EUROCONTROL

ASBU Implementation Monitoring Report

ICAO EUR States

Reference Period 2020

IN PARTNERSHIP WITH

ICAO • OACI • ИКАО

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, 15-year 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 are 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 2030, was endorsed at the 39th ICAO Assembly in October 2016. The 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.

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 Modules be required to be applied in every State and Region. Many of the Block Upgrade Modules 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 Modules based on their specific operational requirements. Using the GANP, Regional and State planners should identify those Modules which provide any needed operational improvements. Although the Block Upgrades do not dictate when or where a particular Module 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.

Document identification sheet

DOCUMENT DESCRIPTION	
Document Title **ASBU Implementation Monitoring Report** **ICAO EUR States** **Reference Period 2020**	
EUROCONTROL and ICAO deliverable	**EDITION : 1.0** **EDITION DATE :** 02/12/2021

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 2020. This is the 7th edition of the Report and the first one that 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 70 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.

AUTHOR: **(Activity Manager)**	**Goran PAVLOVIC** (EUROCONTROL)	**Contacts:** **Goran PAVLOVIC** Email: goran.pavlovic@eurocontrol.int TEL: +32 2 729 32 36	**Director: NM** **Iacopo PRISSINOTTI**
CONTRIBUTORS:	**Sven HALLE** (ICAO EUR/NAT) **Kairat TLENSHIN** (Chairman ANSISG)	**Sven HALLE** Email: shalle@icao.int TEL: +33 1 46 41 85 24	**Division: INF** **Paul BOSMAN**
SUPPORT TEAM: **(EUROCONTROL)**	**Alexandra PAPAGHIUC** **Javier ROSENDO GALAN** **Octavian CIOARA**		**Unit: PAS** **Danny DEBALS**

DOCUMENT STATUS AND TYPE					
STATUS		**CATEGORY**		**CLASSIFICATION**	
Working Draft	☐	Executive Task	☑	General Public	☑
Draft	☐	Specialist Task	☐		
Proposed Issue	☐	Lower Layer Task	☐		
Released Issue	☑				

Document change record

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	08/11/2021	First draft	All
0.2	09/11/2021	Comments from ICAO Paris Office integrated	All
0.3	10/11/2021	Final draft (for endorsement by EASPG/3)	All
1.0	02/12/2021	Released version (endorsed by EASPG/3)	All

Table of contents

EXECUTIVE SUMMARY

1. INTRODUCTION 1

1.1. OBJECTIVE AND INTENDED AUDIENCE OF THE REPORT 1

1.2. BACKGROUND 2

1.3. EUR REGION GANP TRANSITION PROJECT TEAM (EURGANT – PT) 6

1.4. SCOPE OF THE REPORT 7

2. DATA SOURCES 13

2.1. EUROCONTROL LSSIP PROCESS 13

2.2. ICAO QUESTIONNAIRE 14

3. IMPLEMENTATION SUMMARY PER ASBU THREAD 16

4. DETAILED PROGRESS ASSESSMENT PER ASBU ELEMENT 26

5. RECOMMENDATIONS 93

ANNEX – ACRONYMS 94

Executive Summary

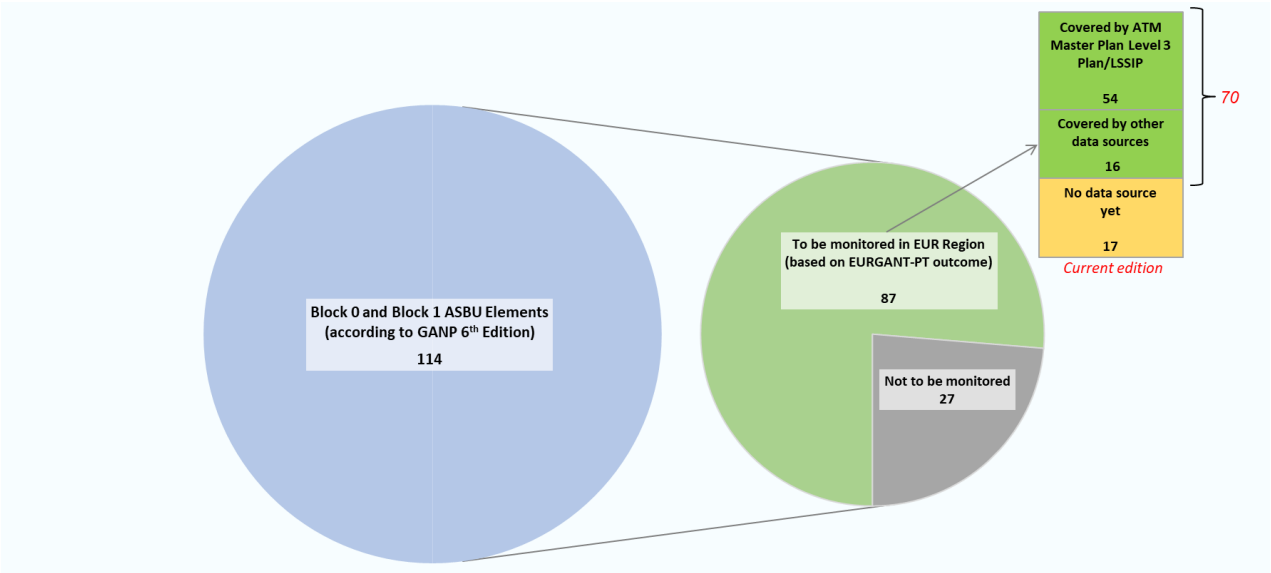
The ICAO/EUROCONTROL ASBU Implementation Monitoring Report represents a key document for the European Aviation System Planning Group (EASPG) to monitor and analyse the implementation within the ICAO EUR Region. It presents an overview of the currently achieved progress, as well as future outlook of the implementation for the ICAO ASBU Block 0 and Block 1 Elements within the entire ICAO EUR Region during the **Reference year 2020**.

The current edition is the 7th edition of the Report in a series of ASBU Implementation Monitoring Reports for the ICAO EUR Region and the **first one that 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.

This edition of the Report includes information on **70 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. Due to substantial changes in the structure of the ASBU framework, no comparison with previous reporting cycles has been made.



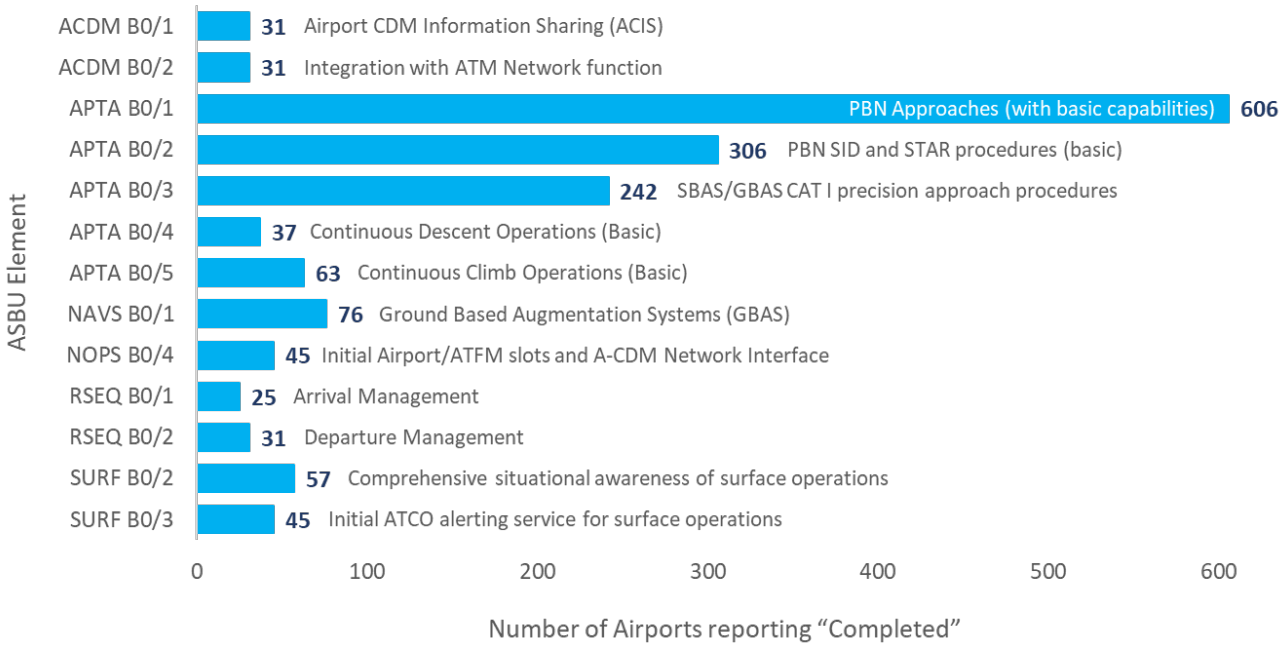
The following two pages show a high-level summary of implementation progress achieved so far for ASBU elements implemented and reported at airport level, as well as other ASBU elements that are mostly implemented at State/ANSP level.

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**.

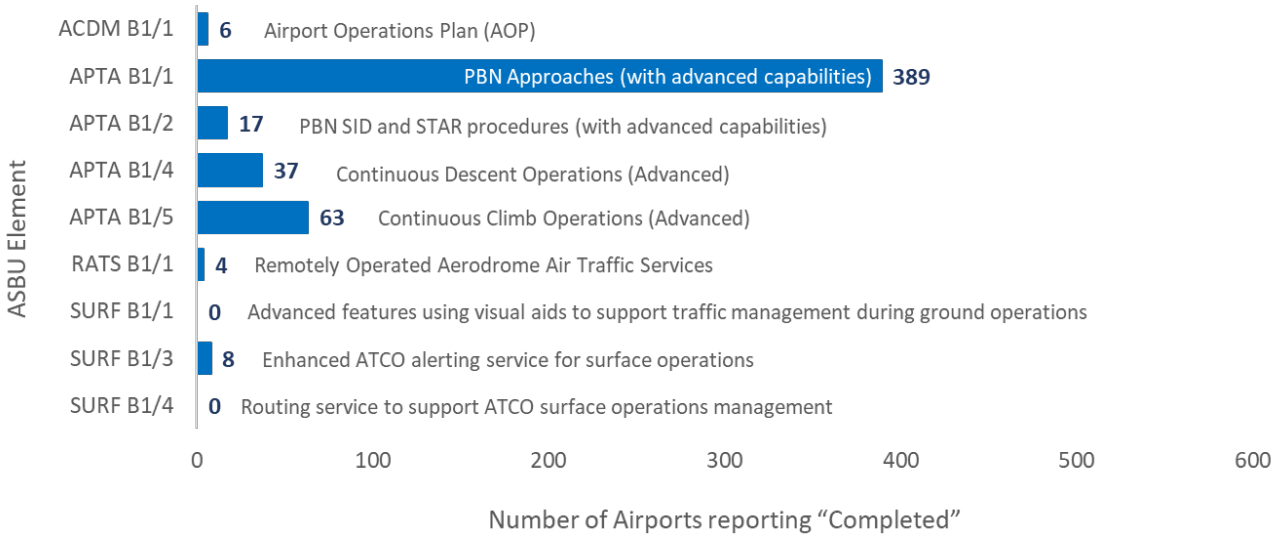
High-level summary (Reference year 2020)*

ASBU Elements implemented at airports

Block 0



Block 1

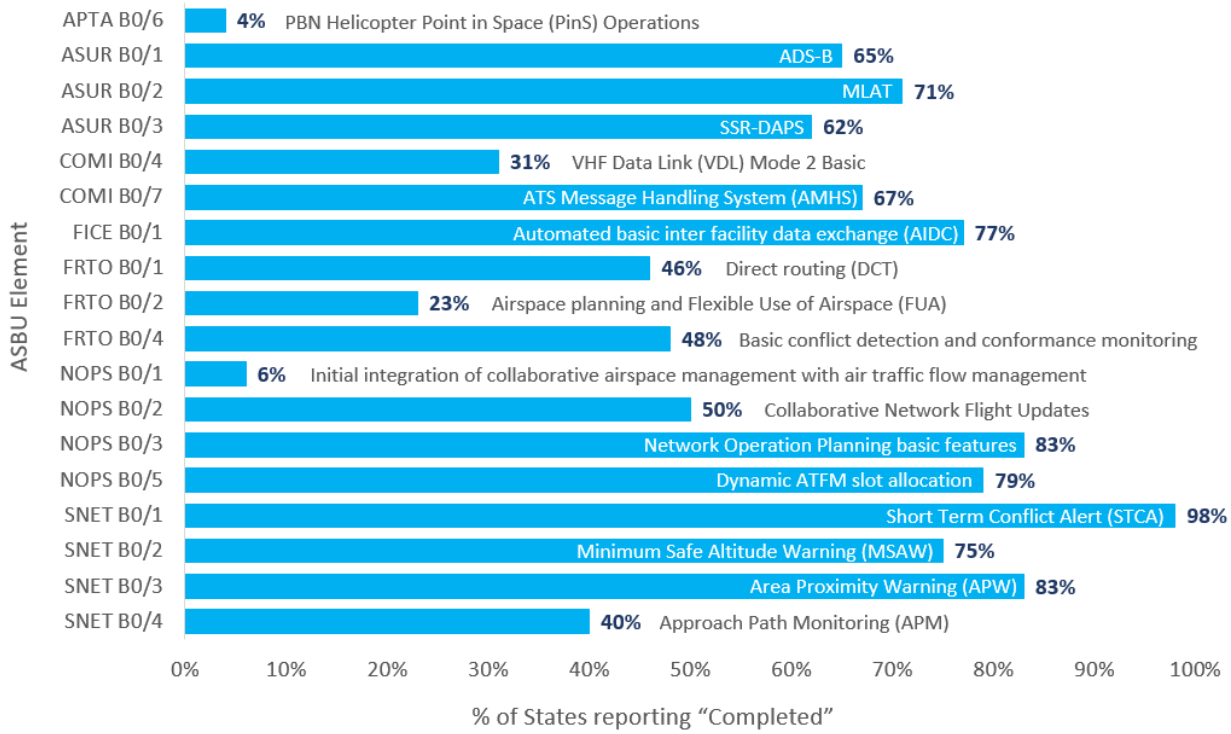


* It should be noted that for some elements (especially those implemented at airports) the actual progress can even be higher than presented, as many States provide information only for their major international airports. Moreover, some States have not submitted their ASBU monitoring questionnaires in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

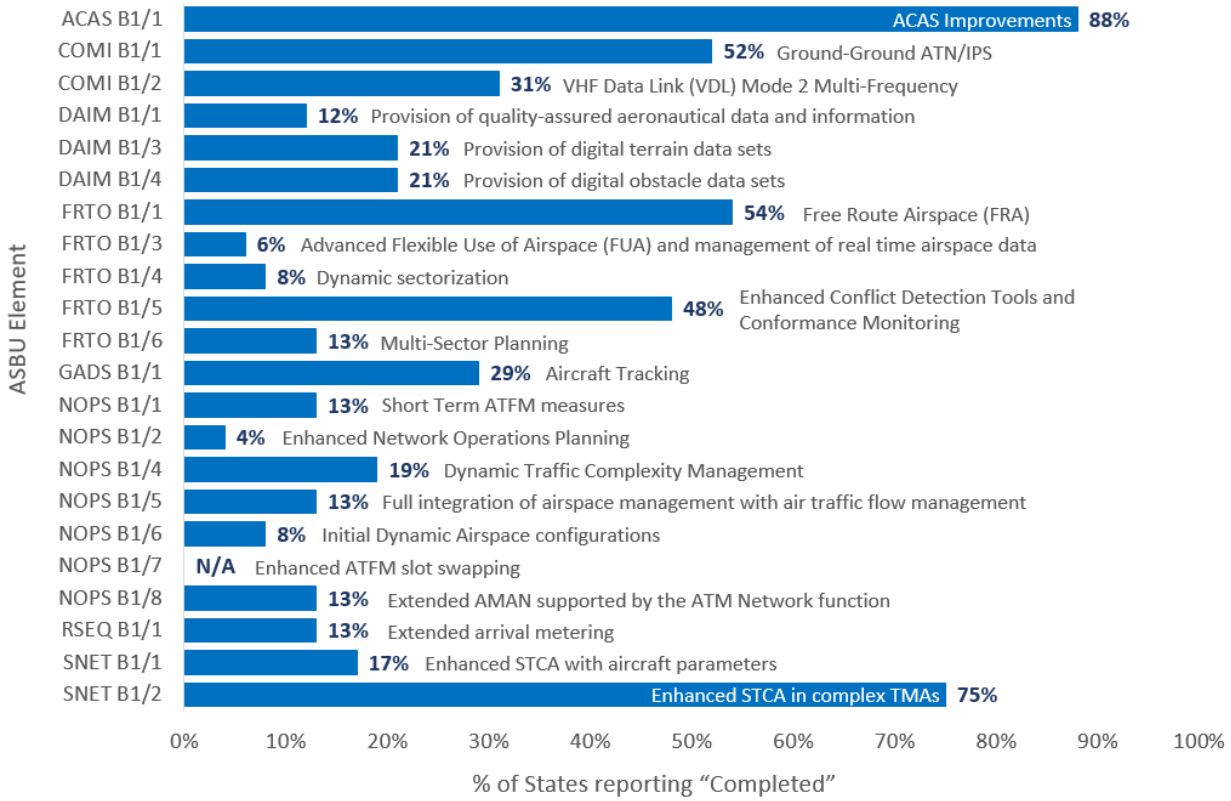
Due to specific data source (METG) and reporting methodology, information for AMET Elements is presented separately at the end of Chapter 4.

Other ASBU Elements (State/ANSP-related)

Block 0



Block 1



1. Introduction

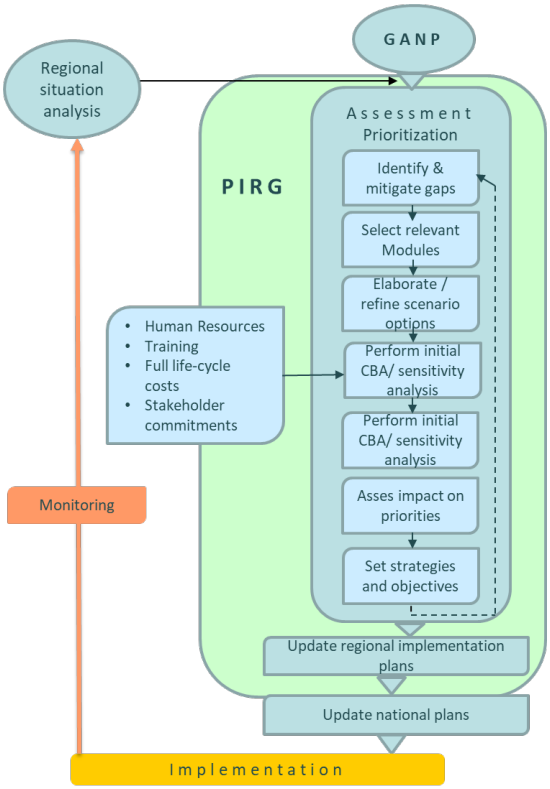
1.1. Objective and intended audience of the report

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 2020. It is the first edition of the Report that is based on the 6th edition of the Global Air Navigation Plan (GANP), endorsed at the 40th ICAO Assembly in September 2019.

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 newly established **European Aviation System Planning Group (EASPG)** (successor to the ICAO European Air Navigation Planning Group (EANPG) after ICAO Council decision from September 2019). 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 would address the initial high priority modules.

Pursuant to EANPG Conclusion 55/02a - the ASBU Block 0 Modules prioritisation table, as provided in Appendix G to EANPG/55 report, was endorsed as the initial version of the EUR ASBU Implementation Plan.

Pursuant to EANPG Conclusion 55/02b - the mechanism for monitoring and reporting the implementation status for ASBU of Priority 1 Modules, is using the combined efforts of EUROCONTROL LSSIP mechanism and the ICAO EUR questionnaire, in an effort to avoid duplication of reporting.

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 all 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. The EANPG/58 finally endorsed the 2015 ICAO/EUROCONTROL ASBU implementation monitoring report with Statement 58/01. The EANPG/58 noted that the endorsed 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.

Following the EANPG Conclusion 55/03, the ASBU Block 0 modules B0-WAKE, B0-AMET, B0-ASEP, B-OFPL and B0-CCO were not included into the monitoring report mechanisms. As some of these modules especially B0-CCO, which had become one of the key ICAO GANP priorities and its implementation was successfully completed in some States, or B0-AMET which is implemented by a number of States in the Region under the METG work programme objectives, the proposed inclusion of those two B0 modules into the implementation monitoring mechanisms for the 2016 reference period was supported by the meeting with EANPG Conclusion 58/22.

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.

During the 40th ICAO Assembly the 6th edition of the GANP was endorsed in October 2019 defining global strategic directions for air navigation and the Assembly Resolution A40-1 (ICAO global planning for safety and air navigation) outlines that the Assembly:

1. Instructs the Council to use the guidance in the Global Air Navigation Plan (GANP) to develop and prioritize the technical work programme of ICAO in the field of air navigation;

2. Urges the Council to provide States with a standardization roadmap, as announced in the GANP, as a basis for the work programme of ICAO;

3. Calls upon States, planning and implementation regional groups (PIRGs), and the aviation industry to utilize the guidance provided in the GANP for planning and implementation activities which establish priorities, targets and indicators consistent with globally-harmonized objectives, taking into account operational needs;

4. Calls upon States to take into consideration the GANP guidelines for the implementation of operational improvements as part of their national strategy to reduce the environmental impact, including CO2 emissions, from international aviation;

5. Calls upon States, 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;

6. Invites PIRGs to use ICAO standardized tools or adequate regional tools to monitor and, in collaboration with ICAO, analyse the implementation status of air navigation systems;

7. Instructs the Council to publish the results of the analysis on the regional performance dashboards and in an annual global air navigation report including, as a minimum, the key implementation priorities and accrued environmental benefits associated with the implementation of the operational improvements outlined in the ASBU framework;

8. Urges States that are developing new air navigation plans, for their own air navigation modernization, to coordinate with ICAO and align their plans so as to ensure regional and global compatibility and harmonization; and

9. Instructs the Council to continue developing the GANP, keeping it current with evolving technology and operational requirements.

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 notable drop for B0-APTA was due to requirements of the new PBN Regulation applicable in the European Union (EU), related in particular to the development and formal approval of a “PBN Transition Plan”, that compelled some States to revert the implementation status from “completed” to “ongoing”. In terms of the overall cumulative progress achieved, the best-performing modules were B0-ACAS (90%), B0-FRTO (77%) and B0-FICE (73%). The largest progress year-over-year was recorded for Continuous Climb Operations (B0-CCO), with nine (9) new airports implementing the module, followed by B0-SURF. 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.

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 future 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 2020), 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	27
ACDM	ACDM-B0/1	Airport CDM Information Sharing (ACIS)	AOP05	LSSIP + questionnaire	28
	ACDM-B0/2	Integration with ATM Network function	AOP05	LSSIP + questionnaire	28
	ACDM-B1/1	Airport Operations Plan (AOP)	AOP11	LSSIP + questionnaire	29
	ACDM-B1/2	Airport Operations Centre (APOC)			
AMET	AMET-B0/1	Meteorological observations products	/	METG	83
	AMET-B0/2	Meteorological forecast and warning products	/	METG	83
	AMET-B0/3	Climatological and historical meteorological products	/	METG	83
	AMET-B0/4	Dissemination of meteorological products	/	METG	83
	AMET-B1/1	Meteorological observations information	/	METG	88
	AMET-B1/2	Meteorological forecast and warning information	/	METG	88
	AMET-B1/3	Climatological and historical meteorological information	/	METG	88
	AMET-B1/4	Dissemination of meteorological information	/	METG	88
APTA	APTA-B0/1	PBN Approaches (with basic capabilities)	NAV10	PBN Map Tool + national AIPs	30
	APTA-B0/2	PBN SID and STAR procedures (with basic capabilities)	NAV03.1	PBN Map Tool + national AIPs	31
	APTA-B0/3	SBAS/GBAS CAT I precision approach procedures	/	PBN Map Tool + questionnaire	32
	APTA-B0/4	CDO (Basic)	ENV01	LSSIP + questionnaire	33
	APTA-B0/5	CCO (Basic)	ENV03	LSSIP + questionnaire	34
	APTA-B0/6	PBN Helicopter Point in Space (PinS) Operations	NAV12	LSSIP + questionnaire	35
	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 + national AIPs	36
	APTA-B1/2	PBN SID and STAR procedures (with advanced capabilities)	NAV03.2	PBN Map Tool + national AIPs	37
	APTA-B1/3	Performance based aerodrome operating minima – Advanced aircraft with SVGS			
	APTA-B1/4	CDO (Advanced)	ENV01	LSSIP + questionnaire	33
	APTA-B1/5	CCO (Advanced)	ENV03	LSSIP + questionnaire	34
ASUR	ASUR-B0/1	Automatic Dependent Surveillance – Broadcast (ADS-B)	/	LSSIP SUR Annex	38
	ASUR-B0/2	Multilateration cooperative surveillance systems (MLAT)	/	LSSIP SUR Annex	39
	ASUR-B0/3	Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-DAPS)	/	LSSIP SUR Annex	40
	ASUR-B1/1	Reception of aircraft ADS-B signals from space (SB ADS-B)			
COMI	COMI-B0/4	VHF Data Link (VDL) Mode 2 Basic	ITY-AGDL	LSSIP + questionnaire	41
	COMI-B0/7	ATS Message Handling System (AMHS)	COM10	LSSIP + questionnaire	42
	COMI-B1/1	Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS)	COM12	LSSIP + questionnaire	43
	COMI-B1/2	VHF Data Link (VDL) Mode 2 Multi-Frequency	ITY-AGDL	LSSIP + questionnaire	41
DAIM	DAIM-B1/1	Provision of quality-assured aeronautical data and information	ITY-ADQ	LSSIP + questionnaire	44
	DAIM-B1/2	Provision of digital Aeronautical Information Publication (AIP) data sets			
	DAIM-B1/3	Provision of digital terrain data sets	INF07	LSSIP + questionnaire	45
	DAIM-B1/4	Provision of digital obstacle data sets	INF07	LSSIP + questionnaire	45
	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	46
FRTO	FRTO-B0/1	Direct routing (DCT)	AOM21.1	LSSIP + questionnaire	47
	FRTO-B0/2	Airspace planning and Flexible Use of Airspace (FUA)	AOM19.1	LSSIP + questionnaire	48
	FRTO-B0/4	Basic conflict detection and conformance monitoring	ATC12.1	LSSIP + questionnaire	49
	FRTO-B1/1	Free Route Airspace (FRA)	AOM21.2	LSSIP + questionnaire	50
	FRTO-B1/2	Required Navigation Performance (RNP) routes			
	FRTO-B1/3	Advanced Flexible Use of Airspace (FUA) and management of real time airspace data	AOM19.2	LSSIP + questionnaire	51
	FRTO-B1/4	Dynamic sectorization	AOM19.4	LSSIP + questionnaire	52
	FRTO-B1/5	Enhanced Conflict Detection Tools and Conformance Monitoring	ATC12.1	LSSIP + questionnaire	49
	FRTO-B1/6	Multi-Sector Planning	ATC18	LSSIP + questionnaire	53
GADS	GADS-B1/1	Aircraft Tracking	/	Aireon ALERT	54
	GADS-B1/2	Contact directory service			
NAVS	NAVS-B0/1	Ground Based Augmentation Systems (GBAS)	/	PBN Map Tool + national AIPs	55
	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	AOM19.2	LSSIP + questionnaire	56
	NOPS-B0/2	Collaborative Network Flight Updates	FCM03	LSSIP + questionnaire	57
	NOPS-B0/3	Network Operation Planning basic features	/	Network Operations Plan + questionnaire	58
	NOPS-B0/4	Initial Airport/ATFM slots and A-CDM Network Interface	AOP05, AOP17	LSSIP + questionnaire	59
	NOPS-B0/5	Dynamic ATFM slot allocation	/	NM ATFCM Operations manual + questionnaire	60
	NOPS-B1/1	Short Term ATFM measures	FCM04.2	LSSIP + questionnaire	61
	NOPS-B1/2	Enhanced Network Operations Planning	FCM05	LSSIP + questionnaire	62
	NOPS-B1/3	Enhanced integration of Airport operations planning with network operations planning			
	NOPS-B1/4	Dynamic Traffic Complexity Management	FCM06	LSSIP + questionnaire	63
	NOPS-B1/5	Full integration of airspace management with air traffic flow management	AOM19.3	LSSIP + questionnaire	64
	NOPS-B1/6	Initial Dynamic Airspace configurations	AOM19.4	LSSIP + questionnaire	65
	NOPS-B1/7	Enhanced ATFM slot swapping	FCM09	LSSIP + questionnaire	66
	NOPS-B1/8	Extended Arrival Management supported by the ATM Network function	ATC15.2	LSSIP + questionnaire	67
	NOPS-B1/9	Target Times for ATFM purposes			
RATS	RATS-B1/1	Remotely Operated Aerodrome Air Traffic Services	AOP14	LSSIP + questionnaire	68
RSEQ	RSEQ-B0/1	Arrival Management	ATC07.1	LSSIP + questionnaire	69
	RSEQ-B0/2	Departure Management	AOP05-ASP05	LSSIP + questionnaire	70
	RSEQ-B0/3	Point merge			
	RSEQ-B1/1	Extended arrival metering	ATC15.2	LSSIP + questionnaire	71
SNET	SNET-B0/1	Short Term Conflict Alert (STCA)	ATC02.2	LSSIP + questionnaire	72
	SNET-B0/2	Minimum Safe Altitude Warning (MSAW)	ATC02.8-ASP03	LSSIP + questionnaire	73
	SNET-B0/3	Area Proximity Warning (APW)	ATC02.8-ASP01	LSSIP + questionnaire	74
	SNET-B0/4	Approach Path Monitoring (APM)	ATC02.8-ASP05	LSSIP + questionnaire	75
	SNET-B1/1	Enhanced STCA with aircraft parameters	ATC20	LSSIP + questionnaire	76
	SNET-B1/2	Enhanced STCA in complex TMAs	ATC02.9	LSSIP + questionnaire	77
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	78
	SURF-B0/3	Initial ATCO alerting service for surface operations	AOP04.2	LSSIP + questionnaire	79
	SURF-B1/1	Advanced features using visual aids to support traffic management during ground operations	AOP16	LSSIP + questionnaire	80
	SURF-B1/3	Enhanced ATCO alerting service for surface operations	AOP12	LSSIP + questionnaire	81
	SURF-B1/4	Routing service to support ATCO surface operations management	AOP13	LSSIP + questionnaire	82

In summary, a total of **70 ASBU Elements are covered** by this Report, representing roughly **80%** of the total set of Elements proposed to be monitored by the EURGANT-PT.

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

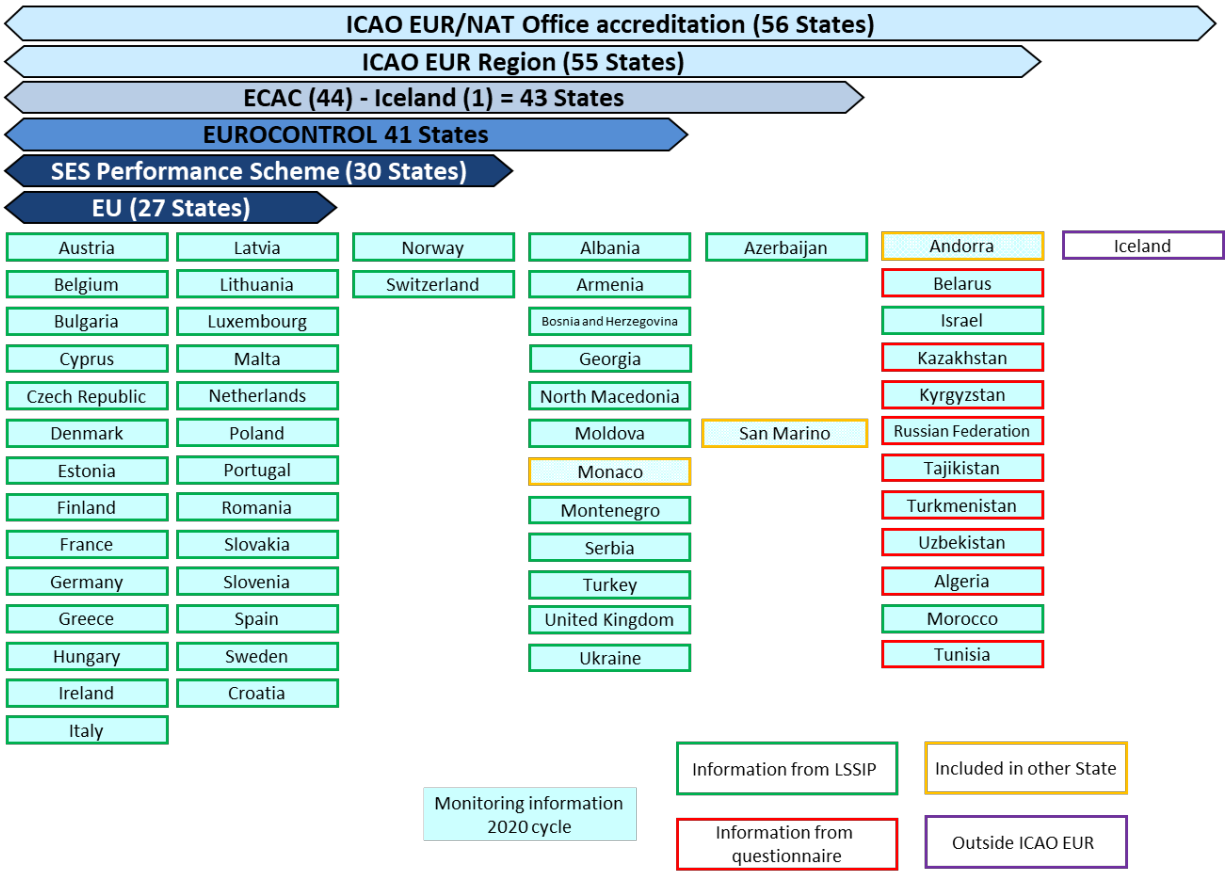
Geographical scope

This report addresses the implementation progress of ASBU Block 0 and Block 1 Elements with reference date December 2020.

