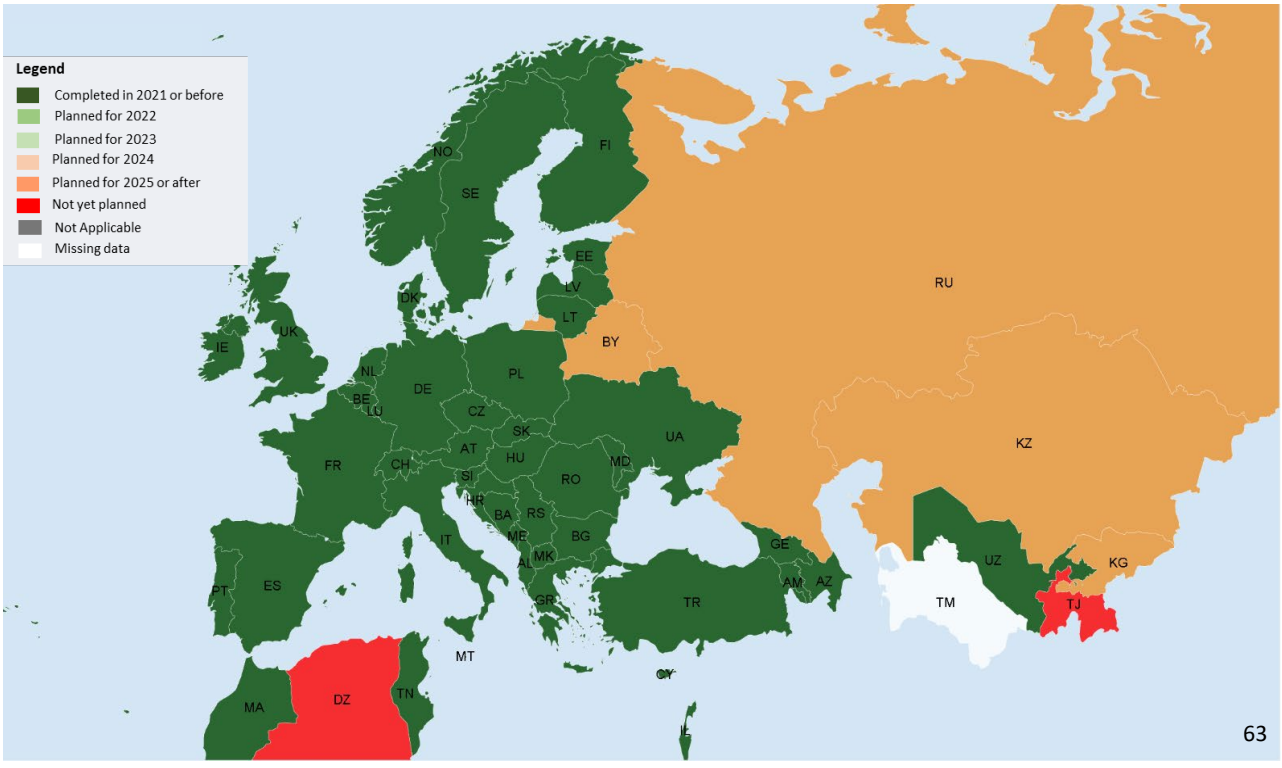
In order to support the COVID-19 recovery, NM started publishing the **Rolling Seasonal Plan**, covering a rolling six-week period and consolidating data from 350 airlines, 68 ACCs, 55 airports and 43 States. It plays a major role in helping European aviation to recover by providing aviation's key actors with the global view they need to plan effectively.

Among the non-LSSIP States, the Element is reported as completed by Tunisia and Uzbekistan and planned in the longer-term (2026/2027) by most of the other States.

New implementers in 2021:

None





NOPS-B0/4	Initial Airport/ATFM slots and A-CDM Network Interface	B0

ATM Master Plan Level 3:	AOP05 - Airport Collaborative Decision Making (A-CDM) AOP17 - Provision/integration of DPI to NMOC FCM11.1 - Initial AOP/NOP Information Sharing

NOPS

Description:

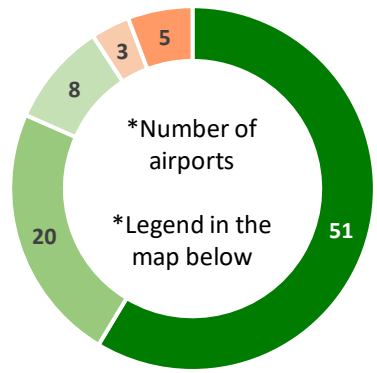
This element ensures an initial integration of airports into the ATM network function. The first objective is the A-CDM (Airport Collaborative Decision Making) integration with ATFM via exchanges of specific messages. The second objective is to ensure ATFM slot adherence and limited ATFM slot swapping in order to meet airline demands in line with capacity declarations.
Stakeholders will be able to share relevant airport and flight turnaround information with ATM network function resulting in better predictability and better use of existing capacity whilst considering user preferences and requirements.

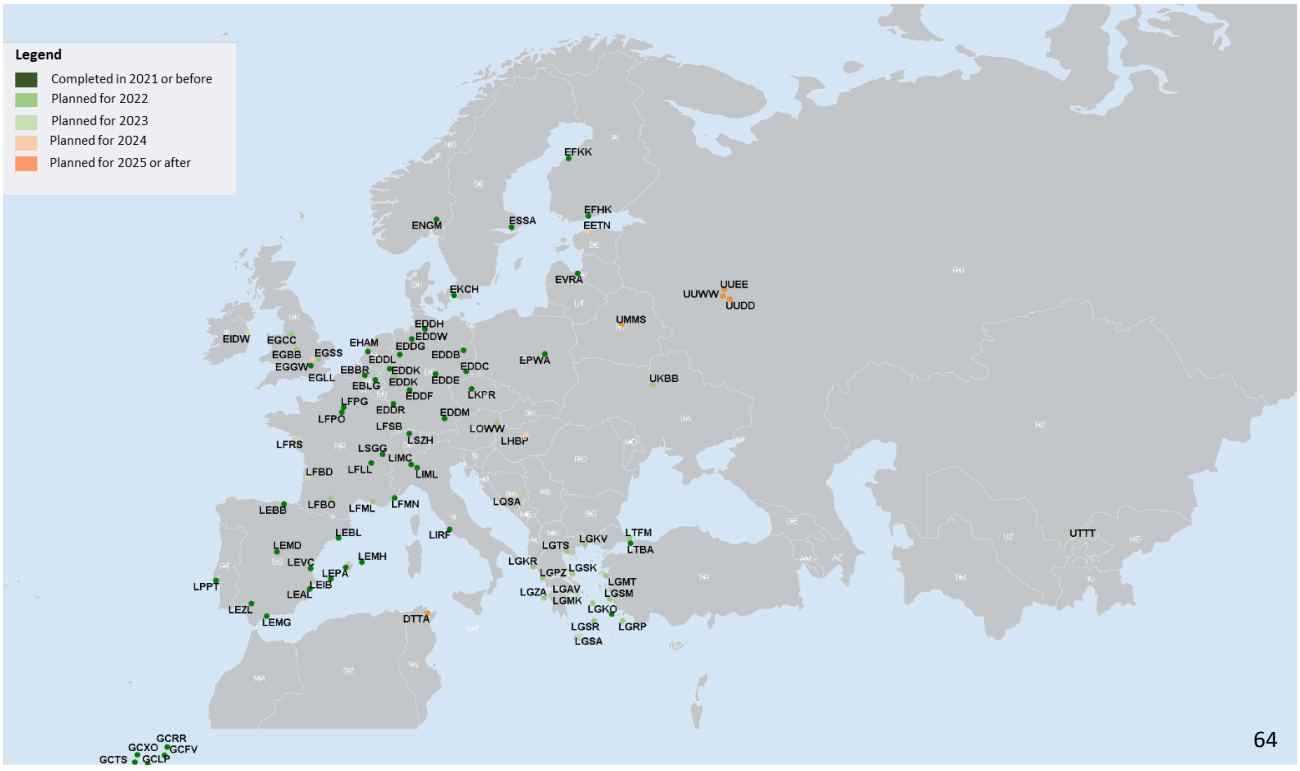
Implementation summary (end 2021):

Implementation summary (end 2021): Within the ATFCM area of EUROCONTROL NM, initial integration of airports within the ATM network function is ensured via information exchanges (DPI and FUM) as part of the Advanced ATC Tower implementation, of full A-CDM, or of AOP/NOP information sharing. It should be noted that these functionalities provide incremental levels of integration, from basic (Advanced TWR) to full integration (AOP/NOP). In the EUR Region, 51 airports have already established certain levels of information exchanges with NM. Most of these airports (32) have implemented the full A-CDM process (see also ACDM-B0/1 and 2 Elements), while additional 19 airports (typically medium and small-sized ones) provide Departure Planning Information (DPI) messages to NM. Another 28 airports have plans for deployment before end 2023. Among the non-LSSIP States, the Element is not yet implemented but it is planned at several airports in Belarus, Russian Federation, Tunisia and Uzbekistan, within the 2023-2027 timeframe.

New implementers in 2021:

EBLG, EVRA, LEZL, LEBB and LGKO





NOPS-B0/5	Dynamic ATFM slot allocation	B0
ATM Master Plan Level 3:	/	

NOPS

Description:

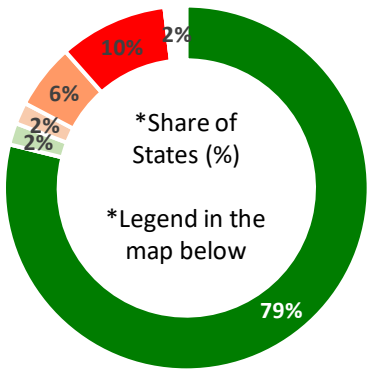
Dynamic ATFM slot allocation represents an ATM network function which provides departure ATFM slots, including Calculated Take-off Time (CTOT) for regulated flight to all concerned operational stakeholders. The CTOT is defined as a time at which the aircraft shall take-off. CTOT is sent to AU/ATS when a flight becomes regulated (e.g. new flight entering the system, new period of regulation in the system, change of runway in use) at a system parameter time before the last received Estimated Off-Block Time (EOBT). AU/ATS/Airport need to adhere to the CTOT. The calculation of take-off times takes into account the off-block times and an average taxing time for the runway in use at the airfield concerned.

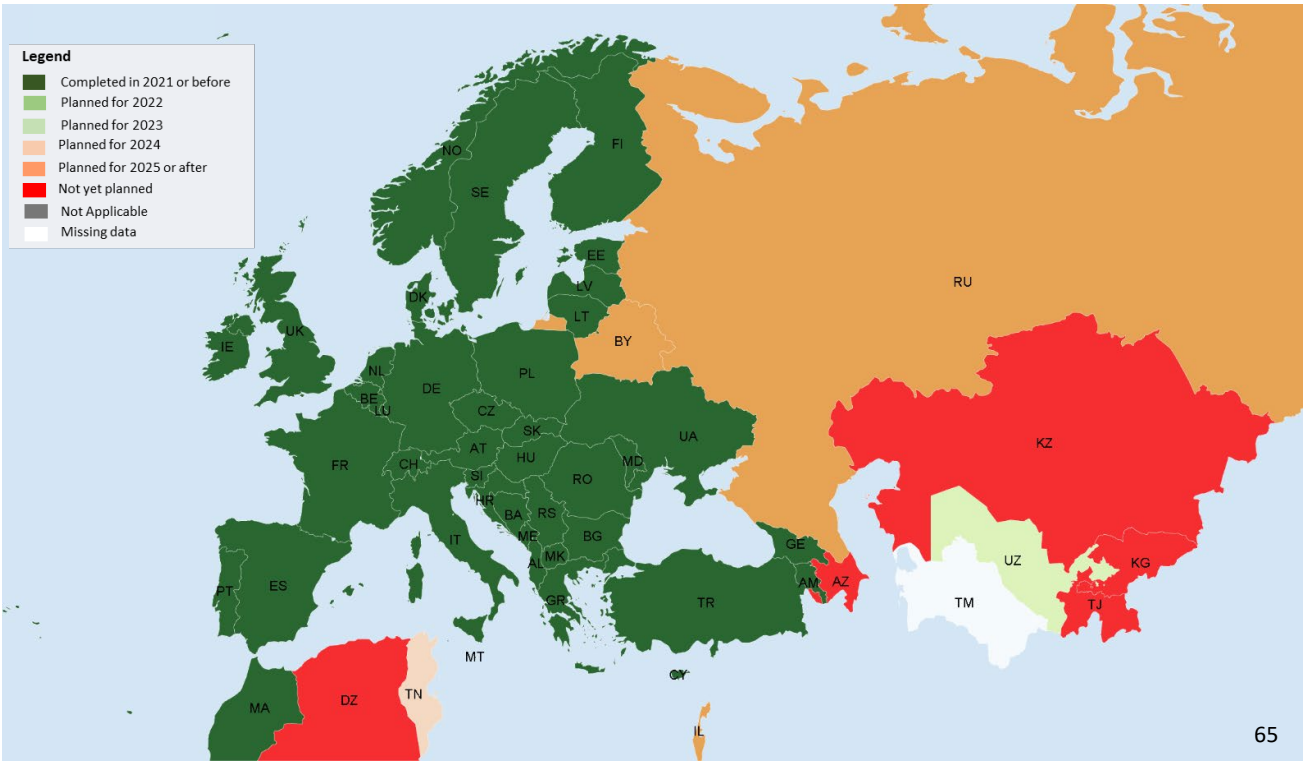
Implementation summary (end 2021):

Within its Air Traffic Flow and Capacity Management (ATFCM) Area (all ECAC Member States apart Azerbaijan and Iceland + Morocco), EUROCONTROL **Network Manager** is responsible for the provision of ATFCM, including the dynamic ATFM slot (CTOT) allocation to flights in order to resolve demand/capacity imbalances. Furthermore, certain States are cooperating with the NM by exchanging data with the NM and participating in the NM ATFCM service. These States are described as cooperating States and are referred as **ATFCM Adjacent Area** (Algeria, Belarus, Tunisia, Iceland, Israel, Egypt). Flow managers (FMPs) of Adjacent Areas may request the NMOC to apply ATFCM measures for the airports within their FIR or for significant points at the interface between the FIR and the NM Area of operations. Requests may come in case of capacity problems or any other disturbances to ATM. Among the remaining States within the Region, UZ expects to implement the Element in 2023 to be followed by TN in 2024.

New implementers in 2021:

None





NOPS-B1/1	Short Term ATFM measures	B1

ATM Master Plan Level 3:	FCM04.2 – Enhanced Short Term Short Term ATFCM Measures

NOPS

Description:

Short Term ATFM Measures (STAM) are intended to smooth sector workloads by reducing traffic peaks through short-term applications of minor ground delays, appropriate flight level capping, timing and modalities of ATC re-sectorization. These measures are capable of reducing the traffic complexity for ATC with minimum curtailing impact on the airspace users.
The rigid application of ATFM measures based on standard capacity thresholds as the pre-dominant tactical capacity measure needs to be replaced by a close working relationship between ANSP, AU and ATM Network function.
STAM tools and procedures are based on accurate short-term occupancy counts. The tactical capacity management procedures can be supported by the ATFM Tools (system-based STAM with the hotspot detection in the network view, the "what-if" function and capabilities of promulgation and implementation of STAM measures, including CDM).

Implementation summary (end 2021):

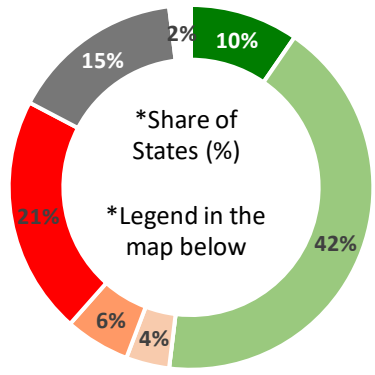
The implementation of short-term ATFM measures is still at an early stage in the EUR Region with only 5 States reporting completion. Yet a substantial spike is expected in 2022 mainly driven by the obligations imposed by the CP1 Regulation (EU 116/2021 - Sub-AF 4.1.1 on enhanced short term ATFCM measures) on the EU Member States.

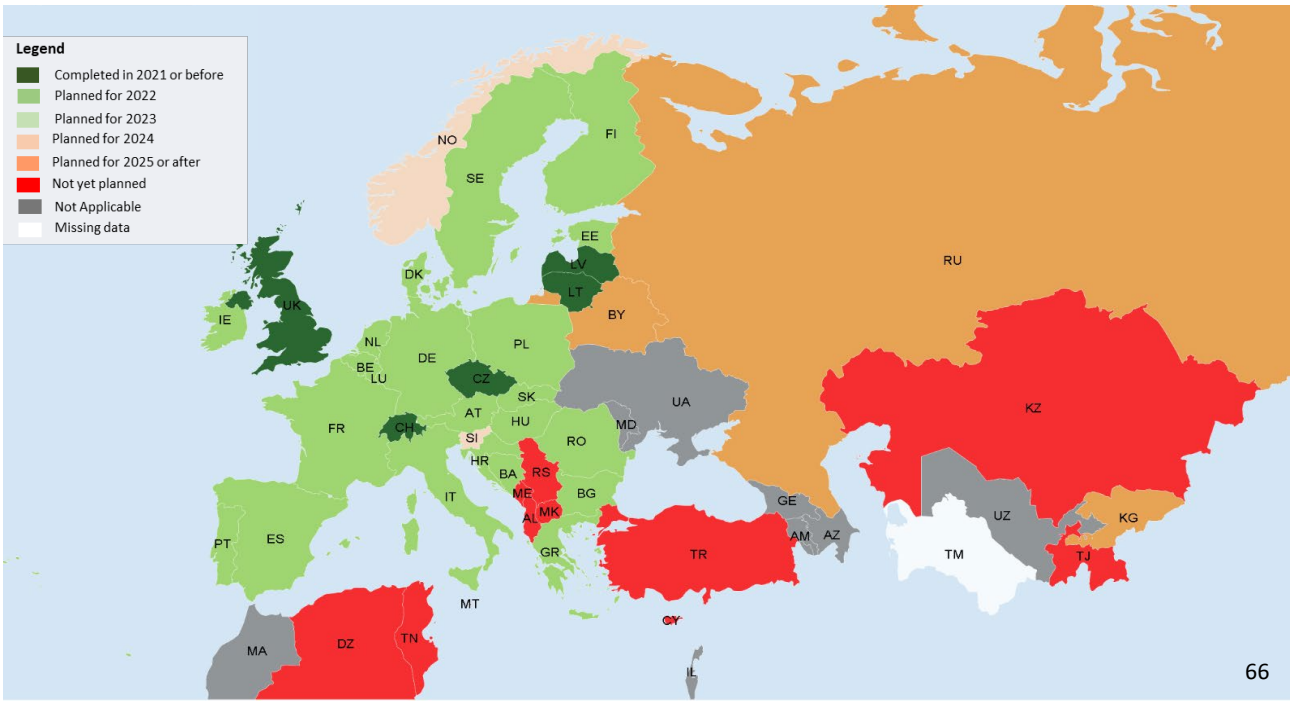
Outside the EU, most of the States consider the functionality as "Not applicable" or do not have concrete implementation plans, mostly because of the levels of traffic not justifying deployment.

Within the non-LSSIP States, only 3 of them have reported longer-term deployment plans, Russian Federation for 2026, followed by Belarus and Kyrgyzstan in 2027.

New implementers in 2021:

None





NOPS-B1/2	Enhanced Network Operations Planning	B1
ATM Master Plan Level 3:	FCM10* – Interactive Rolling NOP	NOPS

Description:

The Network Operations Planning (NOP) process will be enhanced to continuously provide up-to-date situational information on all components of the network. Furthermore, it will provide access to initial network performance objectives and support to network performance assessment in post-operations. The required technological platform will use the state-of-the-art technologies for creation of a virtual operations room for the physically distributed network operations, in support of collaborative NOP. These interfaces will support the network collaborative dynamic/rolling processes from strategic to real-time operations, including capabilities for online performance monitoring integrated and feeding back into the collaborative network planning.