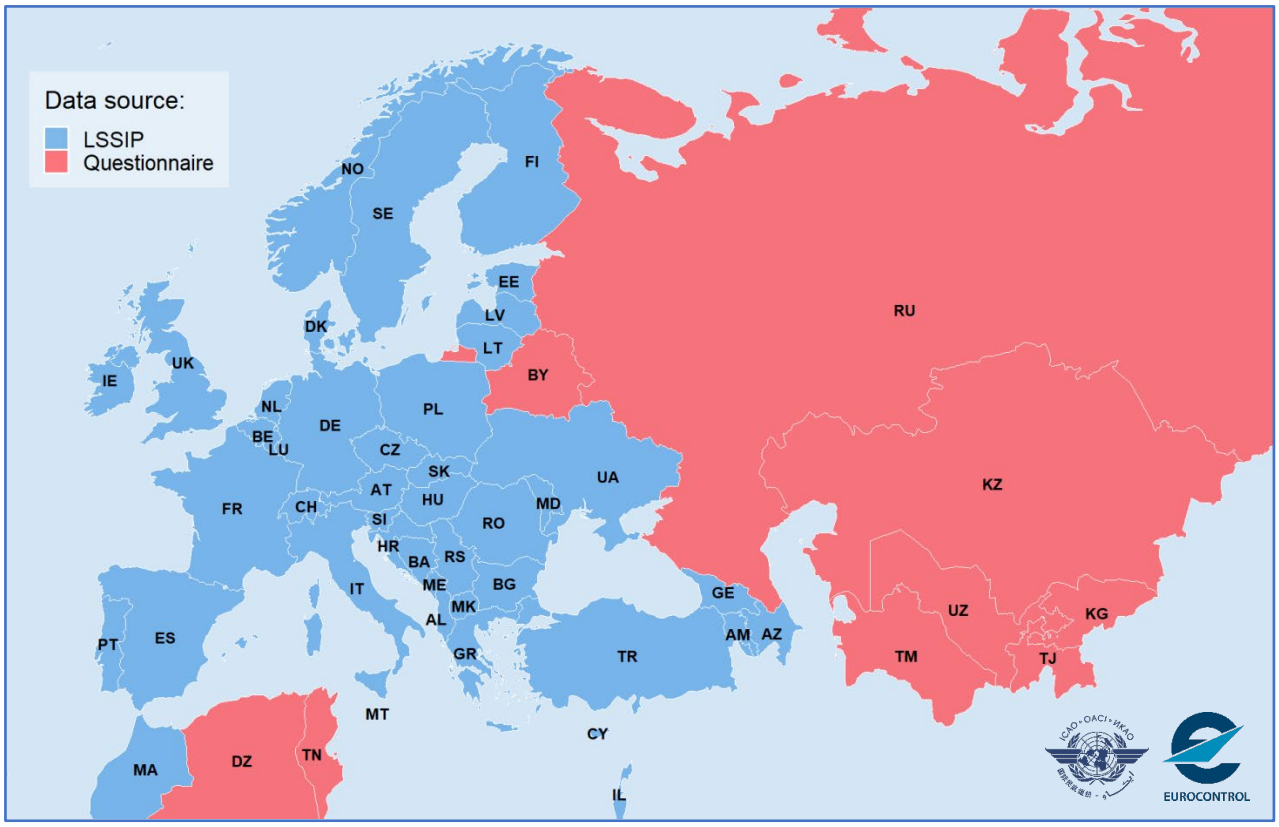
The report is primarily based on the information submitted by the 43 States participating in the LSSIP mechanism, as well as the information reported through the ASBU implementation monitoring questionnaires for the 9 States within the ICAO EUR Region that are outside the LSSIP reporting mechanism. It 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 Annex E - Surveillance;
- Relevant NM documents and manuals (e.g. Network Operations Plan, ATFCM Operations Manual etc.);
- For AMET elements the information was collected and endorsed by the ICAO Meteorology Group (METG) of the EASPG at their last meeting (METG/31).

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.

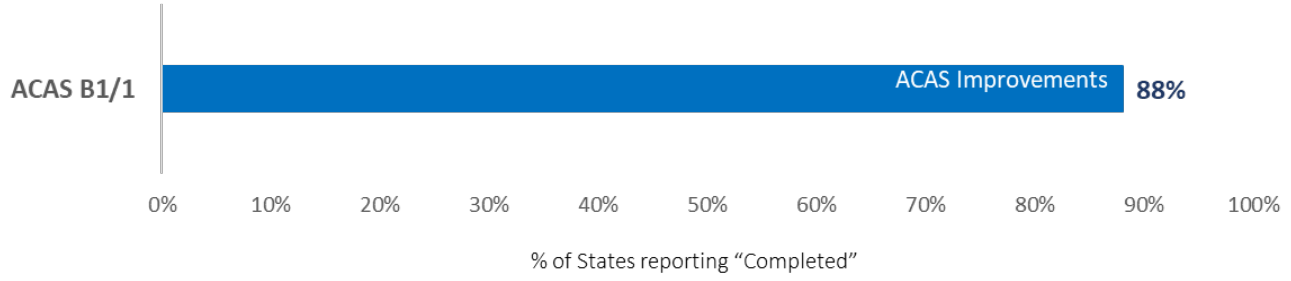
It should be noted that for this edition of the Report **7 out of 9 non-LSSIP States submitted their ASBU implementation questionnaire to the ICAO EUR/NAT Office and EUROCONTROL** before the deadline of 10th September 2020. This deadline had been extended several times was finally closed on 8 October2021. **Tunisia** submitted the questionnaire after the set deadline and its data is included in the Report to the extent possible, based also on the data from previous reporting cycles (where available). **Turkmenistan** has not submitted the questionnaire and only limited data which had been based on previous reporting cycles is included, where available.

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

A high completion rate of 88% (46 States) has been reached for **ACAS** which is very positive from the safety perspective. It should be noted that the reason for delay in the few remaining States is the equipage of military transport-type aircraft with TCAS v7.1 capability, taking into account that for this category of airspace users the carriage/upgrade is voluntary, therefore it takes longer.

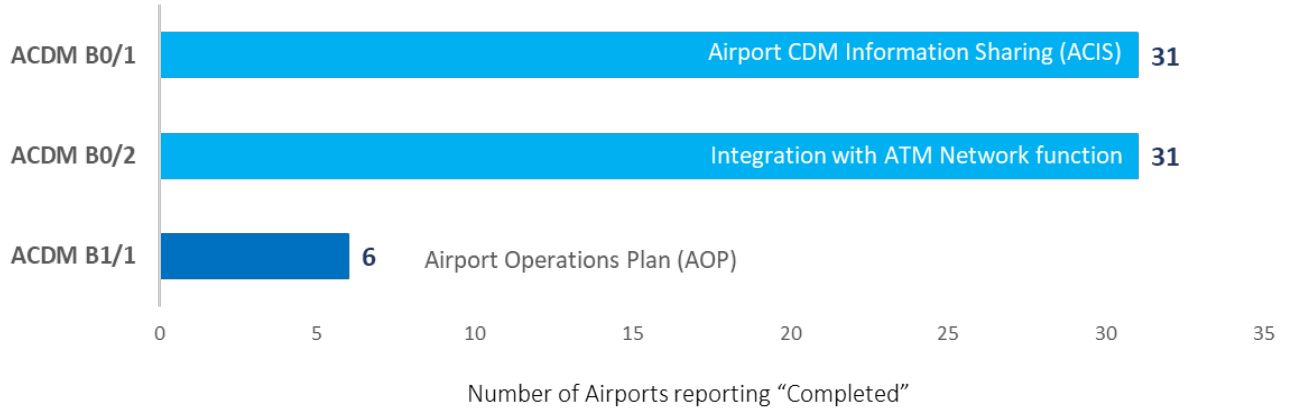


ACDM - Airport Collaborative Decision Making

The implementation of **A-CDM** in ICAO EUR Region shows a steady progress over the years. The current number of implementers is 31 and at least 22 more airports intend to finalize implementation over the next few years. Within the NM area of responsibility, A-CDM already implies the integration with ATM Network function.

With the opening of Berlin Brandenburg Airport (EDDB) in October 2020, the total number of airports having implemented **Initial AOP** in ICAO EUR Region has increased to 6. It should be noted that the implementation of initial AOP is mandated at 19 EU airports by the recently endorsed CP1 Regulation (EU 116/2021).

For most of the non-LSSIP reporting States these elements are considered "not applicable" or "not yet planned" because of the lack of operational need.



APTA - Improve arrival and departure operations

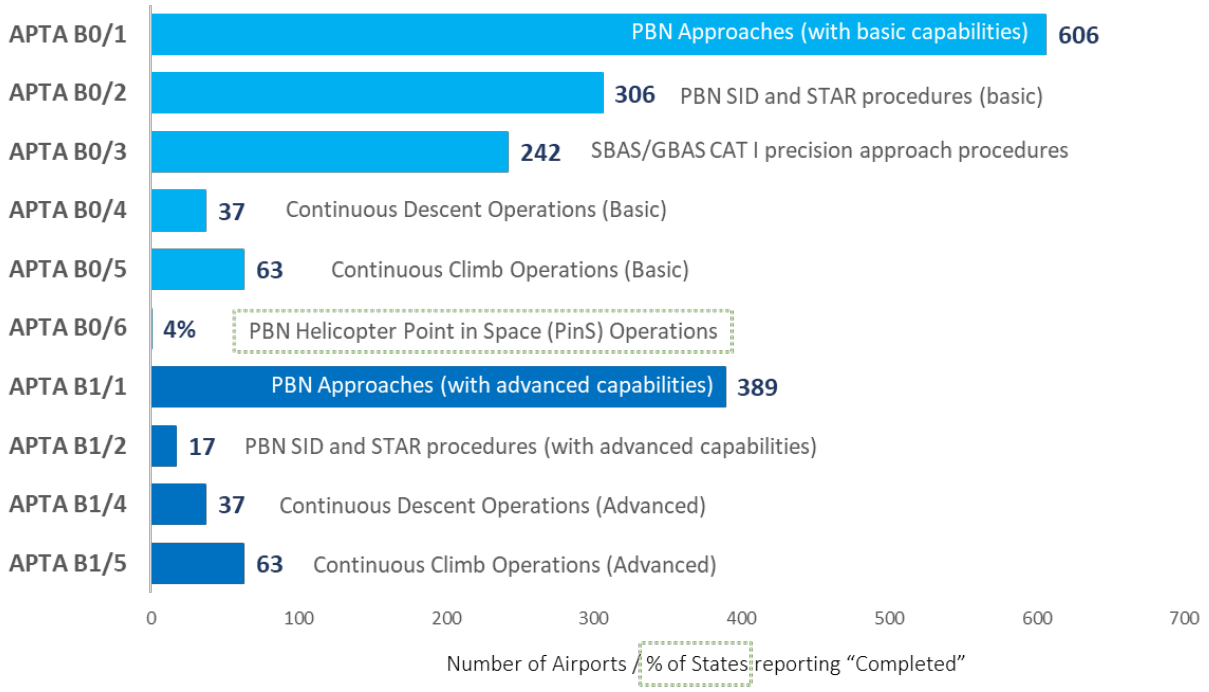
In general, the implementation of **Performance-Based Navigation** (PBN), relying on GNSS as the primary navigation means, is well under way in the ICAO EUR Region.

The leading ASBU Element in terms of the number of implementing airports within the ICAO EUR region are the **PBN approaches** (with basic functionalities - down to LNAV or LNAV/VNAV minima) – more than 600 airports. The interest in deploying **advanced RNP approach procedures** is also high across the ICAO EUR Region. Besides the 389 airports having such procedures already published in AIP for at least one of their runway ends, another 153 intend to publish LPV or RNP AR approach procedures until 2023. Insufficient EGNOS coverage has been reported as one of the main constraints for implementation for a number of airports.

The interest in **RNP1 SIDs and STARs with RF legs** is relatively low across the ICAO EUR Region. On the contrary, at least 306 airports are already served with **PBN SID and STAR procedures based on RNAV1** performance requirements. Regarding **PBN Helicopter Point in Space (PinS)** operations, vast majority of States (75%) have no plans to implement or consider the element as not applicable. They are currently implemented only in Norway and Switzerland.

The interest in **SBAS and GBAS approaches to CAT I** minima is quite large among airports within the ICAO EUR Region. At least 242 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 90 airports throughout the EUR Region, most of which in Norway and Russian Federation (see NAVS-B0/1).

Continuous Climb Operations (CCO) are widely implemented, with a total of 63 airports already applying CCOs and at least another 65 having plans for deployment. Meanwhile, **Continuous Descent Operations (CDO)** are implemented and operationally used (when traffic conditions allow) at 37 airports. It should be noted that for many airports the introduction of CDO/CCO depends on identified operational benefits. Many airports enable CDO only at the pilot request, others only in low traffic density conditions or during night at ATC discretion, or only for PBN arrivals etc.

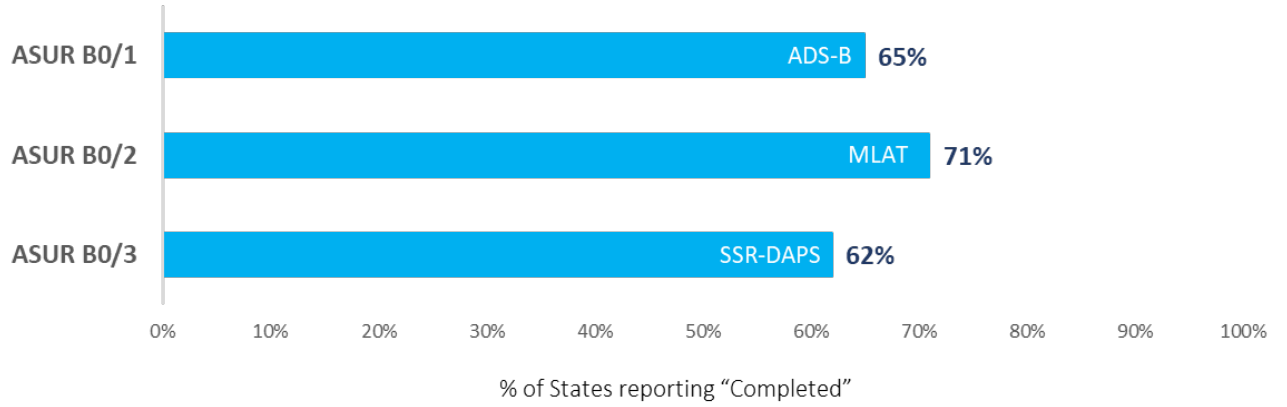


ASUR - Surveillance systems

Based on the available information reported through the LSSIP Surveillance Annex, as well as the questionnaire for non-LSSIP States, it is estimated that the capability to receive **ADS-B data** (en-route or at airports) currently exists in 34 States (65%) within the ICAO EUR Region. In many cases it is deployed as part of the WAM systems with ADS-B capability, while roughly half (17) of those States have installed their stand-alone ADS-B sensors.

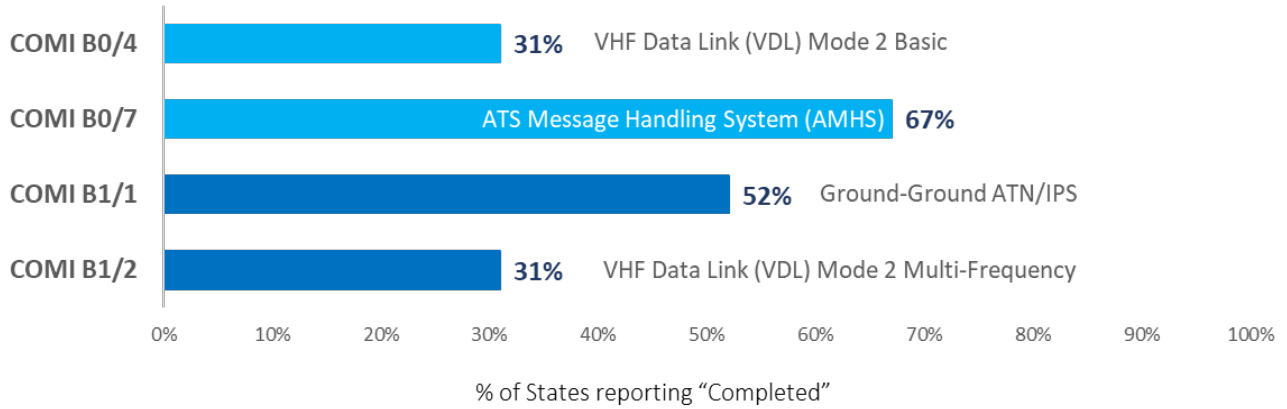
The interest in using **multilateration (MLAT)** technique for providing surveillance at airports or over wide areas (WAM) is quite high within the ICAO EUR Region and especially in ECAC States. MLAT is mostly used to complement (and in some cases even replace) secondary surveillance radars.

Although vast majority of ANSPs in the ICAO EUR Region have the technical capability to receive and process **downlinked aircraft parameters (DAPS)**, not all of them use this data operationally. It is estimated that 32 States use at least one of the aircraft parameters in operations. The most widely used aircraft parameter is the Selected Altitude, which is operationally used in at least 28 States, primarily for enhancing the performance of safety nets.



COMI - Communication infrastructure

The deployment of **VDL Mode 2** communications continues to progress, in particular in the western half of the EUR Region, with 17 States already using it for the provision of CPDLC (Controller Pilot Data Link Communications) services in the upper airspace and the replacement of voice communication for routine, non-time critical messages. 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.



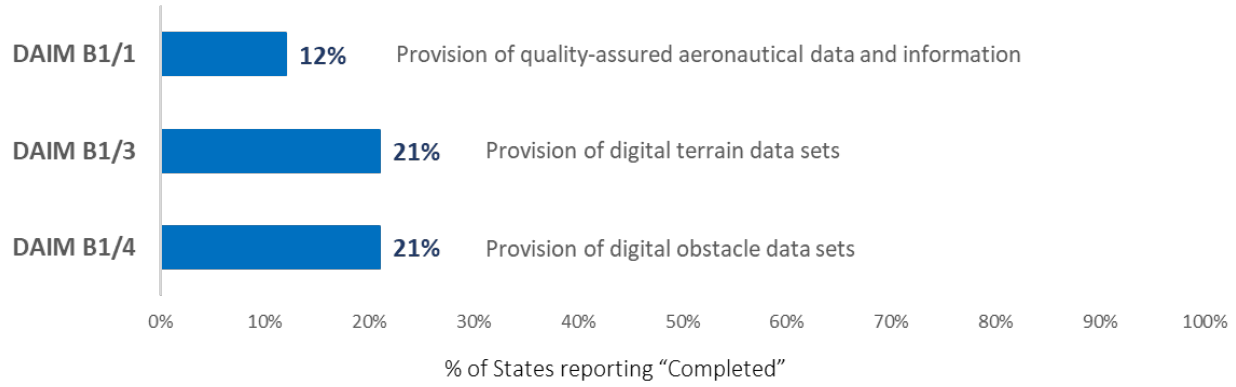
Thirty five (35) States have finalised the implementation of the full **AMHS** functionality (including extended AMHS) up to now, compared with 24 States only 2 years ago. It should be noted that as far as the "basic" AMHS feature is concerned, already providing most of the AMHS benefits, the level of implementation is much better, with 44 States already using it in operations.

The implementation of **Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS)** has witnessed an impressive spike in 2020, with 20 States having finalised implementation during the year (following 6 other States the year before). Overall, 27 States have fully implemented the element, all of them through the use of NewPENS (New Pan-European Network Services).

DAIM - Digital Aeronautical Information Management

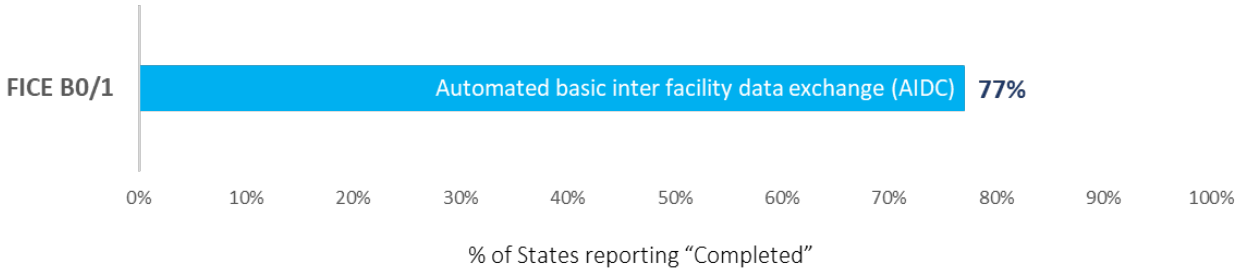
The completion rate for the **provision of quality-assured aeronautical data and information** remains rather low (12%). However, next year this rate should increase to 50% according to the implementation dates reported. It should also be noted that the new ADQ regulation for EU States is applicable from 2022.

For the provision of **digital terrain and obstacle data sets** the overall completion rate is up to 21%. It should be noted that more than half of States in the ECAC area have already established their national Terrain and Obstacle Data (TOD) policies. This action represents a cornerstone in successful TOD implementation and other actions depend on its availability.



FICE - Flight and Flow Information for a Collaborative Environment

Information exchanges for the process of coordination and transfer based on EUROCONTROL's OLDI (On-Line Data Interchange) specification have been widely deployed across the entire ICAO EUR Region. Despite the completion rate being only at 77%, almost all States have the technical capability implemented and at least one bilateral connection with adjacent ATS units in operational use. The work is ongoing to enrich the set of exchanged messages, as well as to establish new bilateral connections.



FRTO - Improved operations through enhanced en-route trajectories

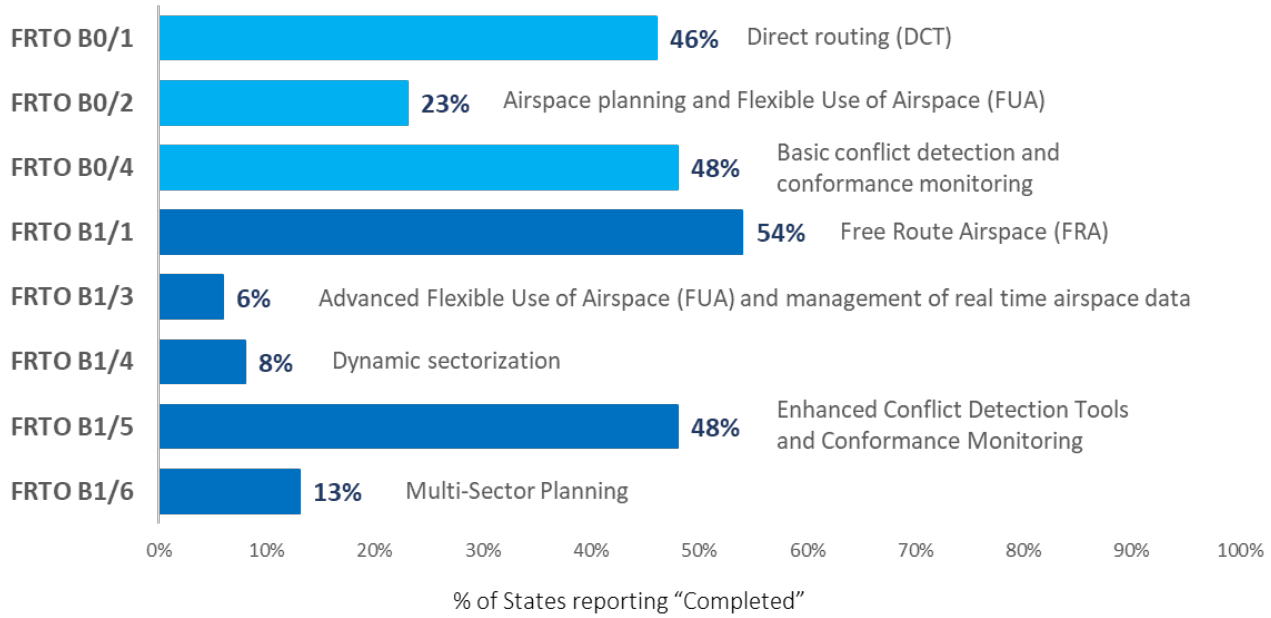
In 2020, no additional State has completed the **Direct Routing** element, so the completion rate remains at 46%, with a high rate (38%) of not applicable States. This is explained by the fact that most of these States have already implemented the Free Route Airspace (FRA), which is more advanced than what is required by this ASBU element. The **FRA** implementation in the ICAO EUR Region shows a solid progress over the years, as full completion has been achieved by 28 States, with some cross-border FRA projects already being operational (e.g. NEFRA, SECSI FRA, SEE FRA etc.).

The implementation of **Flexible Use of Airspace (FUA)** concept is progressing well within the ICAO EUR Region. Already 23 States have implemented their local ASM tools, mostly relying on LARA (Local and sub-Regional ASM Support System). Meanwhile, the implementation of **Advanced FUA** and management of real-time airspace data is still at an early stage within the ICAO EUR region.

For **Conflict detection and conformance monitoring tools**, MTCD functionality is already available in 23 States (or 40 ACCs) and Conformance monitoring function (MONA) is completed in 37 ACCs within ECAC.

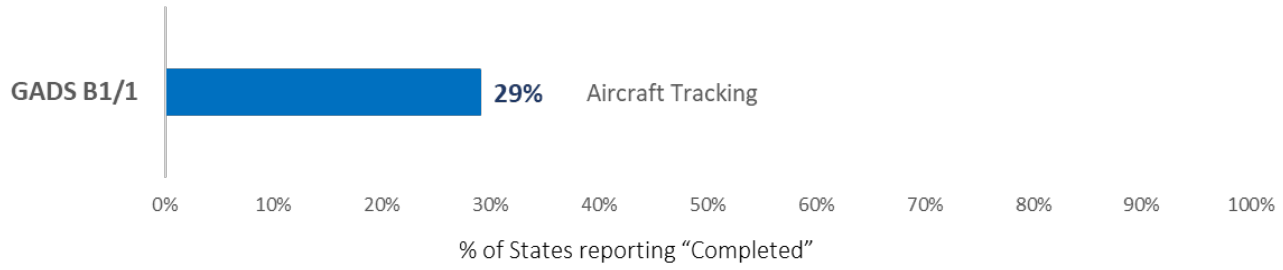
The implementation of **dynamic sectorization** is an ongoing process in the ICAO EUR region, with only 5 States reporting completion so far. Significant increase in progress is expected before the end of 2022, when this functionality is required in EU States by the recently endorsed CP1 Regulation.

Finally, **Multi-Sector Planning** is operationally used only in 7 States/ANSPs within the ICAO EUR region. Vast majority of States (≈70%) consider this ASBU Element as not yet planned or not applicable due to their existing ATM system capabilities, number of sectors and/or configuration, or lack of perceived benefits compared to current operations.



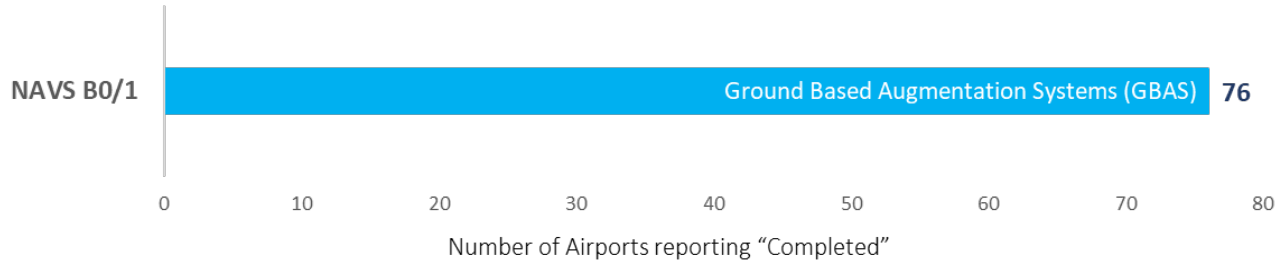
GADS - Global Aeronautical Distress and Safety System (GADSS)

Due to a lack of comprehensive and structured data sources on the implementation of this ASBU Element, 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 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.



NAVS - Navigation systems

Within the ICAO EUR Region, **GBAS** is currently in use at 76 airports, majority of which are located in Norway and Russian Federation. All approaches are currently CAT I, while CAT II/III procedures are planned at 9 airports in ECAC.



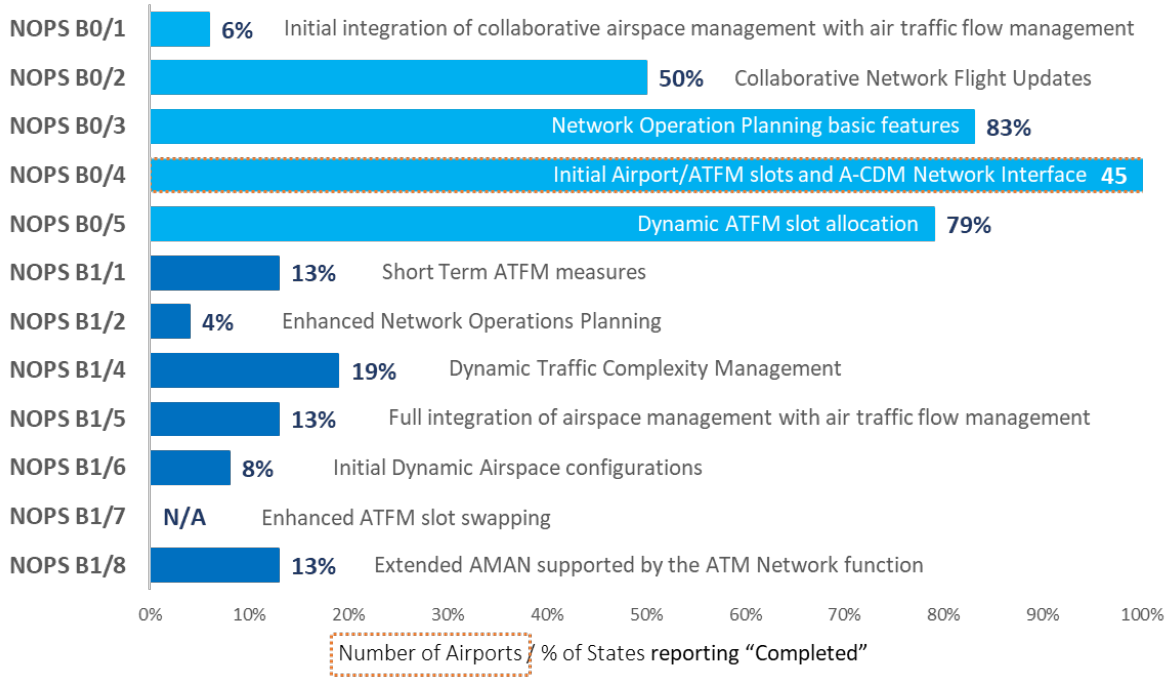
NOPS - Network Operations

Although only 6% of States have implemented the **initial integration of collaborative ASM with ATFM** so far, a substantial increase in the completion rate is expected by the end of 2022, which is consistent with the provisions of the CP1 Regulation in EU States. Within the ATFCM area of EUROCONTROL NM, States/ANSPs 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, 7 States have already finalized the implementation. However, this information should be taken with caution, as the implementation is still at an early stage and there seems to be a confusion among States over the scope of the "initial" and "full" ASM/ATFCM integration. Significant surge in completion is expected by end 2022, which is explained by the target date for Advanced-FUA set by the CP1 regulation (12/2022).

No States have completed the implementation of the **Collaborative Network Flight Updates** during 2020. However, the implementation progress achieved so far is quite good, with 9 States expected to finalise deployment by the end of 2021. **Network Operations Planning** is already a well-established process within the EUROCONTROL Member States and it is coordinated by the Network Manager, resulting in regular publication of the Network Operations Plan. Likewise, within its ATFCM Area, 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 in the network.

Among NOPS elements, the **initial airport/ATFM slots and ACDM Network Interface** is the only one reported at airport level. In the ICAO EUR Region, 45 airports have already established the necessary information exchanges with NM.

Only 5 States (8%) within EUR Region have implemented **initial dynamic airspace configurations** so far. Significant increase in progress is expected before the end of 2022. Similarly, the implementation of **short-term ATFM measures** is still at an early stage in EUR Region. Within EUROCONTROL Member States, stakeholders have the choice to choose between locally developed tool and the tool provided by Network Manager. For EUROCONTROL Member States, **interactive rolling NOP** components are implemented and made available by the Network Manager. However, the interactive rolling NOP is an evolving development and the existing/new functionalities are planned to be integrated within a new platform.



A total of 10 (19%) States/ANSPs in the ICAO EUR Region reported **traffic complexity tools** as implemented so far. Another 13 ANSPs intend to deploy by end 2021, which (for EU Member States) is in line with the deadline specified in the Common Project 1 (CP1) regulation (12/2022). Some of the ATFCM tools currently being developed or used in ANSPs to assess traffic complexity are SALTO (FR), CRYSTAL (CH), IMPACT (ES) and tCAT (BG).

Enhanced ATFM slot swapping 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. This facility has already been implemented by EUROCONTROL's NM in the ECAC area, while it is mostly reported as not yet planned for the other States of the Region.

RATS - Remote Aerodrome Air Traffic Services

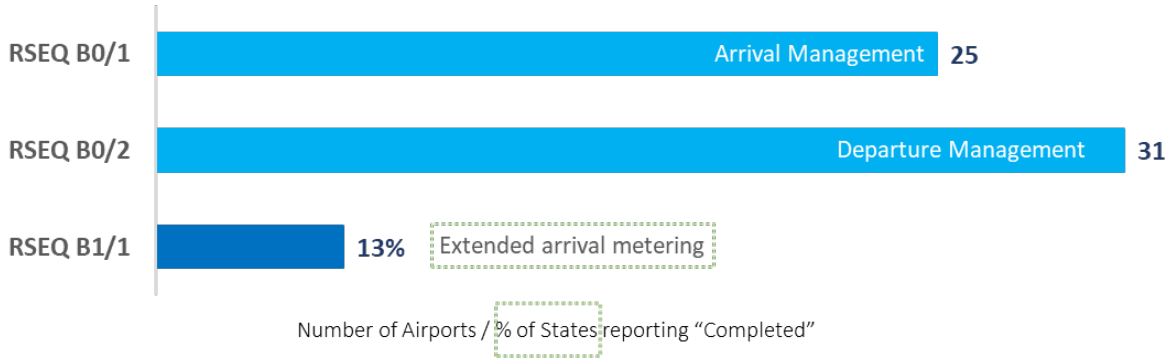
Implementation of **Remote Tower** is building up speed with the functionality already used in operations at 4 airports in the EUR Region. Particularly encouraging is the growing interest in the deployment of RTC, with a total of other 19 locations expected to enter operations in the next 3 years, indicating the first steps towards the virtualisation of service provision.

RSEQ - Improved traffic flow through runway sequencing

Basic Arrival Management (AMAN) tools with associated procedures have been implemented at 25 airports in the ICAO EUR Region. Another 23 airports intend to finalize implementation in the next few years.

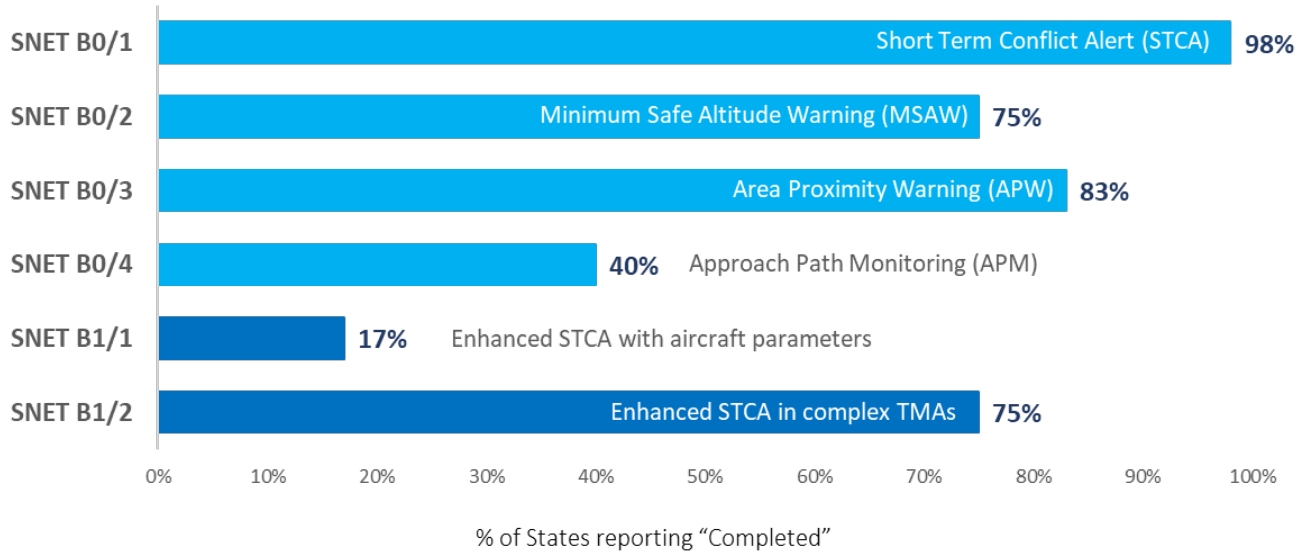
Meanwhile, the implementation of **Extended AMAN** proves to be particularly challenging as it requires coordination with neighbouring ANSPs. Currently it is operationally deployed in 7 States/ANSPs throughout the ICAO EUR Region, serving London Heathrow, Copenhagen, Frankfurt, Munich, Dusseldorf, Berlin, Vienna and Istanbul airports.

Initial DMAN with pre-departure sequencing has so far been implemented at 31 airports across the ICAO EUR Region. 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 vast majority of airports.



SNET - Ground-based Safety Nets

Regarding the implementation of safety nets, **Short Term Conflict Alert (STCA)** represents undoubtedly the most widely implemented safety net in the ICAO EUR Region with 98% completion rate achieved by end 2020. In the case of **Minimum Safe Altitude Warning (MSAW),** function is already implemented in 39 (75%) States, for **Area Proximity Warning (APW)** the figures increase up to 43 (83%) States reporting completion so far and **Approach Path Monitoring (APM)** has been implemented in 40% of States/ANSPs across the ICAO EUR Region. For most of the remaining States, the implementation is usually aligned with scheduled major upgrades or replacements of the ATC systems in ANSPs.



Enhanced STCA with down-linked parameters has so far been implemented only in 9 States (17%) of the ICAO EUR Region. Vast majority (>60%) still do not have plans for deployment or consider this functionality as not applicable.

Enhanced STCA in complex TMAs has been widely deployed throughout ICAO EUR Region, with 75% of States reporting full completion. However, most of the ANSPs use the en-route algorithm also for their TMAs, while only a few have implemented enhanced functionalities, including the so-called multi-trajectory functionality.

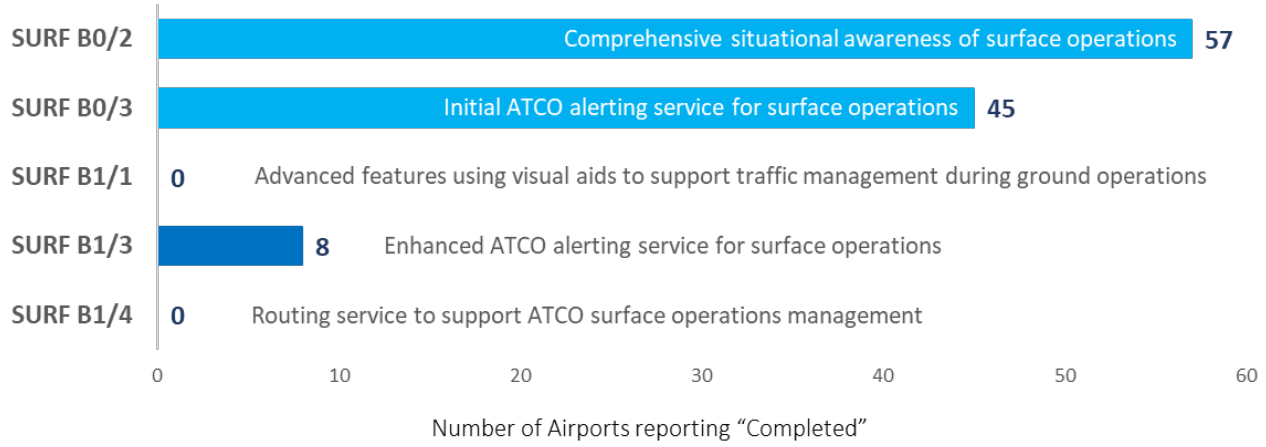
SURF - Surface operations

The implementation of **SURF B0/2 (A-SMGCS Surveillance Service)** has continued to progress despite the COVID-19 pandemic with even more airports (15) expecting to be ready in 2021. This is very encouraging as this functionality is essential, being the fundament unlocking more advanced A-SMGCS features which might be required once the traffic will recover.

Meanwhile, the progress for **SURF B0/3 (A-SMGCS RMCA)** was on hold in 2020, mainly due to substantial reduction of traffic caused by the COVID-19 pandemic. However the increase is expected to resume, driven by the predicted traffic recovery.

Both **SURF B1/1 (A-SMGCS Guidance Service)** and **SURF B1/4 (A-SMGCS Routing Service)** have not yet been implemented anywhere in the EUR Region and for the time being they show quite a limited appeal for deployment. The main reason for this is the reported lack of operational needs or business justification.

Conversely, the implementation of the **enhanced ATCO alerting service for surface operations** is progressing, albeit slowly, with several airports planning to increase the complexity of their A-SMGCS systems and upgrade from A-SMGCS RMCA (Runway Monitoring and Conflict Alerting) service, already implemented or in deployment at 69 locations, to systems allowing the detection of conflicting ATC clearances as well as conformance monitoring.



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.

ASBU Element Code	ASBU Element Title	ASBU Block
ATM Master Plan Level 3:	Master Plan Level 3 objective linked with a given ASBU Element	ASBU Thread

Description:

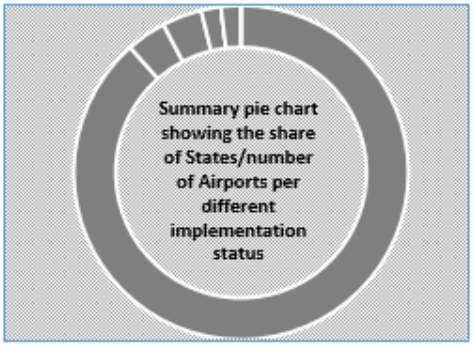
Description of the ASBU Element, its main purpose and new capabilities. Detailed information can be accessed on https://www4.icao.int/ganpportal/ASBU

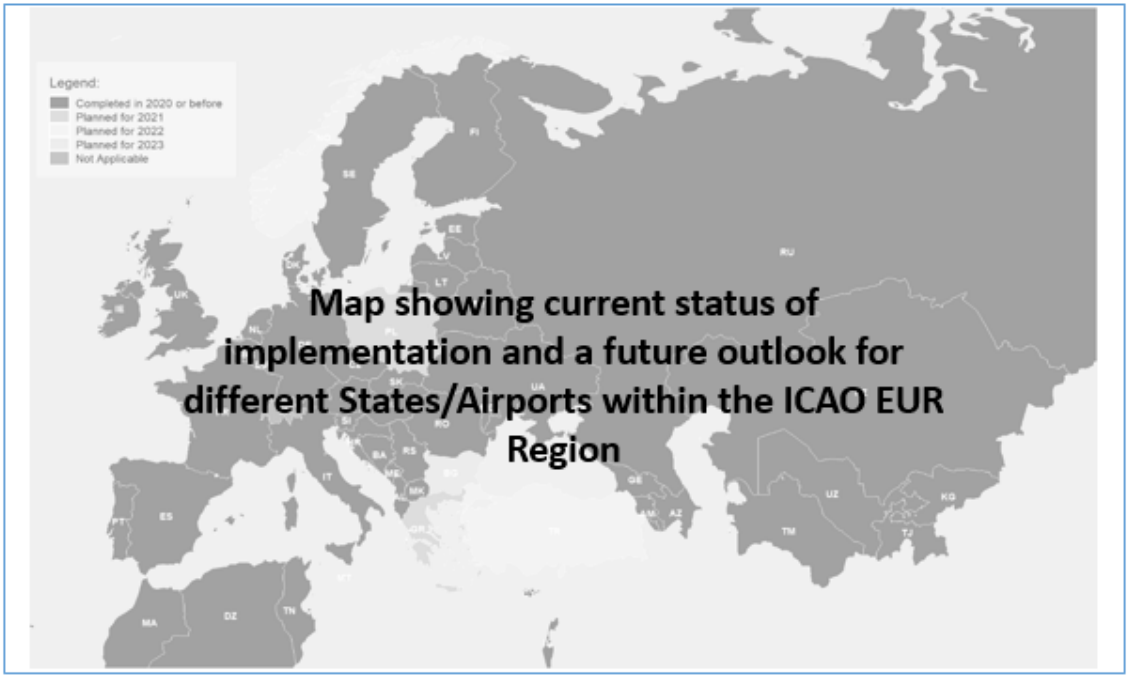
Implementation summary (end 2020):

Textual summary describing the main developments in implementation of a given ASBU Element, with a special focus on the main blocking factors, reasons for delay or lack of interest in deployment, as well as future outlook.

New implementers in 2020:

States/Airports that have implemented a given ASBU Element during 2020





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 2020):

A high completion rate of 88% (46 States) has been reached which is very positive from the perspective of the safety contribution of the element.

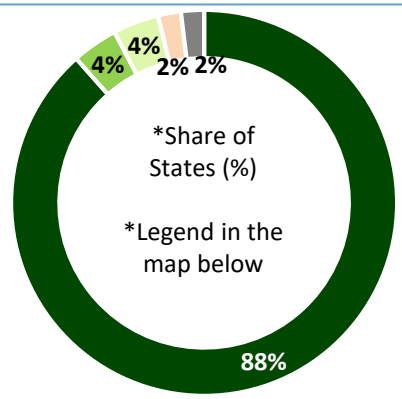
It should be noted that the reason for delay in the few remaining States is the equipage of military transport-type aircraft with TCAS v7.1 capability, taking into account that for this category of airspace users the carriage/upgrade is voluntary, therefore it takes longer.

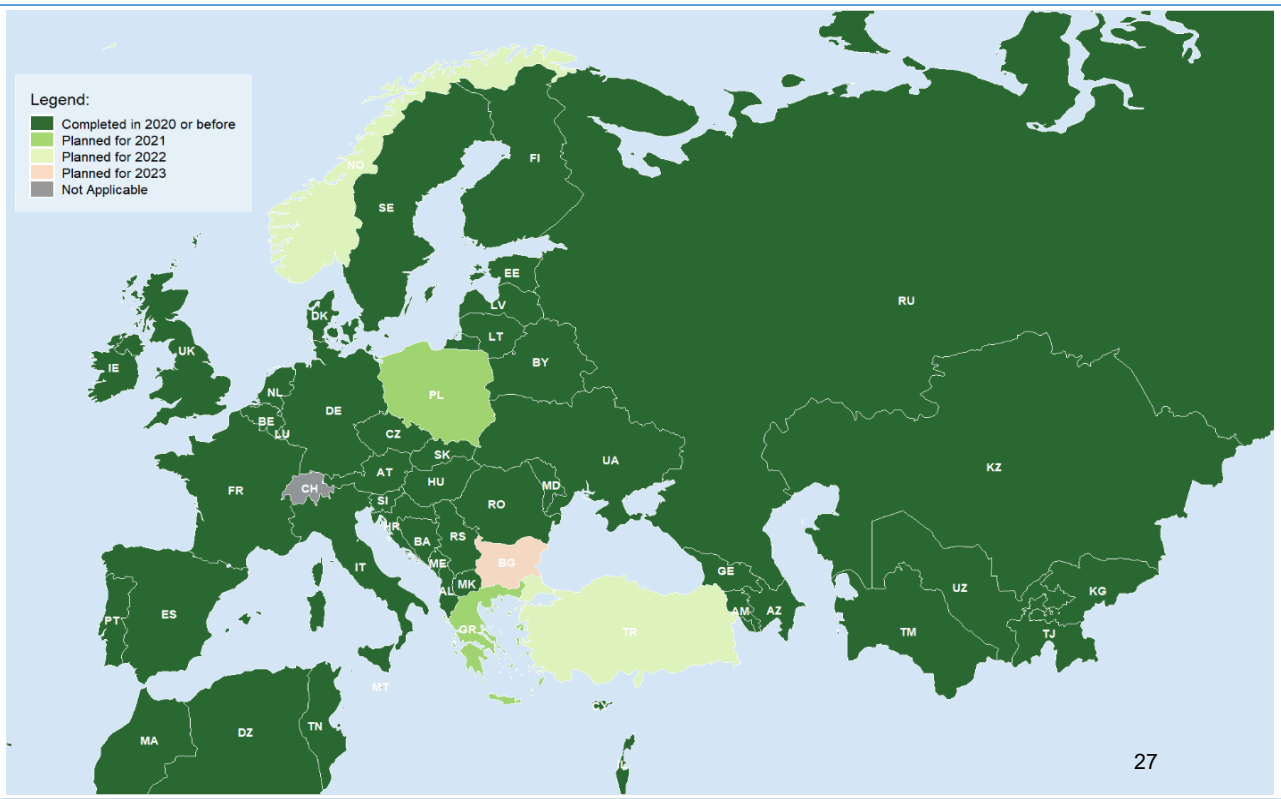
The planned implementation dates in these States range from 2021 to 2023.

Switzerland declared this objective/element as not applicable.

New implementers in 2020:

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.

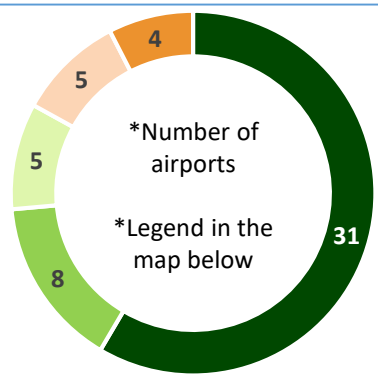
Implementation summary (end 2020):

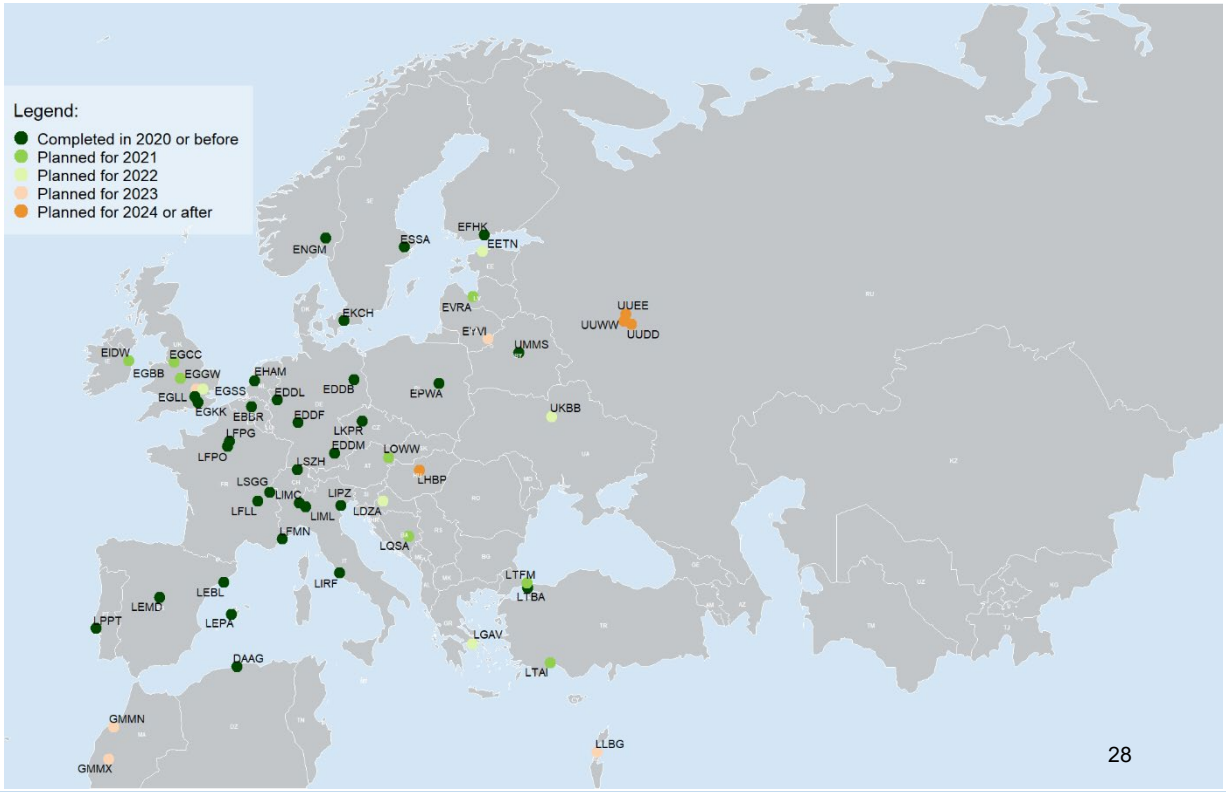
The implementation of A-CDM in ICAO EUR Region shows a steady progress over the years. Four more airports have reached completion during 2020, bringing the total number of implementers to 31. At least 22 more airports intend to finalize implementation over the next few years. Within the NM area of responsibility, A-CDM already implies the integration with ATM Network function. In the context of the CP1 Regulation (EU 116/2021), A-CDM is facilitating the deployment of AF2 on DMAN Synchronized with Pre-departure sequencing which is required by 12/2022.

For most of the non-LSSIP reporting States 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 National (UMMS) and Houari Boumediene (DAAG) airports, while the work is ongoing at Vnukovo (UUWW), Domodedovo (UUDD) and Sheremetyevo (UUEE) airports.

New implementers in 2020:

LPPT, LFMN, EDDB and EPWA





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

ATM Master Plan Level 3:	AOP11 - Initial Airport Operations Plan

ACDM

Description:

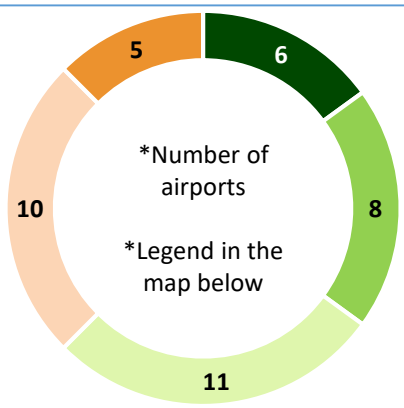
This element consists of a collaborative Airport Operations Plan (AOP) which encompasses "local" airport information and shared information with the ATM network in order to develop a synchronized view for the integration of local airport operations as well as aircraft operations into the overall ATM 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.

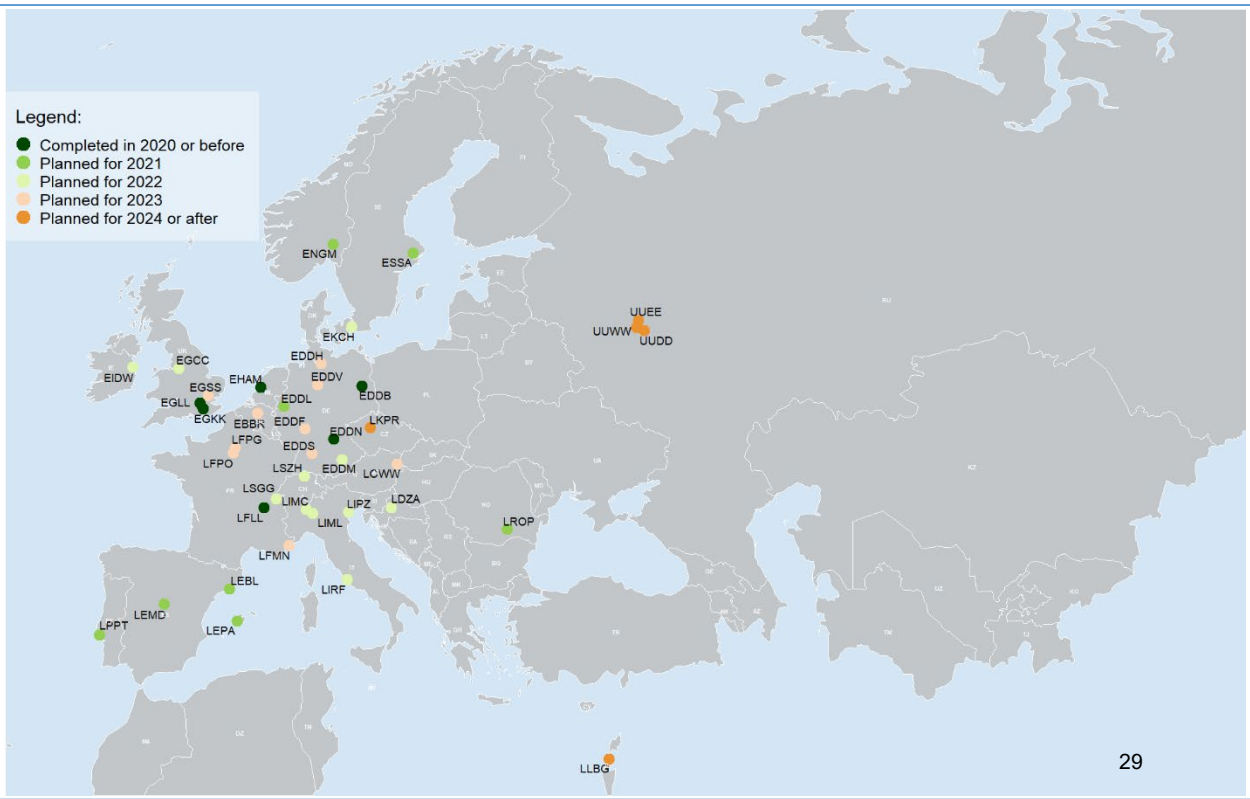
Implementation summary (end 2020):

With the opening of Berlin Brandenburg Airport (EDDB) in October 2020, the total number of airports having implemented initial AOP in ICAO EUR Region has increased to 6.
It should be noted that the implementation of initial AOP is mandated at 19 EU airports by the recently endorsed CP1 Regulation (EU 116/2021). Therefore, some airports have already adapted their plans to reflect the new target date of 12/2023. In general, most of the airports reporting implementation plans (34) intend to implement this element by the end of 2023.
Among non-LSSIP reporting States, this element is mostly considered "not applicable" or "not yet planned" due to lack of operational needs, while the work is ongoing to implement AOP at Vnukovo (UUWW), Domodedovo (UUDD) and Sheremetyevo (UUEE) airports in Russian Federation.

New implementers in 2020:

EDDB





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 2020):

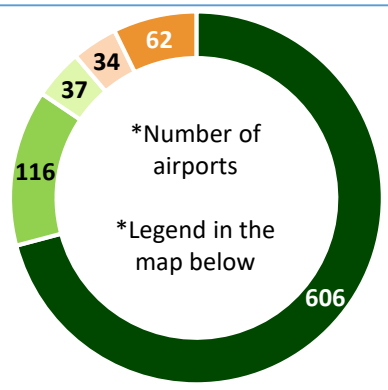
The implementation of Performance-Based Navigation (PBN), relying on GNSS as the primary navigation means, is well under way in the ICAO EUR Region. It represents one of the cornerstones for the CNS rationalization (in particular that of the ground-based navigation aids (navaids)). In EU Member States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

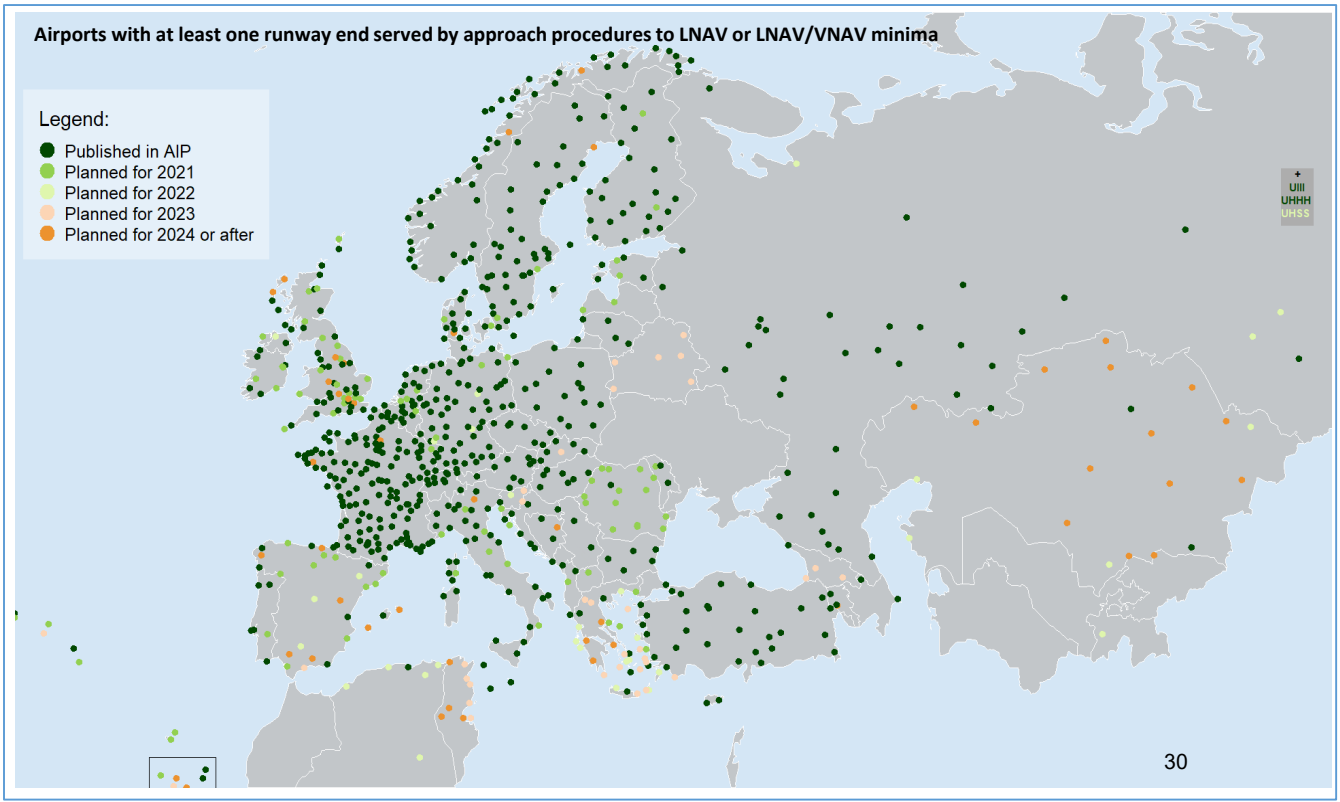
More than 600 airports have already published their PBN approach procedures down to LNAV or LNAV/VNAV minima for at least one runway end across the EUR Region, with many more in the pipeline for implementation in the next few years. This number should be considered rather pessimistic, as the situation is constantly evolving and new procedures are being published in AIPs.

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

New implementers in 2020:

40+ 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 2020):

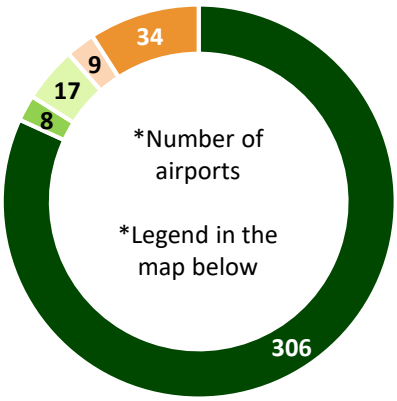
The implementation of Performance-Based Navigation (PBN), relying on GNSS as the primary navigation means, is well under way in the ICAO EUR Region. It represents one of the cornerstones for the CNS rationalization (in particular that of the ground-based navigation aids (navaids)). In EU Member States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

At least 306 airports throughout the ICAO EUR Region are already served with PBN SID and STAR procedures based on RNAV1 performance requirements, most of which are within ECAC. The interest is high in the non-ECAC States as well, with Russian Federation leading the way with 65 airports having this ASBU element already completed or planned in the short term.

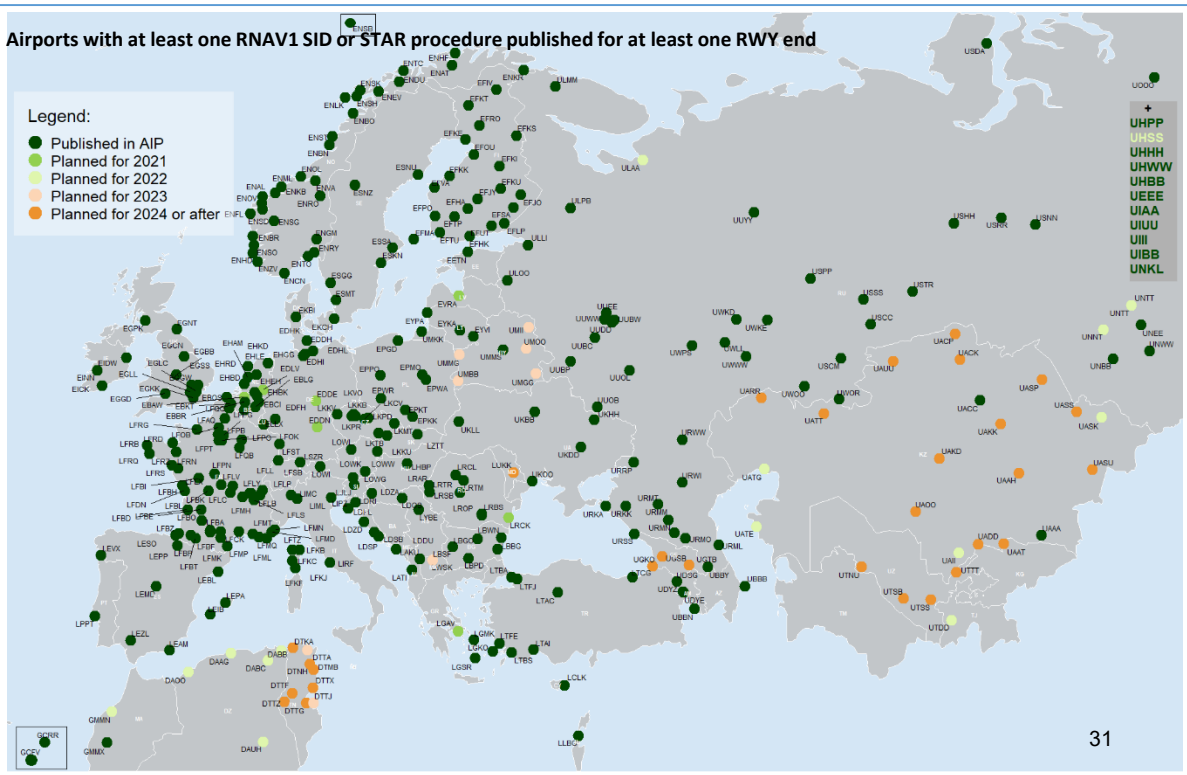
**It should be noted that the PBN IR gives choice to the stakeholders to decide on the need for SID and STAR procedures, as well as on the applicable specifications - RNAV1 or RNP1.*

New implementers in 2020:

Info not available



Airports with at least one RNAV1 SID or STAR procedure published for at least one RWY end



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.

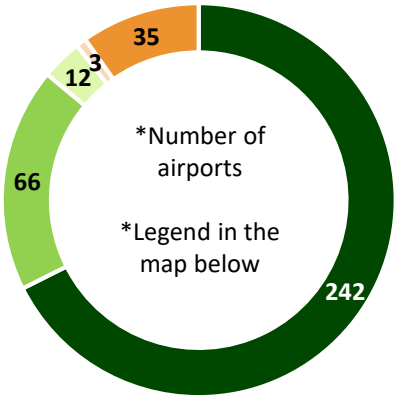
Implementation summary (end 2020):

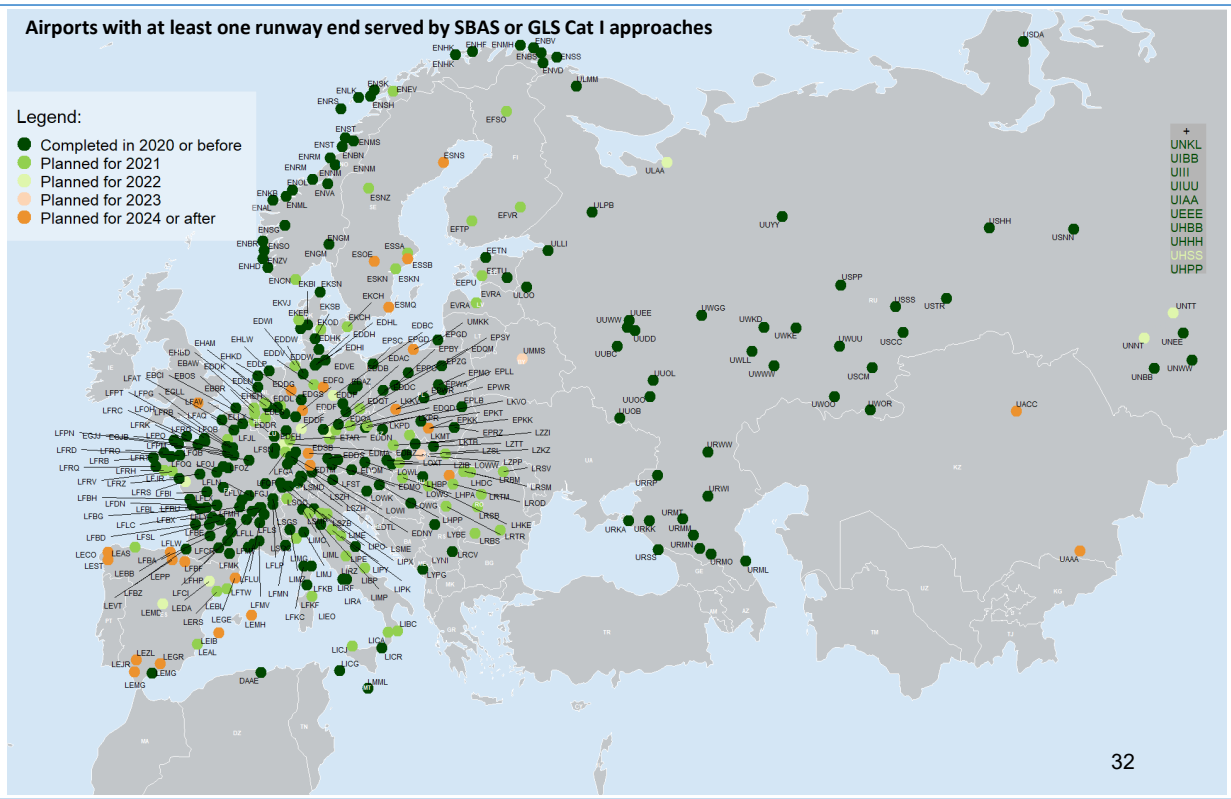
The interest in SBAS and GBAS approaches to CAT I minima is quite large among airports within the ICAO EUR Region. At least 242 airports have so far published such approaches for at least one runway end in the national AIPs. Vast majority of these are LPV CAT I (SBAS), while GLS approaches are currently implemented or planned at more than 90 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 establish firm plans for deployment in the years to come. Only by end 2021, 66 more airports are expected to finalize implementation. Among non-LSSIP States, SBAS/GBAS approaches are mostly not yet planned, with the exception of Russian Federation, Kazakhstan and Algeria.