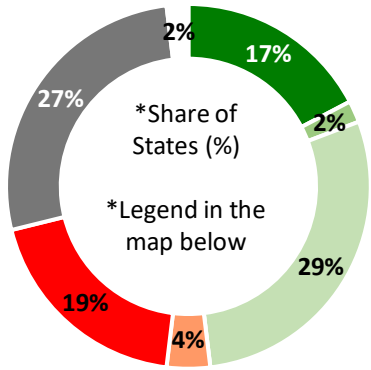
Implementation summary (end 2021):

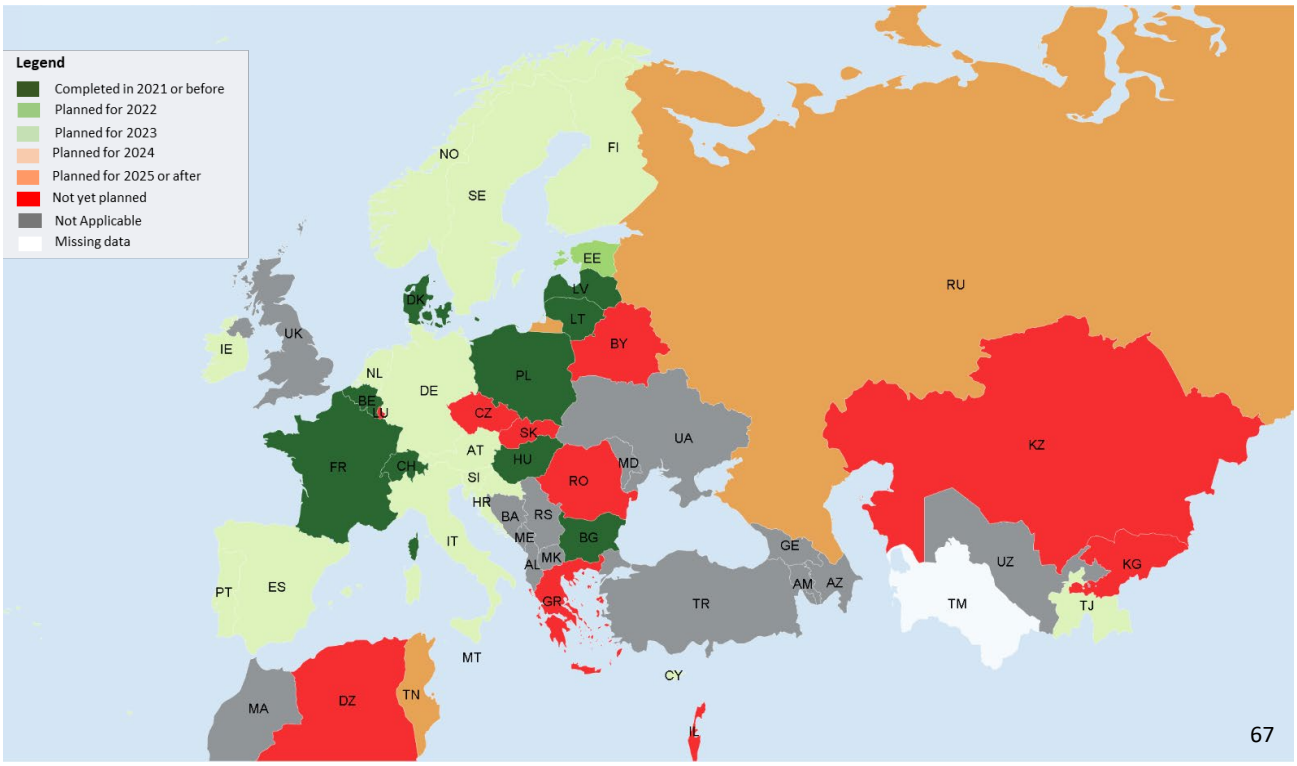
Within the ATFCM Area, interactive rolling NOP components are implemented and made available by the Network Manager (CHMI, NOP Portal). However, the interactive rolling NOP is an evolving development, and the existing/new functionalities are or are planned to be integrated within a new platform (n-CONECT Eco System). Currently 9 States have reported completion while 16 expect completion before end 2023. It should be noted that in some instances, the B2B connection to the NOP is considered as not necessary as the manual access to NM platform is fit for the local needs. Most of the non-LSSIP States do not have plans for implementation yet, apart from the Russian Federation, Tajikistan and Tunisia who expressed their intentions for deployment between 2023 and 2026.

**Note: for a better granularity, the analysis is performed based on the evolution of Stakeholder Line of Action FCM010-ASP01 "Use of NM technical platform and NM B2B service".*

New implementers in 2021:

Info not available – first monitoring cycle of the Implementation Objective





NOPS-B1/3	Enhanced integration of Airport operations planning with network operations planning	B1

ATM Master Plan Level 3:	FCM11.2 – AOP/NOP integration

NOPS

Description:

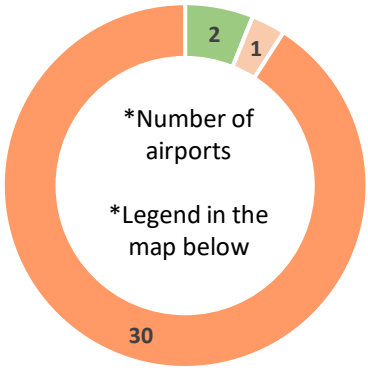
The airport operations plan will contain all data and information related to the different status of planning phases and will be a dynamic/rolling plan, which naturally evolves over time. The integration of airport operations planning within the network operations planning provides a dynamic/rolling picture of the network situation to be used by all operational stakeholders to prepare their plans and their inputs to the network CDM processes. The data exchanges are based on the subset of B2B/SWIM services that are most widely available to all stakeholders, communicating with local airport A-CDM systems to exchange relevant operational information.

Implementation summary (end 2021):

The Element is still in very early planning phases, with no airports having deployed it and with a slow progress expected in the next years. Only 3 airports plan to finalise deployment before 2025 while out of the overall 33 airports reporting deployment plans, 19 expect to finalise deployment in 2027. The choice of this date is also related to the CP1 Regulation (EU 116/2021 - Sub-AF 4.1.4 on AOP/NOP integration) mandating the functionalities of the Element to a sub-set of airports in the Region, by 2027.
Among the non-LSSIP States, Belarus, Kyrgyzstan and the Russian Federation show interest in the deployment of the Element at a number of airports, between 2024 and 2028. The first one planning to be ready is Minsk (UMMS) in 2024, followed by Manas (UCFM) and Osh (UCFO) in 2025.

New implementers in 2021:

Info not available – first monitoring cycle of the Element



NOPS-B1/4	Dynamic Traffic Complexity Management	B1

ATM Master Plan Level 3:	FCM06.1* – Automated Support for Traffic Complexity Assessment and Flight Planning interfaces

NOPS

Description:

The local traffic complexity assessment continuously monitors sector demand and evaluates traffic complexity (by applying predefined complexity metrics) according to a predetermined qualitative scale. It provides support in the determination of solutions in order to plan airspace, sectors and staff to handle the predicted traffic. The local complexity assessment would benefit by receiving, processing and integrating the ATM Network function information in order to supplement the local traffic counts with the relevant flight plan data. This will improve the quality of the planned trajectory and further enhance the traffic complexity management.

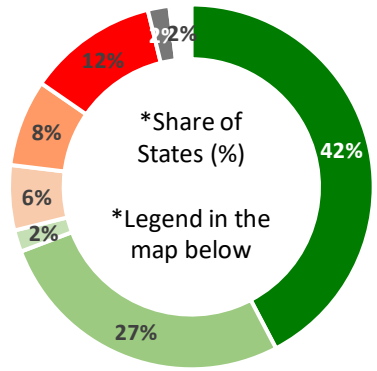
Implementation summary (end 2021):

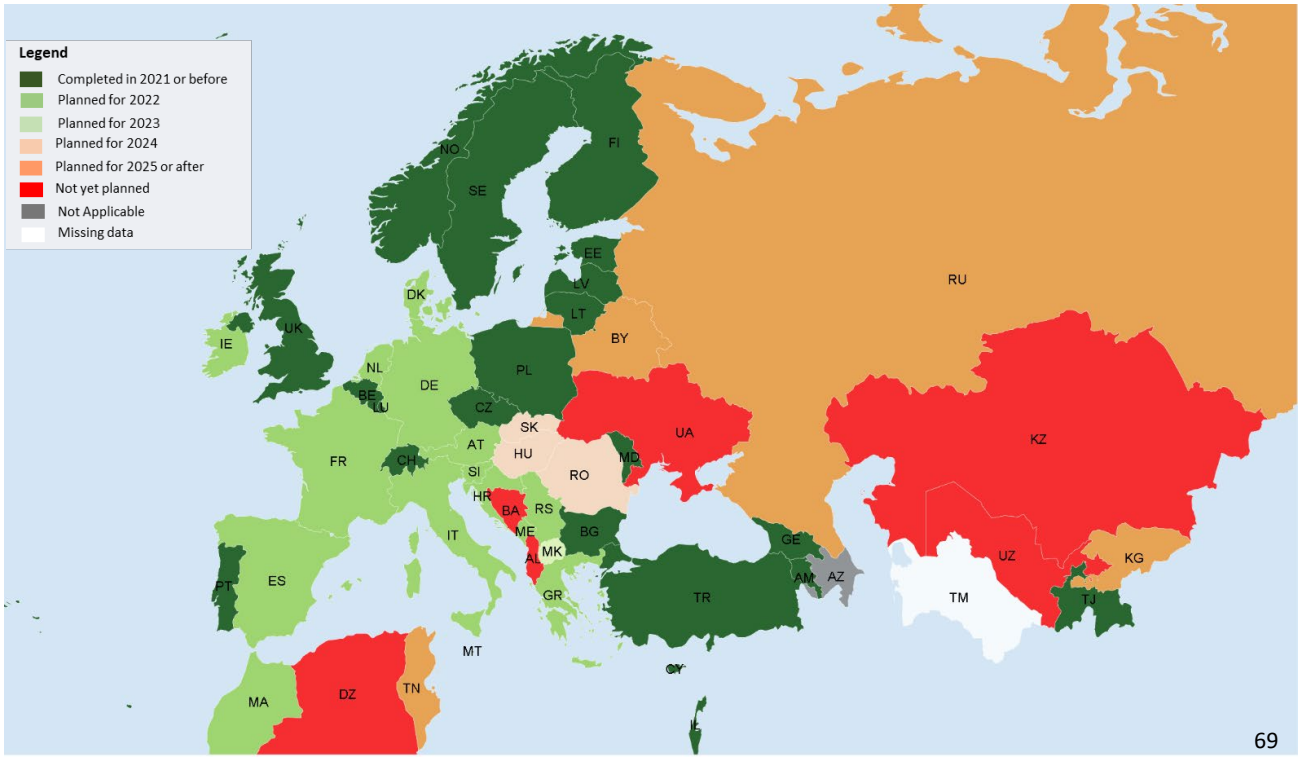
The Element has already been deployed by 22 States in the Region, another 14 States expecting completion in 2022. Among the LSSIP-States (21 implementers), 11 States have chosen to implement the tool which is provided by the NM while 10 have deployed local tools which are either exchanging or planned to exchange data with NM. Within the EU Member States the implementation of the Element is driven by the provisions of the CP1 Regulation (EU 116/2021 - Sub-AF 4.1.3 on automated support for traffic complexity assessment) requiring the deployment by 12/2022, therefore the spike in implementation expected for 2022. Several States consider traffic load monitoring as sufficient to fulfil the requirements of the Element. Among the non-LSSIP States, TJ reports this element as completed, while BY, KG, RU and TN report implementation plans between 2025 and 2027.

**Note: for better granularity, the analysis is performed based on the evolution of Stakeholder Lines of Action FCM06.1-ASP03 "Use NM systems for traffic complexity management" and FCM06.1-ASP04 "Implement Local Traffic Complexity Tool".*

New implementers in 2021:

Info not available – first monitoring cycle of the Implementation Objective





NOPS-B1/5	Full integration of airspace management with air traffic flow management	B1

ATM Master Plan Level 3:	AOM19.5* – ASM and A-FUA

NOPS

Description:

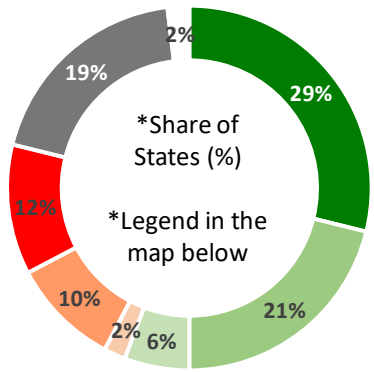
The full dynamic/rolling ASM/ATFM process focuses on improving airspace planning. It will ensure a continuous, seamless and iterative airspace planning and management/allocation based on airspace requests at any time period within strategic, pre-tactical and tactical ASM levels. It will result in a rolling process, supporting the enhancement of dynamic Network Operations Planning. The real time ASM data exchanges relates to the automated exchange services of ASM data during the tactical phase continuously in real time. ASM information (real-time Airspace Reservation status) is shared between different systems and Stakeholders and communicated to ATFM in the tactical phase.

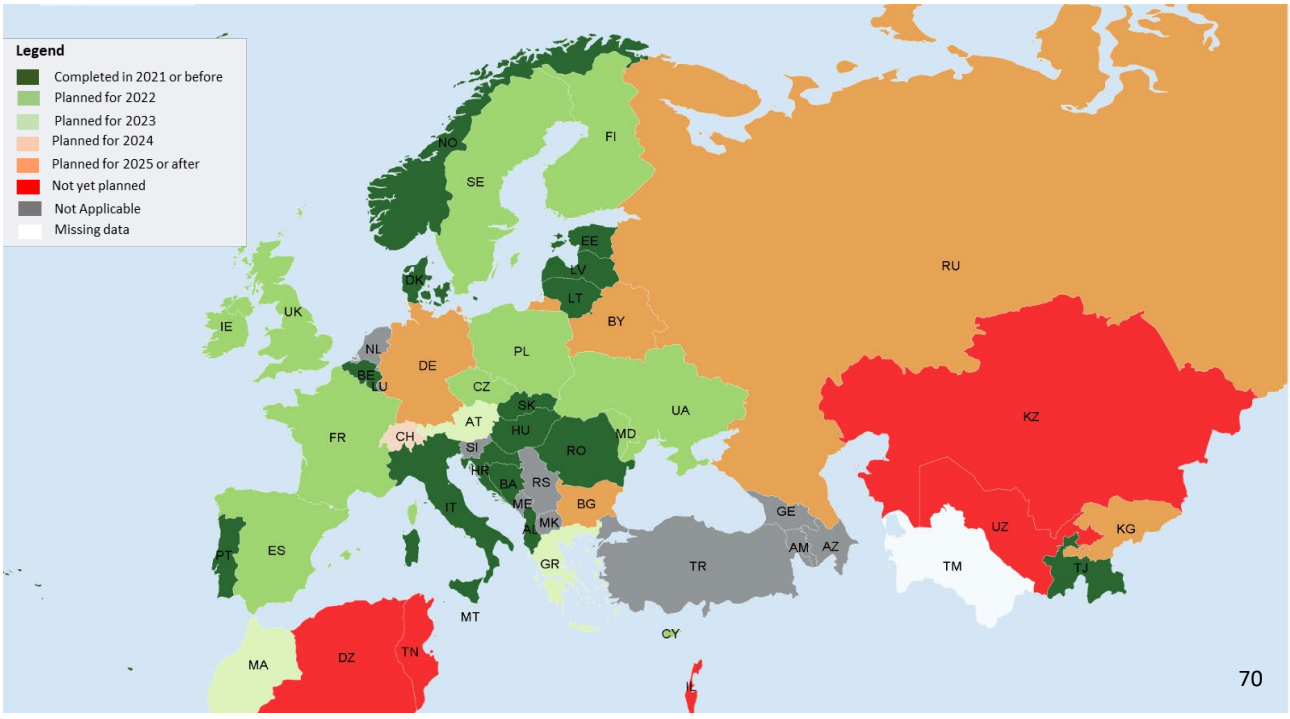
Implementation summary (end 2021):

Within the ATFCM area, the States are adapting their systems and procedures in order to support a full rolling ASM/ATFCM process via Airspace Use Plans (AUPs) and Updated Airspace Use Plans (UUPs). Within this area, 14 States have already finalized the implementation (15 at EUR Region level). Another 11 States expect to achieve completion in 2022 as within the EU the implementation of the Element is driven by the provisions of the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) requiring the availability of this functionality by 12/2022.
Within the non-LSSIP States, only Tajikistan has reported completion, while Belarus, Kyrgyzstan and the Russian Federation expect deployment between 2026 and 2027.
** Note: for better granularity, the analysis is performed based on the evolution of Stakeholder Lines of Action AOM19.5-ASP04 "Deploy automated ASM support systems (LARA or equivalent)" or AOM19.5-ASP02 "Adapt ASM systems to support a full rolling ASM/ATFCM process".*

New implementers in 2021:

Info not available – first monitoring cycle of the Implementation Objective





NOPS-B1/6	Initial Dynamic Airspace configurations	B1

ATM Master Plan Level 3:	AOM19.4 – Management of Predefined Airspace Configurations

NOPS

Description:

This element addresses the ASM solutions and initial dynamic airspace configurations for ATFM planning, synchronization of traffic flows and demand/capacity balancing. The ASM solutions process is aimed at delivering ASM options/solutions that can help reducing or even alleviate the ATFM measures and address capacity issues identified in any particular area as well as to improve flight efficiency, assess impact on capacity and ensure the synchronized availability of optimized airspace structures based on traffic demand and dynamic sectors management. The Airspace configurations are pre-defined and coordinated airspace structures and ATC dynamic sectorization, to meet the ATFM and airspace needs in terms of capacity and/or flight efficiency. The implementation of pre-defined airspace configuration exchange covers the improvements of ATFM systems, to allow exchange of predefined airspace configurations information.

Implementation summary (end 2021):

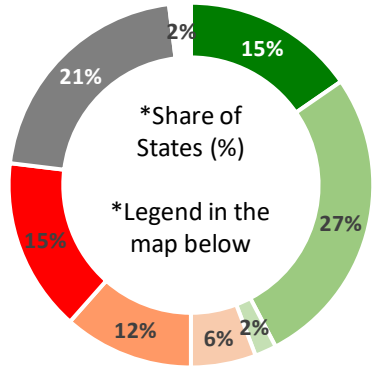
Please note that for LSSIP States this element is linked to the same ATM MP L3 Objective as FRTO-B1/4.

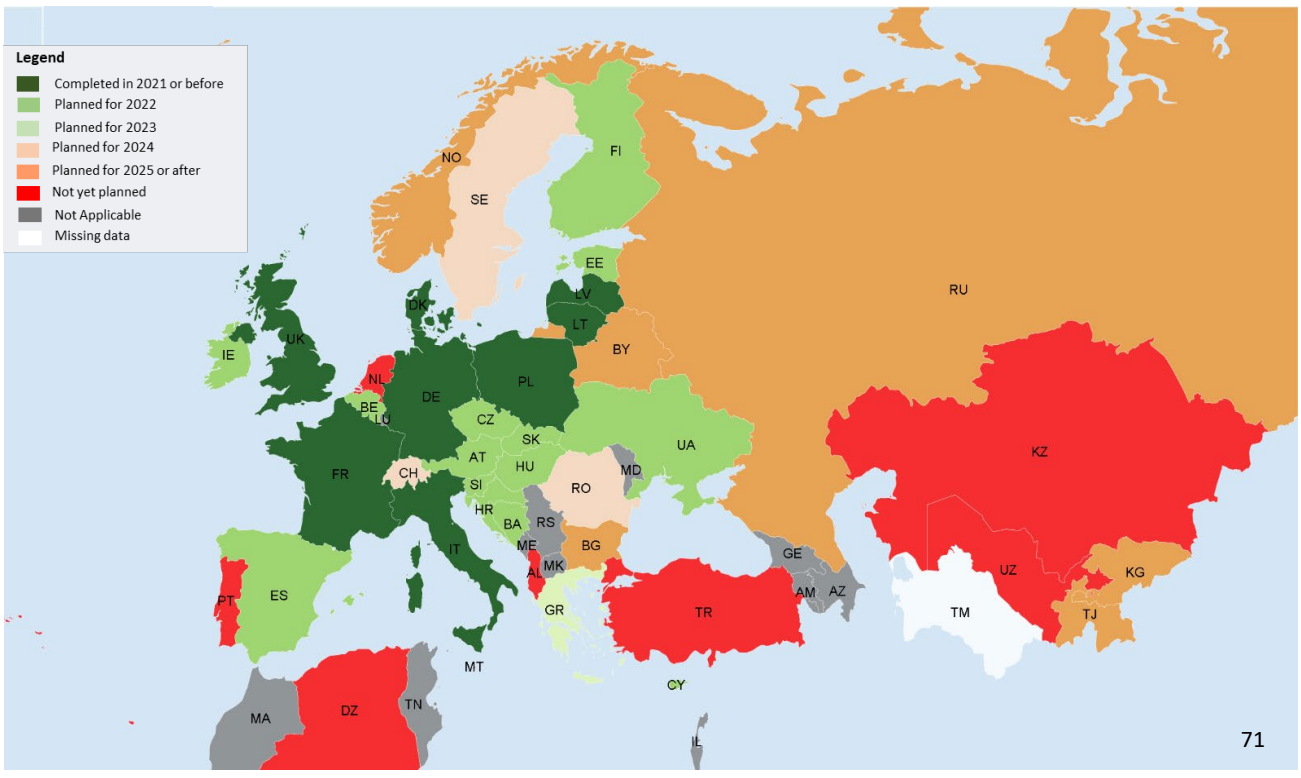
The Element has been implemented by 5 States in 2021, reaching a total of 8 States within the Region. A substantial increase (14 States) is expected in 2022, mainly driven by the obligations imposed by the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) on the EU Member States.

There is a lower interest within the non-LSSIP States (3 of these States do not have deployment plans yet while another one considers it as “not applicable”), in particular due to the lack of operational needs. Only Belarus, Kyrgyzstan, the Russian Federation and Tajikistan have reported implementation plans, between 2025 and 2027.

New implementers in 2021:

FR, DE, IT, LT, LV and UK





NOPS-B1/7	Enhanced ATFM slot swapping	B1

ATM Master Plan Level 3:	FCM09 – Enhanced ATFM Slot Swapping

NOPS

Description:

ATFM slot swapping allows Airspace Users (AU) to request a rearrangement of their own flights subject to an ATFM measure in order to better suit their needs. The enhanced ATFM Slot Swapping improves the slot swapping currently used by AU, by allowing the function to be extended gradually to all AU, by re-prioritizing their flights during the pre-departure part of operations. The Enhanced Slot swapping increases flexibility for AU and provides a wider range of possibilities, by facilitating the identification of possible swaps for an ATFM Measure impacted flight and by reducing the rate of rejection of swap requests by refining current processes.

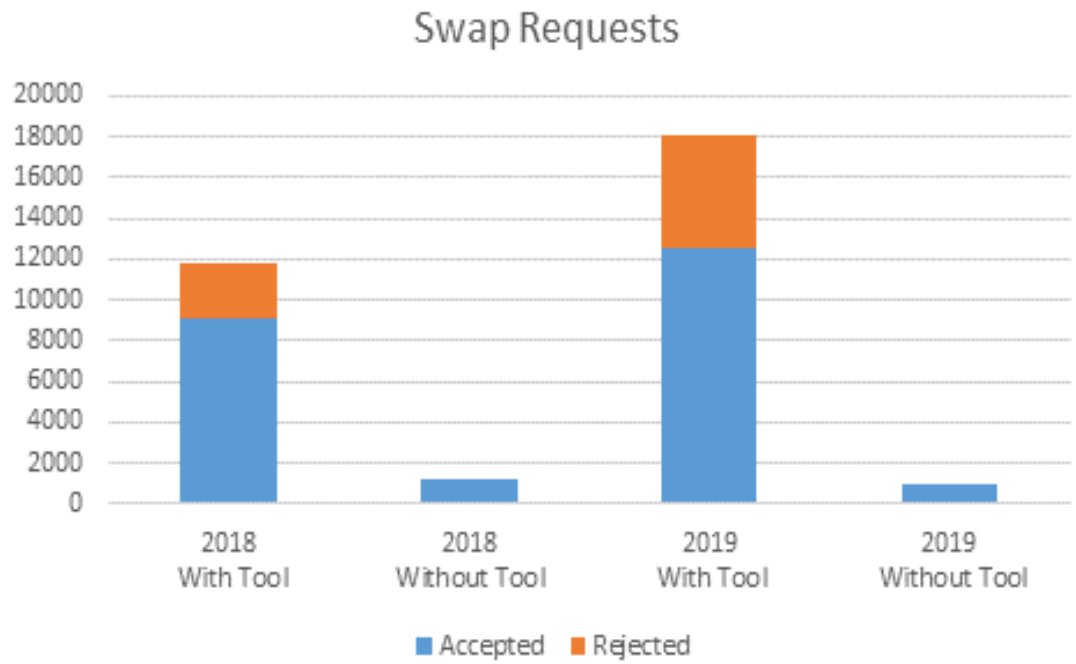
Implementation summary (end 2021):

This Element involves the Centralised Flow Management Unit(s) and the Airspace Users during ATFM constrained situations. In practice slot swapping facilitates the Airspace User to balance the priorities of flights subject to the same ATFM regulation. A higher priority flight may transfer a portion of its ATFM delay to a lower priority flight or a low priority flight may increase its proportion of delay to benefit a neutral priority flight (reducing their delay). In addition to this, slot swapping can be used to reduce the delay of a flight by re-using the slot of a to-be cancelled flight from the same airline or airline grouping.

This functionality has already been implemented by EUROCONTROL's NM in the ATFCM area, while it is mostly reported as not yet planned for the other States of the EUR Region, with the exception of Belarus (2027), Russian Federation (2026) and Tunisia (2024). Advanced capabilities (e.g. automated responses and automated multi-swaps) are in the pipeline and are expected in the years to come.

Element only relevant for the Centralised Flow Management Unit(s) and Airspace Users

Element only relevant for the Centralised Flow Management Unit(s) and Airspace Users



NOPS-B1/8	Extended AMAN supported by the ATM Network function	B1

ATM Master Plan Level 3:	ATC15.2 – Arrival Management Extended to En-route Airspace

NOPS

Description:

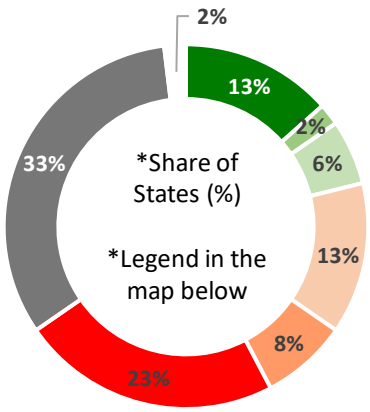
The ATM Network function involvement in extended Arrival Management includes enhancements of ATFM Planned Trajectory about the accuracy/predictability of estimates to meet the extended AMAN operational requirements; provision of ATFM Planned Trajectory to ANSPs; reception and processing of ANSPs extended AMAN info by ATM Network function; and ATFM assessment tool for extended AMAN.
Bilateral agreements need be established between the sectors involved that can be in different ATC units and also in different countries, including the ATM Network function for the notification purposes. The ATFM procedures need to be revised for the management of the extended Arrival Management information.

Implementation summary (end 2021):

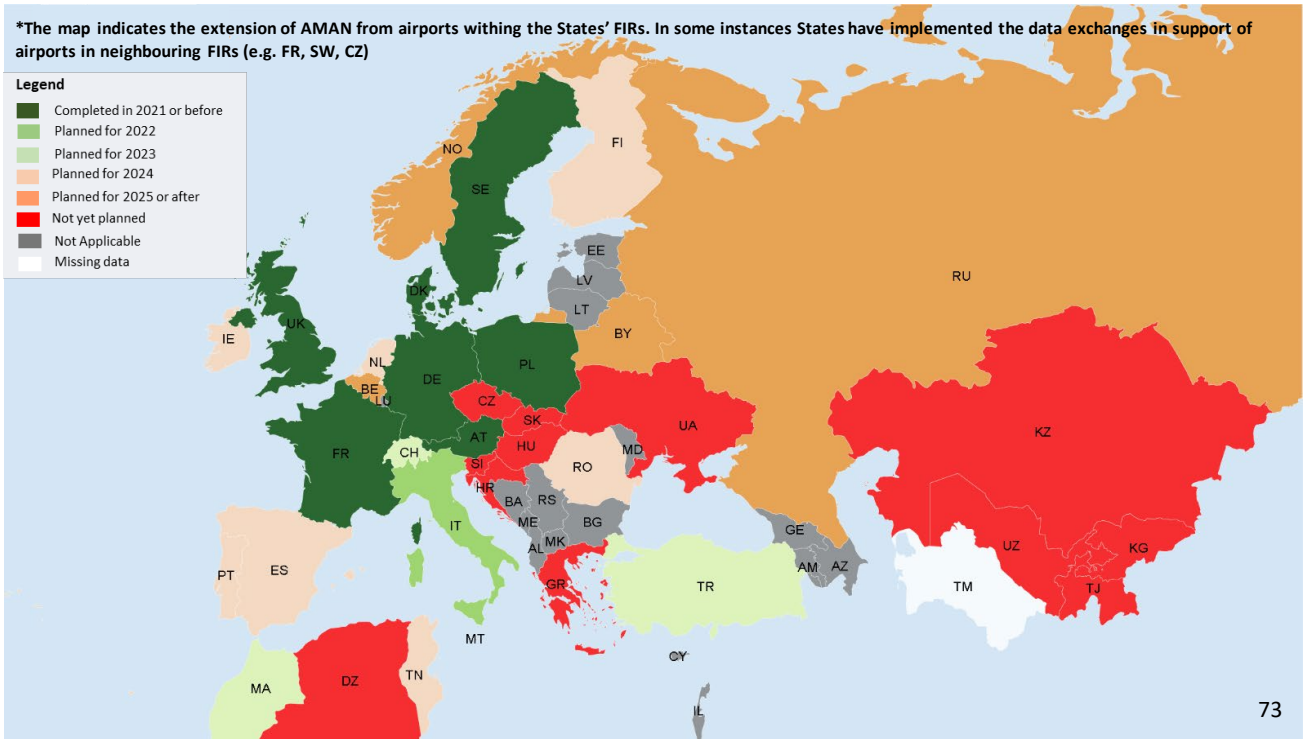
The implementation of Extended AMAN proves to be particularly challenging as it requires coordination with several ANSPs, sometimes going beyond the neighbouring ones. Within the ATFCM area, it also implies necessary information exchanges with NM. At the moment AMAN advisories from Vienna (LOWW), Frankfurt (EDDF), München (EDDM), Copenhagen (EKCH), Warsaw (EPWA), London Heathrow (EGLL) are extended to up to 180 NM. Within the EU, the implementation is driven by the CP1 Regulation (EU 116/2021 - Sub-AF 1.1.1 on AMAN extended to en-route) mandating the functionalities of the Element to a sub-set of 20 airports in the Region, by end 2024. However, more than half of the States in the EUR Region consider the Element as "Not applicable" or "Not yet planned" due to the lack of operational needs. Among non-LSSIP Reporting States, the implementation is currently planned (in the 2024 - 2027 timeframe) only in Belarus, the Russian Federation and Tunisia.

New implementers in 2021:

AT (LOWW)



*The map indicates the extension of AMAN from airports withing the States' FIRs. In some instances States have implemented the data exchanges in support of airports in neighbouring FIRs (e.g. FR, SW, CZ)



NOPS-B1/9	Target Times for ATFM purposes	B1

ATM Master Plan Level 3:	FCM10 (ASP03) – Adapt systems to receive TT for ATFCM purposes

NOPS

Description:

In order to improve the flight predictability at the entry of the congested area, a target time of entry at the congested area will be provided by ATM Network function. At this stage, the target times will be applied for ATFM purpose only, including an initial level of arrival sequencing in case of an arrival ATFM measure. The ATM Network function will provide the calculated Target Time (TT) at the most penalising measure reference point in addition to Calculated Take-Off Time (CTOT) to all concerned users. Stakeholders using TTs should be able to receive, extract and present the target times. ANSPs have access to the relevant information on flights that are subject to a Target Time to manage these flights as required. The Flight Operating centres should provide TT to pilots prior to departure; pilots should endeavour to adhere to the Target Times to the extent possible.

Implementation summary (end 2021):

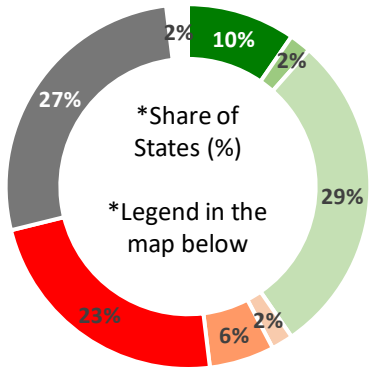
The current implementation of the Element is quite limited with only 5 States reporting completion and only one planning to deploy in 2022.

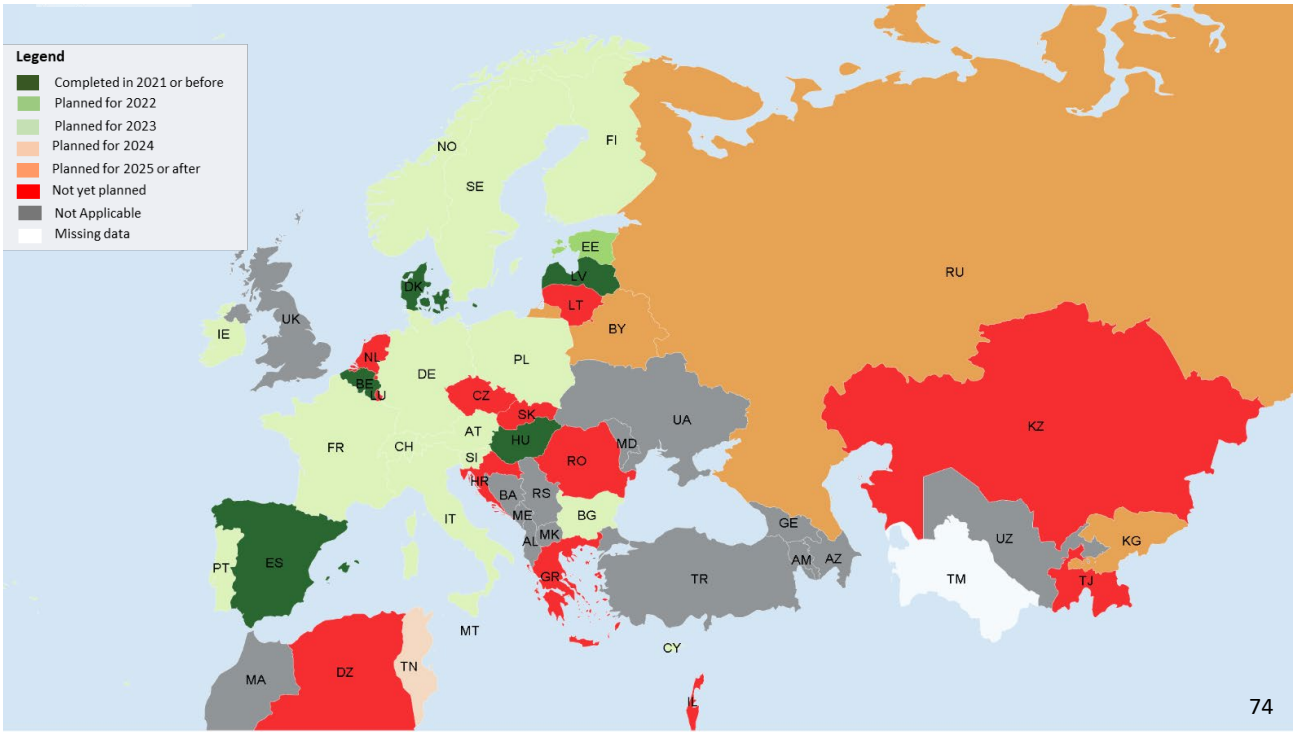
Most of the implementers report plans for 2023 which is in line with the requirements of the CP1 Regulation (EU 116/2021 - Sub-AF 4.1.2 on Collaborative NOP) mandating the functionalities of the Element within the EU Member States. However, more than half of the States in the EUR Region consider the Element as "Not applicable" or "Not yet planned" due to the lack of perceived operational needs, taking into account the traffic levels and patterns.

Among non-LSSIP Reporting States, the implementation reported as planned (in the 2024 - 2027 timeframe) only in Belarus, Kyrgyzstan, the Russian Federation and Tunisia.

New implementers in 2021:

Info not available – first monitoring cycle of the Element





RATS-B1/1	Remotely Operated Aerodrome Air Traffic Services	B1

ATM Master Plan Level 3:	AOP14 – Remote Tower Services

RATS

Description:

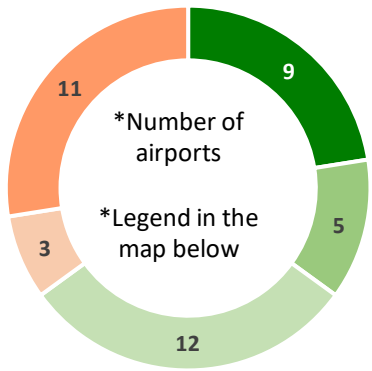
This element represents the provision of Aerodrome Control or Aerodrome Flight Information Services (AFIS) at aerodromes from other than an on-site facility. This could be achieved by utilizing either video surveillance, digital surveillance, procedural processes, or a combination thereof, which is commensurate with the complexities and traffic demands at the aerodrome. A Remote Tower Centre (RTC) will be remotely connected to one or more aerodromes and consist of one or more Controller Working Positions (CWP), dependent on the requirements of the connected aerodrome(s).

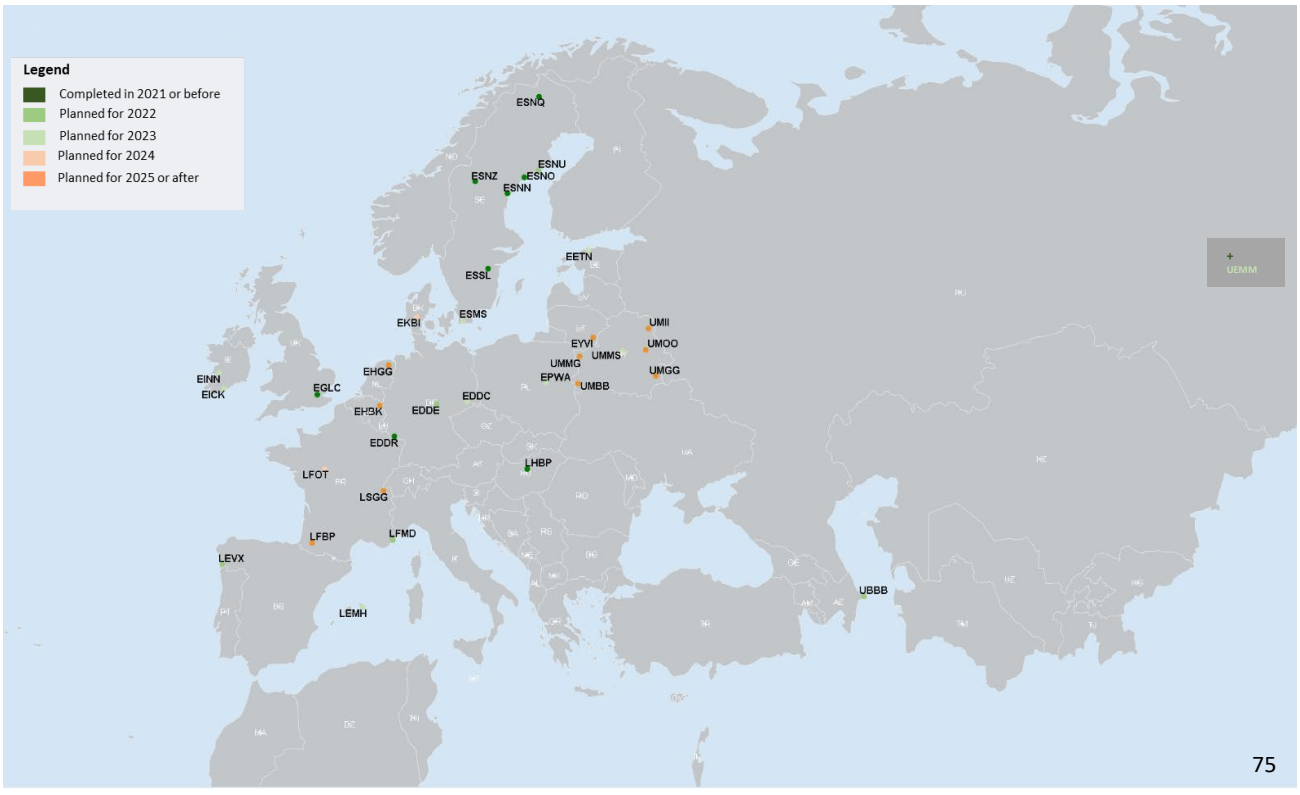
Implementation summary (end 2021):

Implementation of Remote Tower is building up speed with the functionality already used in operations at 9 locations in the EUR Region.
Particularly encouraging is the growing interest in the deployment of RTC, with at least 17 other locations expected to enter operations before end 2023, indicating the first steps towards the virtualisation of service provision. It should be noted that several States which have reported implementation plans have not yet indicated the precise locations were the Element will be implemented.
Interest is deployment is starting to build up in the non-LSSIP States as well, with the first implementations being expected in 2023 at Minsk (UEMM) and Yakutsk/Magan (UEMM) airports to be followed by other airports in Belarus, in the 2028 timeframe.