New implementers in 2020:

30+ 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 2020):

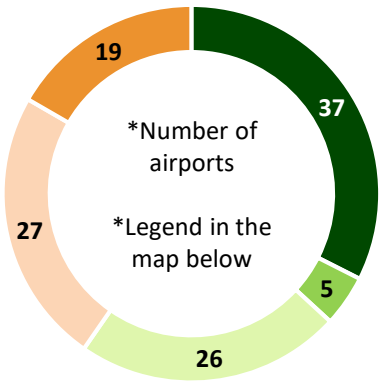
Continuous Descent Operations (CDO) are implemented and operationally used (when traffic conditions allow) at 37 airports across ICAO EUR Region. Most of these airports have implemented advanced CDO procedures under PBN. Many airports enable CDO only at the pilot request, others only in low traffic density conditions or during night at ATC discretion, or only for PBN arrivals etc.

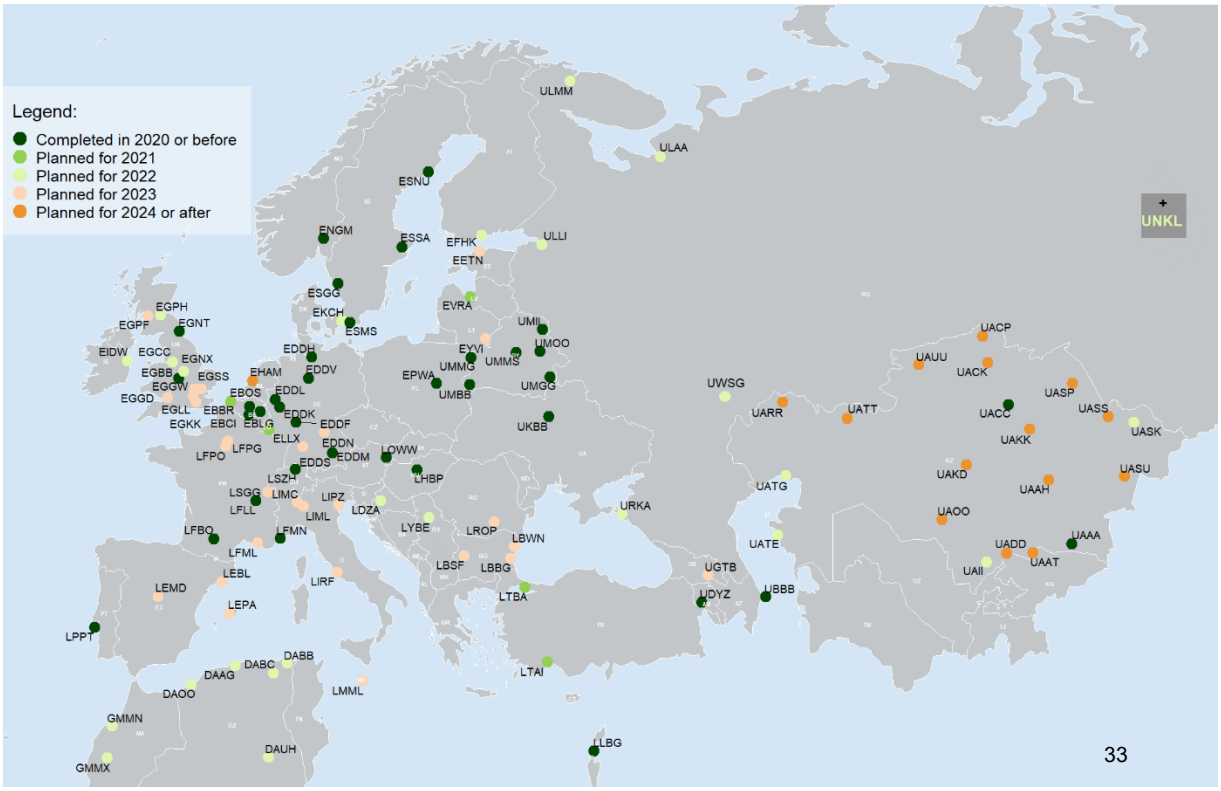
Implementation is ongoing at another 77 airports, most of which intend to reach operational deployment by the end of 2023. In general, actions related to performance monitoring are the most challenging for implementation among ECAC States.

Among non-LSSIP Reporting States, basic CDOs are executed at 7 airports in Belarus and 2 more in Kazakhstan (procedures published during 2020), while the implementation is ongoing at a number of airports in Algeria, Kazakhstan and Russian Federation.

New implementers in 2020:

UACC and UAAA





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

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

APTA

Description:

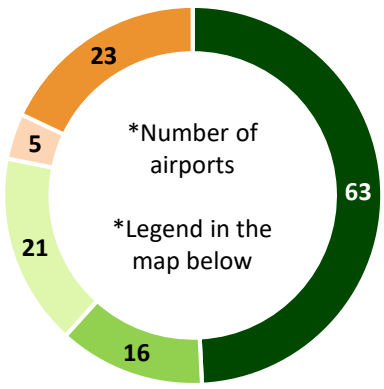
CCO represent ATC procedures to facilitate uninterrupted climb, reducing fuel burn and ATC/Pilot interaction. Departing aircraft are allowed to climb continuously, to the greatest possible extent, by employing optimum engine thrust. An optimal continuous climb should start on take-off and allow the aircraft 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.

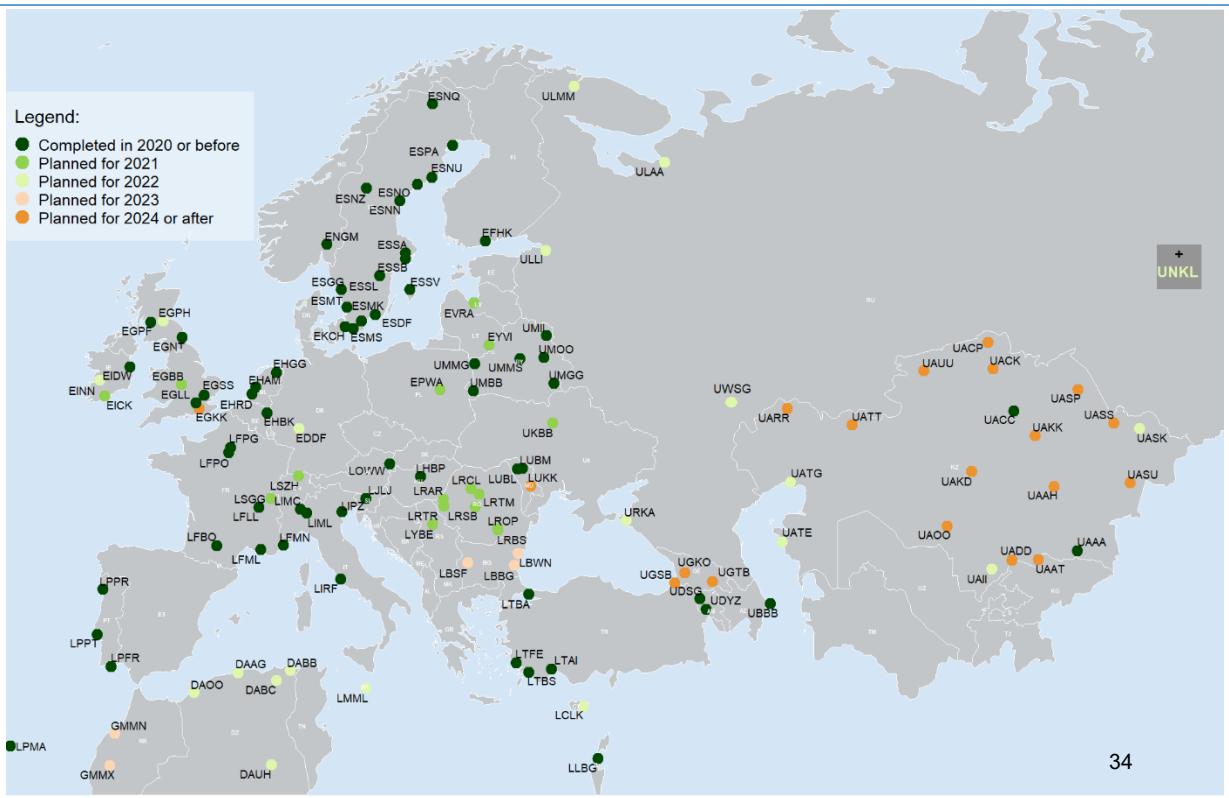
Implementation summary (end 2020):

Continuous Climb Operations (CCO) are widely implemented throughout the ICAO EUR Region, with a total of 63 airports already applying CCOs and at least another 65 having plans for deployment.
It should be noted that for many airports the introduction of CDO/CCO depends on identified operational benefits. Furthermore, for some airports CCO is introduced as part of an airspace re-organisation/revision project.
Among non-LSSIP Reporting States, basic CCOs are presently applied 7 airports in Belarus and 2 in Kazakhstan (procedures published during 2020), while the implementation is ongoing at a number of airports in Algeria, Kazakhstan and Russian Federation.

New implementers in 2020:

EFHK, LHBP, LJLJ, UACC and UAAA





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 2020):

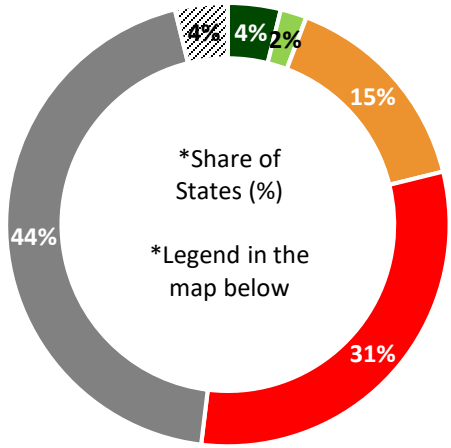
The interest for the deployment of the element remains reduced, with the vast majority of States (75%) having no plans to implement or considering the element as not applicable. The main reason for not implementing the element is the lack of business needs, as well as the characteristics of the operational environments.

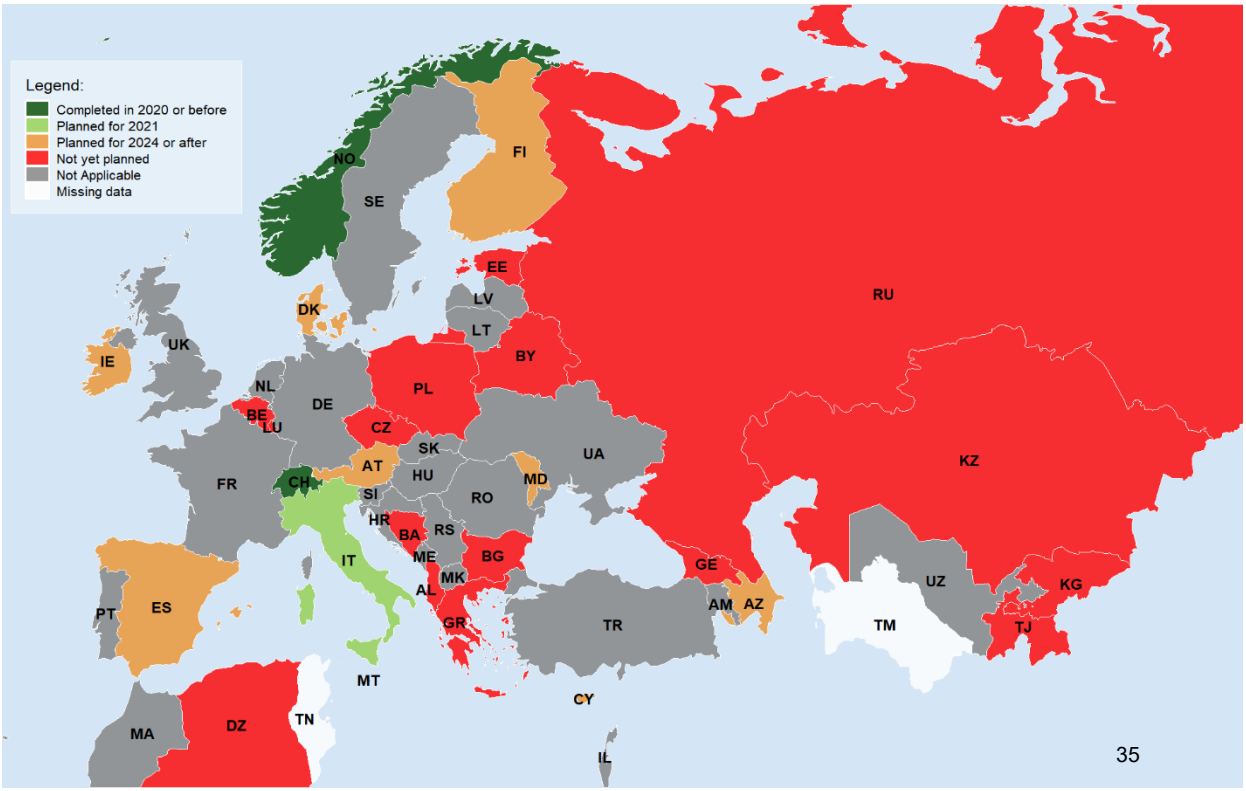
In Norway, Avinor has published IFR routes for helicopters in several TMAs. Furthermore, Low Flight Network (LFN) has been implemented in Switzerland for helicopter IFR flights based on RNP0.3.

In Italy, a National Task Force has been established to support the operational implementation of LLR and PinS procedures, mainly for HEMS (Helicopter Emergency Medical Service) operations. The first PinS Approaches and PinS Departures to connect Trento Airport and Cles Helipad have been published in the AIP in March 2020.

New implementers in 2020:

CH, NO





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.

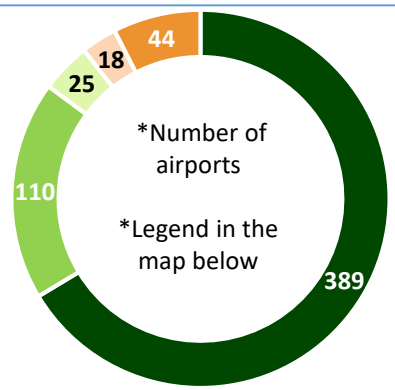
Implementation summary (end 2020):

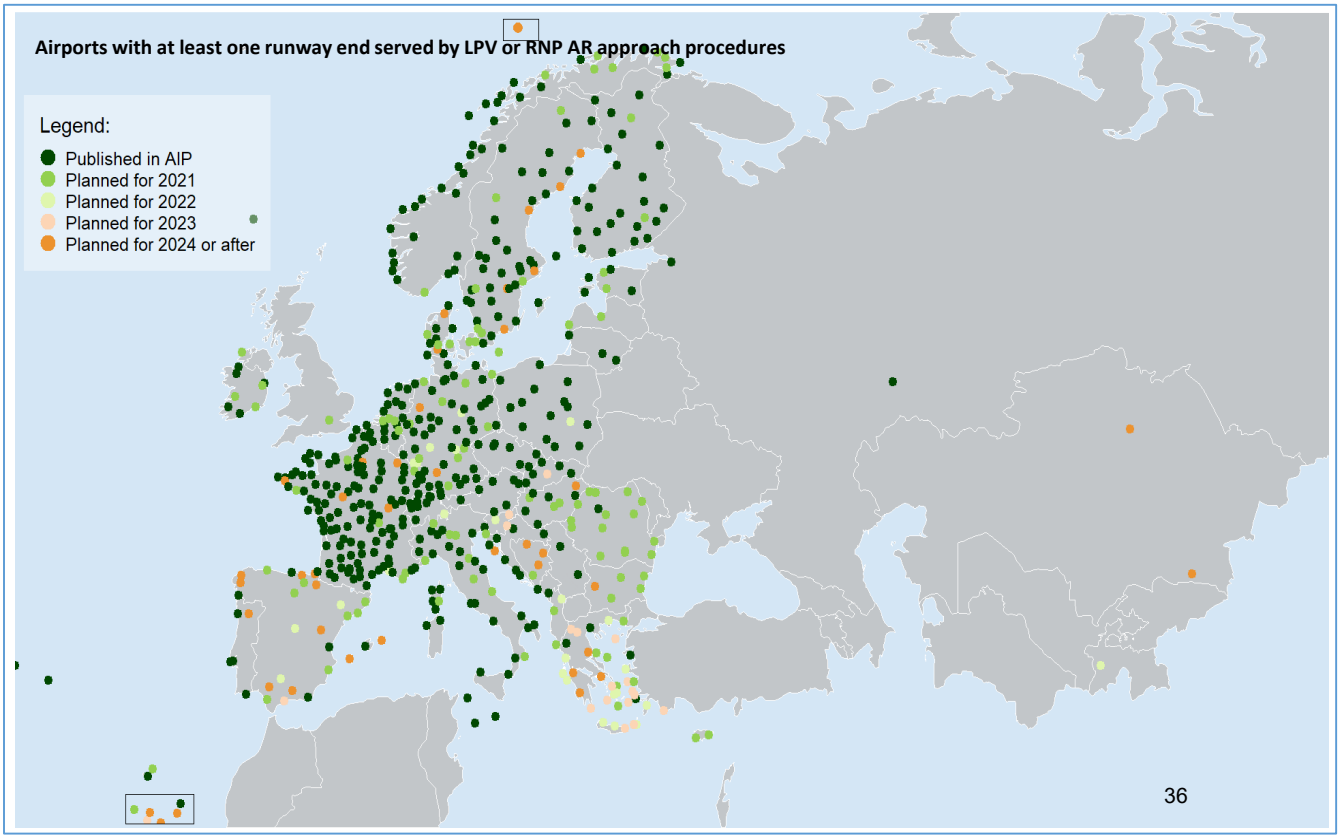
The implementation of Performance-Based Navigation (PBN), relying on GNSS as the primary navigation means, is well under way in the ICAO EUR Region. It represents one of the cornerstones for the CNS rationalization (in particular that of the ground-based navigation aids (navaids)). In EU Member States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

The interest in deploying advanced RNP approach procedures remains high across the ICAO EUR Region, with at least 389 airports having such procedures already published in AIP for at least one of its runway ends. Another 153 airports intend to publish LPV or RNP AR approach procedures until 2023. It should be noted that for a number of airports the main constraint to implement this ASBU element is insufficient EGNOS coverage.

New implementers in 2020:

50+ 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 2020):

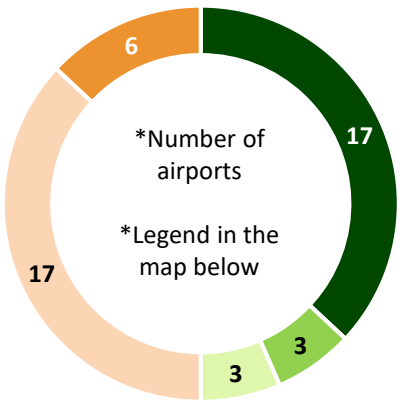
The implementation of Performance-Based Navigation (PBN), relying on GNSS as the primary navigation means, is well under way in the ICAO EUR Region. It represents one of the cornerstones for the CNS rationalization (in particular that of the ground-based navigation aids (navaids)). In EU Member States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

The interest in RNP1 SIDs and STARs with RF legs is relatively low across the ICAO EUR Region. Only 17 airports are so far served by such procedures (although many without RF legs), with another 29 having plans for implementation. Many States indicated lack of business (operational) needs for RNP1 implementation, stating that RNAV1 is sufficient at the moment.

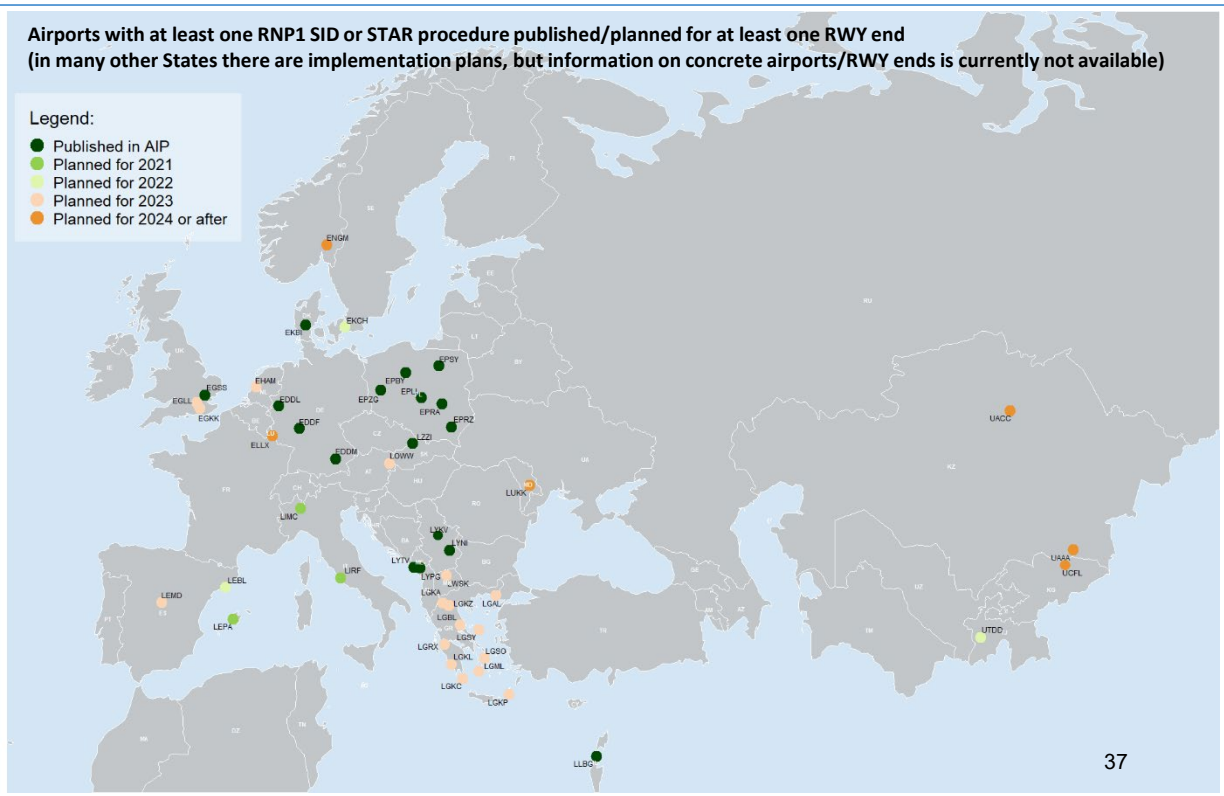
**It should be noted that the PBN IR gives choice to the stakeholders to decide on the need for SID and STAR procedures, as well as on the applicable specifications - RNAV1 or RNP1.*

New implementers in 2020:

EDDL



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 2020):

It should be noted that enhanced information on surveillance projects, sensors and data integration has been captured by LSSIP only since 2020, as part of the separate dedicated Annex.

Based on a thorough analysis of this information, as well as the information provided through the Excel questionnaire for non-LSSIP States, it can be concluded that the capability to receive ADS-B data (en-route or at airports) currently exists in 34 States (65%) within the ICAO EUR Region.

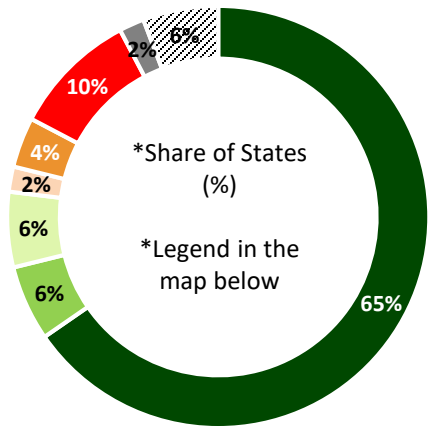
In many cases it is deployed as part of the WAM systems with ADS-B capability, while roughly half (17) of those States have installed their stand-alone ADS-B sensors (see map below).

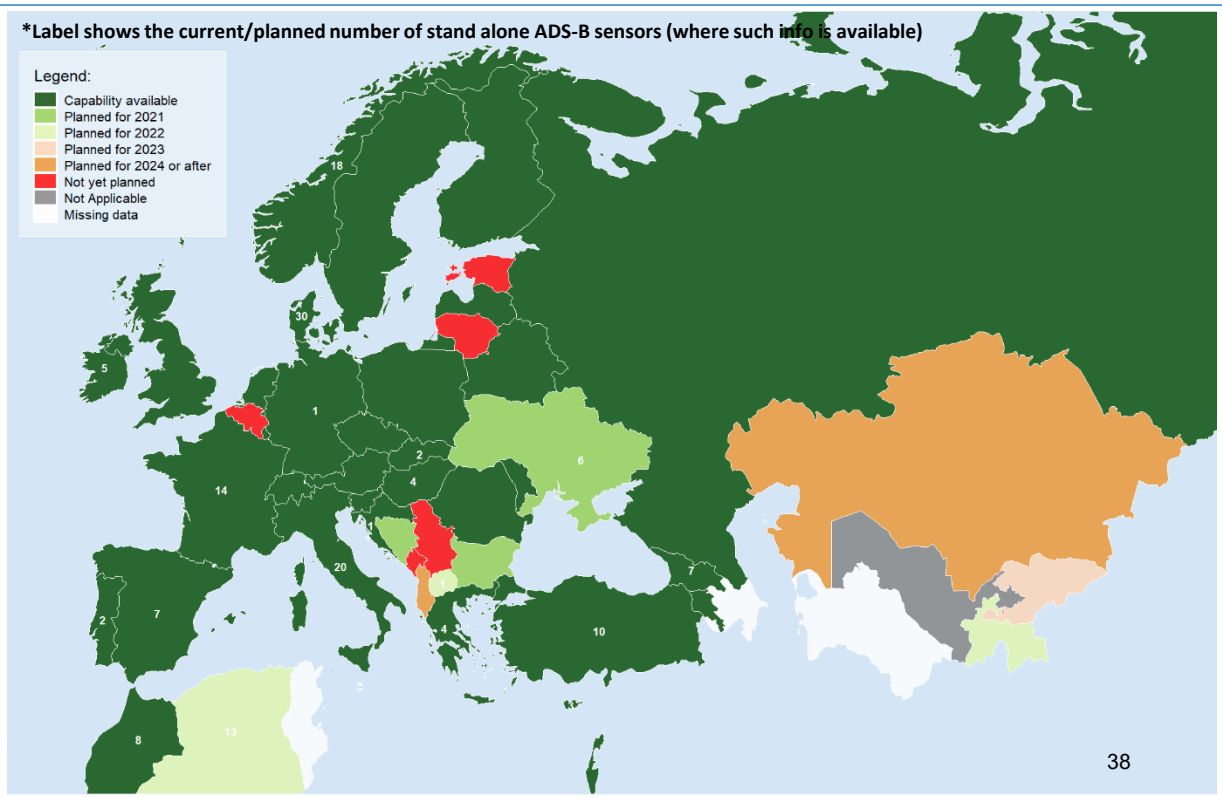
However, it should be noted that this does not imply the operational use of ADS-B data at the Controller Working Positions (CWPs).

New implementers in 2020:

Not applicable

(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 2020):

The interest in using multilateration (MLAT) technique for providing surveillance at airports or over wide areas (WAM) is quite high within the ICAO EUR Region and especially in ECAC States.

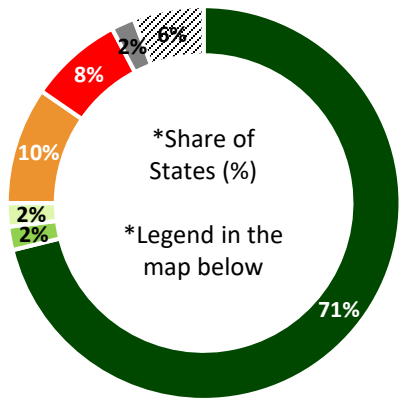
It is estimated that around 70% of States are already using MLAT, with 7 more (14%) having plans for installation in the next few years. MLAT is mostly used to complement (and in some cases even replace) secondary surveillance radars. It is particularly important in lower parts of airspace in mountainous regions that previously had no radar coverage (e.g. in Austria).

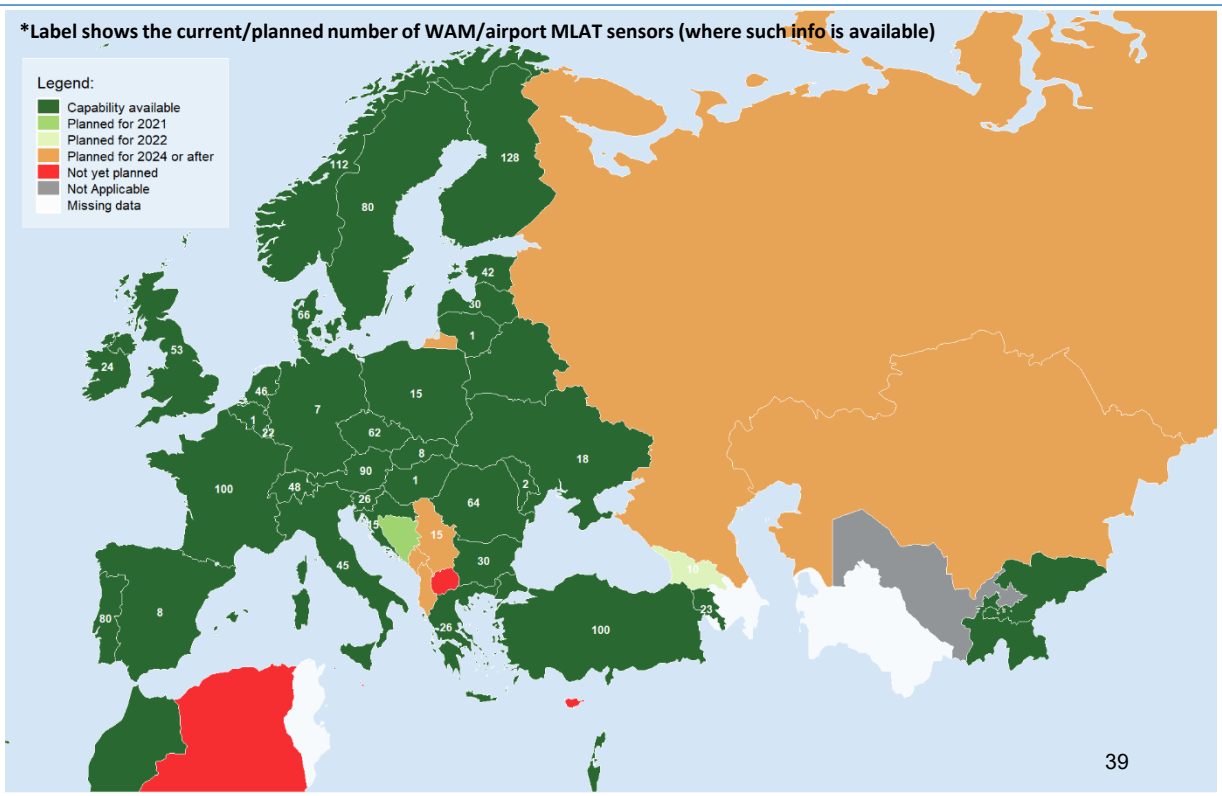
MLAT is already widely used to enable airport surface surveillance, allowing the implementation of Advanced Surface Movement Guidance and Control Systems (A-SMGCS).

New implementers in 2020:

Not applicable

(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.

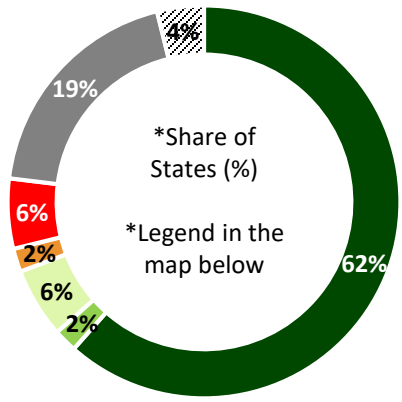
Implementation summary (end 2020):

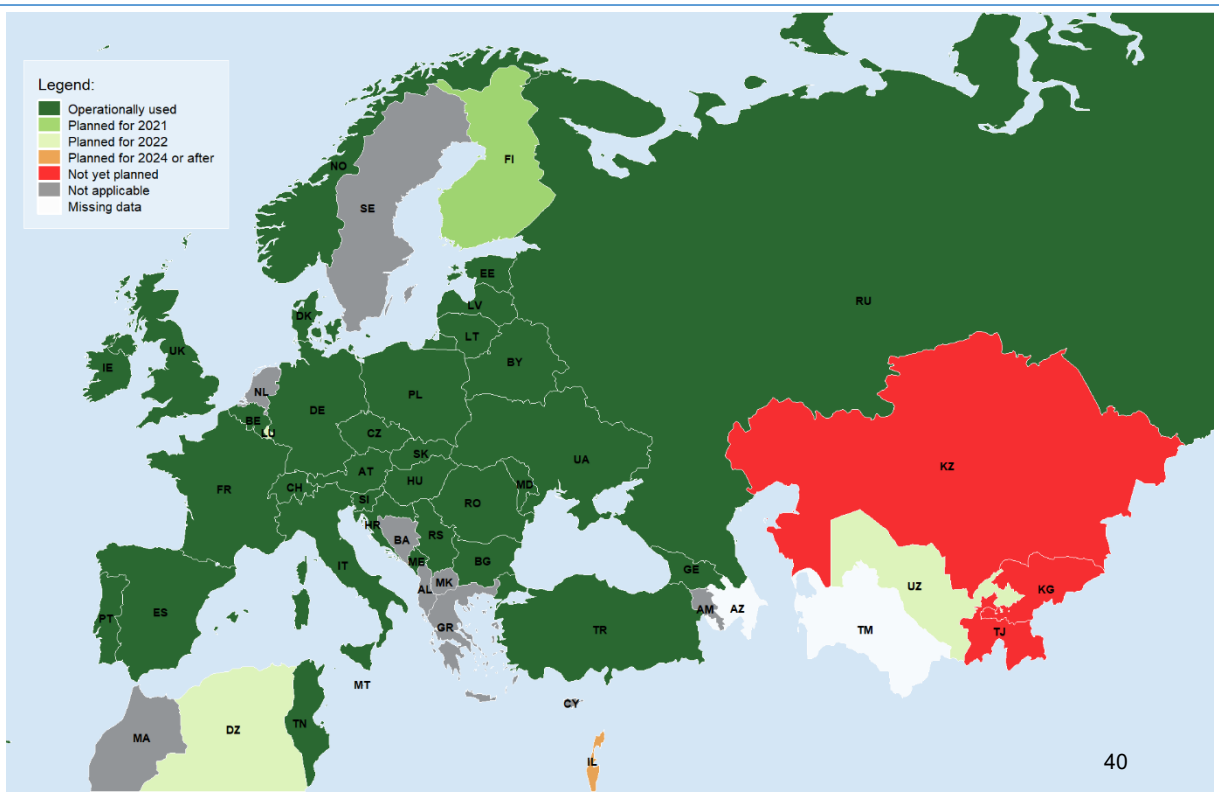
Although vast majority of ANSPs in the ICAO EUR Region have the technical capability to receive and process downlinked aircraft parameters (DAPS), not all of them use this data operationally.

Based on the available information reported through the LSSIP Surveillance Annex, as well as the questionnaire for non-LSSIP States, it is estimated that 32 States use at least one of the aircraft parameters in operations. The most widely used aircraft parameter is the **Selected Altitude**, which is operationally used in at least 28 States, primarily for enhancing the performance of safety nets. This is followed by the **Indicated Airspeed**, mostly used as an indication on ATCO ODS (Operator Input and Display Systems). On the contrary, **Barometric Pressure Setting** and **Roll Angle** are the least used parameters.