New implementers in 2021:

ESNQ, ESNZ and EGLC





RSEQ-B0/1	Arrival Management	B0

ATM Master Plan Level 3:	ATC07.1 – AMAN Tools and Procedures

RSEQ

Description:

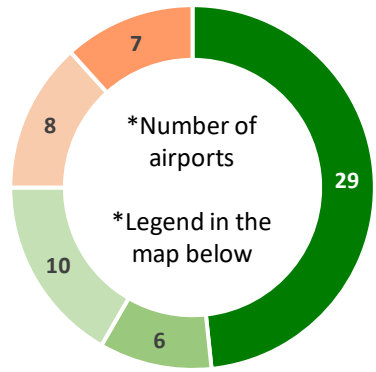
This element represents management of arrival sequences, thereby allowing aircraft to fly more efficiently to the necessary fix and to reduce the use of holding stacks, especially at low altitude.
Based on inbound traffic prediction information and decision making support, ATC operational techniques (metering points, speed-control, Time-To-Gain/Time-To-Lose, etc.) will be used to sequence inbound flights at minimum separation on final approach (time or distance based), so as to optimize runway utilization. Time-based metering is the practice of planning a sequence of traffic by time rather than distance. Typically, the relevant ATC authorities will assign a time in which a flight must arrive at the aerodrome or at a specific control point, and/or advises subject flights of speed changes as required to achieve the optimal separation on final approach.

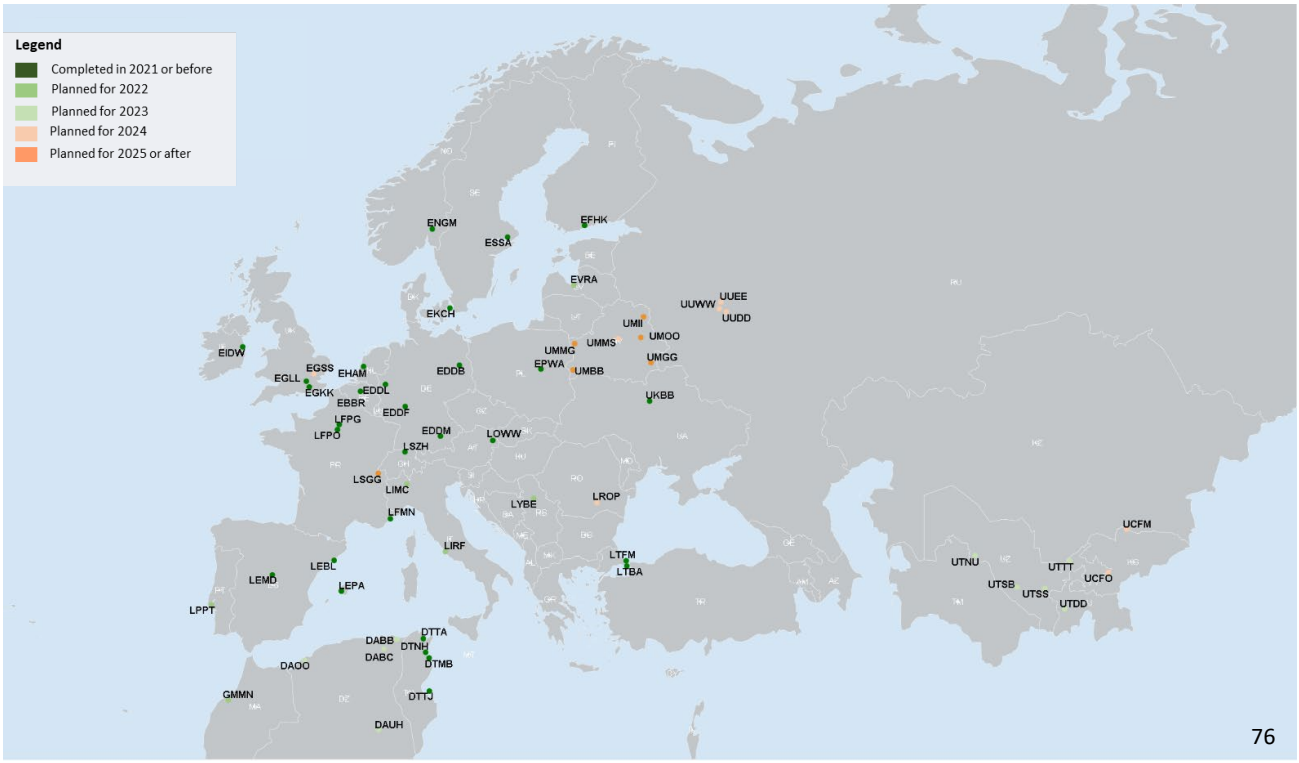
Implementation summary (end 2021):

Basic Arrival Management (AMAN) tools are quite well spread within the EUR Region, having already been deployed at 29 locations. Another 24 airports expect to finalise deployment before the end of 2024. Still the Element is considered as “not applicable” by many airports where the amount and distribution of traffic does not justify the implementation of such tool.
The interest in AMAN deployment is also high among the non-LSSIP States almost all of them reporting implementation (or implementation plans) at 26 locations. Tunisia has reported completion at Tunis (DTTA), Enfidha (DTNH), Monastir (DTMB) and Djerba (DTTJ). Next ones to implement, in 2023, will be several airports in Algeria, Tajikistan and Uzbekistan, to be followed in 2024 by airports in Belarus, Kyrgyzstan and the Russian Federation.

New implementers in 2021:

None





RSEQ-B0/2	Departure Management	B0

ATM Master Plan Level 3:	**AOP19 -** Departure Management Synchronised with Pre-departure sequencing **AOP05 (ASP05)*** - Define and implement variable taxi-time and pre-departure sequencing procedure (i.e. initial DMAN) according to airport CDM Manual guidelines

RSEQ

Description:

Departure management (DMAN) is used to sequence the aircraft for optimized utilization of ground infrastructure and efficiently meet en-route and destination airport constraints, taking on board user preferences. Like its arrival counterpart, it serves to optimize departure operation to ensure the most efficient utilization of aerodrome and terminal resources. Slots assignment and adjustments will be supported by departure management automation. Dynamic ATFM slot allocation will foster smoother integration into overhead streams and help airspace users to better meet metering points and comply with other ATM requirements. Where Airport CDM is implemented, departure management will interface with the associated A-CDM processes (including the pre-departure sequencing of A-CDM) in determining optimal departure sequencing.

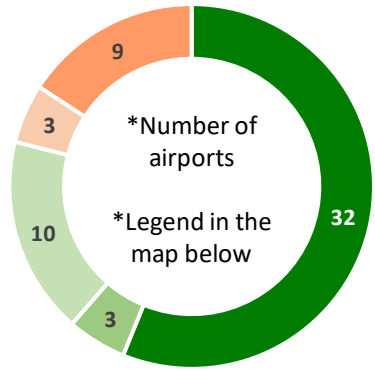
Implementation summary (end 2021):

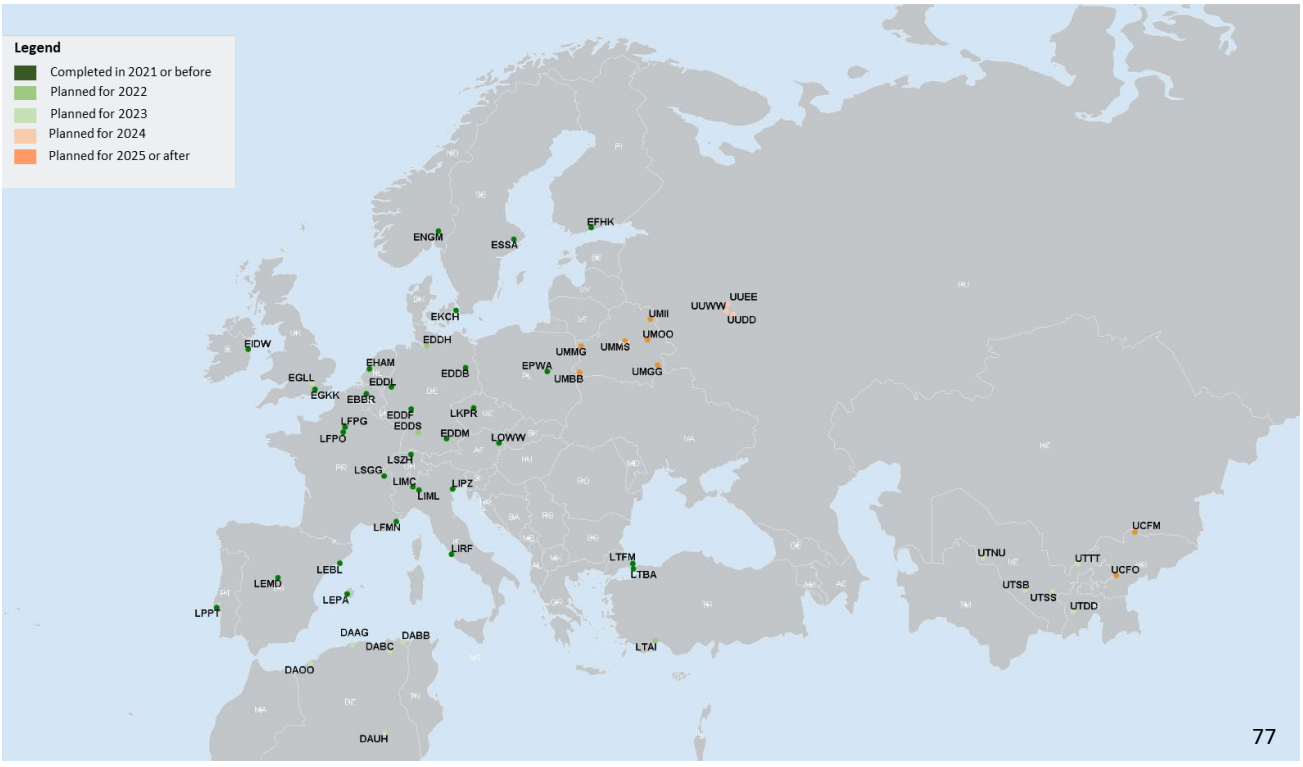
The Element has been already implemented at 32 locations in the EUR Region, all of them in the LSSIP States. It should be noted that information exchange needed for DMAN is supported by A-CDM platforms, which is why a DMAN deployment is tightly linked with A-CDM implementation at the vast majority of airports. For the same reason, many airports consider the Element as "Not applicable" as the levels of traffic do not justify the investments. Still, implementation at 16 other is expected to take place before the end of 2024. Within the non-LSSIP States, the Element has not been implemented anywhere yet. The first deployments will take place in 2023 at several airports in Algeria, Tajikistan and Uzbekistan, to be followed in 2024 by the Russian Federation as well as Belarus and Kyrgyzstan in 2025 and later.

**Note: for better granularity, historical data collected through the former SLoA AOP05-ASP05 has been used as well.*

New implementers in 2021:

None





RSEQ-B0/3	Point merge	B0
ATM Master Plan Level 3:	/	RSEQ

Description:

This element represents a procedural concept that uses existing technology to merge arrival flows. Its purpose is to improve and harmonize arrival operations by enabling continuous descent operations (CDO) and increasing arrival predictability, thereby enhancing airport capacity and limiting the environmental impact of aircraft emissions. Point Merge is based on a specific route structure that is made of a point (the merge point) with pre-defined legs (the sequencing legs) equidistant from this point that are used for shortening or stretching the arrival path..

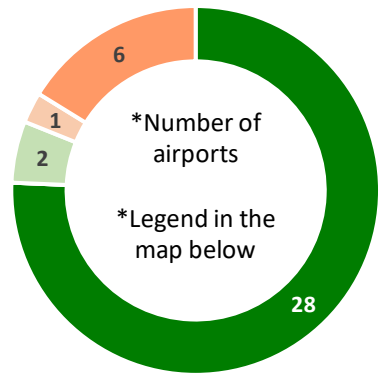
Implementation summary (end 2021):

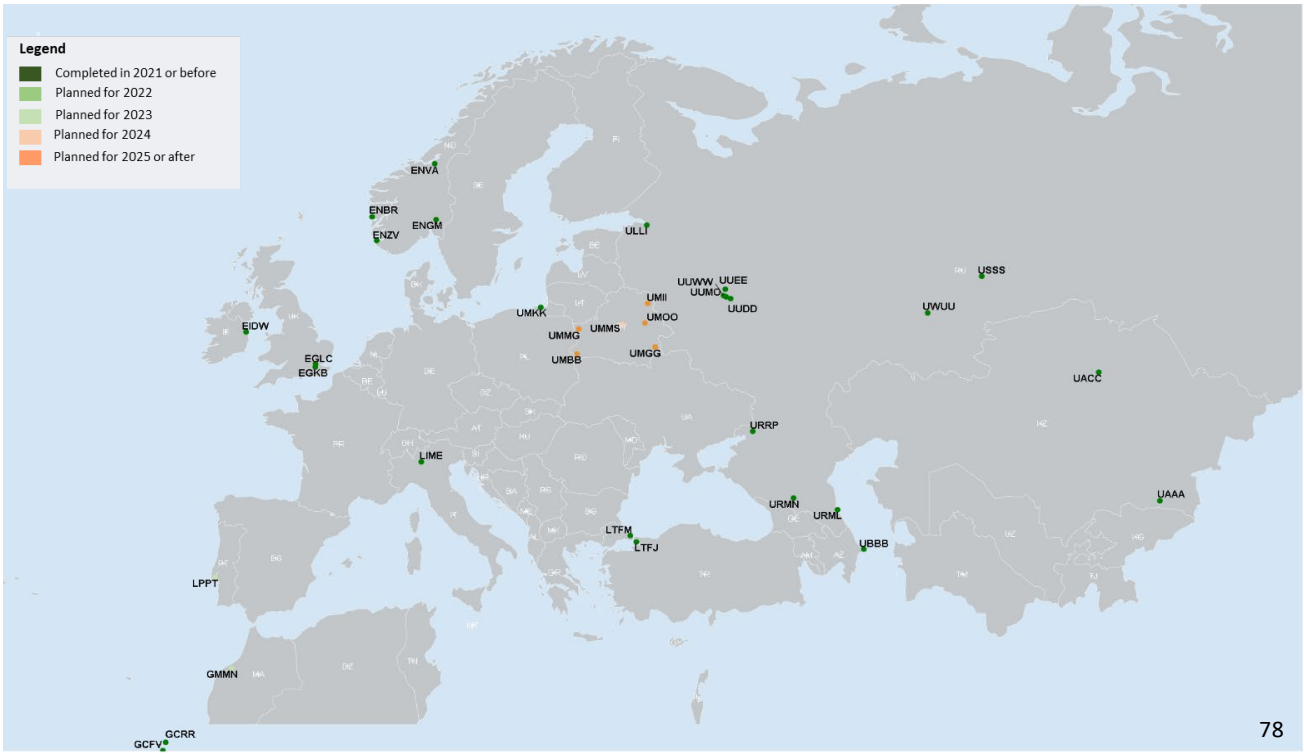
This is the first year that the Element is monitored therefore it is not yet possible to establish clear implementation trends, in particular with regard the plans for deployment. For the time being the Element is implemented at 28 locations, equally spread between LSSIP and non-LSSIP States. Most of the implementation have taken place in the Russian Federation (12 locations), followed by Norway (4 locations). Next implementations are planned at Lisbon (LPPT), Casablanca (GMMN) in 2023 and Minsk (UMMS) in 2024.

Note: for the next monitoring cycle the Element will be associated to a new ATM Master Plan Level 3 Implementation Objective, facilitating the data collection.

New implementers in 2021:

None





RSEQ-B1/1	Extended arrival metering	B1

ATM Master Plan Level 3:	ATC15.2 – Arrival Management Extended to En-route Airspace

RSEQ

Description:

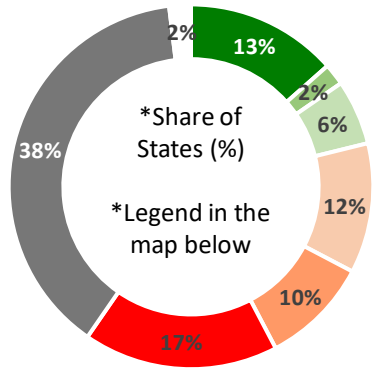
Extended metering will enhance predictability and ATM decision compliance. The ATS units will be able to meter across FIR boundaries. Extended metering will enable ATS units to continue metering during high volume traffic and will improve metering accuracy. This will also facilitate synchronization between adjacent FIRs. With extended metering, delays can be shifted to higher attitudes or even to the departure gate, where it can be more efficiently absorbed by incoming flights. This metering will provide extended arrival management, increasing arrival management effectiveness and benefits (e.g. in terms of reduced holding time) while reducing approach ATC workload. Extended metering may set requirements on flights pre-departure, if departing within the arrival metering range of the destination airport.

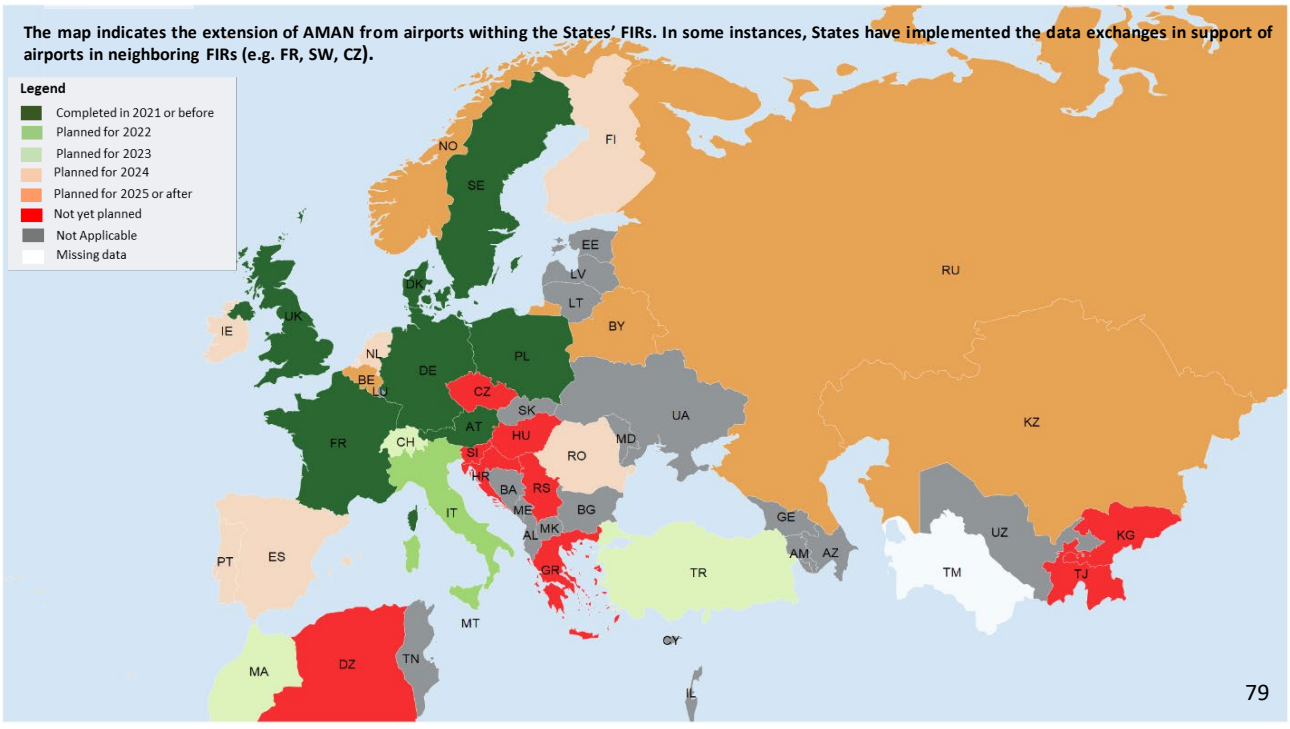
Implementation summary (end 2021):

The implementation of Extended AMAN proves to be particularly challenging as it requires coordination with several ANSPs, sometimes going beyond the neighbouring ones. Within the ATFCM area, it also implies necessary information exchanges with NM. At the moment AMAN advisories from Vienna (LOWW), Frankfurt (EDDF), München (EDDM), Copenhagen (EKCH), Warsaw (EPWA), London Heathrow (EGLL) are extended to up to 180 NM. Within the EU, the implementation is driven by the CP1 Regulation (EU 116/2021 - Sub-AF 1.1.1 on AMAN extended to en-route) mandating the functionalities of the Element to a sub-set of 20 airports in the Region, by end 2024. However, more than half of the States in the EUR Region consider the Element as "Not applicable" or "Not yet planned" due to the lack of operational needs. Among non-LSSIP Reporting States, the implementation is currently planned (in the 2026 - 2027 timeframe) only in Belarus, Kyrgyzstan and the Russian Federation.

New implementers in 2021:

AT (LOWW)





SNET-B0/1	Short Term Conflict Alert (STCA)	B0

ATM Master Plan Level 3:	ATC02.2 - Short Term Conflict Alert (STCA) - level 2 for en-route operations

SNET

Description:

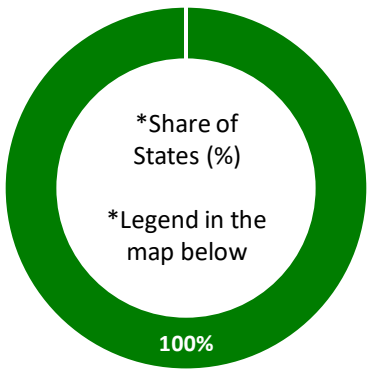
Short-term conflict alert (STCA) systems alert the controller when a given separation between two aircraft is actually lost or may be lost within a given amount of time.
Surveillance data from ground radars and ADS-B stations is used to track aircraft. For each pair of aircraft which are sufficiently close, an STCA is raised if at least one of the following tests is true: (current proximity test) their current horizontal separation is lower than a horizontal threshold and their current vertical separation is lower than a vertical threshold; or (linear prediction test) at any of their future positions within a given amount of time (warning time), as linearly extrapolated from their current track, their horizontal separation will be lower than a horizontal threshold and their vertical separation will be lower than a vertical threshold.

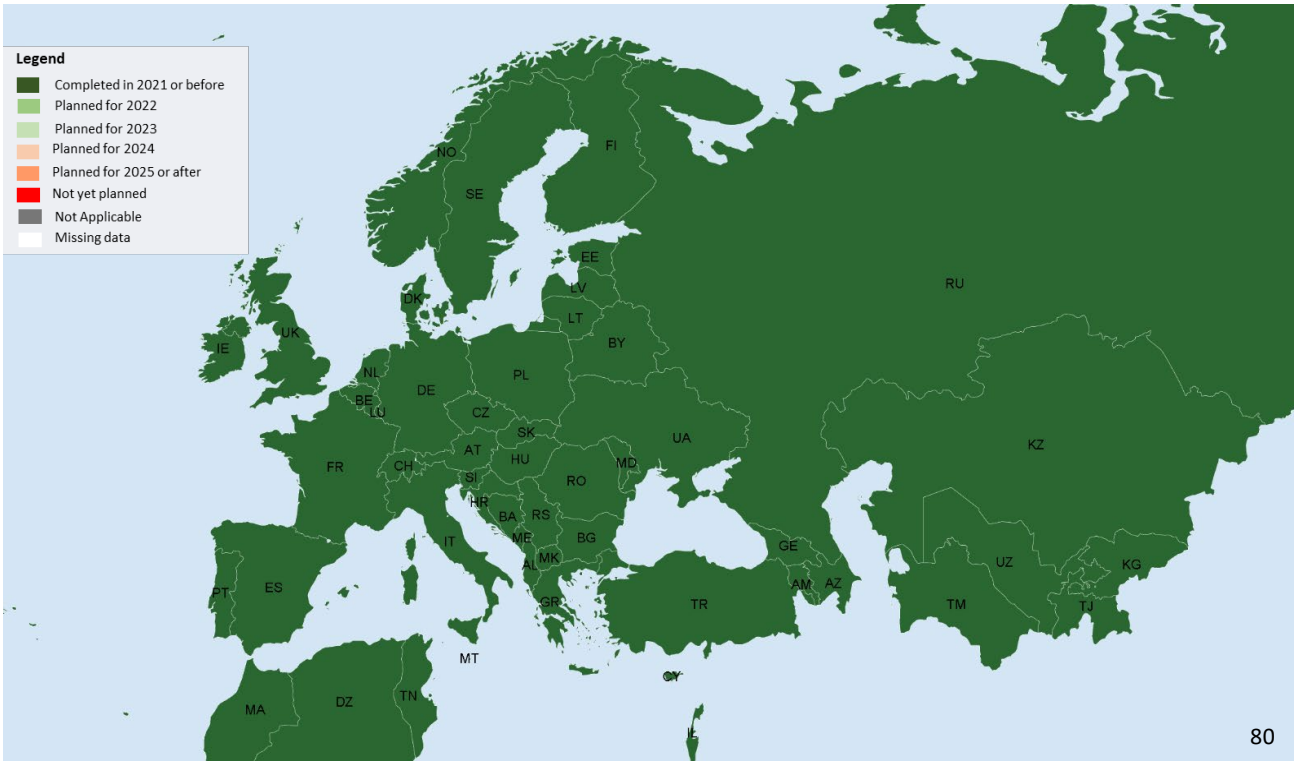
Implementation summary (end 2021):

Short Term Conflict Alert (STCA) represents undoubtedly not only the most widely implemented safety net in the ICAO EUR Region with 100% completion but also the first ASBU Element for which deployment has been completed.

New implementers in 2021:

None





SNET-B0/2	Minimum Safe Altitude Warning (MSAW)	B0

ATM Master Plan Level 3:	ATC02.8 (ASP03) - Implement the MSAW function

SNET

Description:

Minimum Safe Altitude Warning (MSAW) systems warn the controller about the increased risk of Controlled Flight Into Terrain (CFIT) accidents by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles.
Surveillance data (including tracked pressure altitude), flight data (including cleared flight levels) and environment data (including terrain and obstacle data) represent an input to the MSAW system to generate the alerts to the controller working position.
Upon noticing the alert, the controller has to analyze the situation and, if deemed necessary, issue an instruction to the aircraft, with the appropriate emergency phraseology.

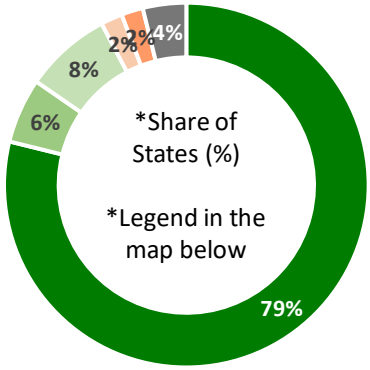
Implementation summary (end 2021):

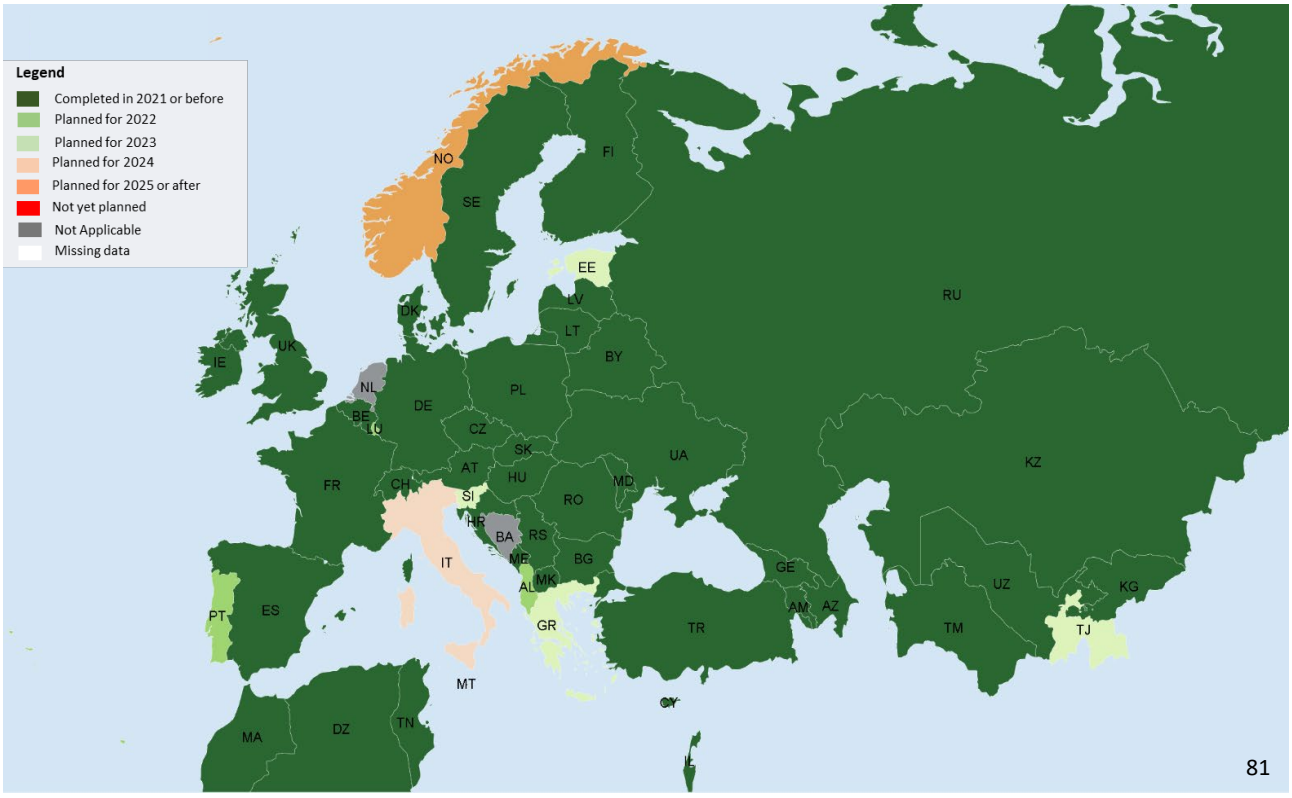
Minimum Safe Altitude Warning (MSAW) function has reached a very good level of implementation, with 41 States having reported completion. Implementation is expected by 7 other States by the end of 2023 as part of ATM systems' upgrades. Next States expected to implement, in 2022 are Albania, Luxemburg and Portugal.

Among the non-LSSIP States the Element is also widely deployed, the only State still reporting implementation in progress being Tajikistan, which expects to complete deployment in 2023.

New implementers in 2021:

None





SNET-B0/3	Area Proximity Warning (APW)	B0

ATM Master Plan Level 3:	ATC02.8 (ASP01) - Implement the APW function

SNET

Description:

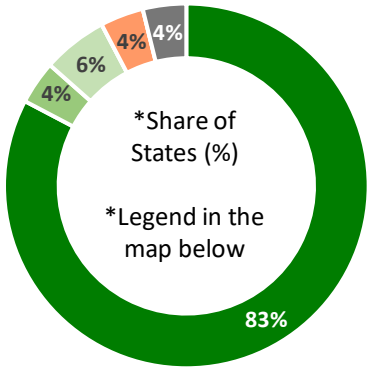
Area Proximity Warning (APW) systems warn the air traffic controller about unauthorized penetration into the airspace (either restricted or controlled) by a flight (either controlled or uncontrolled).
Surveillance data (including tracked pressure altitude), flight data (including cleared flight levels and RVSM status) and environment data (including airspace volumes) are input to the APW system to generate the alerts to the controller working position(s).
Upon noticing the alert, the controller has to analyze the situation and, if deemed necessary, issue an instruction to the aircraft, with the appropriate emergency phraseology.

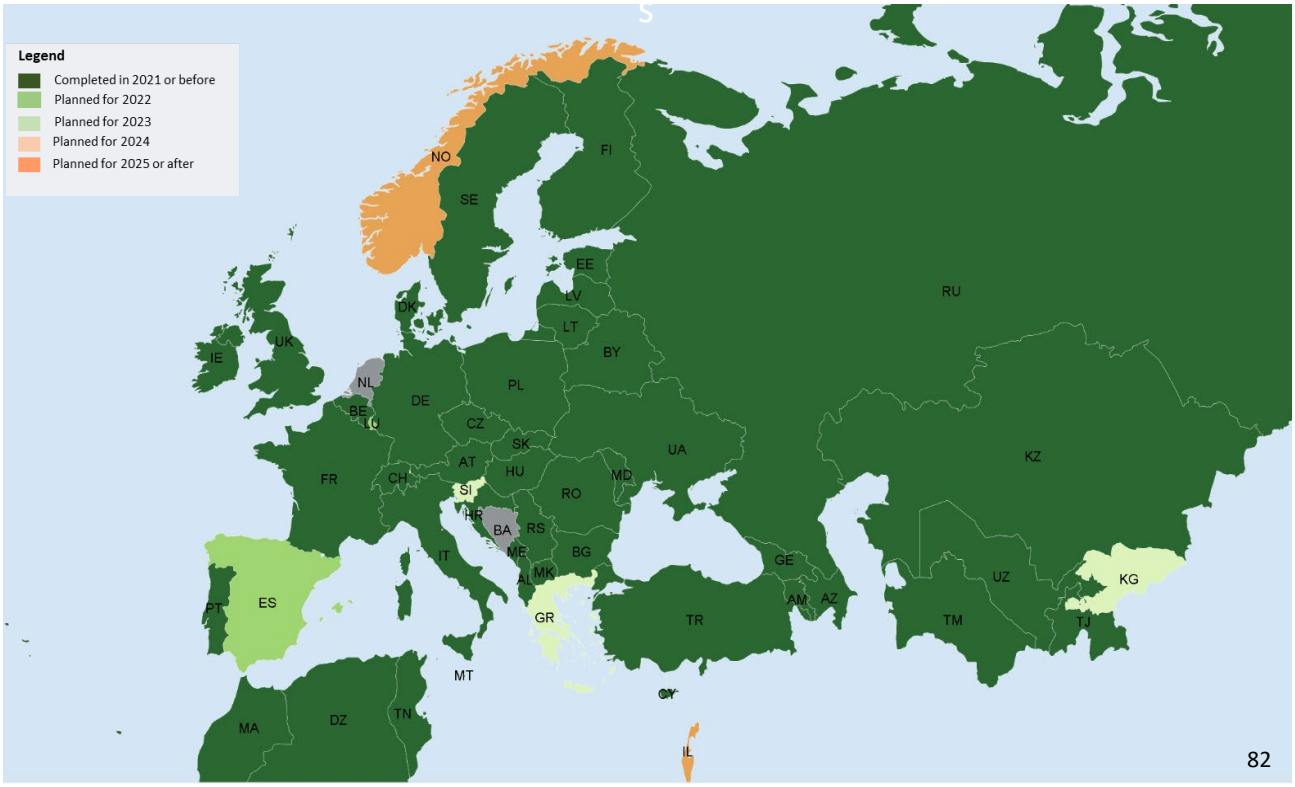
Implementation summary (end 2021):

The Area Proximity Warning (APW) function has the highest completion rate among the safety nets, beside the STCA. It has been already implemented in 43 States, 5 other expecting to fully deploy the Element by the end of 2023. It should be noted that there are cases were in States which have not reported completion yet, the functionality is already deployed in parts of the airspace (e.g. Spain has already implemented the Element in 4 of its 5 ACCs).
The good progress of the Element is justified by the fact that it addresses one of the system enablers facilitating the deployment of Free Route Airspace.
The Element is also widely implemented across the non-LSSIP States, with only Kyrgyzstan still planning to finalize implementation by end 2023.

New implementers in 2021:

None





SNET-B0/4	Approach Path Monitoring (APM)	B0

ATM Master Plan Level 3:	ATC02.8 (ASP05) - Implement the APM function

SNET

Description:

Approach Path Monitoring (APM) is designed, configured and used to make a significant positive contribution to avoidance of Controlled Flight Into Terrain (CFIT) accidents by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles during final approach.
Surveillance data (including tracked pressure altitude), flight data (including concerned sectors) and environment data (including terrain and obstacle data) are input to the APM system to generate the alerts to the controller working position(s).
Upon noticing the alert, the controller has to analyze the situation and, if deemed necessary, issue an instruction to the aircraft, with the appropriate emergency phraseology.

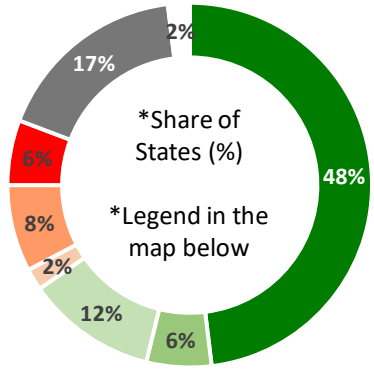
Implementation summary (end 2021):

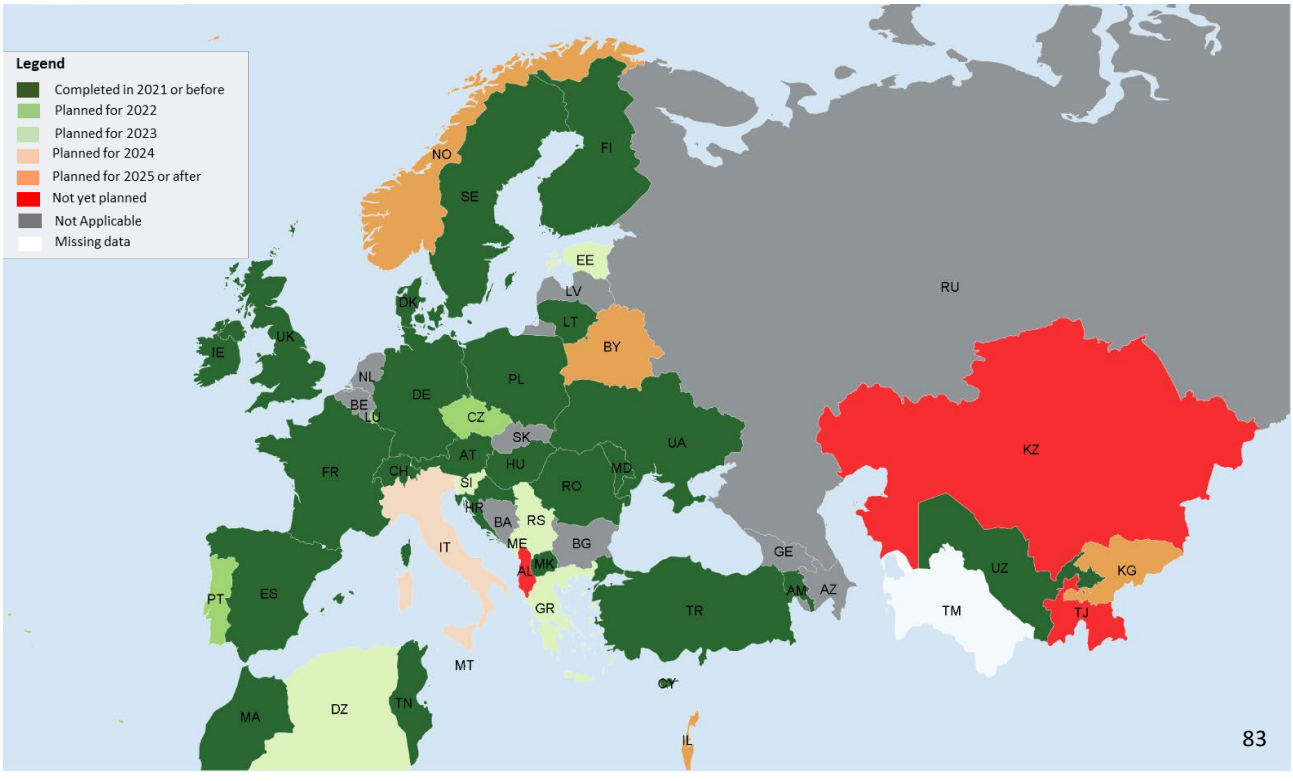
Among the safety nets related Elements, the one addressing Approach Path Monitoring shows the lowest completion rate, with 25 States reporting finalisation. This is in particular due to the fact that the implementation is seen as slightly less beneficial in fulfilling the operational needs in comparison with the other safety nets. However, the implementation is progressing, with 3 more States having finalised deployment in 2021 and 9 other expecting completion by the end of 2023.

Among the non-LSSIP States, APM shows a mixed progress, with 2 States (Tunisia and Uzbekistan) reporting completion, while Algeria expects to deploy it in 2023, to be followed by Kyrgyzstan in 2025 and Belarus in 2030.

New implementers in 2021:

HR, LT and SW





SNET-B1/1	Enhanced STCA with aircraft parameters	B1

ATM Master Plan Level 3:	ATC20 – Enhanced STCA with down-linked parameters via Mode S EHS

SNET

Description:

This element assists the air traffic controller in preventing collision between aircraft, using position data from ground surveillance and flight intent reported by aircraft.
This enhanced STCA works the same as the basic STCA system in Block 0, but stops the linear extrapolation of the vertical position of an aircraft when it reached the Selected Flight Level (SFL) information reported from ADS-B or downlinked from Mode S transponders. Therefore, using aircraft intent parameters allows STCA systems to reduce the number of unnecessary alerts, increase the number of relevant alerts, as well as to alert earlier compared to the basic STCA.