New implementers in 2020:

Info not available





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:

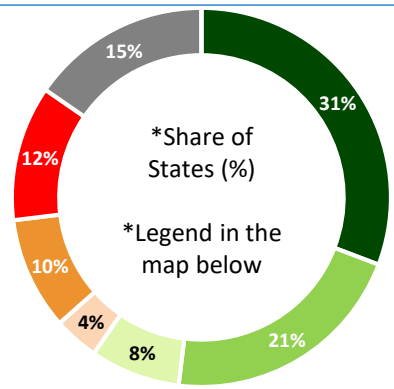
VDL Mode 2 is narrow-band transceiver operating in the VHF aviation protected spectrum band, which will transmit data to support data communications between the aircraft and ground. VDL Mode 2 Multi-Frequency consists of a set of air-ground protocols that increase the data rate to 31.5 kbits. It allows 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.

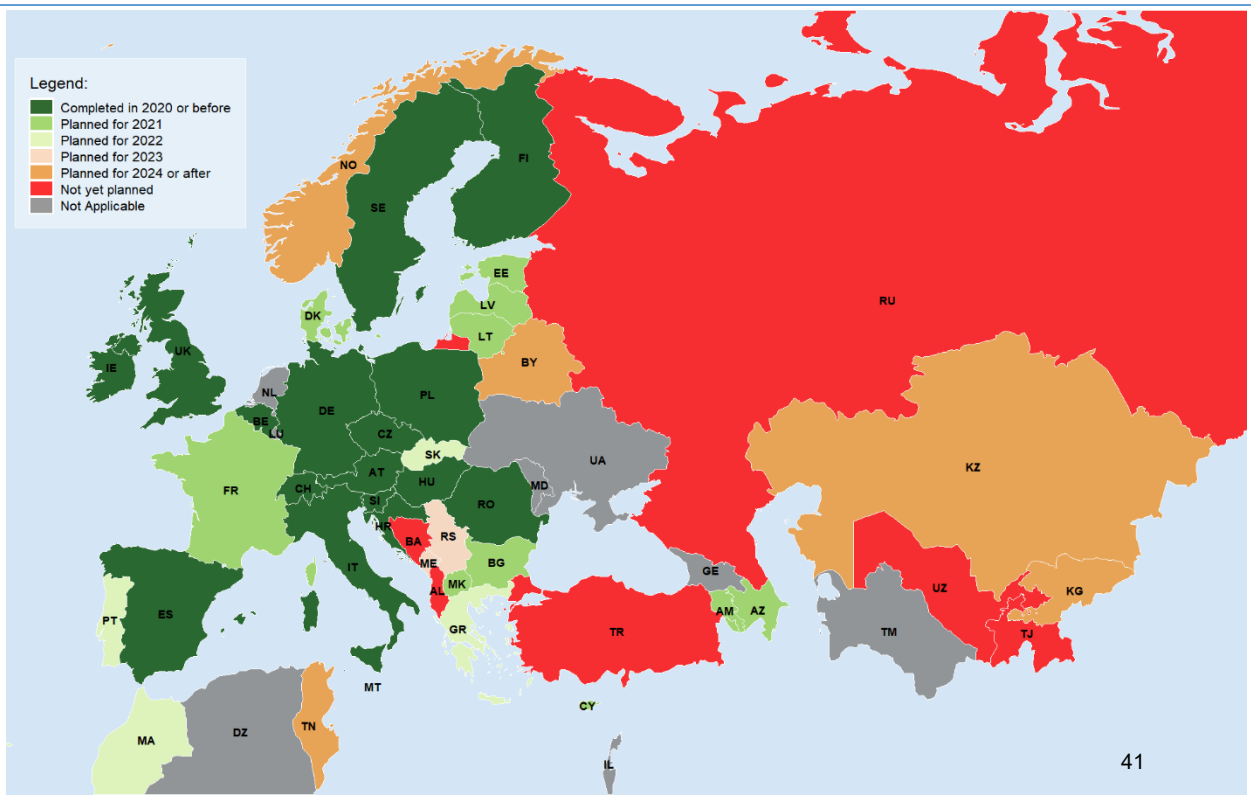
Implementation summary (end 2020):

The deployment of VDL Mode 2 communications continues to progress, in particular in the western half of the EUR Region, with 17 States already using it for the provision of CPDLC (Controller Pilot Data Link Communications) services in the upper airspace and the replacement of voice communication for routine, non time critical messages. Such 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 "Multi-Frequency" will become the solution of choice, capable to accommodate the growing number of equipped aircraft.

New implementers in 2020:

RO, SI





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

ATM Master Plan Level 3:	COM10 – Migrate from AFTN to AMHS

COMI

Description:

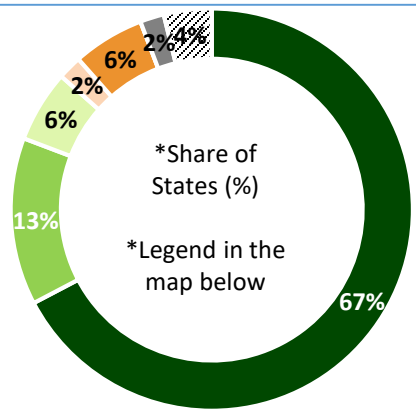
Aeronautical Fixed Telecommunications Network (AFTN) has provided an effective store-and-forward messaging service for the conveyance of text messages, using character-oriented procedures, for many years.
ATS Message Handling System (AMHS) makes use of higher speed communication than AFTN. It also allows 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.

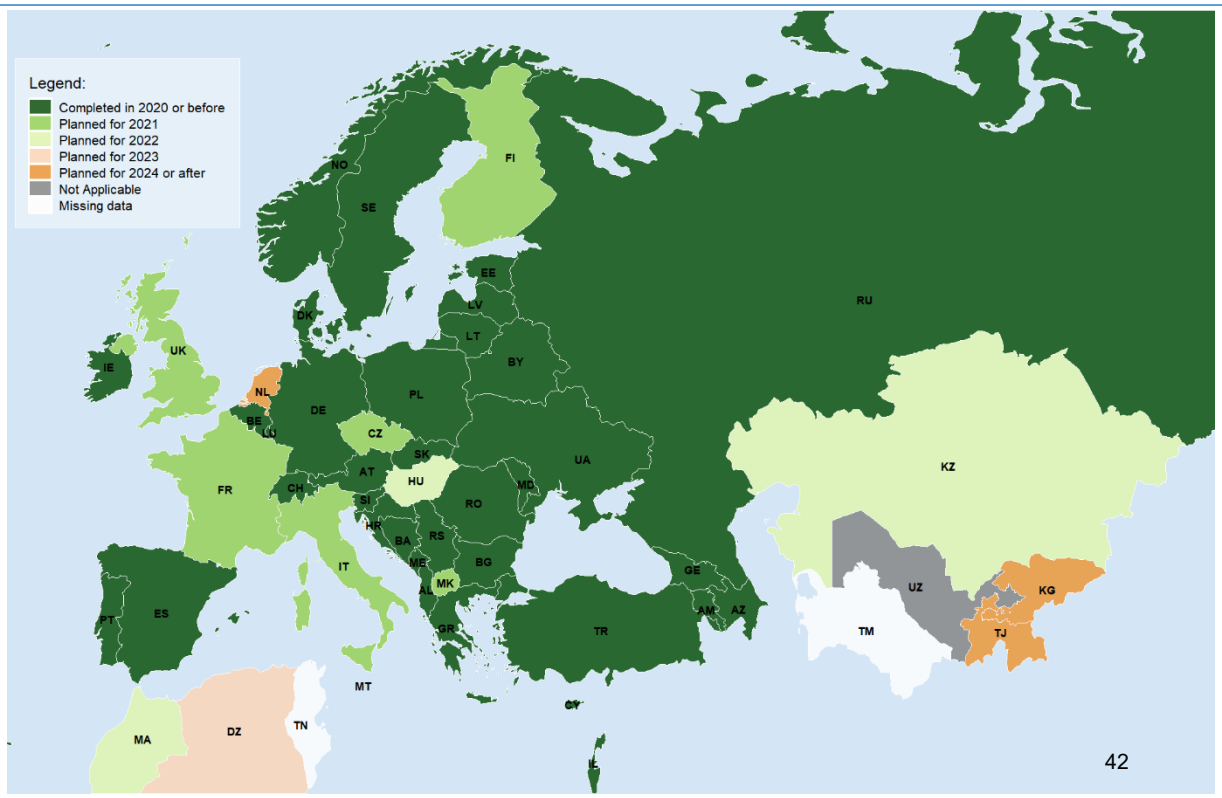
Implementation summary (end 2020):

The implementation of the functionality confirmed the very good pace already noticed in the previous years. 35 States have finalised the implementation of the full AMHS functionality (including extended AMHS) up to now, compared with 24 States only 2 years ago. It should be noted that as far as the "basic" AMHS feature is concerned, already providing most of the AMHS benefits, the level of implementation is much better, with 44 States already using it in operations.

New implementers in 2020:

BA, CH, EE, GR, LT, PL





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:

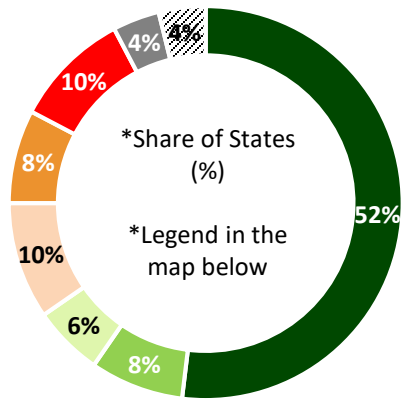
ATN/IPS enables the efficient integration of technologies with improved integrity to support air to ground aeronautical safety services and regularity of flight communications.
It consists of IPS nodes and networks operating in a multinational environment in support of Air Traffic Service Communication (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.

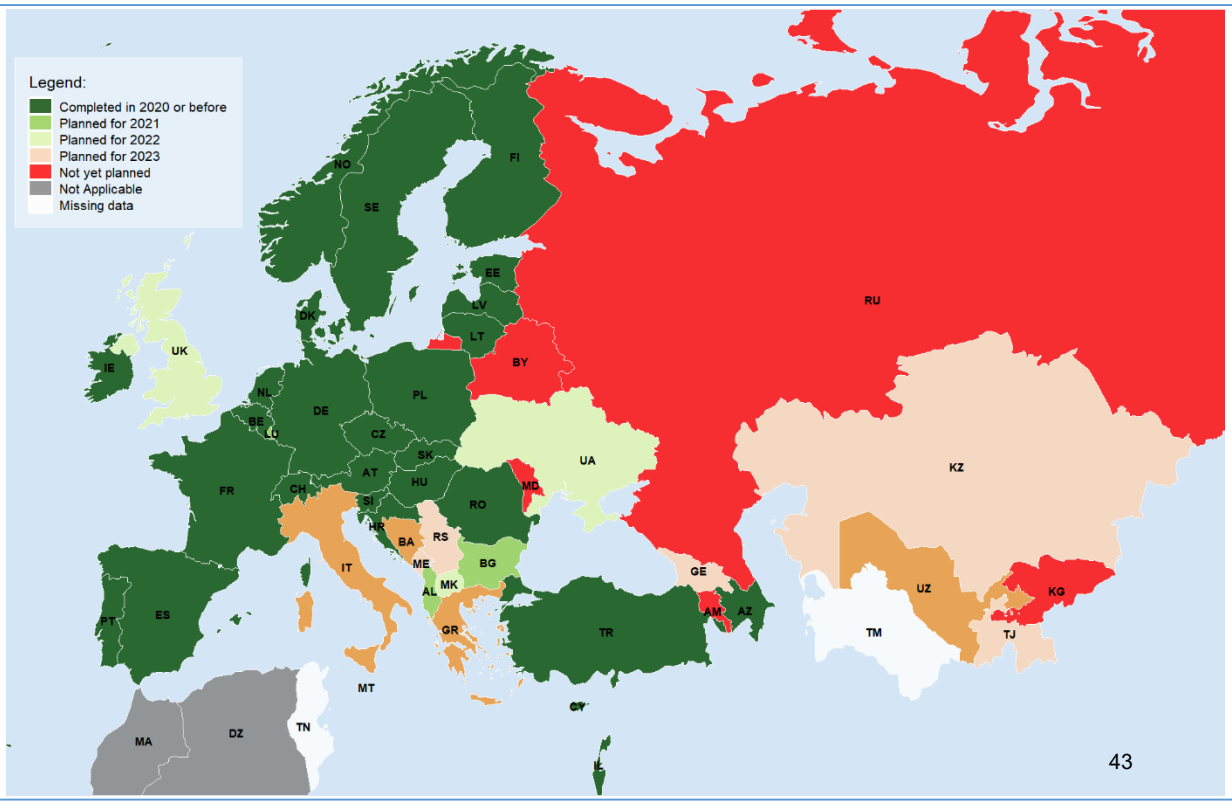
Implementation summary (end 2020):

The implementation of the element has witnessed an impressive spike in 2020, with 20 States having finalised implementation during the year (following 6 other States the year before). Overall, 27 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 ACC level is more advanced (31 States have reported completion) compared with the migration of Airports for which the pace is slower. At Airport level, the interest in deployment is substantially lower (only 3 Sates have implemented while 4 other reported plans to implement or implementation in progress). The main reason stated by the Airports for not implementing is that the deployment is not deemed beneficial from an operational and/or business point of view.

New implementers in 2020:

AZ, BE, CH, CY, CZ, DE, DK, EE, ES, FR, HR, IE, IL, LV, NL, NO, PL, PT, SE, TR





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 2020):

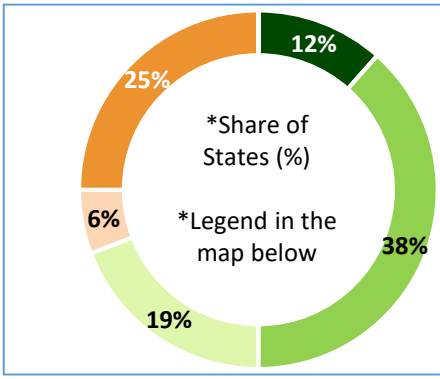
In 2020, no additional State has completed this element, so only six States have so far fully implemented DAIM-B1/1. The completion rate remains rather low (12%). However, next year this rate should increase to 50% according to the implementation dates reported. It should also be noted that the new ADQ regulation for EU States is applicable from 2022.

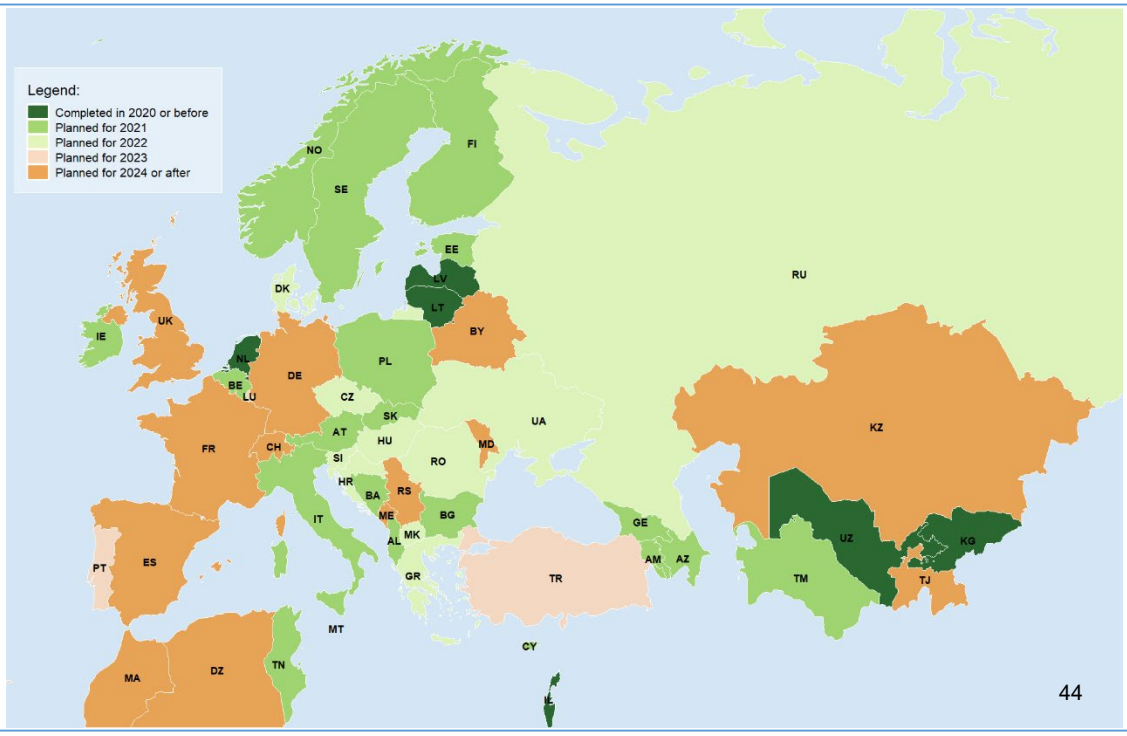
In general, majority of ANSPs report either no progress or very low progress. Slightly better progress is achieved by airports and regulatory authorities.

Among non-LSSIP reporting States, Kyrgyzstan and Uzbekistan reported completion, with two more States (Turkmenistan and Tunisia) expecting finalization by end 2021.

New implementers in 2020:

None





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 2020):

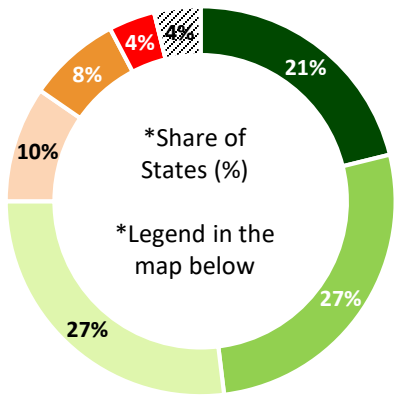
Two additional States (AL and FR) have completed these elements during 2020, raising the total number of implementers to 11 and the overall completion rate to 21%.

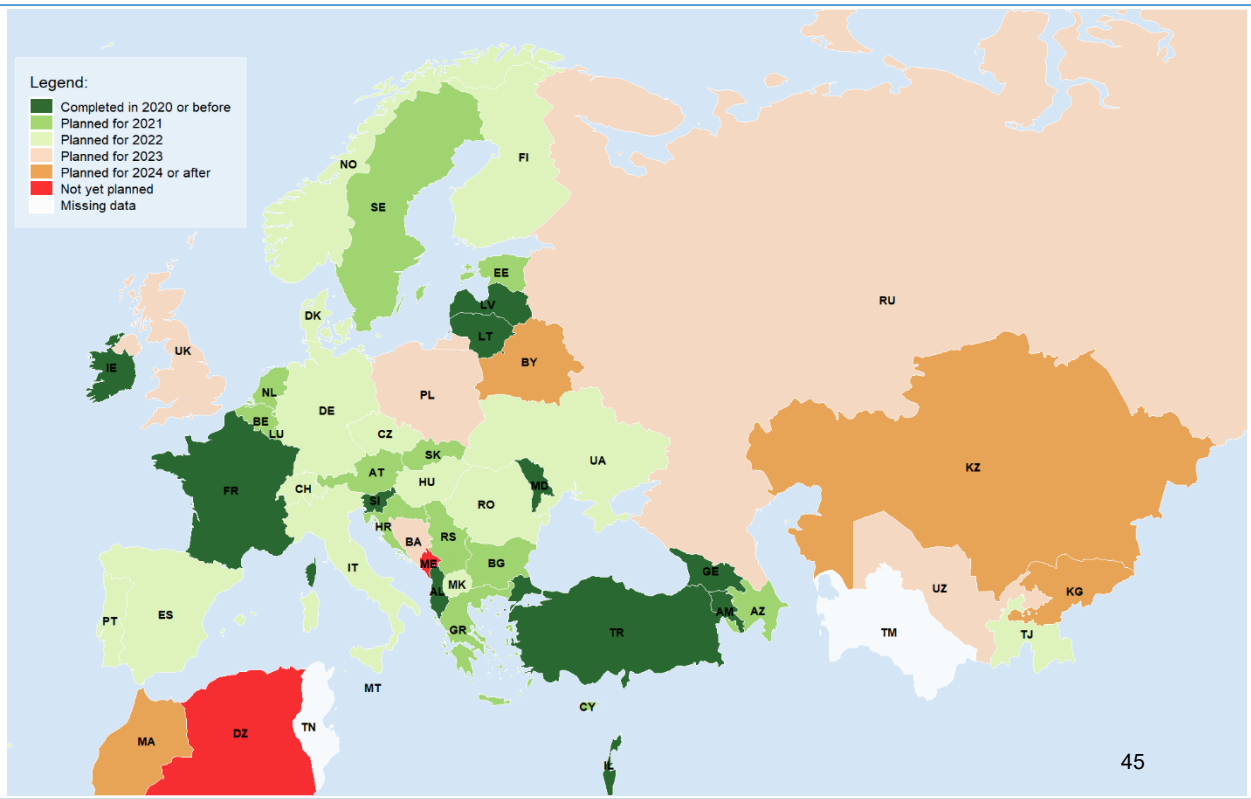
It should be noted that more than half of States in the ECAC area have already established their national Terrain and Obstacle Data (TOD) policies. This action represents a cornerstone in successful TOD implementation and other actions depend on its availability.

Among non-LSSIP States, there are still no implementers up to the current review and it is not expected that in the two coming years any of them will finalize implementation. Russian Federation and Uzbekistan should be the first by end 2022.

New implementers in 2020:

AL and FR





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.

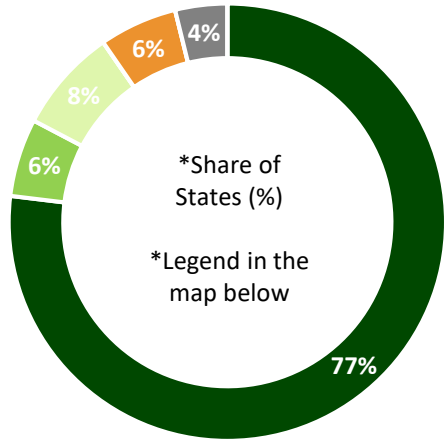
Implementation summary (end 2020):

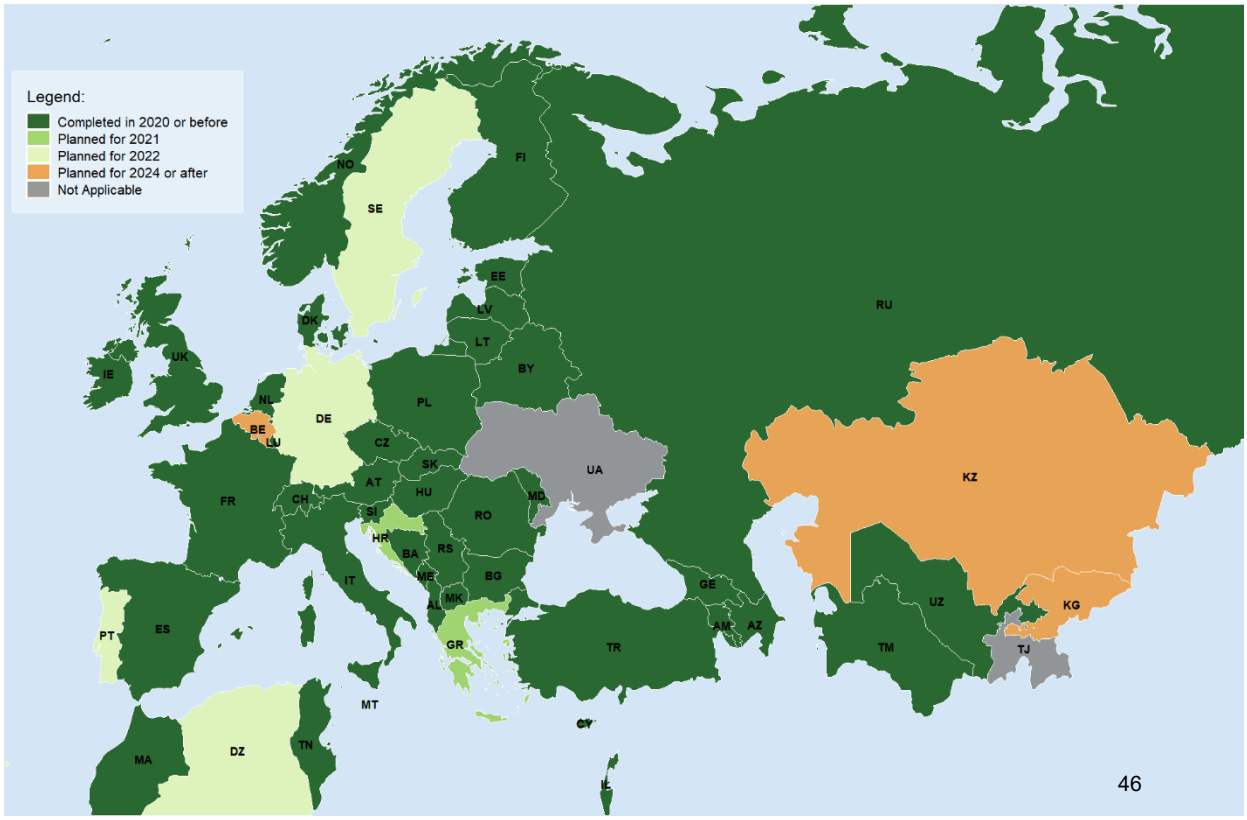
Information exchanges for the process of coordination and transfer based on EUROCONTROL's OLDI (On-Line Data Interchange) specification have been widely deployed across the entire ICAO EUR Region. Despite the completion rate being only at 77%, almost all States have the technical capability implemented and at least one bilateral connection with adjacent ATS units in operational use. The work is ongoing to enrich the set of exchanged messages, as well as to establish new bilateral connections. In some States (e.g. Germany) the implementation is still ongoing in the military ATS units.

Among non-LSSIP Reporting States, OLDI is already operational in Belarus, Russian Federation (basic OLDI used in more than 80% of interactions between automated ATC systems), Tunisia, Turkmenistan and Uzbekistan (implemented in 2020 as part of the automated ATC system "Managair").

New implementers in 2020:

SI, RU, UZ





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 2020):

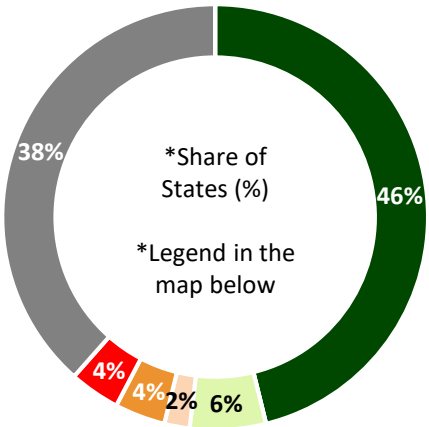
In 2020, no additional State has completed this element, so the completion rate remains at 46%, with a high rate (38%) of not applicable States. This is explained by the fact that most of these States have already implemented the Free Route Airspace (FRA), which is more advanced than what is required by this ASBU element.

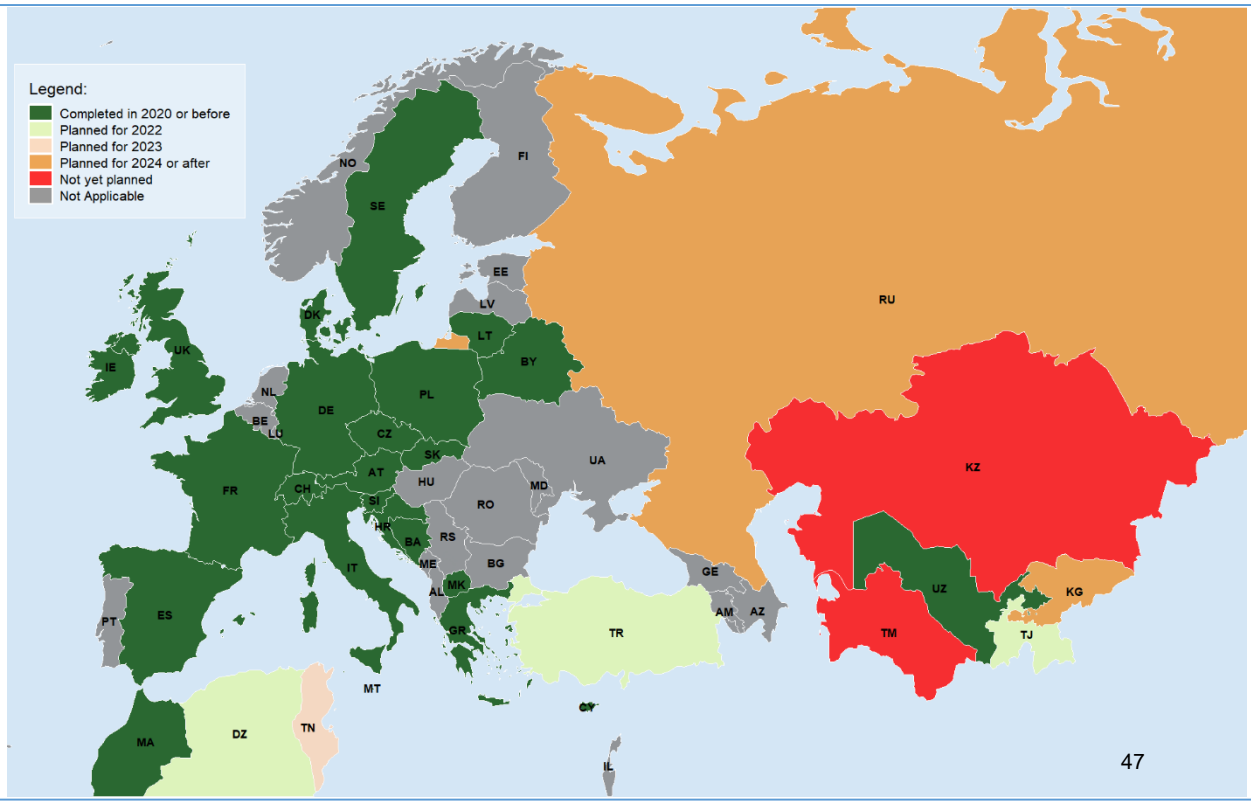
Within LSSIP area the completion rate is quite high, with only Turkey still having plans for full implementation by end 2022.

Among non-LSSIP States, Uzbekistan remains as the only implementer, while Algeria and Tajikistan are expected to implement Direct Routing by end 2022. On the contrary, Kazakhstan and Turkmenistan have not yet planned the implementation of this ASBU element.

New implementers in 2020:

None





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

ATM Master Plan Level 3:	AOM19.1 – ASM support tools to support Advanced 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 2020):

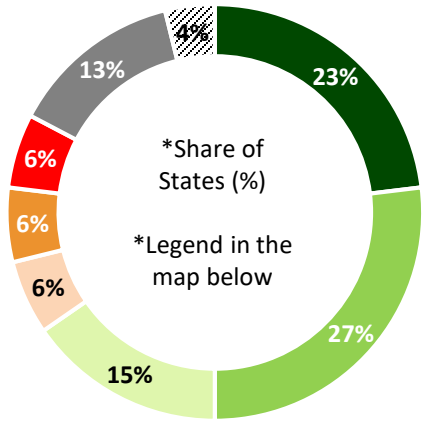
The implementation of Flexible Use of Airspace (FUA) concept is progressing well within the ICAO EUR Region. Already 23 States have implemented their local ASM tools, mostly relying on LARA (Local and sub-Regional ASM Support System). Actions related to ensuring the interoperability between local ASM systems and NM systems proved to be more challenging, which is explains the rather low completion rate (23%) for this ASBU element.

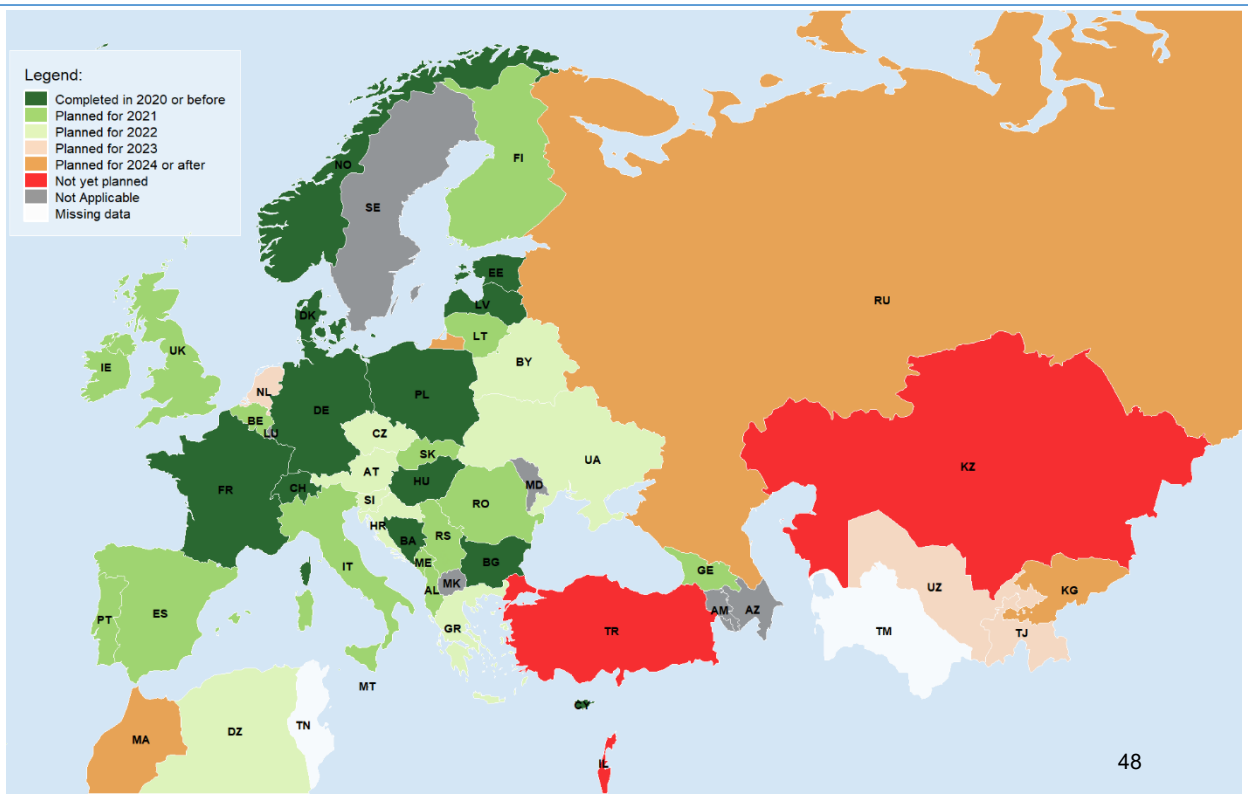
The widespread implementation of FUA is expected to be reached during 2022, which is consistent with the provisions of the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA) requiring the availability of this functionality by 12/2022 for the EU States.

No State outside the ECAC area has implemented FRTO-B0/2 yet. Algeria and Belarus intend to finalize implementation by end 2022.

New implementers in 2020:

None





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

Medium Term Conflict Detection (MTCD) tool 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 and identifying aircraft constraining the resolution of a conflict or occupying a flight level requested by another aircraft. It is enhanced by a basic conflict resolution advisor and a what if function. The monitoring aids (MONA) function provides the controller with warnings if aircraft deviate from a clearance or planned trajectories, as well as 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. MONA is enhanced with the integration of Aircraft Derived Data (ADD).