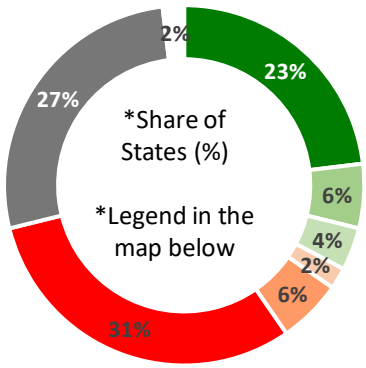
Implementation summary (end 2021):

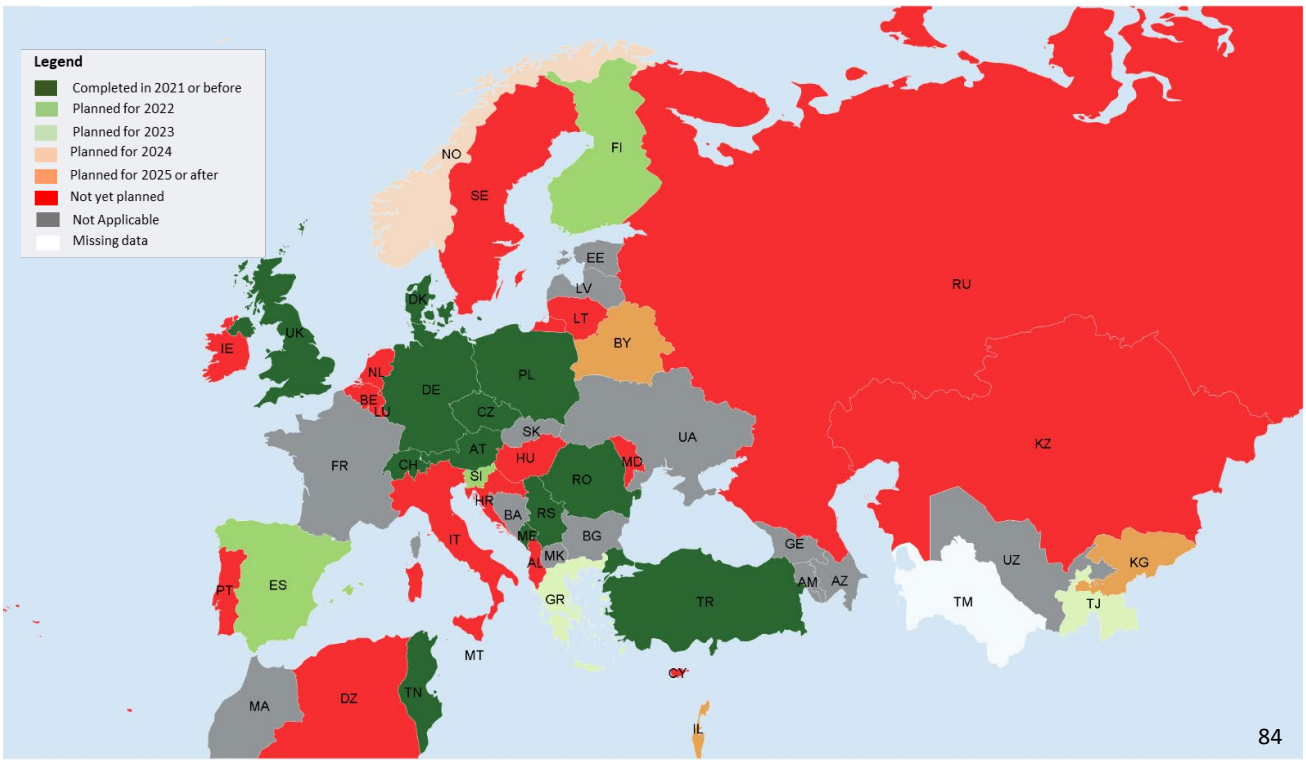
The Element has so far been implemented in 12 States in the ICAO EUR Region while 30 States either consider it as "Not Applicable" or have not established implementation plans yet. Deployment is expected by another 5 States by the end of 2023. Among all the available parameters, in order to enhance the STCA, all implementations use the Selected Altitude. It should be noted that for many other States (a least 21), the downliked Selected Altitude parameter is available and shown for information on the controller screen, but it is not yet integrated with the safety tools (STCA) due to the complexity of this task.

Among the non-LSSIP States, the Element is only implemented in Tunisia. The next State expected to implement is Tajikistan, in 2023, while Belarus and Kyrgyzstan have deployment plans in the 2025-2030 timeframe.

New implementers in 2021:

DK and TR





SNET-B1/2	Enhanced STCA in complex TMAs	B1

ATM Master Plan Level 3:	ATC02.9 – Short Term Conflict Alert (STCA) for TMAs

SNET

Description:

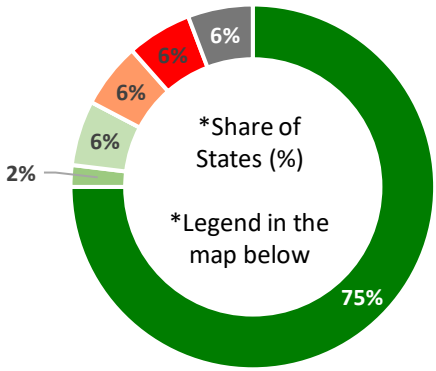
This element assists the air traffic controller in preventing collision between aircraft, using position data from ground surveillance and taking into account possible crew intents linked to traffic patterns and ATC practices in complex TMAs.
This enhanced STCA works the same as the basic STCA system in Block 0. However, in addition of the current proximity test and the linear prediction test, it performs the level-off prediction test and the turn prediction test, allowing to reduce the number of unnecessary alerts, increase the number of relevant alerts, as well as to alert earlier compared to the basic STCA system.

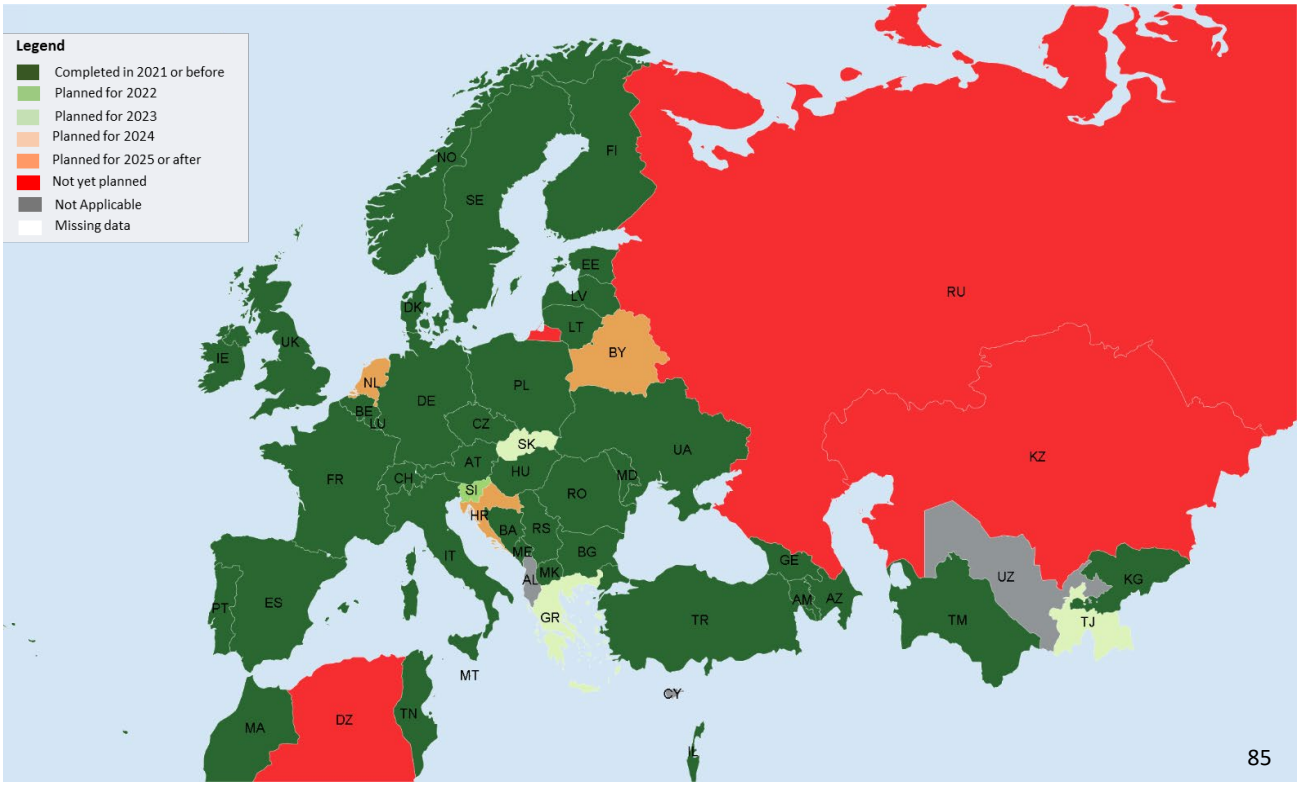
Implementation summary (end 2021):

The Element is widely deployed in the EUR Region, with 39 States reporting completion. It should be noted that this value includes the States which have implemented in TMAs the same STCA algorithms (linear) as in their en-route environments. This is justified by the fact that "standard" STCA algorithms are fit for purpose and suitable for their (non-complex) TMAs. Out of this overall completion, not more than 40% of the States have explicitly reported the implementation of enhanced STCA algorithms (in general based on multi-hypothesis) in order to accommodate the specific needs of their (complex) TMAs.
Among the non-LSSIP States, the Element has been reported as completed by Kyrgyzstan and Tunisia, while implementation is expected by Tajikistan, in 2023, and by Belarus, in 2030.

New implementers in 2021:

LT





SURF-B0/2	Comprehensive situational awareness of surface operations	B0

ATM Master Plan Level 3:	AOP04.1 - Advanced Surface Movement Guidance and Control System A-SMGCS Surveillance (former Level 1)

SURF

Description:

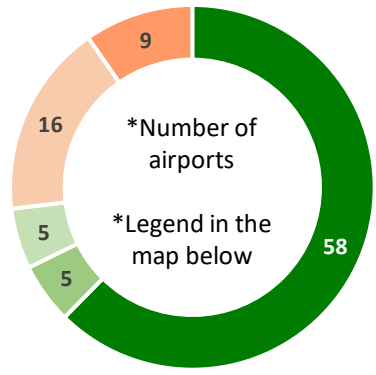
The surveillance service of A-SMGCS provides airport traffic situational awareness through the position, identification and tracking of aircraft and vehicle suitably equipped on the aerodrome surface. It allows the controller to: confirm the identity of all participating vehicles according to the defined identification procedures; prevent collisions between all aircraft and vehicles especially in conditions when visual contact cannot be maintained; manually correlate (link a target with a call sign) targets for the rare cases where there is an operational need to, e.g. areas of poor cooperative surveillance coverage and the need to track non-cooperative targets such as towed aircraft; detect and indicate the position of potential intruders.
Information is presented on the controller and airport operator display independent of visibility conditions and controller line of sight.

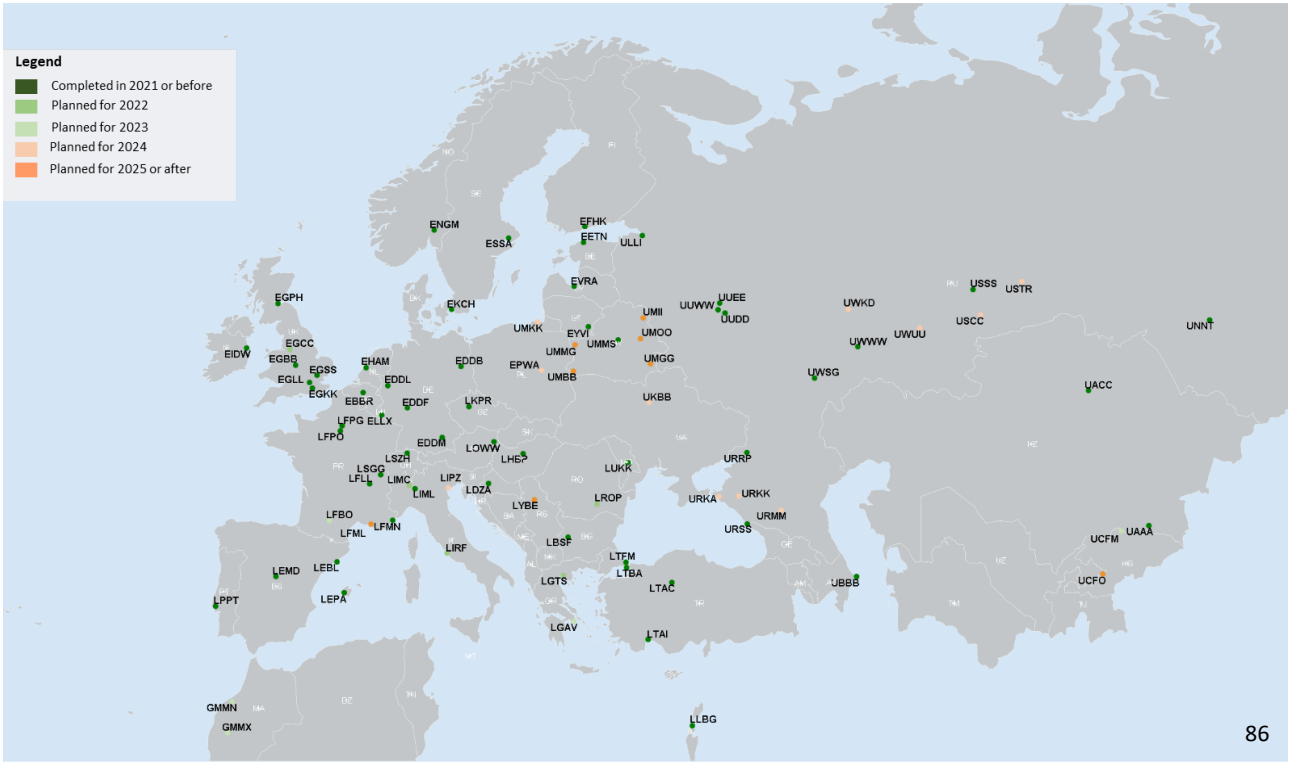
Implementation summary (end 2021):

This Element is progressing well, not only from the perspective of the completion rate but also with regard the constant growth of the number of airports that report implementation intentions. This increased interest is driven by the need to accommodate the growing levels of traffic. This is very encouraging as this functionality is essential as the fundament unlocking more advanced A-SMGCS features, which might be required once the traffic will recover postCOVID. The Element is already operational at 58 locations while 10 others are expected to deploy it by end 2023. It also shows a very good progress in the non-LSSIP States as well, being deployed at 15 locations (12 in the Russian Federation, 2 in Kazakhstan and 1 in Belarus). Several other locations in Belarus, Kyrgyzstan and Russian Federation will follow, between 2024 and 2027.

New implementers in 2021:

LPPT





SURF-B0/3	Initial ATCO alerting service for surface operations	B0

ATM Master Plan Level 3:	AOP04.2 - Advanced Surface Movement Guidance and Control System (A-SMGCS) Runway Monitoring and Conflict Alerting (RMCA)

SURF

Description:

This element represents the first step of A-SMGCS alerting service and is based on A-SMGCS surveillance. It takes into account elements such as: the runway configuration of the airport (e.g. one, two or more runways); the associated procedures (e.g. multiple line ups and reduced separation on the runway when approved by the ATS authorities); the position and type of the aircraft and vehicles (e.g. arrival, departure or vehicle) according to the set time parameters and their relative speeds and positions when within or about to enter a predefined area around the runway; aircraft in the vicinity of the runway (e.g. on final approach, climb out and helicopters crossing); meteorological conditions.

The ATCO will be provided with a short term conflicting alerting tool (A-SMGCS initial alerting service) that monitors movements on or near the runway and detects conflicts between an aircraft and another vehicle as well as runway incursion by intruders. Appropriate alerts will be visualized on the ATCO display.

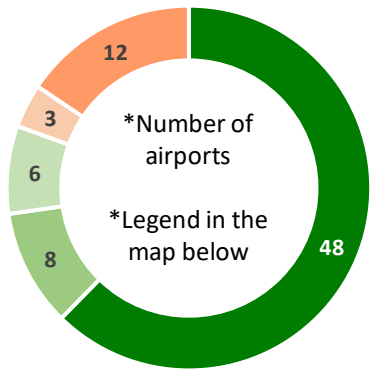
Implementation summary (end 2021):

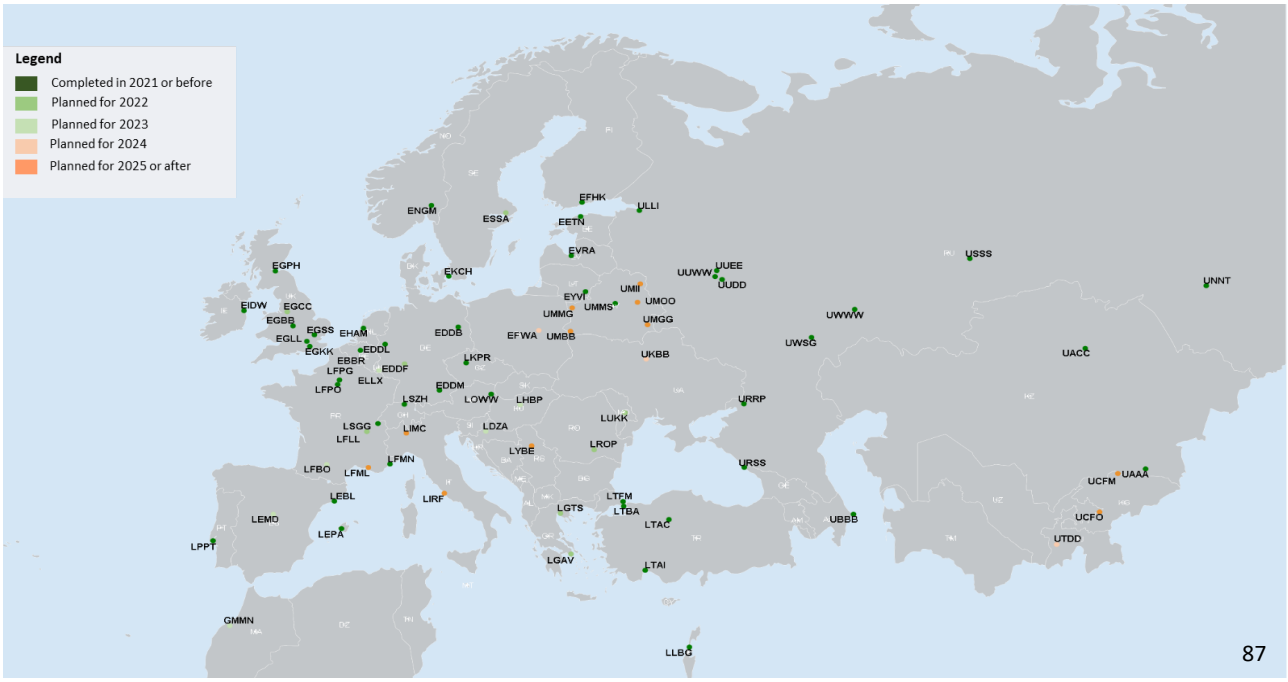
This Element is progressing well, not only from the perspective of airports having completed the implementation but also with regard the constant growth of the number of airports that report implementation intentions. This increased interest is driven by the need to accommodate the growing levels of traffic of the post-COVID-19 recovery.

The Element is already operational at 48 locations while 14 others are expected to finalise deployment by end 2023. It also shows a very good progress in the non-LSSIP States as well, being deployed at 15 locations (12 in the Russian Federation, 2 in Kazakhstan and 1 in Belarus). Several other locations in Belarus, Kyrgyzstan and Tajikistan are expected to follow, between 2024 and 2027.

New implementers in 2021:

EDDB, LEBL and LEPA





SURF-B1/1	Advanced features using visual aids to support traffic management during ground operations	B1

ATM Master Plan Level 3:	AOP16 – Guidance assistance through airfield ground lighting

SURF

Description:

This element improves surface operations with the aim to reduce taxi time and fuel burn, as well as potential mistakes. Advanced features including "Follow the Greens" (FTG) and Variable Message Panels are used to optimize routing during taxi operations. The lighting system is used to direct the aircraft, making the guidance safer, as errors are minimized.
Lighting system for other vehicles than aircraft is connected to the Surface Movement Guidance and Control System (SMGCS) in order to optimize ground circulation and prevent collision.