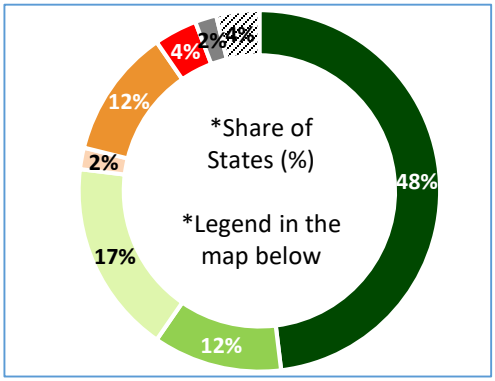
Implementation summary (end 2020):

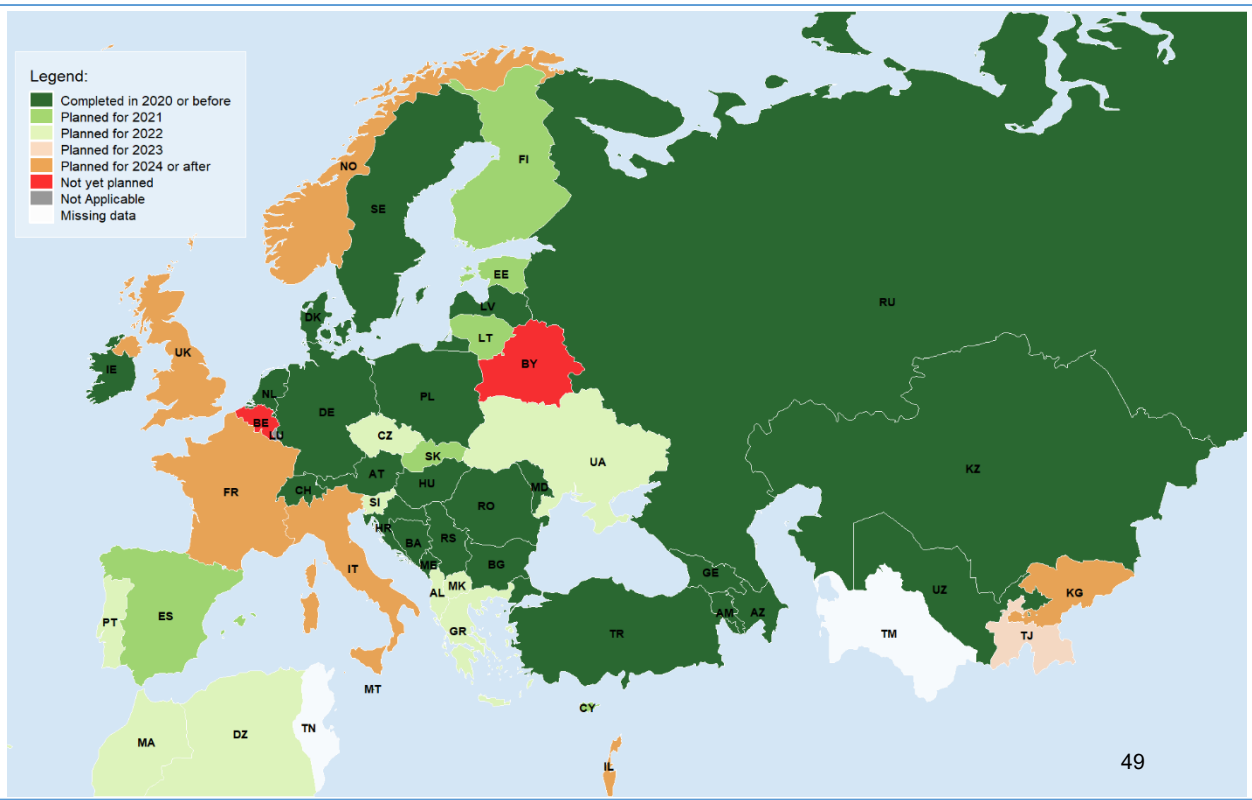
The implementation of conflict detection and conformance monitoring tools is progressing well within the ICAO EUR Region. In ECAC area, MTCD functionality is already available in 23 States (or 40 ACCs), 2 more than in 2019. Conformance monitoring function (MONA) is also well deployed, being reported "completed" in 37 ACCs within ECAC.

Among non-LSSIP States, these functionalities have already been implemented in Russian Federation, Kazakhstan and Uzbekistan, with Algeria, Kyrgyzstan and Tajikistan having plans for deployment in short to medium term.

New implementers in 2020:

BA, HR





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

ATM Master Plan Level 3:	AOM21.2 – 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 2020):

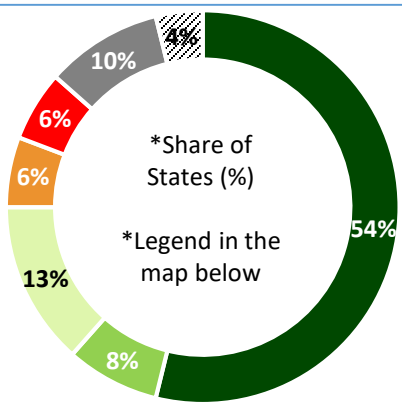
The FRA implementation in the ICAO EUR Region shows a solid progress over the years. Full completion has been achieved by 28 States, with some cross-border FRA projects already being operational (e.g. NEFRA, SECSI FRA, SEE FRA etc.).

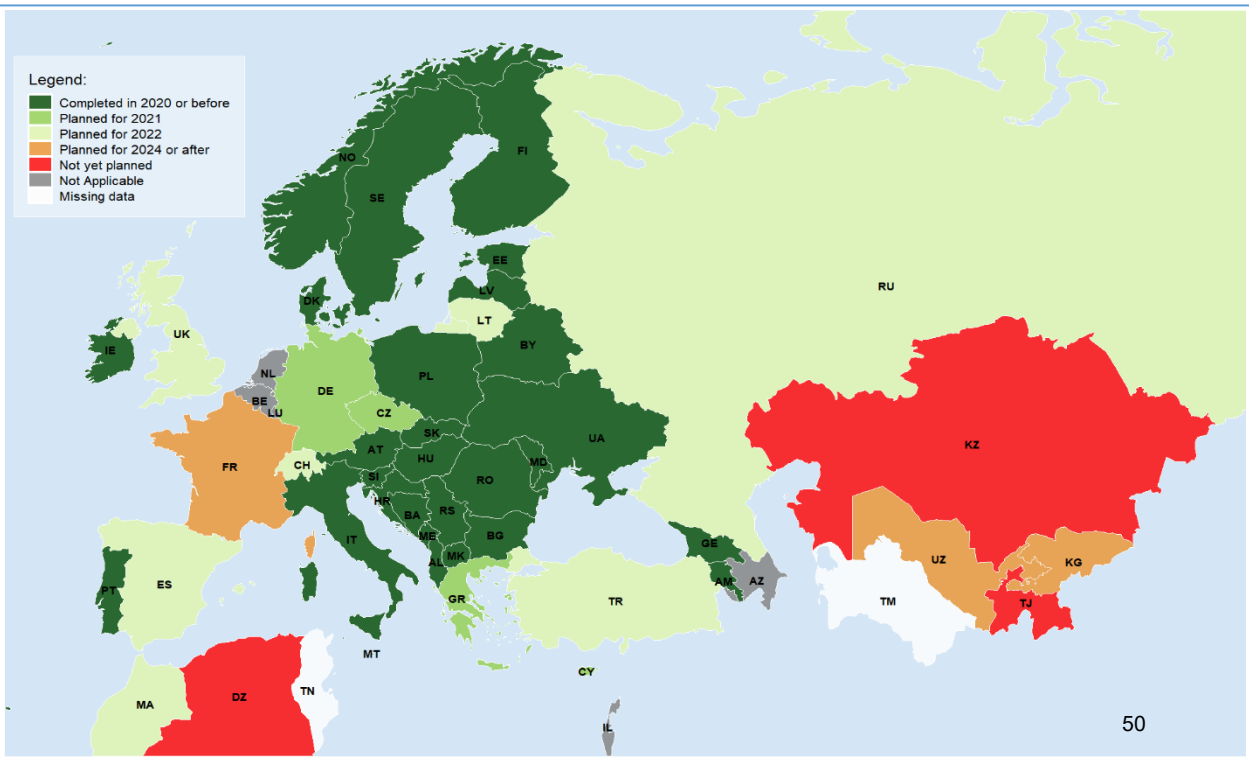
The notable rate of implementation is persistent and it is anticipated that before the end of 2022 (deadline imposed by the CP1 Regulation EU 116/2021 for the implementation of Initial FRA) most of the States will finalise implementation, at least within their own FIRs if not already in cross-border areas.

Among non-LSSIP States, Belarus is the only State reporting completion, whereas a positive trend of ongoing developments is seen in Russian Federation. Furthermore, Kyrgyzstan and Uzbekistan plan implementation in the long term. Remaining States mostly report this element as “Not yet planned” due to the lack of operational needs.

New implementers in 2020:

BY





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

ATM Master Plan Level 3:	AOM19.2 – ASM Management of Real-Time Airspace Data

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.

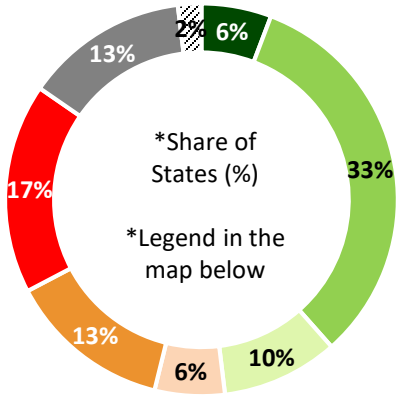
Implementation summary (end 2020):

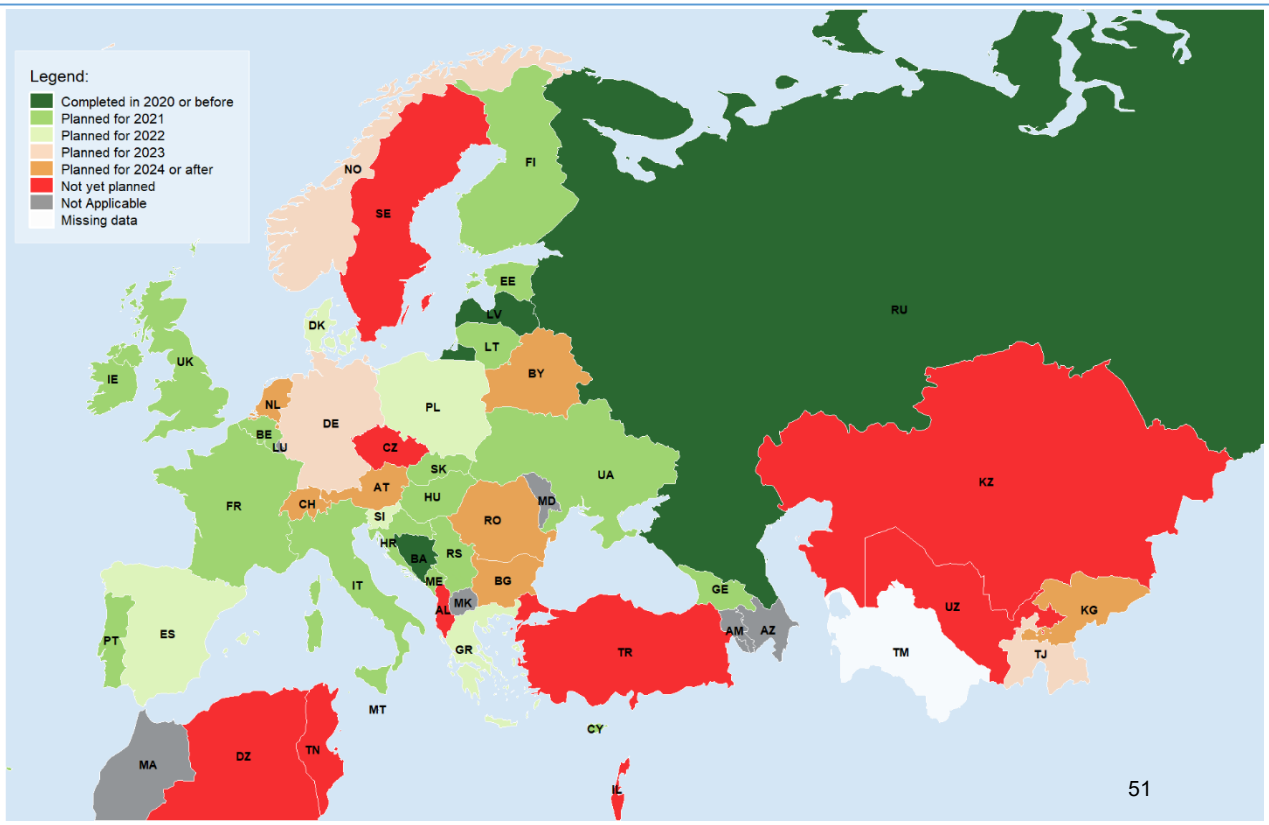
Based on the information reported so far, the implementation of Advanced FUA and management of real-time airspace data is still at an early stage within the ICAO EUR region. Within ECAC, only Latvia and Bosnia & Herzegovina report this ASBU element as completed. Based on the reported plans, a substantial increase in the completion rate is expected by the end of 2022, in particular in the EU area, which is consistent with the provisions of the CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA).

Among non-LSSIP States, in 2020 Russian Federation has amended its federal regulations on the use of airspace to include rules related to FUA, thus considering this element as completed. Remaining States mostly do not have plans for implementation yet, with the exception of Belarus, Kyrgyzstan and Tajikistan.

New implementers in 2020:

LV, RU





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.

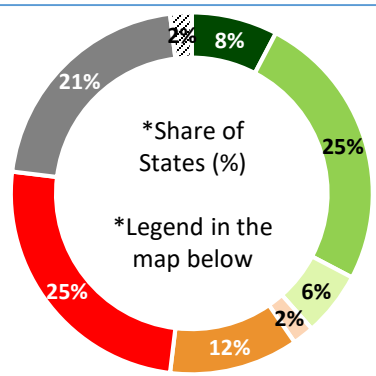
Implementation summary (end 2020):

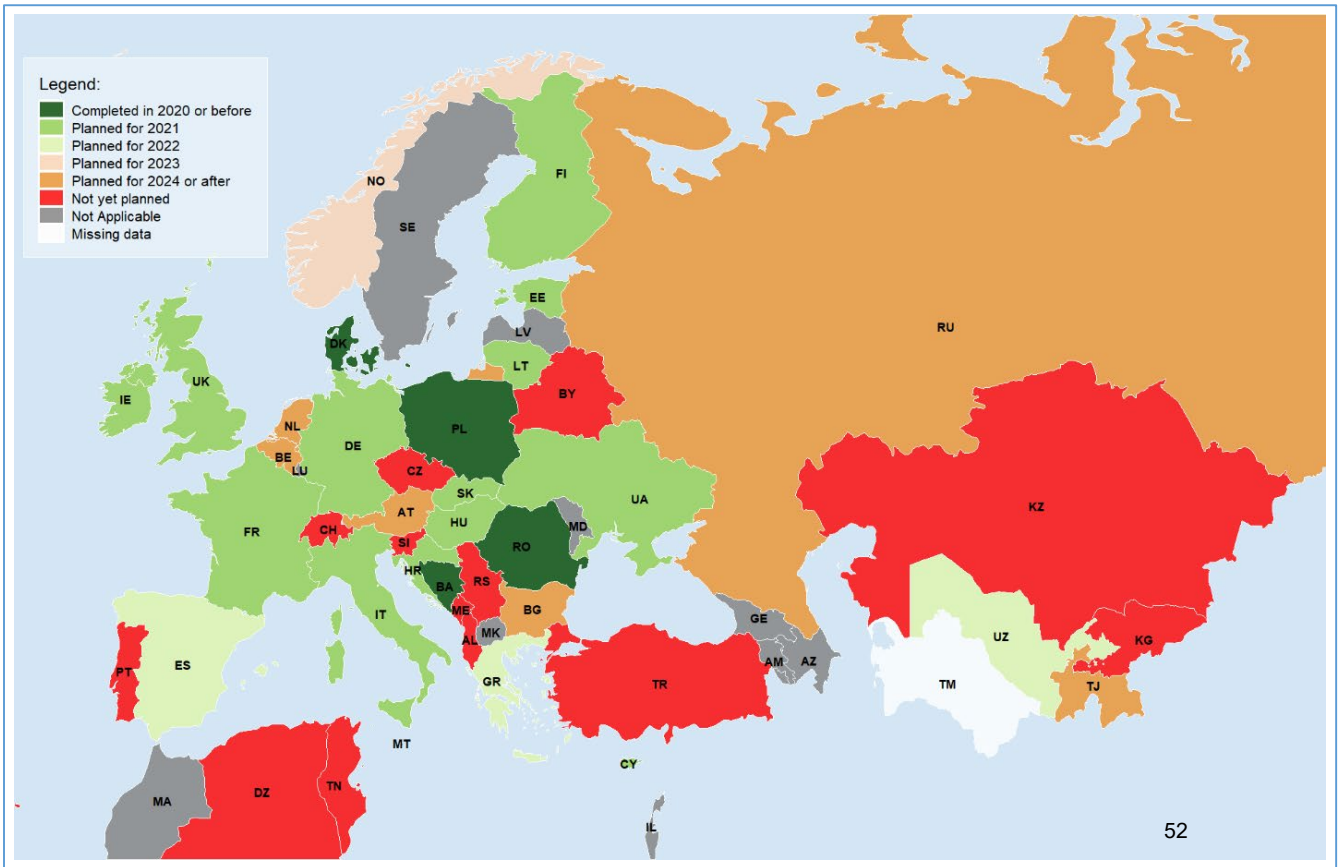
The implementation of dynamic sectorization is an ongoing process in the ICAO EUR region, with only 5 States reporting completion so far. Significant increase in progress is expected before the end of 2022, when this functionality is required by the recently endorsed CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA), applicable for EU States.

Most of non-LSSIP reporting States do not yet plan the implementation of this ASBU element due to lack of operational need. Uzbekistan intends to finalize implementation by the end of 2022. Procedures for pre-defined configurations have already been developed in Russian Federation, where full implementation is expected by 2026. Tajikistan reports plans in the longer term.

New implementers in 2020:

None





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 an access to flight data, system tracks, trajectory, warnings and tools for the airspace of several ATC sectors allocated to him.

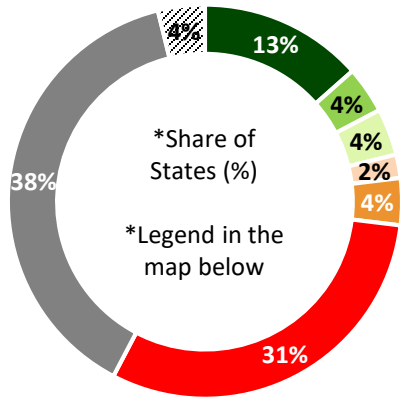
Implementation summary (end 2020):

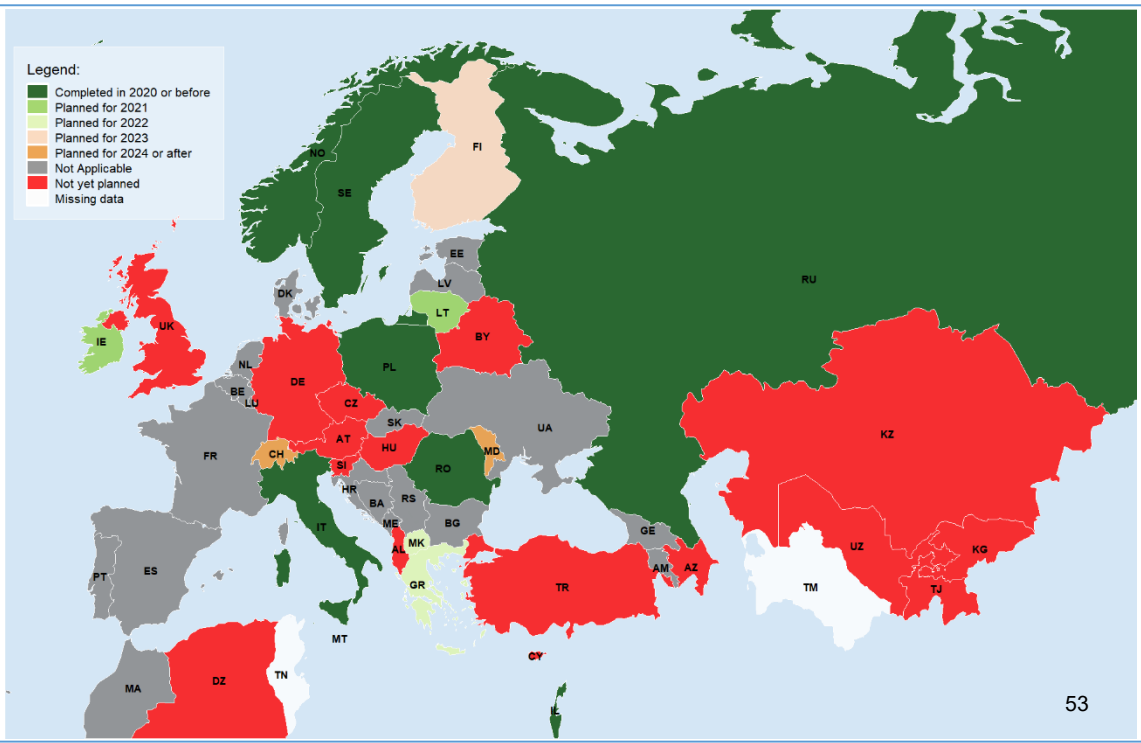
Multi-Sector Planning proposes a new organization of controller team(s) whereby, in en-route sectors, a single planner controller (P) is planning and organizing the traffic flows for two tactical controllers (T), each of whom is controlling a different sector (1P-2T configuration).

The interest in deploying such a procedure is rather low within the ICAO EUR region with only 7 States/ANSPs declaring completion and 7 more having plans with foreseen dates ranging from 2021 to 2030. Vast majority of States (≈70%) consider this ASBU Element as not yet planned or not applicable due to their existing ATM system capabilities, number of sectors and/or configuration, or lack of perceived benefits compared to current operations. Among non-LSSIP States, Russian Federation declared completion during 2020. Remaining States do not have plans for deployment yet.

New implementers in 2020:

RU





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).

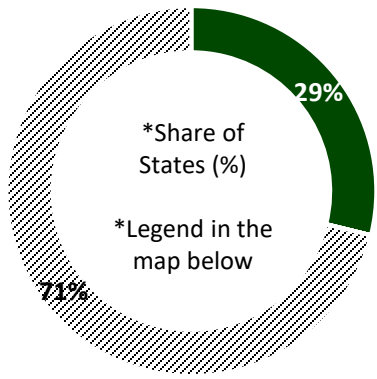
Implementation summary (end 2020):

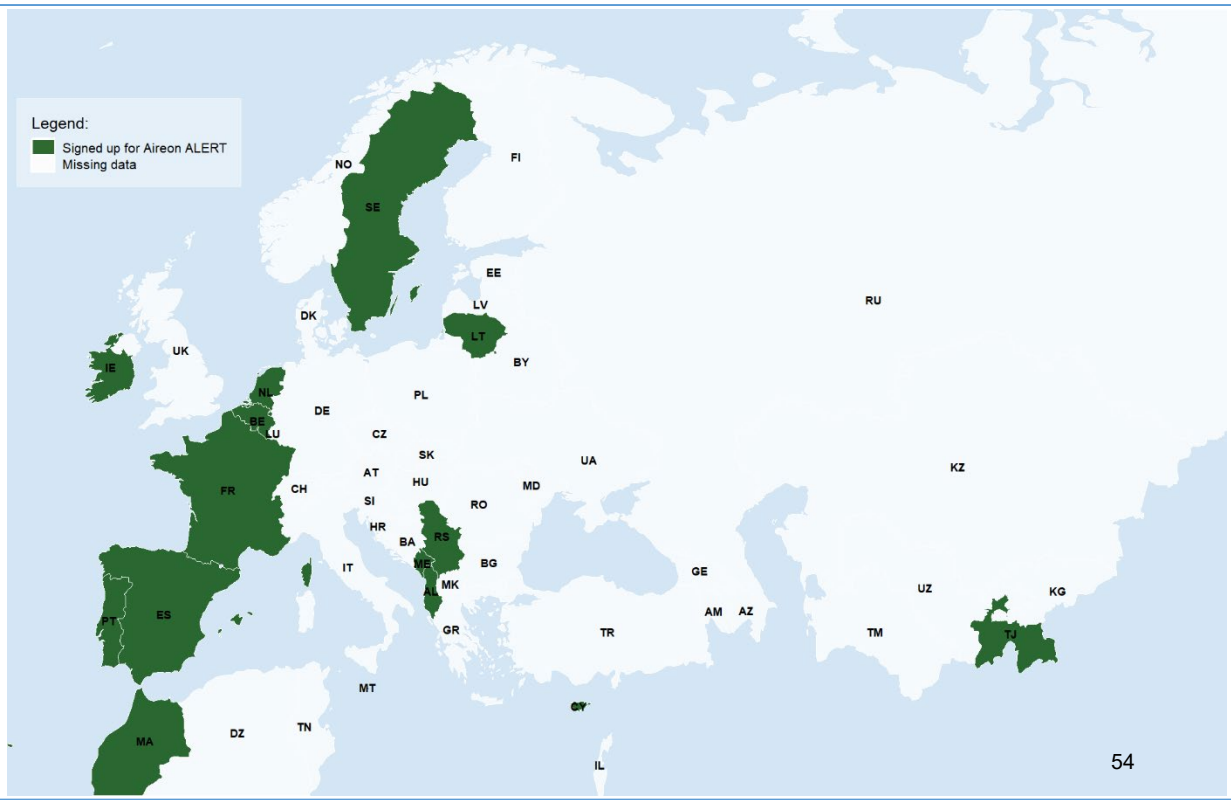
Due to a lack of comprehensive and structured data sources on the implementation of this ASBU Element, in this edition of the Report only limited and currently available information is presented. Namely, the map below shows States (in green) whose Civil Aviation Authorities or Air Navigation Service 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 2020:

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.

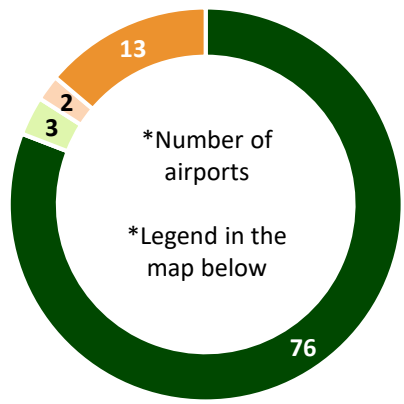
Implementation summary (end 2020):

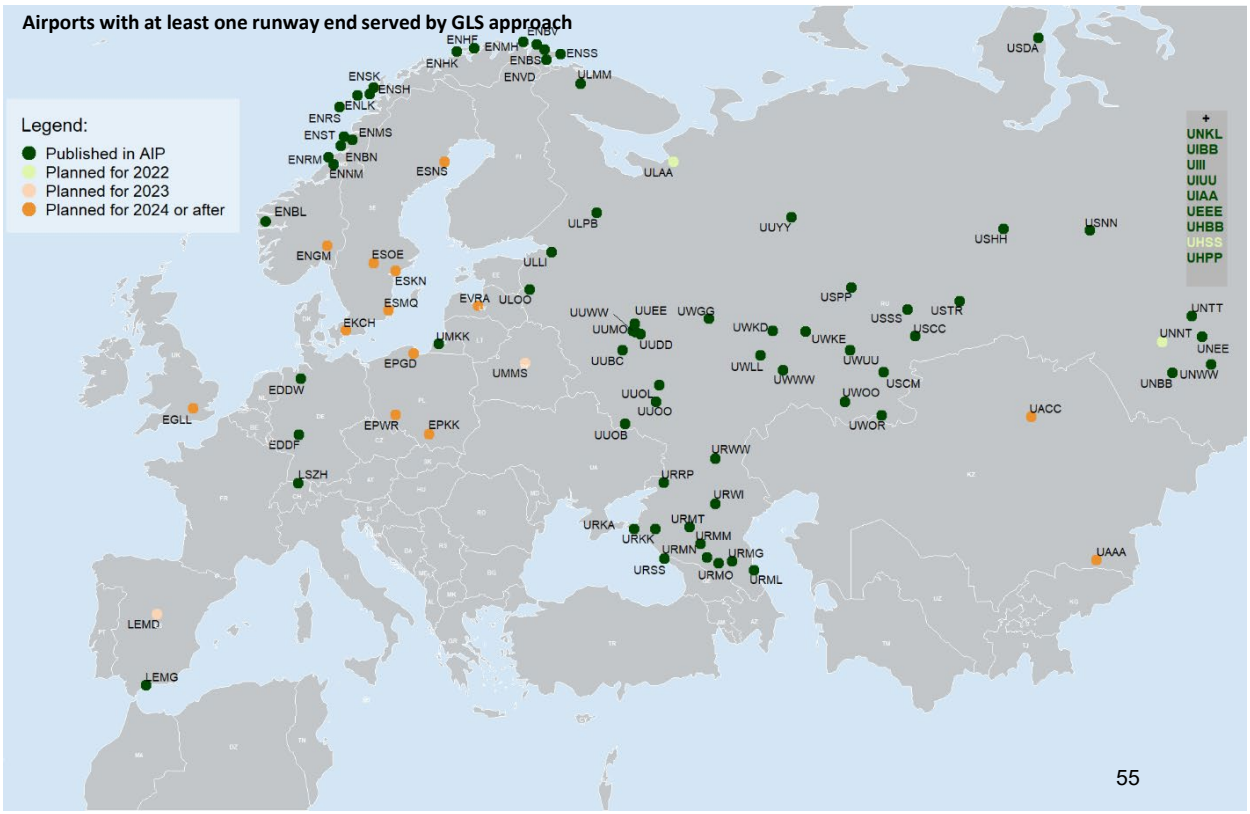
The primary advantage of using GBAS-enabled approaches are the associated cost-efficiency gains, as one single ground station is sufficient to serve multiple approaches to different runway ends at one airport. As such, together with SBAS it is often seen as an enabler for ILS decommissioning and/or for providing precision approaches at airports currently not equipped with ILS systems.

Within the ICAO EUR Region, GBAS is currently in use at 76 airports, majority of which are located in Norway and Russian Federation. All approaches are currently CAT I, while CAT II/III procedures are planned at 9 airports in ECAC.

New implementers in 2020:

Info not available





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

ATM Master Plan Level 3:	AOM19.2 – ASM Management of Real-Time Airspace Data

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.

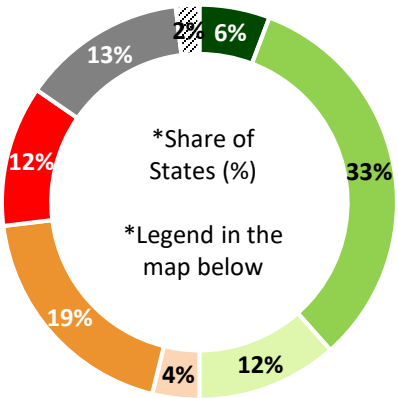
Implementation summary (end 2020):

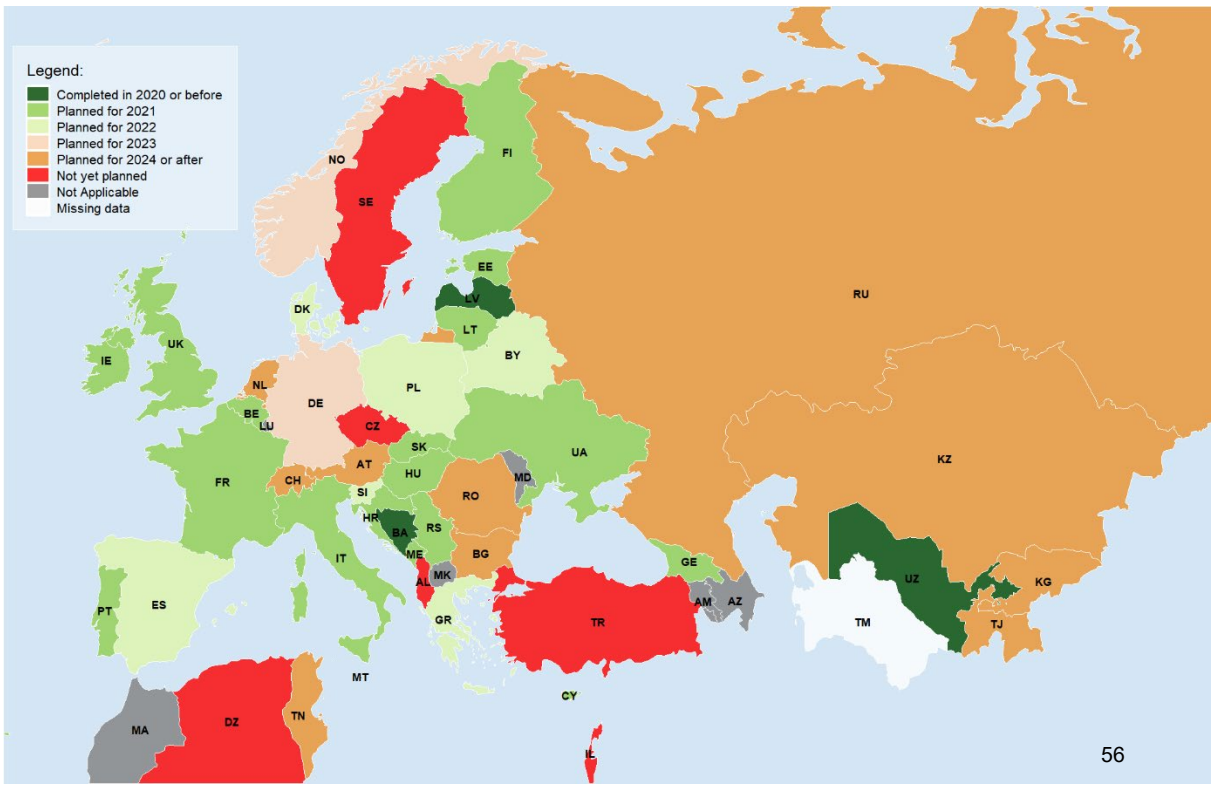
It should be noted that for LSSIP reporting States the integration of collaborative ASM with ATFM is already implied by ASBU element FRTO-B1/3 on Advanced FUA, which is why the implementation progress is the same for both elements. Within this area, substantial increase in the completion rate is expected by the end of 2022, which is consistent with the provisions of the CP1 Regulation in EU States (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA).

Among non-LSSIP States, only Uzbekistan reports the element as completed. In Russian Federation, procedures for the dynamic collaborative ASM and airspace reservation/release have already been developed and notification process has been improved. Full implementation of the element is expected by 2026. Most of remaining States have plans for implementation in the long term, with the exception of Algeria (not yet planned).

New implementers in 2020:

LV





NOPS-B0/2	Collaborative Network Flight Updates	B0

ATM Master Plan Level 3:	FCM01 – Implement Enhanced Tactical Flow Management Services FCM03 – Collaborative Flight Planning

NOPS

Description:

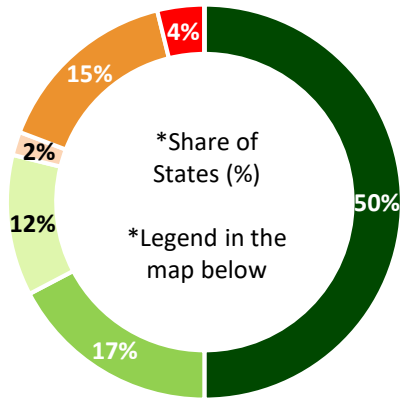
This element will ensure effective interface between ATC and ATFM with regard to deviations from the current flight plan, as well as enhanced tactical flow management service based on real-time aircraft position data and flight activation information, resulting to more accurate ATFM measures and thus 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.