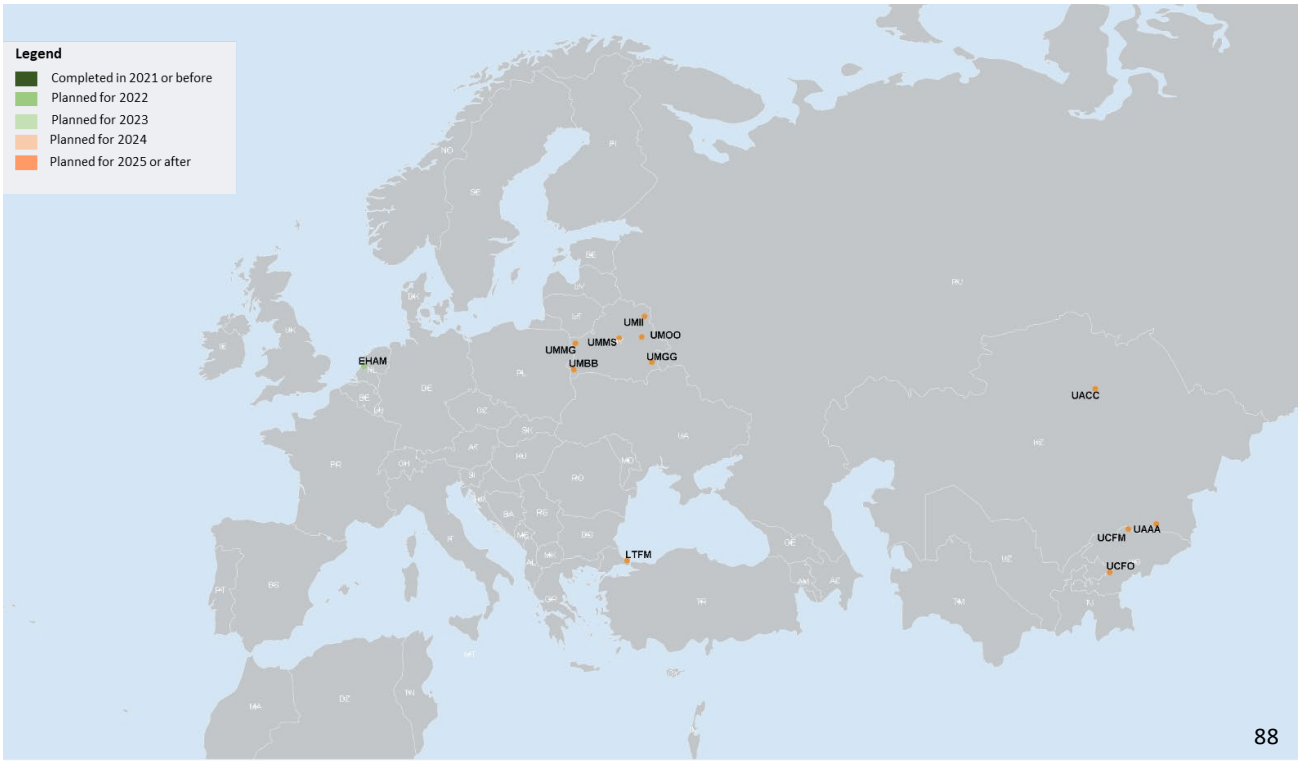
Implementation summary (end 2021):

The functionality addressed by the Element is not yet implemented anywhere in the EUR Region and for the time being it has an extremely limited appeal for deployment. The main reason for this is the reported lack of operational needs or business justification. This is justified by the complexity of the implementation requiring an advanced A-SMGCS system providing the guidance function, linked with the aerodrome lighting infrastructure. Only one airport is expected to implement the Element in 2022 (Amsterdam - EHAM) while no other deployments are expected before 2025.

The Element seems to attract more the interest of the non-LSSIP States, with several airports in Belarus, Kyrgyzstan and Kazakhstan reporting deployment plans on a longer term (between 2025 and 2030).

New implementers in 2021:

None



SURF-B1/3	Enhanced ATCO alerting service for surface operations	B1

ATM Master Plan Level 3:	AOP12.1 – Airport Safety Nets

SURF

Description:

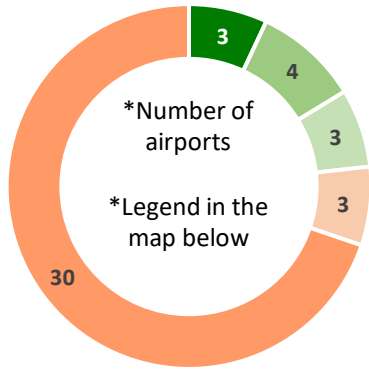
This element covers an enhanced A-SMGCS alerting service that anticipates potential runway conflicts, runway incursion and other hazardous situations on the aerodrome surface.
The A-SMGCS Alerting service for controllers is complemented with the detection of conflicting ATC Clearances (CATC) given by the controller (e.g. Line-up versus Land on same runway) and with the detection of non-conformance to procedures or instructions (e.g. route deviation). An electronic clearance input means is used by the controller to make the clearances known to the system. Surveillance data and routing information are also used by the logic to generate alerts to the controller.

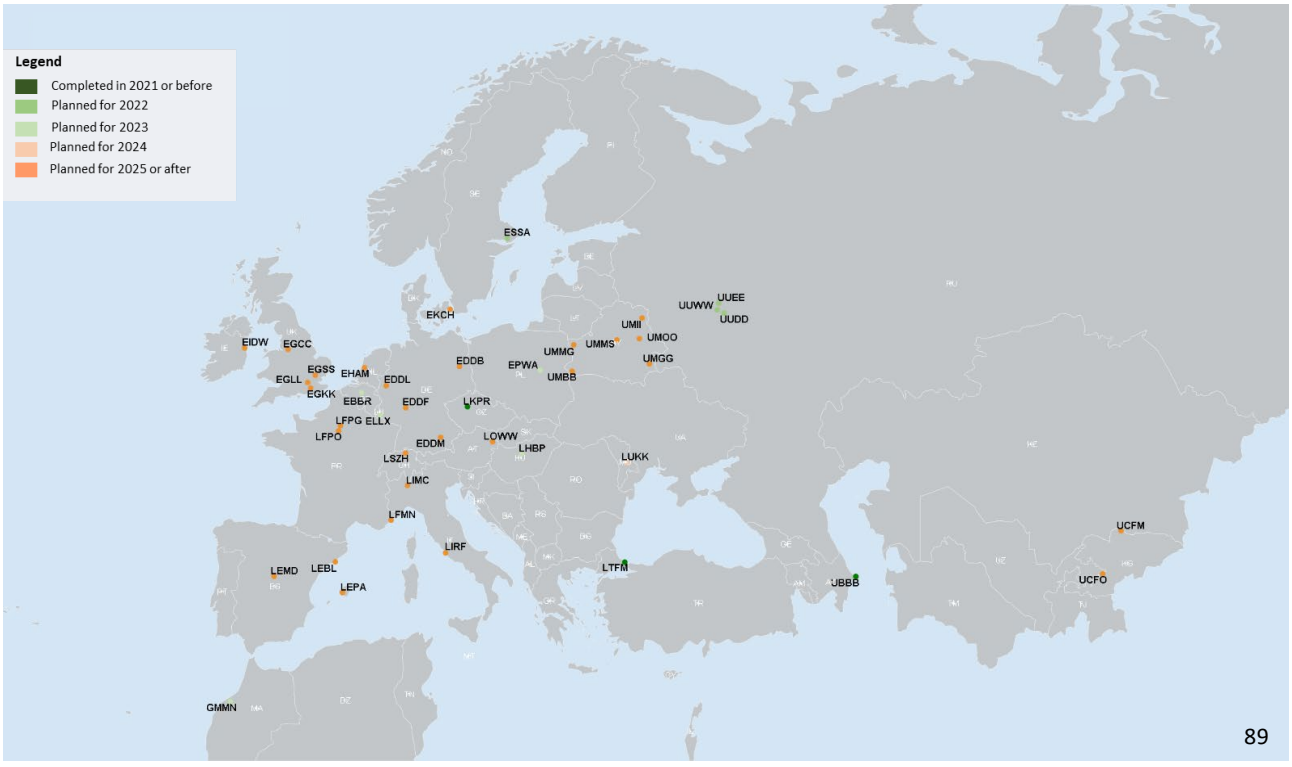
Implementation summary (end 2021):

Even if the level of implementation is still low, with only 3 Airports reporting completion, there is growing interest in deployment, with more and more airports reporting deployment plans, even if in a longer-term. The slow uptake is due to the fact that the functionality of Element SURF-B0/3 on initial alerting for surface operations is still fit for purpose for the majority of Airports in the Region therefore the upgrade to the more advanced functionalities addressed by SURF-B1/3 will be performed when the operational needs will require it. A boost in implementation will also be given by the CP1 Regulation (EU 116/2021 - Sub-AF 2.1.3 on Airport Safety Nets) mandating the functionalities of the Element to a sub-set of airports in the Region, by 2025.
Among the non-LSSIP States, the first airports expected to deploy are Vnukovo (UUWW), Domodedovo (UUDD), Sheremetyevo (UUEE) in 2022 to be followed by several airports in Belarus and Kyrgyzstan, between 2025 and 2030.

New implementers in 2021:

None





SURF-B1/4	Routing service to support ATCO surface operations management	B1

ATM Master Plan Level 3:	AOP13 – Automated Assistance to Controller for Surface Movement Planning and Routing

SURF

Description:

This element covers the A-SMGCS routing service, which calculates individual routes for mobiles based on known airport parameters and constraints or following an interaction by the controller, thereby supporting the runway sequencing strategy.

The controller is presented with planned or cleared routes and has means to modify these routes or to create new route if necessary. Information is updated in real time in order to improve predictability of surface operations.

Implementation summary (end 2021):

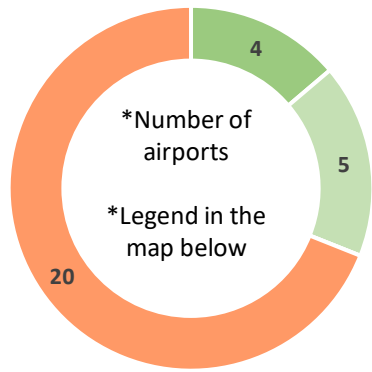
The functionality has a very limited appeal as the investment would only be beneficial at airports with high amounts of traffic and complex layouts. Therefore, the Element is not planned for deployment or is considered as "Not applicable" to most Airports within the scope of the report.

Currently the Element is not deployed anywhere in the EUR Region while only 9 airports expect to have it deployed by the end of 2023, starting with Vnukovo (UUWW), Domodedovo (UUDD), Sheremetyevo (UUEE) and Istanbul (LTFM) in 2022.

The majority of airports in the Region consider that less advanced A-SMGCS capabilities are suitable and fit for the foreseeable levels of traffic and operational conditions.

New implementers in 2021:

None



AMET - Meteorological information (data from METG)

Block 0

Description and purpose

Global, regional and local meteorological information:

a) forecasts provided by world area forecast centres (WAFC), volcanic ash advisory centres (VAAC) and tropical cyclone advisory centres (TCAC);

b) aerodrome warnings to give concise information of meteorological conditions that could adversely affect all aircraft at an aerodrome including wind shear; and

c) SIGMETs to provide information on occurrence or expected occurrence of specific en-route weather phenomena which may affect the safety of aircraft operations and other operational meteorological (OPMET) information, including METAR/SPECI and TAF, to provide routine and special observations and forecasts of meteorological conditions occurring or expected to occur at the aerodrome.

This module includes elements which should be viewed as a subset of all available meteorological information that can be used to support enhanced operational efficiency and safety.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	Y	Y

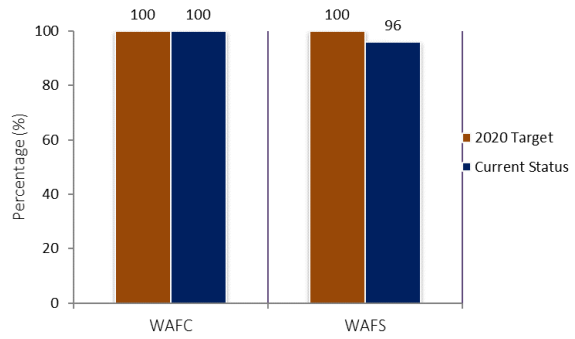
Applicability consideration:

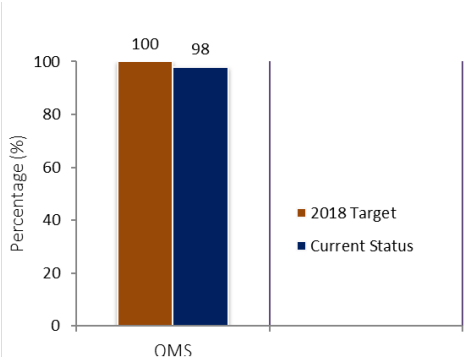
Applicable to traffic flow planning, and to all aircraft operations in all domains and flight phases, regardless of level of aircraft equipage.

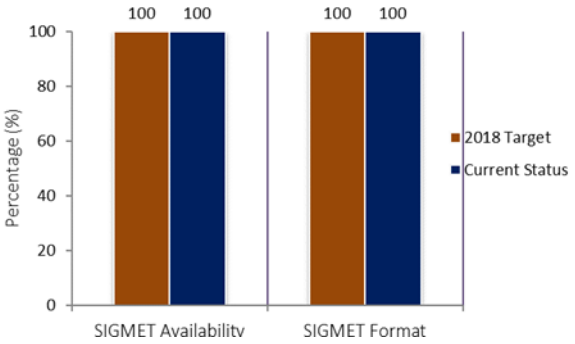
Elements	*Applicability*	*Performance Indicators/Supporting Metrics*	*Targets*
WAFS	***All States***	Indicator: % of States using WAFS data. Supporting metric: number of States having implemented SADIS FTP	100% by Dec 2020
QMS	***All** States*	Indicator: % of States having implemented QMS for MET Supporting metric: number of States having implemented QMS for MET	100% by Dec 2020
METAR Availability	***All** States*	Indicator: % of States providing METAR as per requirements in the ANP, Volume II Table MET II-2 Supporting metric: number of States providing METAR as per requirements in the ANP Volume II Table MET II-2	98% by Dec 2020
TAF Availability	***All** States*	Indicator: % of States providing TAF as per requirements in the ANP, Volume II Table MET II-2 Supporting metric: number of States providing TAF as per requirements in the ANP Volume II Table MET II-2	98% by Dec 2020
METAR Timeliness	***All** States*	Indicator: % of States providing METAR in the time required as defined in Annex 3 Supporting metric: number of States providing METAR in the time required as defined in Annex 3	98% by Dec 2020
TAF Timeliness	***All** States*	Indicator: % of States providing TAF in the time required as defined in Annex 3 Supporting metric: number of States providing TAF in the time required as defined in Annex 3	98% by Dec 2020
SIGMET Availability	***All** with a FIR*	Indicator: % of States providing SIGMET Supporting metric: number of States providing SIGMET	100% by Dec 2020
SIGMET Format	***All** with a FIR*	Indicator: % of States providing SIGMET format in accordance with WMO AHL in the List of EUR SIGMET and AIRMET headers	100% by Dec 2020

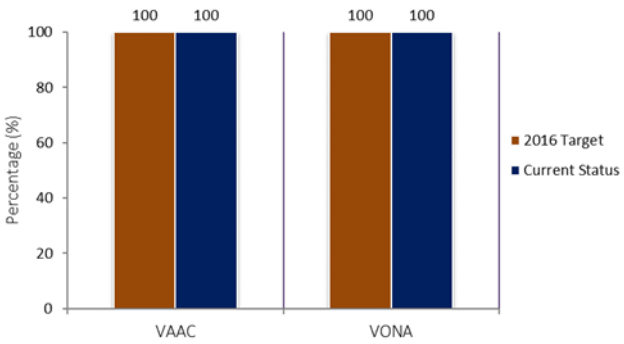
Elements	Applicability	Performance Indicators/Supporting Metrics	Targets
		Supporting metric: number of States providing SIGMET format in accordance with WMO AHL in the List of EUR SIGMET and AIRMET headers	
VAAC	***France, United Kingdom***	Indicator: % of VAACs in or serving the EUR Region that provide Annex 3 volcanic ash products (Volcanic Ash Advisories (VAA) and Volcanic Ash Advisories in Graphic Form (VAG)) Supporting metric: number of States hosting a VAAC having implemented VAA/VAG	100% by Dec 2020
VONA	***Italy, Russian Federation, Spain***	Indicator: % of Volcano Observatories in the EUR Region that provide volcano observatory notice for aviation (VONA) as per the Handbook on the International Airways Watch (IAVW) (Doc 9766) Supporting metric: number of States with Volcano Observatory having implemented VONA	100% by Dec 2020
WAFC	***United Kingdom***	Indicator: % of WAFCs in the EUR Region that provide Annex 3 World Area Forecast System (WAFS) data Supporting metric: number of States hosting a WAFC having implemented Annex 3 WAFS data	100% by Dec 2020

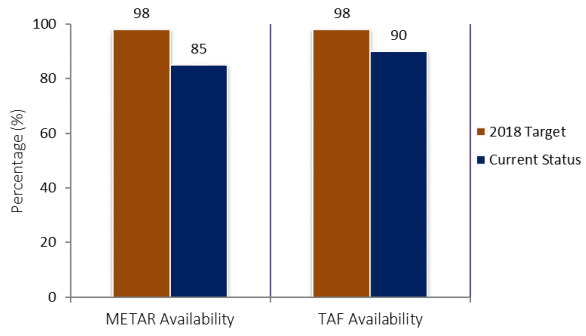
B0-AMET Status of implementation in the EUR Region

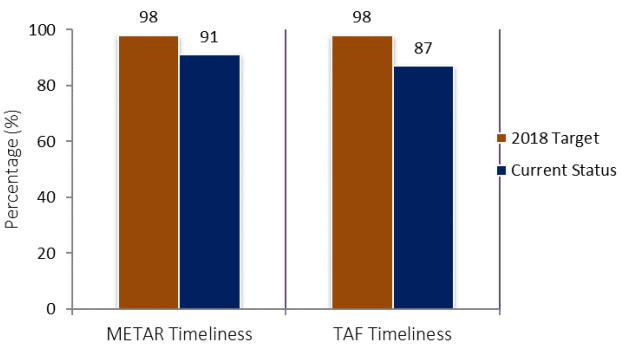




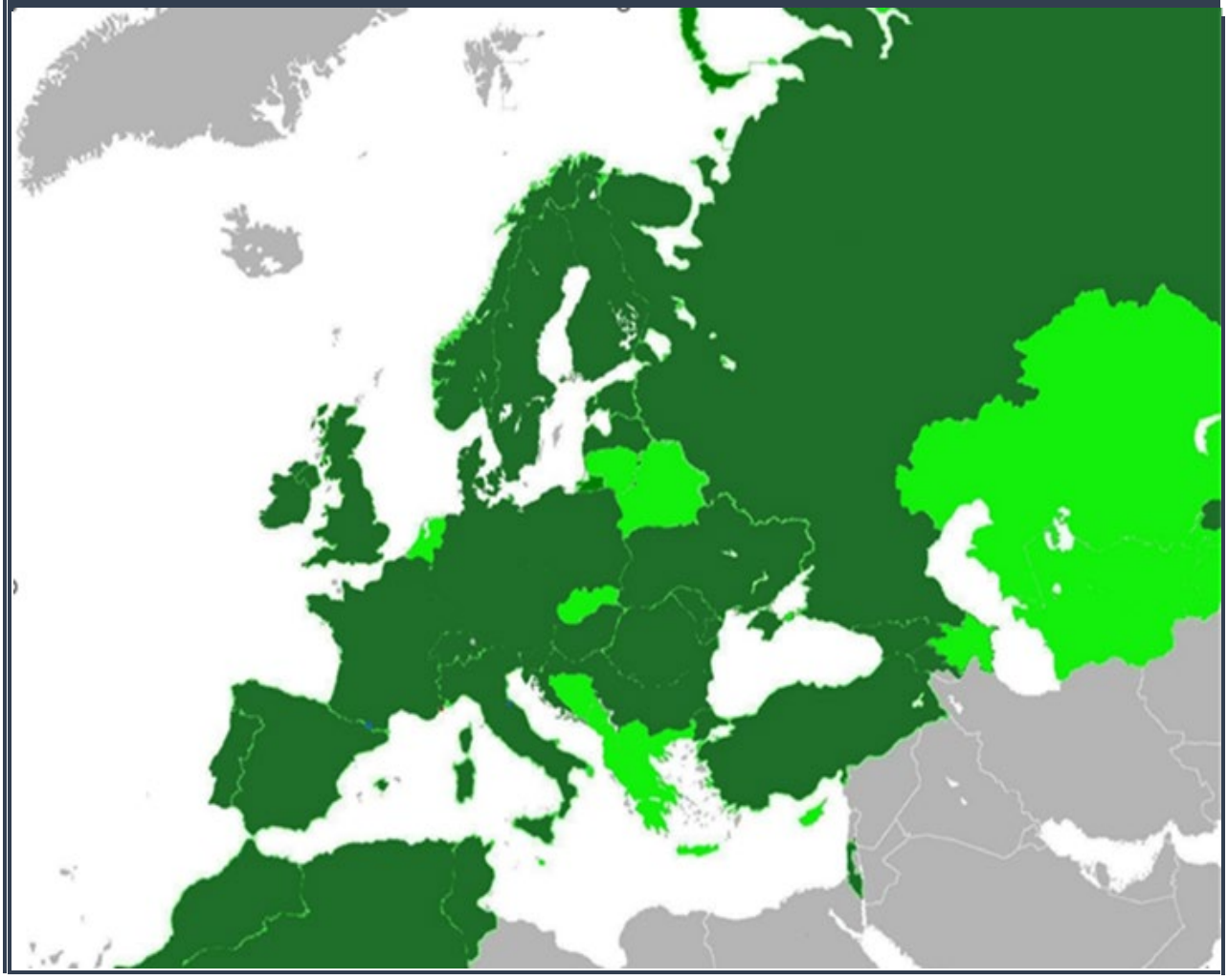








AMET B0 Status of implementation in the EUR Region



Legend

- Completed
- Partially Completed (50%+)
- Partially Completed / Late (50%-)
- Not Started/Not implemented
- Not Applicable
- Missing Data

The progress for AMET-B0 is acceptable (with approximately 93% implementation).