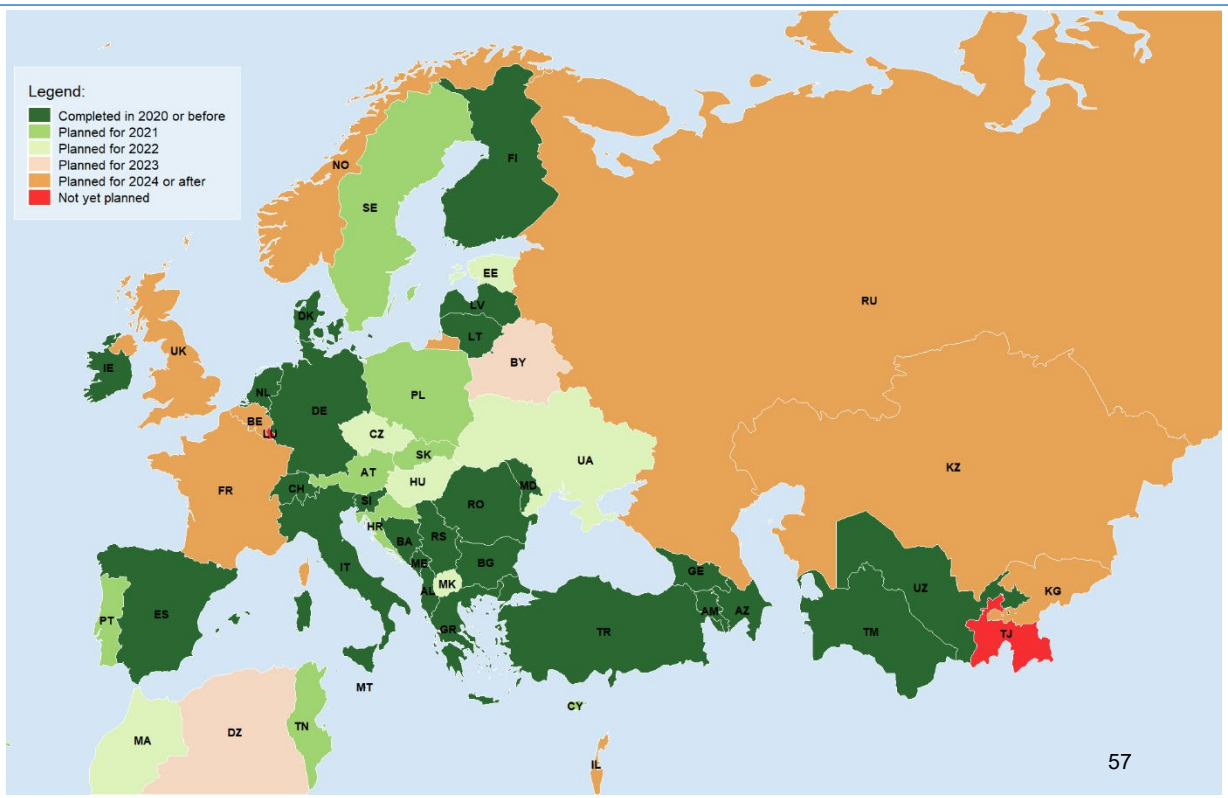
Implementation summary (end 2020):

Even if no States have completed the implementation of the element in 2020, the progress is quite good, in particular in the ECAC area. The basic features (the provision of position reports or of flight activation) are virtually implemented in the ECAC States, with the remaining States in the Region reporting ongoing deployment activities. 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 the last years. 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. Overall the full element is implemented by half of the States in the Region, with 9 other States expected to finalise deployment by the end of 2021.

New implementers in 2020:

None





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 2020):

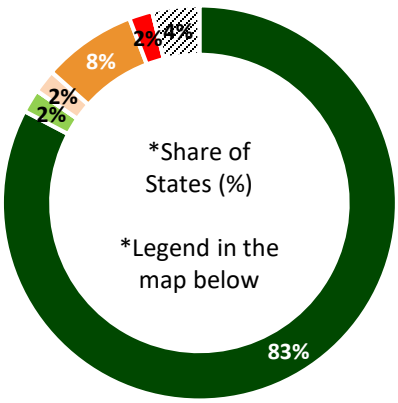
Network Operations Planning is already a well-established process within the EUROCONTROL Member States and it is coordinated by the Network Manager, representing one of its ATM network functions. In this context, the **Network Operations Plan** is regularly produced and published after approval by the Network Management Board, following the agreed CDM process. 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.

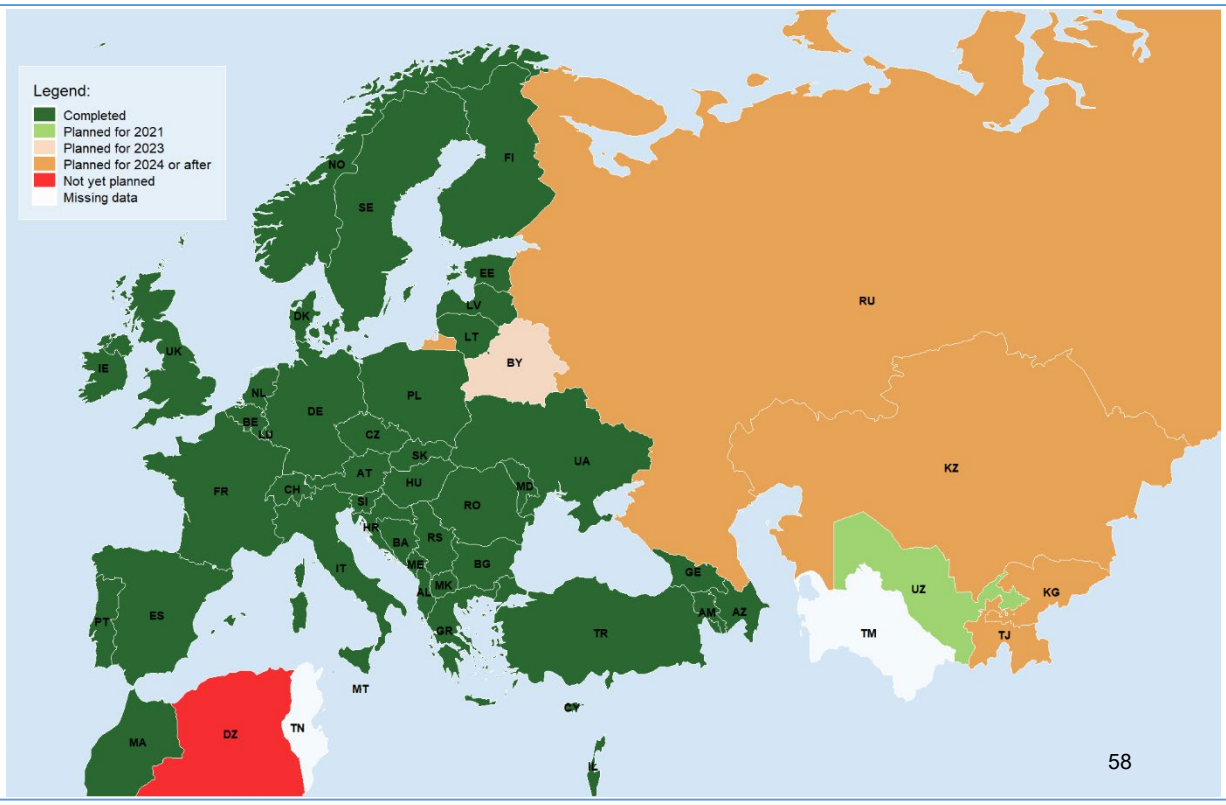
Due to COVID-19 crisis and the need to dynamically assess the changing network situation, NM started publishing the **Rolling Seasonal Plan**, covering a rolling six-week period and consolidating data from 350 airlines, 68 ACCs, 55 airports and 43 States.

Among non-LSSIP reporting States, this ASBU element is mostly planned in the long-term.

New implementers in 2020:

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

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 2020):

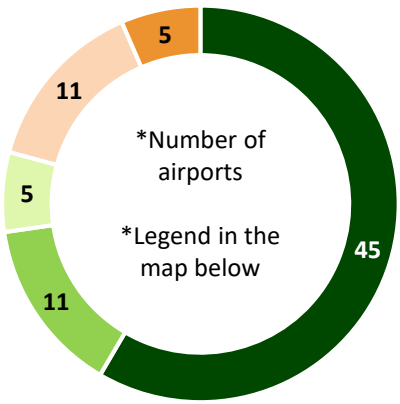
Within the ATFCM area of EUROCONTROL NM, initial integration of airports within the ATM network function is ensured via information exchanges (DPI and FUM) as part of the full A-CDM or Advanced ATC Tower implementation.

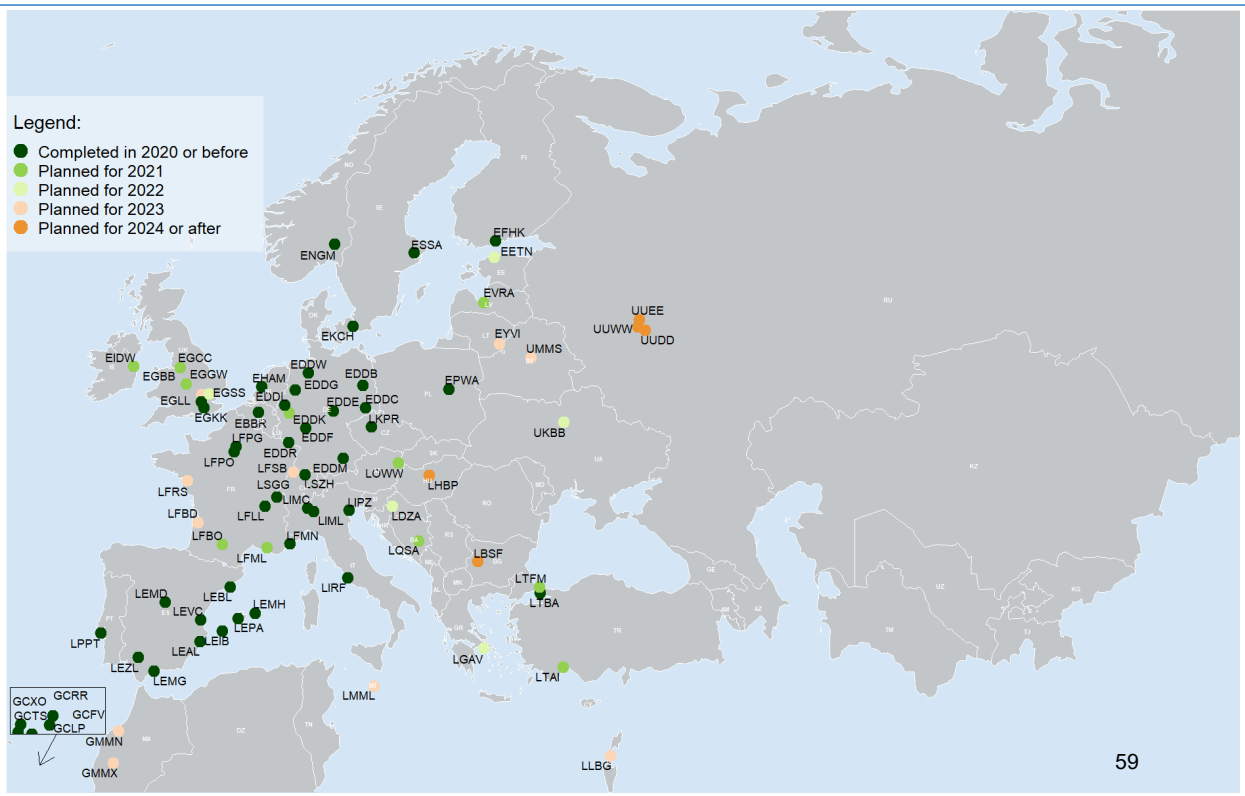
In the ICAO EUR Region, 45 airports have already established the necessary information exchanges with NM. Most of these airports (29) have implemented the full A-CDM process (see ACDM-B0/1 and 2), while additional 16 airports (typically medium and small-sized ones) provide Departure Planning Information (DPI) messages to NM. Another 27 airports have plans for deployment until 2023.

Among non-LSSIP reporting States, this ASBU element is planned only in Belarus (at Minsk National Airport) and Russian Federation (at Moscow's Sheremetyevo, Domodedovo and Vnukovo airports).

New implementers in 2020:

LPPT, LFMN, EDDB and EPWA





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.

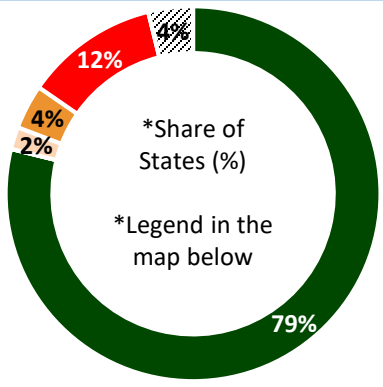
Implementation summary (end 2020):

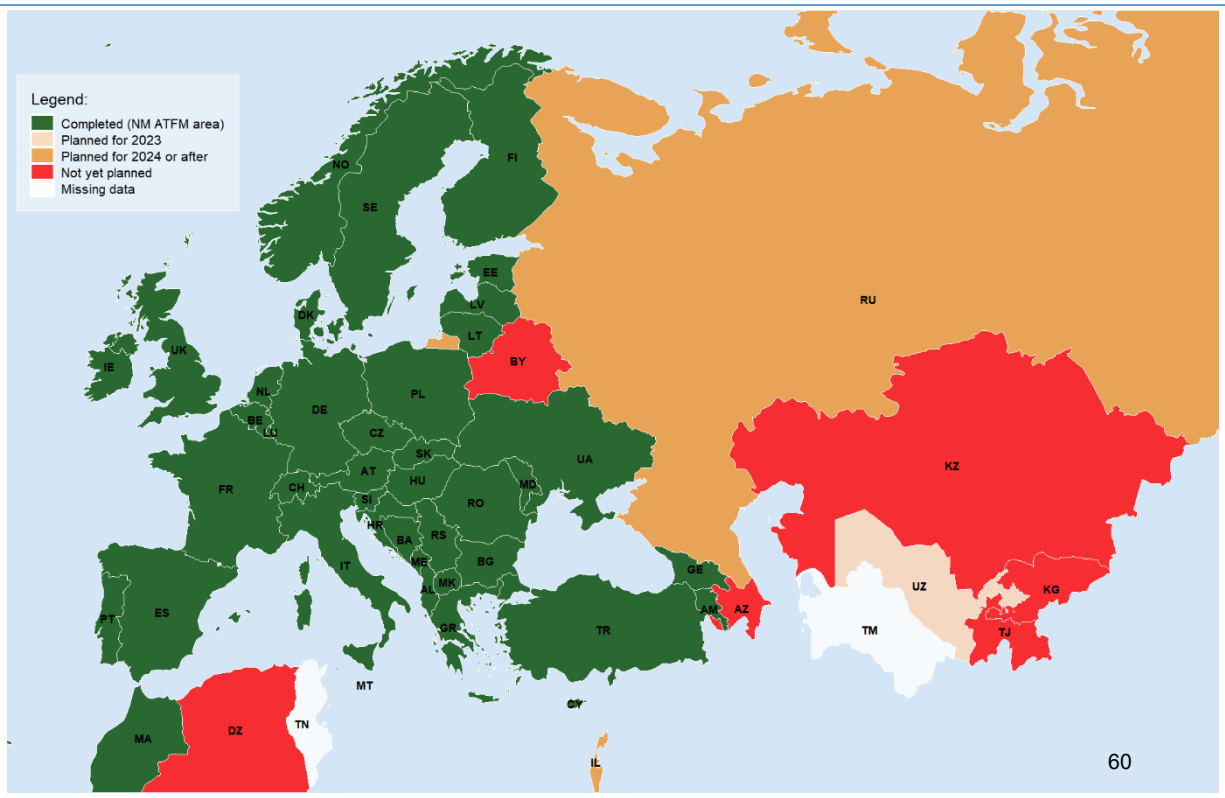
Within its Air Traffic Flow and Capacity Management (ATFCM) Area, EUROCONTROL **Network Manager** is responsible for the provision of ATFCM, including the dynamic ATFM slot (CTOT) allocation to flights in order to resolve demand/capacity imbalances in the network.

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 the NM collectively refers them as the **ATFCM Adjacent Area** (e.g. Belarus, Algeria, Tunisia, Israel etc.). 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.

New implementers in 2020:

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 2020):

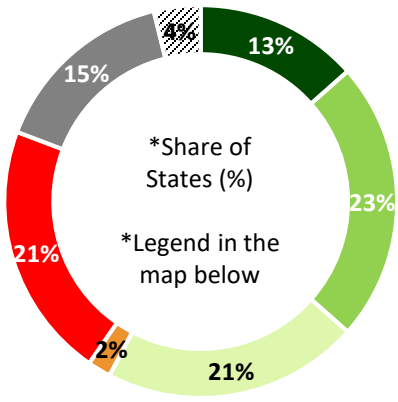
The implementation of short-term ATFM measures is still at an early stage in EUR Region. Within EUROCONTROL Member States, stakeholders have the choice to choose between locally developed tool and the tool provided by Network Manager.

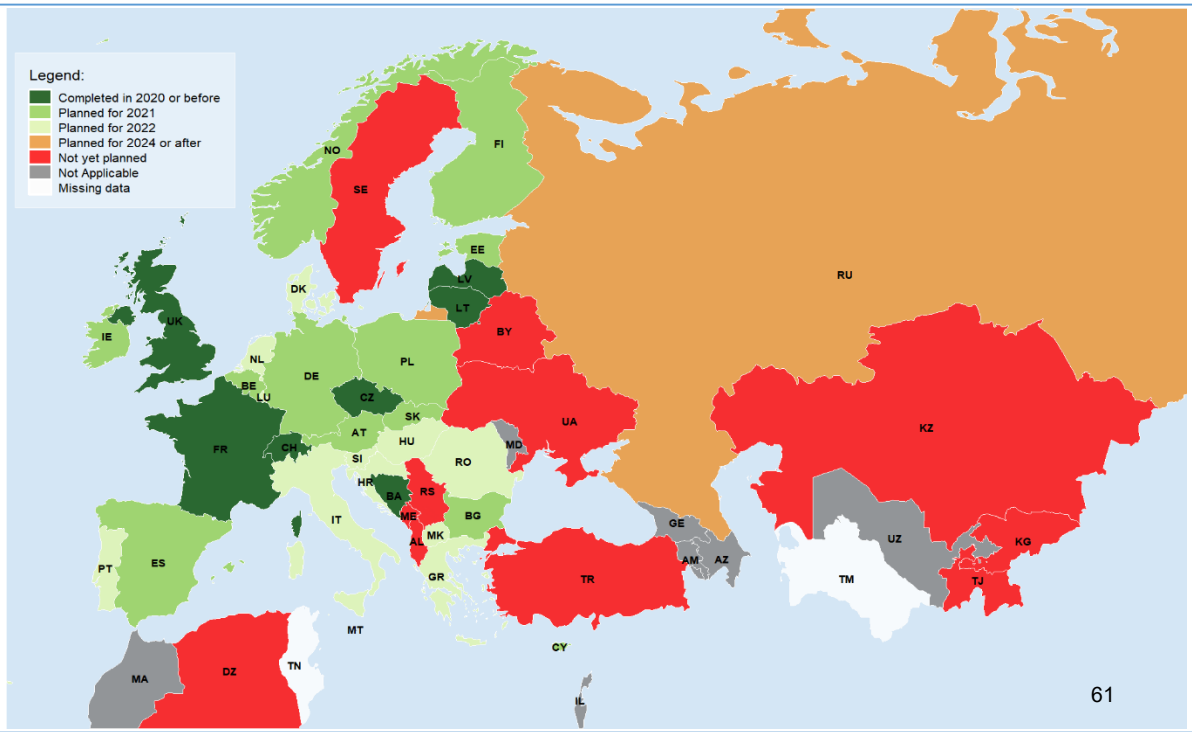
Among States reporting this element as completed, locally developed tool is used in CH, CZ, FR and UK, while other States use the HMI provided by Network Manager with limited STAM Phase 2 functionality. Remaining States mostly intend to use the NM HMI (15), while fewer (6) have plans to develop their own local tool.

Most of non-ECAC States (except Russian Federation) consider this ASBU element as not applicable or not yet planned at the moment.

New implementers in 2020:

FR





NOPS-B1/2	Enhanced Network Operations Planning	B1

ATM Master Plan Level 3:	FCM05 – 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 2020):

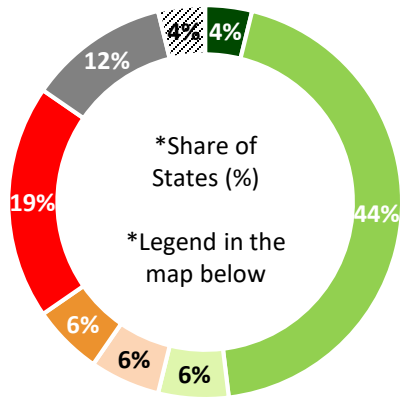
For EUROCONTROL Member States, interactive rolling NOP components are implemented and made available by the Network Manager. However, the interactive rolling NOP is an evolving development and the existing/new functionalities are planned to be integrated within a new platform.

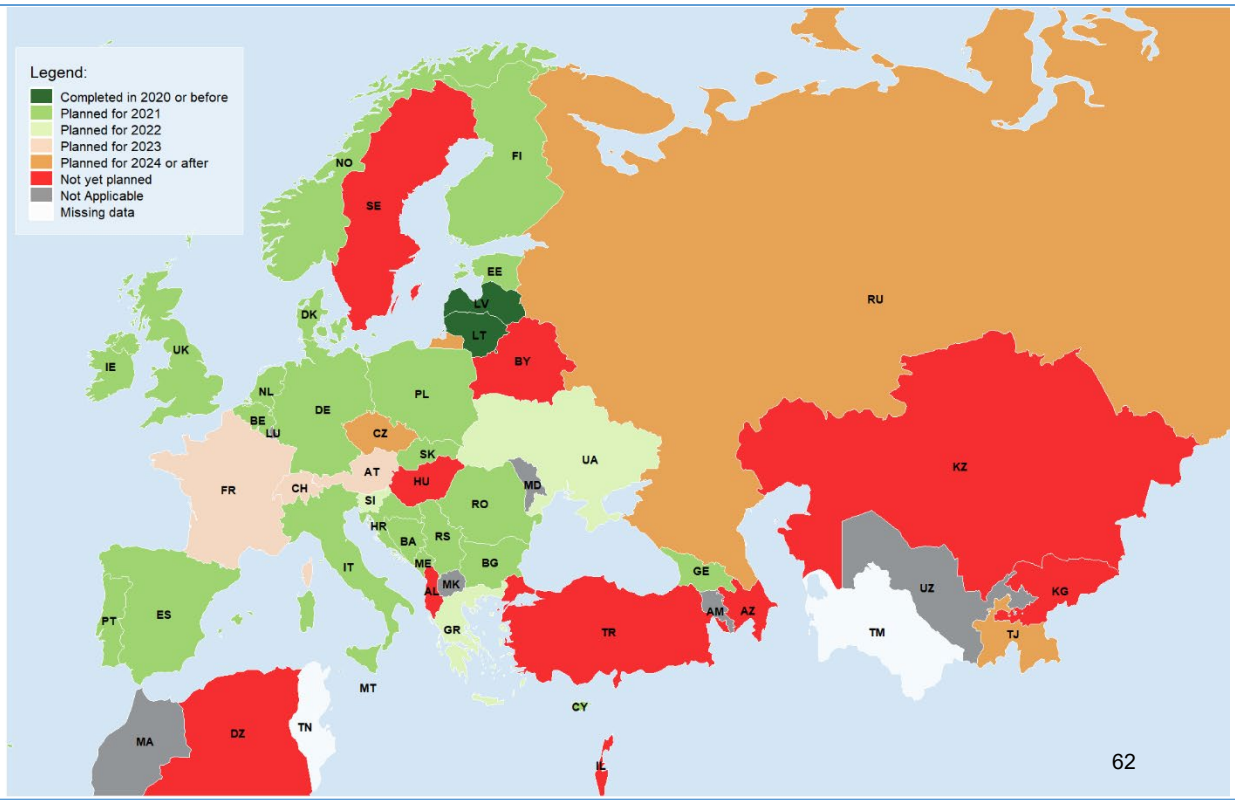
The full migration to the new platform with enhanced functional capabilities fully compliant with the CP1 Regulation is scheduled for mid 2022. For this reason, most of the States within the ICAO EUR Region report this ASBU element as planned for end 2021 (ANSP actions are limited to the development of ATFM procedures and staff training).

Most of non-LSSIP reporting States do not have plans for implementation yet, with the exception of Russian Federation and Tajikistan who expressed their intentions in the long-term.

New implementers in 2020:

None





NOPS-B1/4	Dynamic Traffic Complexity Management	B1

ATM Master Plan Level 3:	FCM06 – Traffic Complexity Assessment

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 2020):

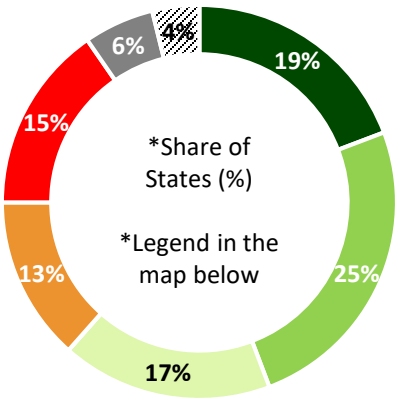
A total of 10 (19%) States/ANSPs in the ICAO EUR Region reported this element as implemented so far, with Bulgaria, Turkey and Switzerland being the most recent implementers. Another 13 ANSPs intend to deploy traffic complexity tools by end 2021, which (for EU Member States) is in line with the deadline specified in the Common Project 1 (CP1) regulation (12/2022).

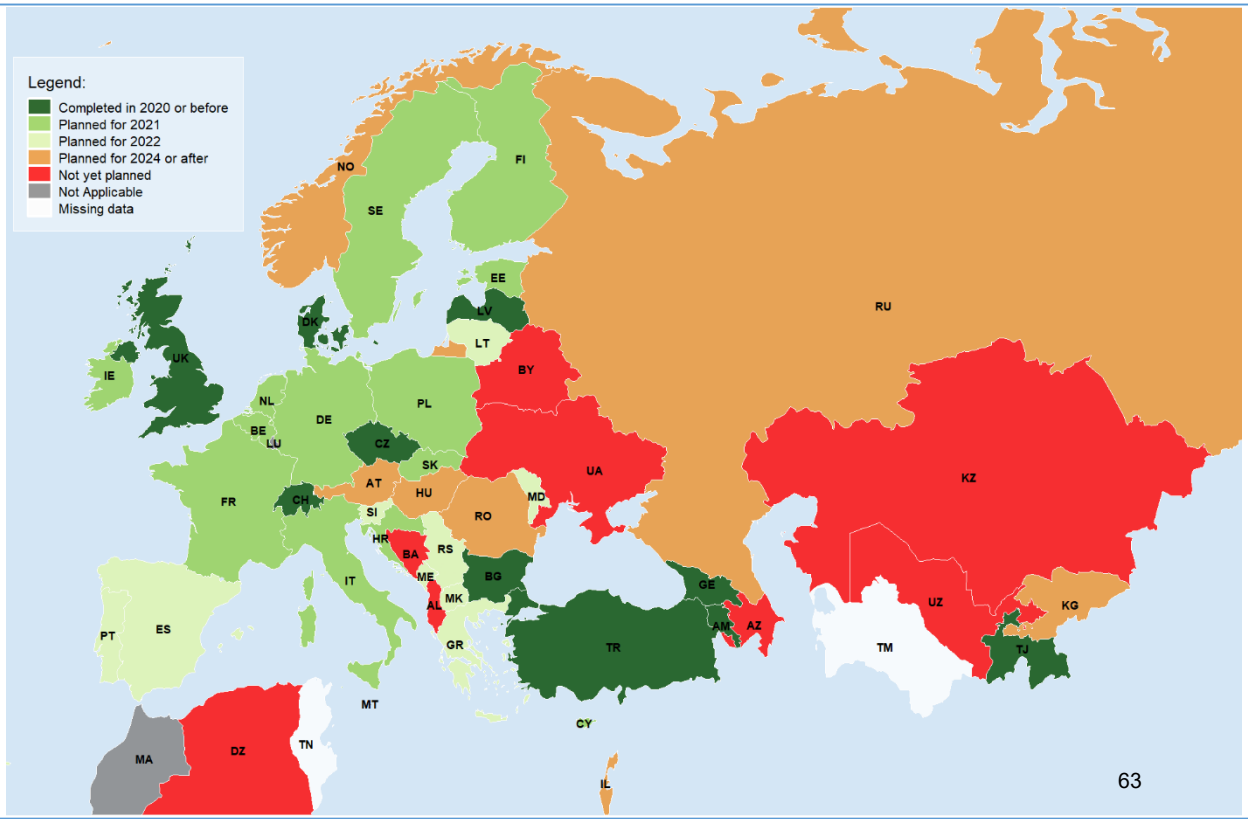
Some of the ATFCM tools currently being developed or used in ANSPs to assess traffic complexity are SALTO (FR), CRYSTAL (CH), IMPACT (ES) and tCAT (BG). It should be noted that a number of States/ANSPs (including those who declared the implementation as completed) consider traffic load monitoring as sufficient to fulfil the requirements of this ASBU element.

Among non-LSSIP reporting States, Tajikistan reports this element as completed, while there are also plans for deployment in Russian Federation and Kyrgyzstan.

New implementers in 2020:

BG, CH and TR





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

ATM Master Plan Level 3:	AOM19.3 – Full Rolling ASM/ATFCM Process and ASM Information Sharing

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.

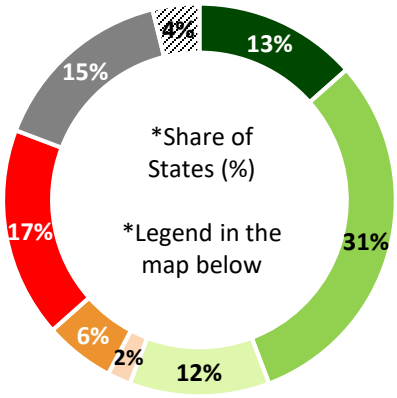
Implementation summary (end 2020):

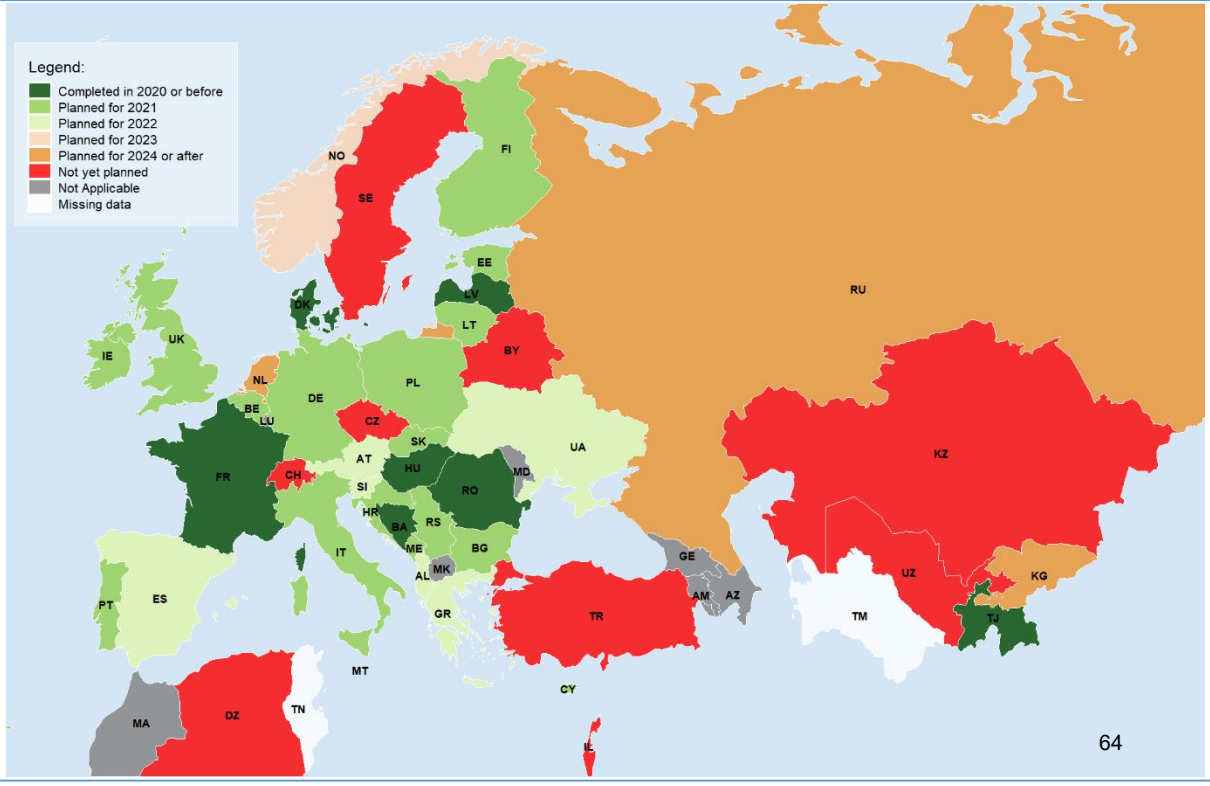
Within the ATFCM area of EUROCONTROL NM, States/ANSPs are adapting their systems and procedures in order to support a full rolling ASM/ATFCM process via Airspace Use Plans (AUPs) and Updated Airspace Use Plans (UUPs). Within this area, 7 States have already finalized the implementation. Significant surge in completion is expected by end 2022, which is explained by the target date for Advanced-FUA set by the CP1 regulation (12/2022).

Vast majority of non-LSSIP States do not have plans for implementation yet or intend to implement this ASBU element in the long-term (RU, KG). The only State which reported it as completed is Tajikistan.

New implementers in 2020:

FR





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 2020):

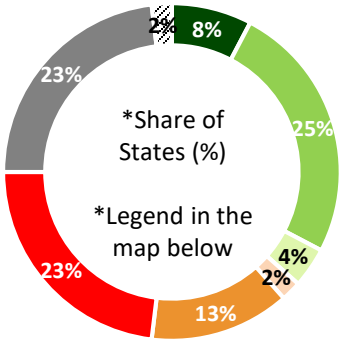
Please note that for LSSIP States this element is linked to the same ATM MP L3 Objective as FRTO-B1/4.