Note: These high-level implementation elements are not applicable to Andorra, Monaco and San Marino.

Yellow – identified in Feb monitoring 2021 (existed and status has not changed)
Amber – first identified in Feb monitoring 2022 (new)
Light Green – identified in Feb monitoring 2021 and corrected by Feb 2022
Dark Green – implemented correctly for both Feb 2021 and 2022 monitoring
Red – on the list of air navigation deficiencies
Blue – not applicable

Module	Elements	Albania	Algeria	Armenia	Austria	Azerbaijan	Belarus	Belgium	Bosnia and Herzegovina	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland
AMET B0	WAFS															
	QMS															
	METAR availability															
	TAF availability															
	METAR timeliness															
	TAF timeliness															
	SIGMET availability															
	SIGMET format															
	VAAC															
	VONA															
	WAFC															

Module	Elements	France	Georgia	Germany	Greece	Hungary	Ireland	Israel	Italy	Kazakhstan	Kyrgyzstan	Latvia	Lithuania	Luxembourg	Malta	Monaco
AMET B0	WAFS															
	QMS															
	METAR availability															
	TAF availability															
	METAR timeliness															
	TAF timeliness															
	SIGMET availability															
	SIGMET format															

Module	Elements	France	Georgia	Germany	Greece	Hungary	Ireland	Israel	Italy	Kazakhstan	Kyrgyzstan	Latvia	Lithuania	Luxembourg	Malta	Monaco
	VAAC															
	VONA															
	WAFC															

Module	Elements	Montenegro	Morocco	Netherlands	North Macedonia	Norway	Poland	Portugal	Republic of Moldova	Romania	Russian Federation	Serbia	Slovakia	Slovenia	Spain	Sweden
AMET B0	WAFS															
	QMS															
	METAR availability															
	TAF availability															
	METAR timeliness															
	TAF timeliness															
	SIGMET availability															
	SIGMET format															
	VAAC															
	VONA															
	WAFC															

Module	Elements	Switzerland	Tajikistan	Tunisia	Turkey	Turkmenistan	Ukraine	United Kingdom	Uzbekistan
AMET B0	WAFS								
	QMS								
	METAR availability								
	TAF availability								
	METAR timeliness								
	TAF timeliness								
	SIGMET availability								

Module	Elements	Switzerland	Tajikistan	Tunisia	Turkey	Turkmenistan	Ukraine	United Kingdom	Uzbekistan
	SIGMET format								
	VAAC								
	VONA								
	WAFC								

Block 1

Description and purpose

To enable the reliable identification of solutions when forecast or observed meteorological conditions impact aerodromes, airspace or operations in general. Full ATM-Meteorology integration is needed to ensure that meteorological information is included in the logic of a decision process and the impact of the meteorological conditions on the operations are automatically derived, understood and taken into account. The supported decision time-horizons range from minutes, to several hours or days ahead of the ATM operation. This includes optimum flight profile planning and execution, and support to tactical in-flight avoidance of hazardous meteorological conditions (improved in-flight situational awareness) to typical near-term and planning (>20 minutes) type of decision making. This module promotes the establishment of standards for global exchange of the MET information closely aligned with other data domains and adhering to a single reference (ICAO-AIRM). It also promotes the further enhancement of meteorological information on various quality-of-service aspects including the accuracy and consistency of the data when used in inter-linked operational decision making processes.

Appreciating that the number of flights operating on cross-polar and trans-polar routes continues to steadily grow and recognizing that space weather affecting the earth's surface or atmosphere (such as solar radiation storms) pose a hazard to communications and navigation systems and may also pose a radiation risk to flight crew members and passengers, this module acknowledges the need for space weather information services in support of safe and efficient international air navigation.

This module builds, in particular, upon Module B0-AMET, which detailed a sub-set of all available meteorological information that can be used to support enhanced operational efficiency and safety.

Main performance impact:

KPA-01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	Y	Y

Applicability consideration:

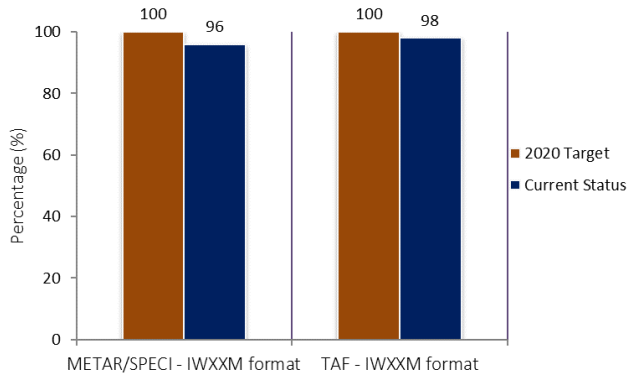
Applicable to traffic flow planning, and to all aircraft operations in all domains and flight phases, regardless of level of aircraft equipage.

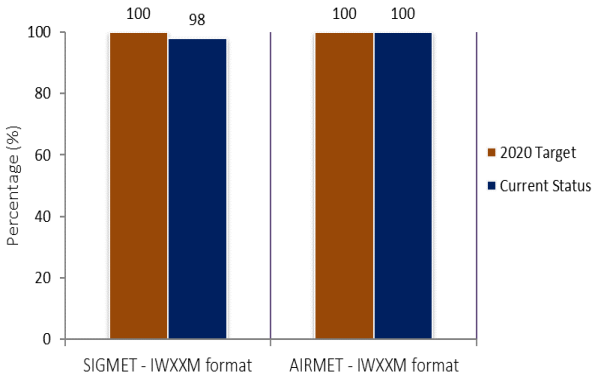
Though not explicit in ICAO Doc 9750, the implementation of providing a suite of MET products (METAR/SPECI, TAF, SIGMET, AIRMET, TCA, VAA and SWXA) in IWXXM format is a prerequisite to the System Wide Information Management (SWIM) and a requirement during the ASBU-B1 time frame (requirement 5 November 2020). Therefore, these elements in IWXXM format will be measured in EUR ANP Volume III.

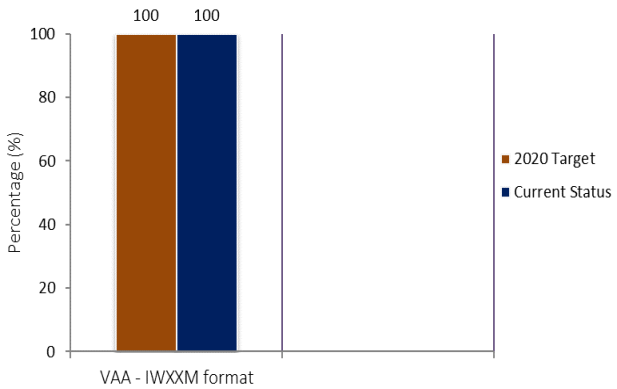
Elements in IWXXM format	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***
METAR/SPECI	*States where METAR/SPECI is required as per the EUR ANP Volume II, Table MET II-2*	Indicator: % of relevant States having implemented METAR/SPECI in IWXXM format Supporting metric: number of relevant States having implemented METAR/SPECI in IWXXM format	100% by Nov 2020
TAF	*States where TAF is required as per the EUR ANP Volume II, Table MET II-2*	Indicator: % of relevant States having implemented TAF in IWXXM format Supporting metric: number of relevant States having implemented TAF in IWXXM format	100% by Nov 2020

Elements in IWXXM format	*Applicability*	*Performance Indicators/Supporting Metrics*	*Targets*
SIGMET	*States who designated a Meteorological Watch Office to provide SIGMET for a FIR (or FIRs) as per the EUR ANP Volume II, Table MET II-1*	Indicator: % of relevant States having implemented SIGMET in IWXXM format Supporting metric: number of relevant States having implemented SIGMET in IWXXM format	100% by Nov 2020
AIRMET	*States who designated a Meteorological Watch Office to provide AIRMET for a FIR (or FIRs) as per the EUR ANP Volume II, Table MET II-1*	Indicator: % of relevant States having implemented AIRMET in IWXXM format Supporting metric: number of relevant States having implemented AIRMET in IWXXM format	100% by Nov 2020
VAA	***France, United Kingdom***	Indicator: % of VAACs in the EUR Region having implemented Volcanic Ash Advisories (VAA) in IWXXM format Supporting metric: number of States hosting a VAAC having implemented VAA in IWXXM format	100% by Nov 2020
TCA	***Not applicable in EUR Region***	N/A	N/A

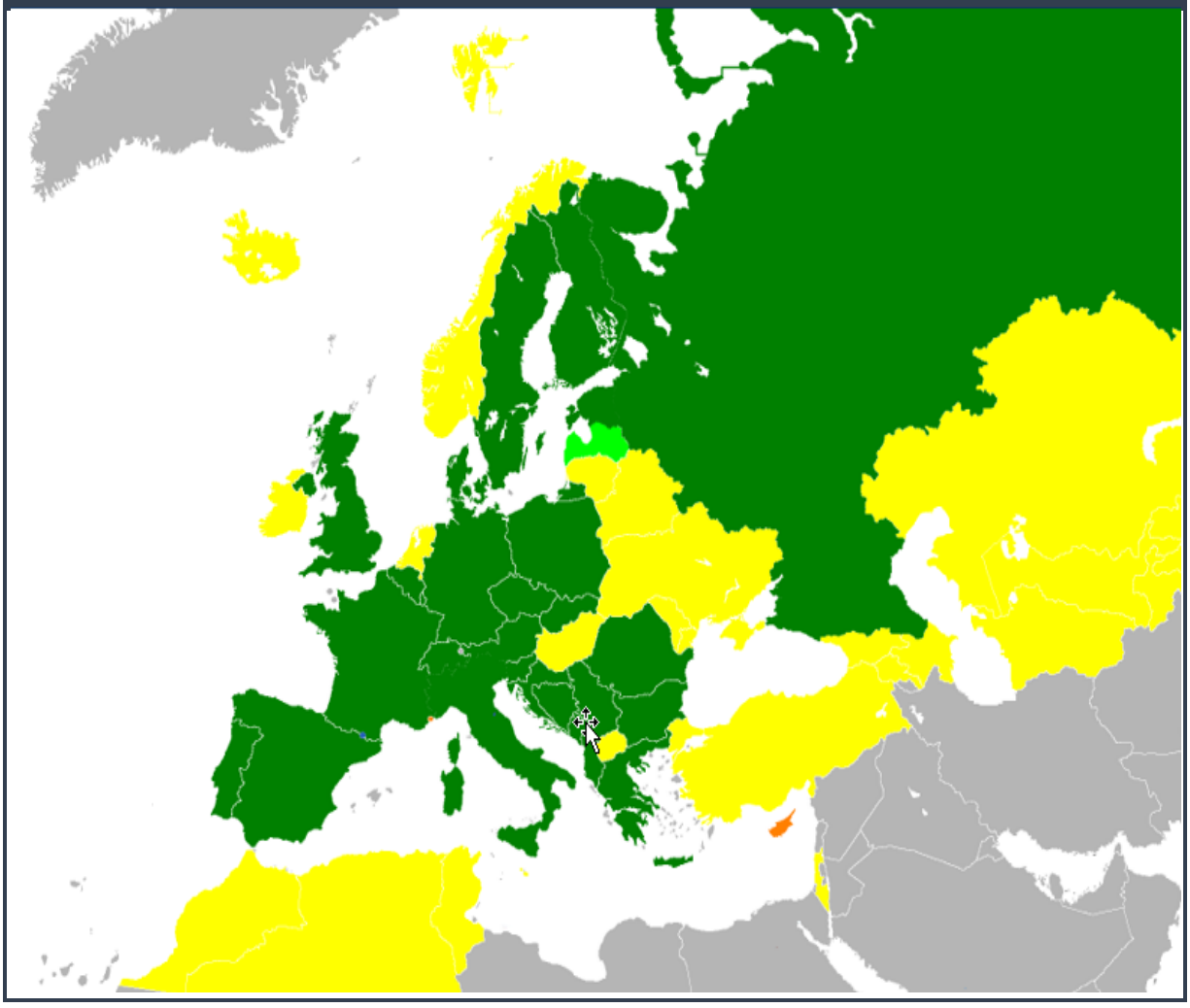
B1-AMET Status of implementation in the EUR Region







AMET B1 Status of implementation in the EUR Region



Legend

- Completed
- Partially Completed (50%+)
- Translation Service used
- Not Started/ Not Implemented
- Not Applicable
- Missing Data

The progress for AMET B1 is on-going (with approximately 98% implementation).

Note: These high-level implementation elements are not applicable to Andorra and San Marino.

Module	Elements in IWXXM format	Albania	Algeria	Armenia	Austria	Azerbaijan	Belarus	Belgium	Bosnia and Herzegovina	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland
AMET B1	METAR/SPECI															
	TAF															
	SIGMET															
	AIRMET															
	VAA															
	TCA															

Module	Elements in IWXXM format	France	Georgia	Germany	Greece	Hungary	Ireland	Israel	Italy	Kazakhstan	Kyrgyzstan	Latvia	Lithuania	Luxembourg	Malta	Monaco
AMET B1	METAR/SPECI															
	TAF															
	SIGMET															
	AIRMET															
	VAA															
	TCA															

Module	Elements in IWXXM format	Montenegro	Morocco	Netherlands	North Macedonia	Norway	Poland	Portugal	Republic of Moldova	Romania	Russian Federation	Serbia	Slovakia	Slovenia	Spain	Sweden
AMET B1	METAR/SPECI															
	TAF															
	SIGMET															
	AIRMET															
	VAA															
	TCA															

Module	Elements in IWXXM format	Switzerland	Tajikistan	Tunisia	Turkey	Turkmenistan	Ukraine	United Kingdom	Uzbekistan
AMET B1	METAR/SPECI								
	TAF								
	SIGMET								
	AIRMET								
	VAA								
	TCA								

5. Recommendations

Based on the analysis of the reported implementation status and the lessons learned from the development of this version of the report, the following recommendations are proposed:

Recommendation 1:

Continue to ensure that no duplication of reporting activities will be requested from the States, meaning that the data available through existing reporting mechanisms such as the Local Single Sky Implementation Monitoring (LSSIP) shall be always used.

Recommendation 2:

States need a continuous support with ASBU workshops (with French and Russian language support) in individual States or group of States so that the GANP transition can be explained and implementation data can be (again) collected from all 55 States in the ICAO EUR Region. This will support that the regional developments and deployment actions can be coordinated across the whole EUR Region and that interoperability can be ensured at the highest level.

Recommendation 3:

States are invited to further address carefully the completeness of the reported data and their timely availability. In this context, States should be more encouraged to ask for additional support and clarification of the data before the final submission of the questionnaire.

ANNEX – Acronyms

A	
ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
A-CDM	Airport Collaborative Decision Making
ACM	ATC Communication Management
ADQ	Aeronautical Data Quality
ADS-B	Automatic Dependent Surveillance – Broadcast
ADS-C	Automatic Dependent Surveillance - Contract
AGDL	Air-Ground Data Link
AMAN	Arrival Manager
AMHS	ATS Message Handling Service
ANSP	Air Navigation Service Provider
AOP	Airport Operations Plan
APTA	Airport Accessibility
APV	Approach with Vertical Guidance
APO	Airport Operations
APW	Airborne Proximity Warning
ASBU	Aviation System Block Upgrade
ASM	Airspace Management
ASP	Air Navigation Service Providers
ATC	Air Traffic Control
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATCO	Air Traffic Control Officer
ATM	Air Traffic Management
ATMGE	Air Traffic Management Group - East
ATN	Aeronautical Telecommunication Network
AUP	Airspace Use Plan
B	
BBB	Basic Building Blocks
C	
CBA	Cost Benefit Analysis
CCO	Continuous Climb Operations
CDM	Collaborative Decision Making
CDO	Continuous Descent Operations
CNS	Communication, Navigation and Surveillance
COTR	Coordination and Transfer
CTOP	Collaborative Trajectory Options Program
D	
DAIM	Digital Aeronautical Information Management
DATM	Digital Air Traffic Management
DMAN	Departure Manager
E	
EAD	European Aeronautical Database
EANPG	European Air Navigation Planning Group
EASA	European Aviation Safety Agency
EASPG	European Aviation System Planning Group
ECAC	European Civil Aviation Conference
ENV	Environment
EU	European Union
EURGANT-PT	EUR Region GANP Transition Project Team
F	
FAB	Functional Airspace Block
FCM	Flow and Capacity Management
FF-ICE	Flight & Flow Information for a Collaborative Environment
FIR	Flight Information Region
FMTP	Flight Message Transfer Protocol
FO	Flight Object
FOC	Flight Operations Centre
FOC	Full Operational Capability
FP	Flight Plan
FPL	Filed Flight Plan
FRA	Free Route Airspace
FRTO	Free-Route Operations
G	
GADS	Global Aeronautical Distress and Safety System
GANP	ICAO Global Air Navigation Plan
GAT	General Air Traffic
GBAS	Ground Based Augmentation System
GDP	Gross Domestic Product
GLS	GNSS Landing System
I	
ICAO	International Civil Aviation Organisation
INF	Information Management
IPS	Internet Protocol Suite
IR	Implementing Rule
ITP	In Trail Procedure

L

LSSIP	Local Single Sky ImPlementation
L3	Level 3

M

MET	Meteorology
MIL	Military Authorities
MP L3	Master Plan Level 3
MTCD	Medium Term Conflict Detection
MUAC	Maastricht Upper Area Control (Centre)

N

NAV	Navigation
NewPENS	New Pan-European Network Services
NM	Network Manager
NOP	Network Operations Plan
NOPS	Network Operations
NOTAM	Notice to Airmen

O

OI	Operational improvements
OLDI	On-Line Data Interchange
OSI	Open System Interconnection

P

PBN	Performance Based Navigation
PENS	Pan-European Network Service
PIA	Performance Improvement Areas
PinS	Points in Space

R

RATS	Remote Air Traffic Services
REG	National Regulatory Authorities/NSAs
RMCA	Runway Monitoring and Conflict Alerting
RNAV	Area Navigation
RNP	Required Navigation Performance
RSEQ	Runway Sequencing

S

SAF	Safety
SBAS	Satellite-Based Augmentation System
SES	Single European Sky
SESAR	Single European Sky ATM Research
SLoA	Stakeholder Line(s) of Action
SNET	Safety Nets
SPI	Surveillance Performance and Interoperability
SSR	Secondary Surveillance Radar
STAR	Standard Terminal Arrival Route
STCA	Short Term Conflict Alert
SURF	Surface Operations

T

TBO	Time-Based Operations
TCAS	Traffic Alert and Collision Avoidance System
TOD	Terrain and Obstacle Data
TOS	Trajectory Options Set
TMA	Terminal Control Area

U

UUP	Updated Airspace Use Plan

V

VDL	VHF Digital Link
VFE	Vertical Flight Efficiency
VHF	Very High Frequency
VNAV	Vertical Navigation

W

WAM	Wide Area Multilateration
WAKE	Wake Turbulence Separation

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