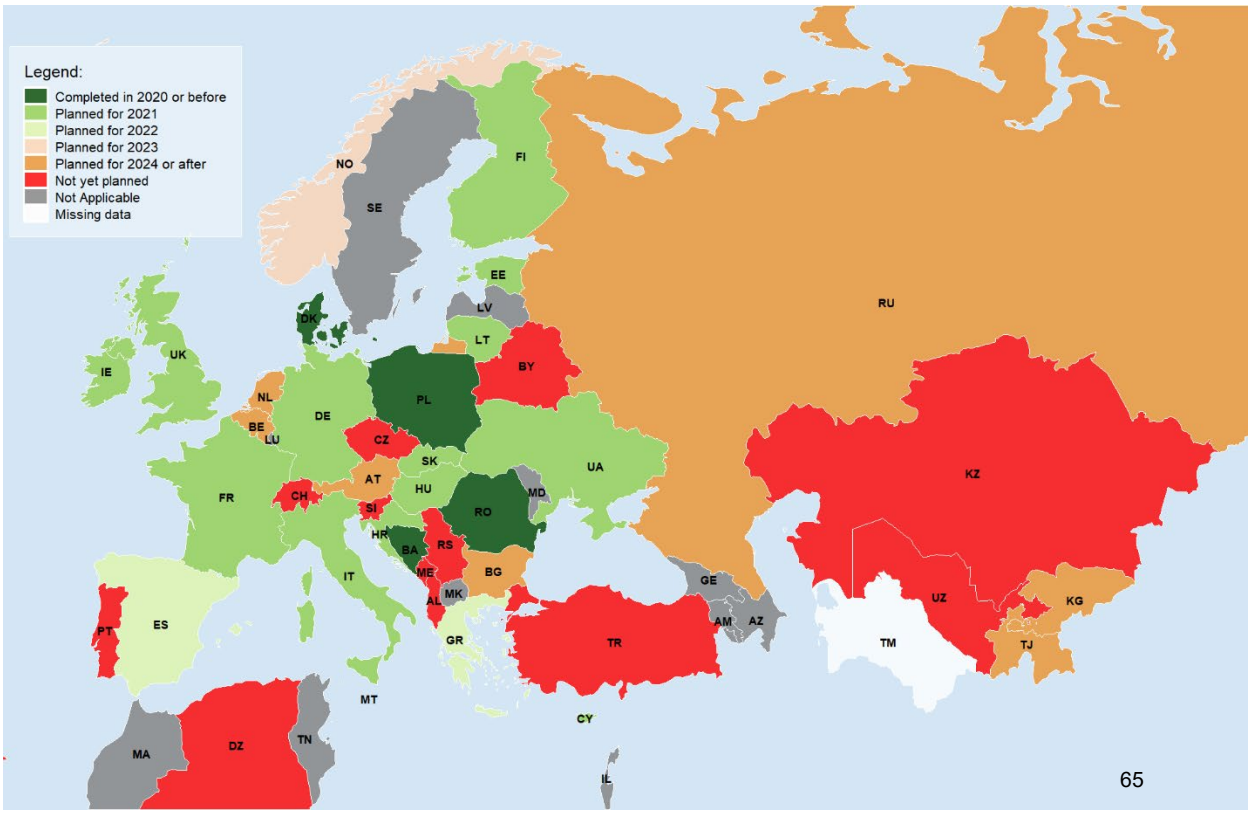
Only 5 States within EUR Region have implemented initial dynamic airspace configurations so far. Significant increase in progress is expected before the end of 2022, when this functionality is required by the recently endorsed CP1 Regulation (EU 116/2021 - Sub-AF 3.1 on ASM and Advanced FUA), applicable for EU States.

Most of non-LSSIP reporting States do not yet plan the implementation of this ASBU element due to lack of operational need. Russian Federation, Kyrgyzstan and Tajikistan have implementation plans in the longer term.

New implementers in 2020:

None





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.

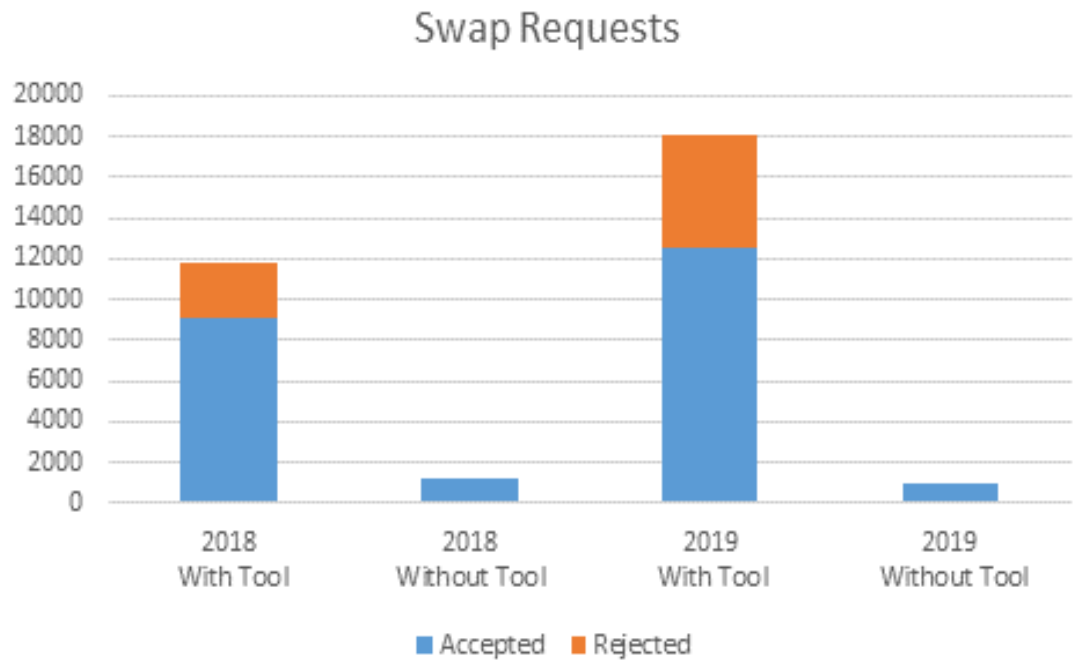
Implementation summary (end 2020):

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 facility has already been implemented by EUROCONTROL's NM in the ECAC area, while it is mostly reported as not yet planned for the other States of the Region, with the exception of Russian Federation (planned) and Tunisia (ongoing). 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.

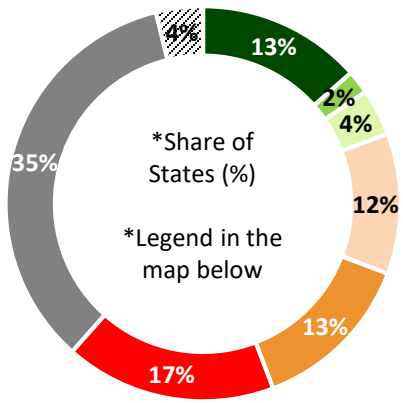
Implementation summary (end 2020):

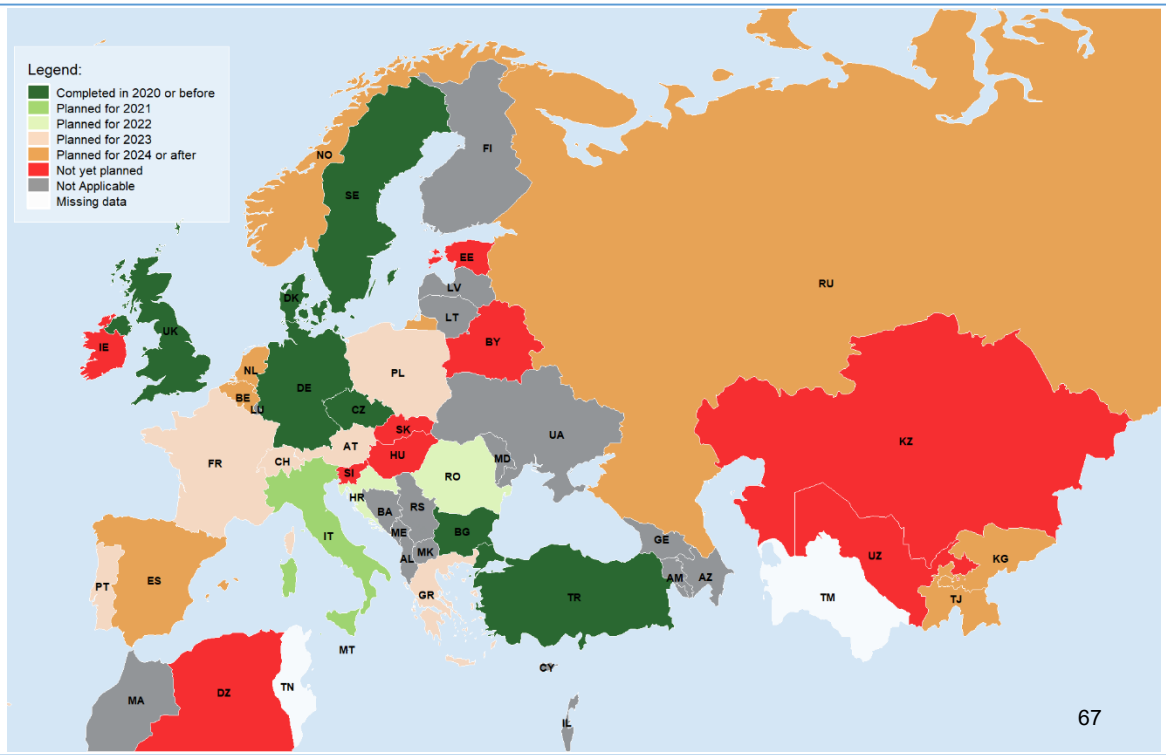
The implementation of Extended AMAN proves to be particularly challenging as it requires coordination with neighboring ANSPs. Within the EUROCONTROL NM ATFM area, it also **implies necessary information exchanges with NM**. At the moment, extended AMAN is operationally deployed in 7 States/ANSPs throughout the ICAO EUR Region, serving London Heathrow (EGLL), Copenhagen (EKCH), Frankfurt (EDDF), Munich (EDDM), Dusseldorf (EDDL), Berlin (EDDB), Vienna (LOWW) and Istanbul (LTFM) airports.

It should be noted that Extended AMAN implementation is mandated by CP1 regulation at 19 airports in the EU Member States. In vast majority of other States, the functionality is considered not applicable or not yet planned due to lack of operational needs. Among non-LSSIP Reporting States, the implementation is currently planned (in long term) only in Russian Federation, Tajikistan and Kyrgyzstan.

New implementers in 2020:

CZ





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 2020):

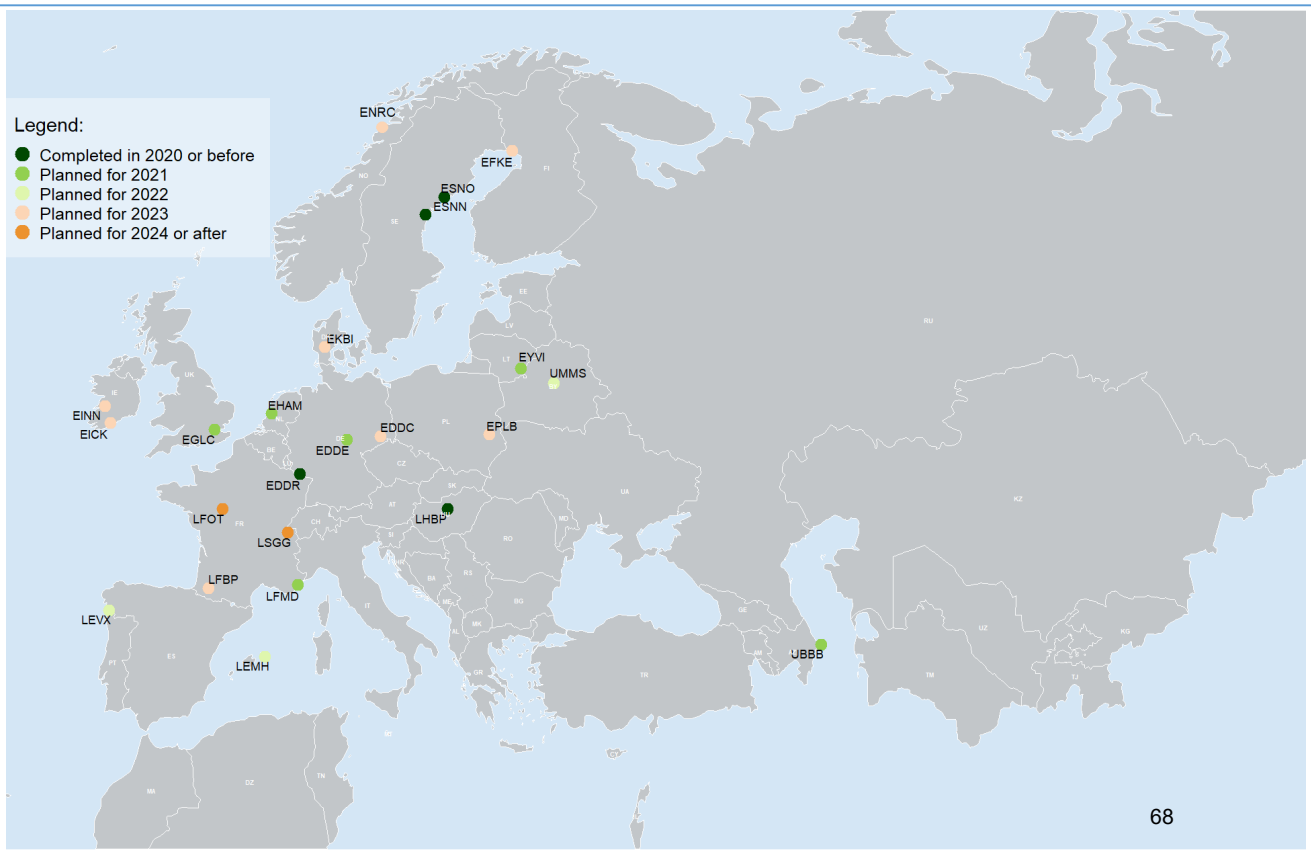
Implementation of Remote Tower is building up speed with the functionality already used in operations at several locations in the EUR Region.

Particularly encouraging is the growing interest in the deployment of RTC, with many other locations expected to enter operations in the next 3 years, indicating the first steps towards the virtualisation of service provision.

Some other States (e.g. IT) have confirmed the intention to deploy RTC functionalities, however the locations have not been announced yet therefore are not shown on the map.

New implementers in 2020:

None



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 2020):

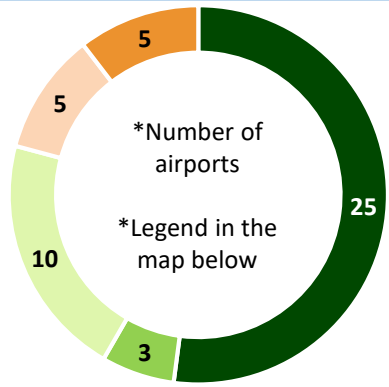
Basic Arrival Management (AMAN) tools with associated procedures have been implemented at 25 airports in ICAO EUR Region. Another 23 airports intend to finalize implementation in the next few years.

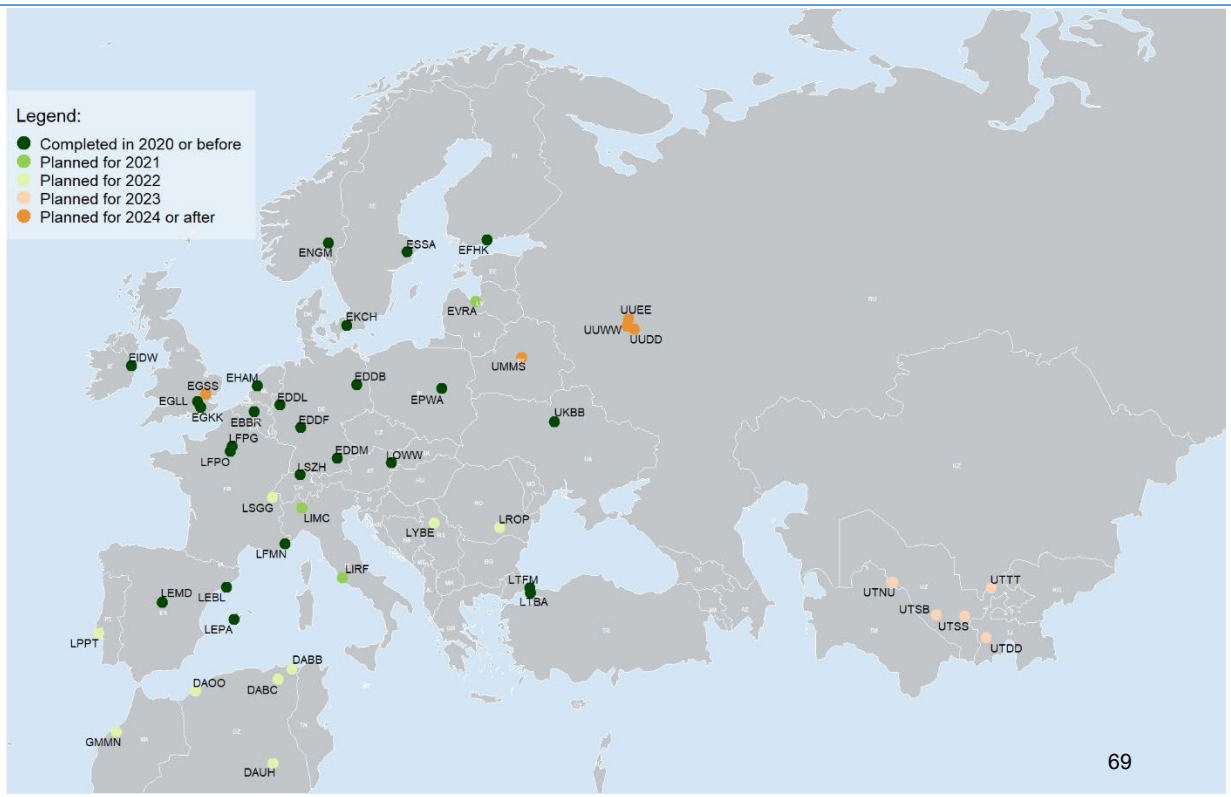
The interest in AMAN deployment is also high among the non-LSSIP reporting States, where implementation is ongoing or planned at 14 locations. In some of them (e.g. in Russian Federation) there are also plans for AMAN-DMAN integration.

It should be noted that basic AMAN ensures information exchange with initial upstream sectors, typically within a single FIR. Progress in Extended AMAN implementation is covered by ASBU element ***RSEQ-B1/1.***

New implementers in 2020:

EDDB





RSEQ-B0/2	Departure Management	B0

ATM Master Plan Level 3:	**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 2020):

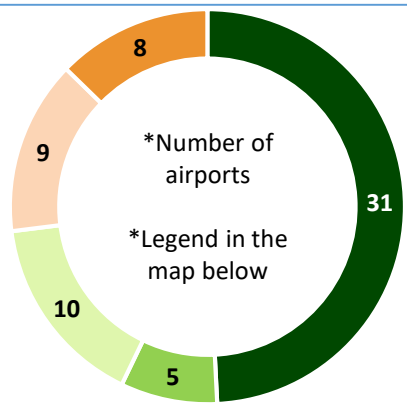
Initial DMAN with pre-departure sequencing has so far been implemented at 31 airports across the ICAO EUR Region.

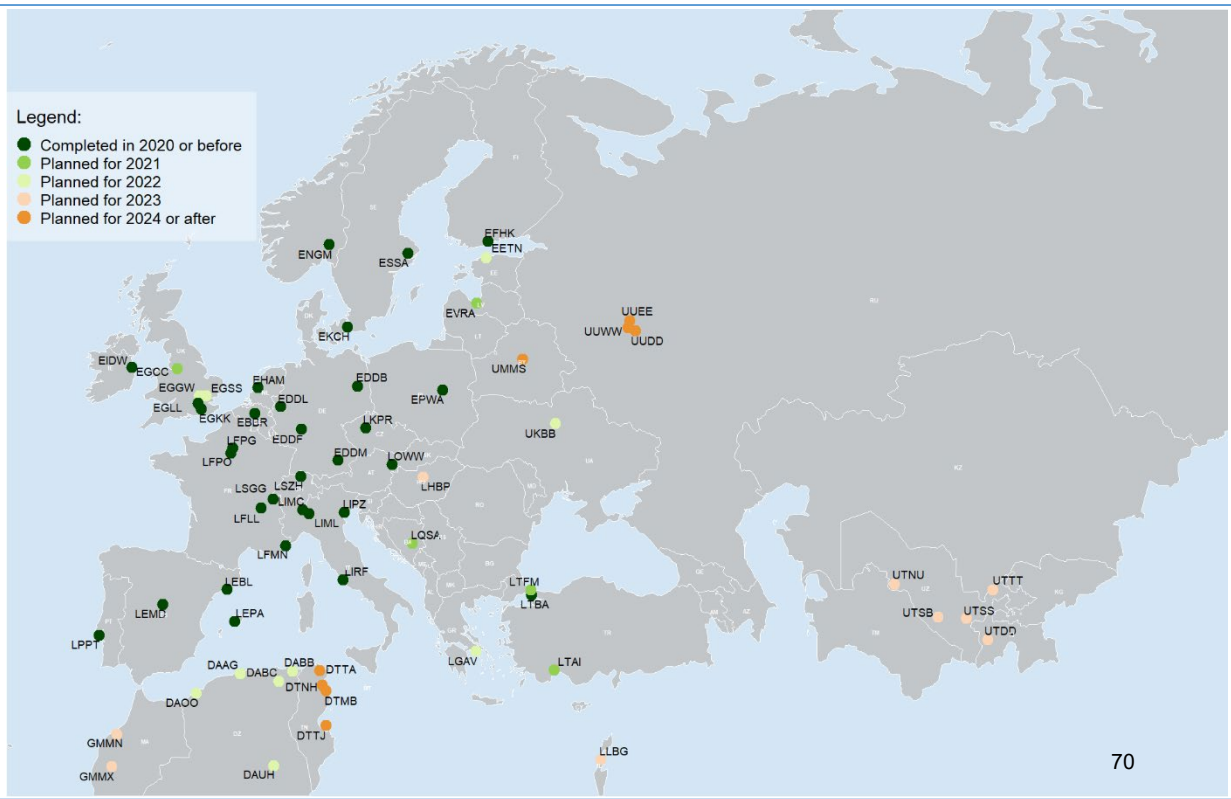
It should be noted that information exchange needed for DMAN is supported by A-CDM platforms, which is why a DMAN deployment is **tightly linked with A-CDM** implementation at vast majority of airports.

Implementation is ongoing or planned at another 32 airports, with foreseen years of completion ranging from 2021 to 2024. Eighteen (18) of these airports are located in non-LSSIP reporting States and a number of them also intend to implement A-CDM.

New implementers in 2020:

LFMN and EDDB





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.

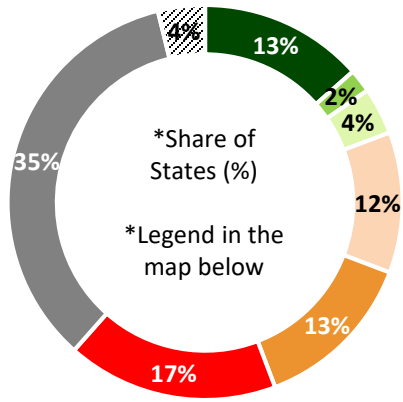
Implementation summary (end 2020):

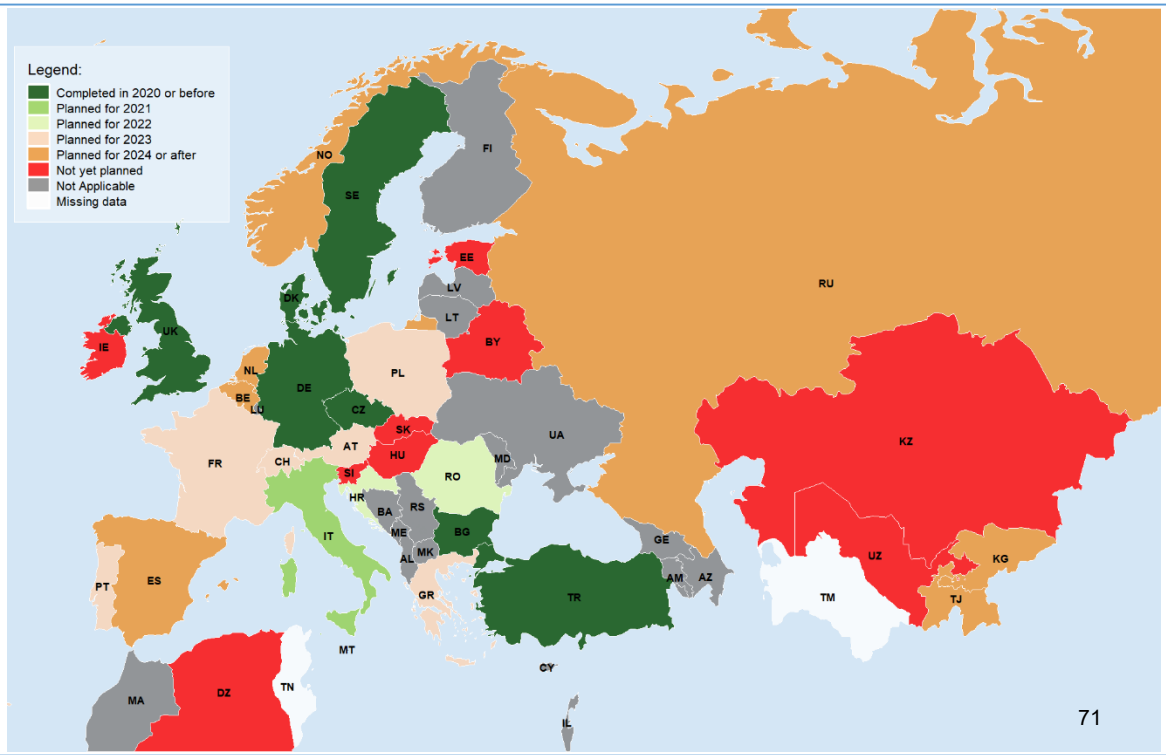
The implementation of Extended AMAN proves to be particularly challenging as it requires coordination with neighboring ANSPs. Currently it is operationally deployed in 7 States/ANSPs throughout the ICAO EUR Region, serving London Heathrow (EGLL), Copenhagen (EKCH), Frankfurt (EDDF), Munich (EDDM), Dusseldorf (EDDL), Berlin (EDDB), Vienna (LOWW) and Istanbul (LTFM) airports.

It should be noted that Extended AMAN implementation is mandated by CP1 regulation at 19 airports in the EU Member States. In vast majority of other States, the functionality is considered not applicable or not yet planned due to lack of operational needs. Among non-LSSIP Reporting States, the implementation is currently planned (in long term) only in Russian Federation, Tajikistan and Kyrgyzstan.

New implementers in 2020:

CZ





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.

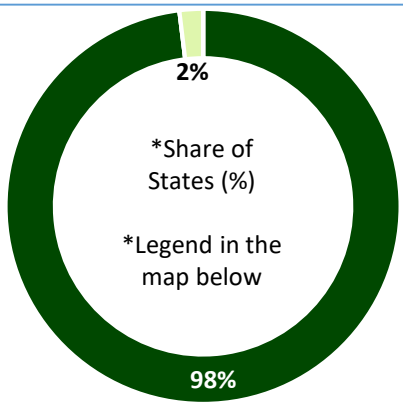
Implementation summary (end 2020):

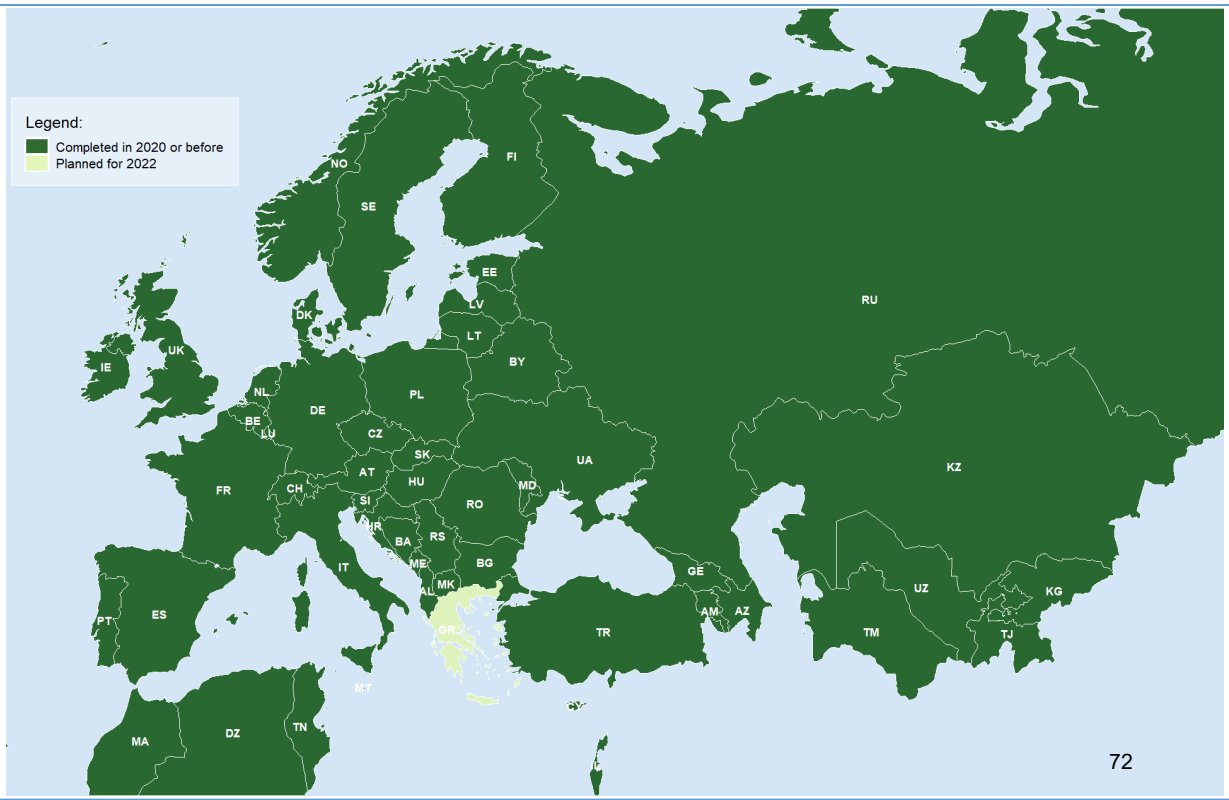
Short Term Conflict Alert (STCA) represents undoubtedly the most widely implemented safety net in the ICAO EUR Region with 98% completion rate achieved by end 2020.

In Greece, the STCA Level 1 is deployed and operational. Implementation of STCA Level 2 is foreseen with the implementation of the new DPS/ATM system, scheduled for end 2022.

New implementers in 2020:

UZ





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 2020):

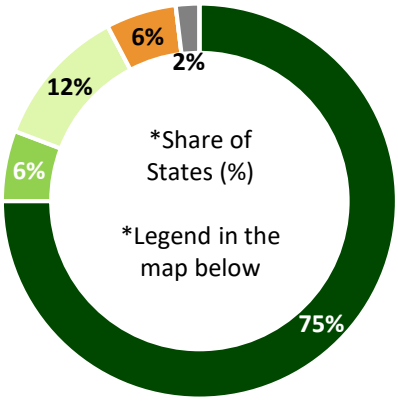
Minimum Safe Altitude Warning (MSAW) function is already implemented in 39 (75%) States/ANSPs across the ICAO EUR Region.

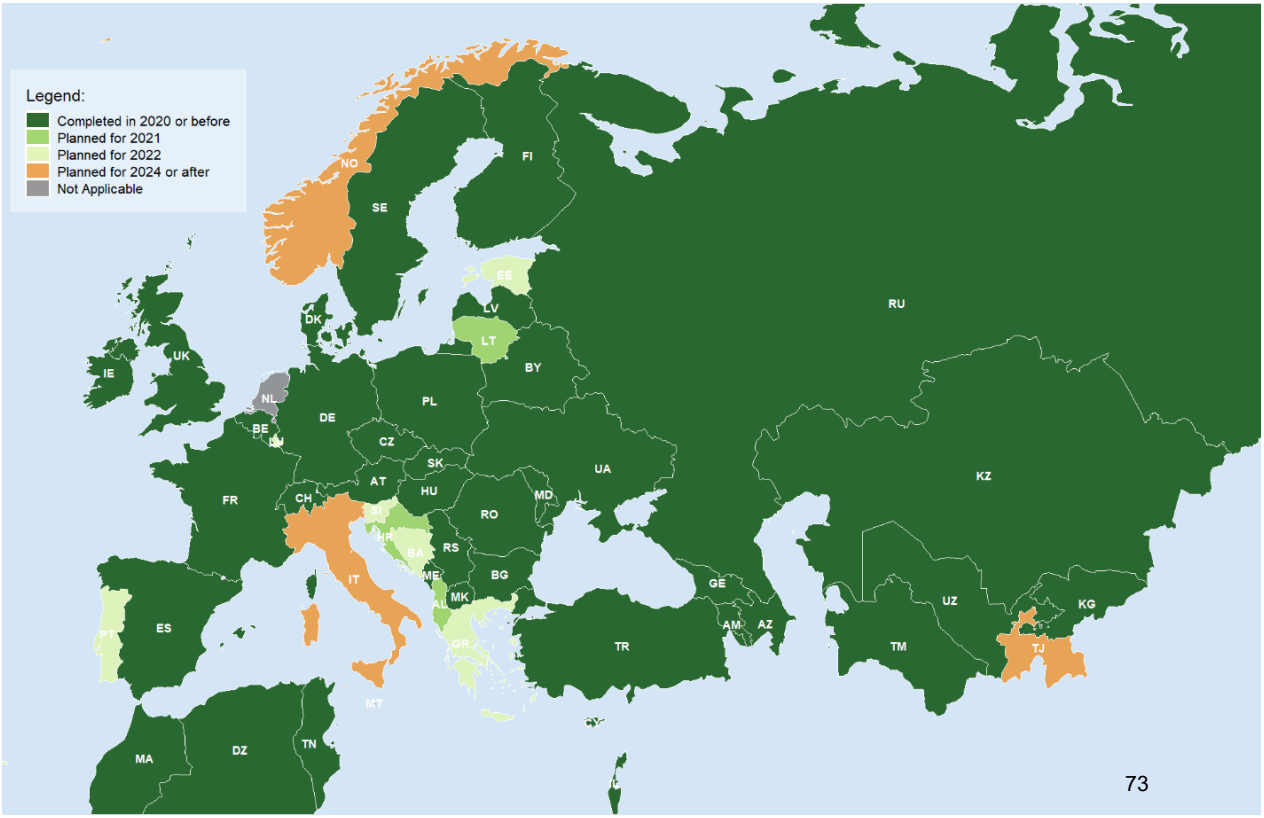
In other States the implementation is mostly linked to next scheduled upgrades of ATC systems (e.g. in Portugal - the new Lisbon ATM System (TOPLIS) foreseen for Q4/2022, Norway – by 04/2024, Greece – end 2022, Italy – end 2024 etc.). In some States (e.g. Croatia) the function is already installed, but not in operational use due to many nuisance alerts. In Netherlands MSAW is not used due to flat landscape.

MSAW is also widely available in non-LSSIP reporting States, with only Tajikistan being the State where implementation is still planned.

New implementers in 2020:

SE and UZ





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 2020):

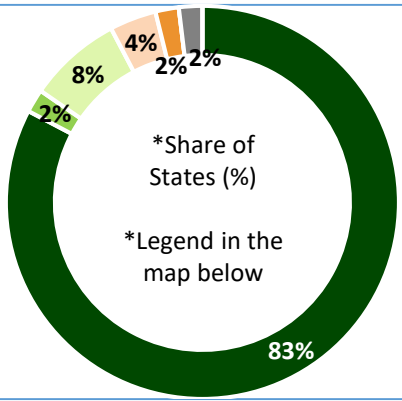
Area Proximity Warning (APW) function has been widely implemented across the ICAO EUR Region, with 43 (83%) States reporting completion so far.

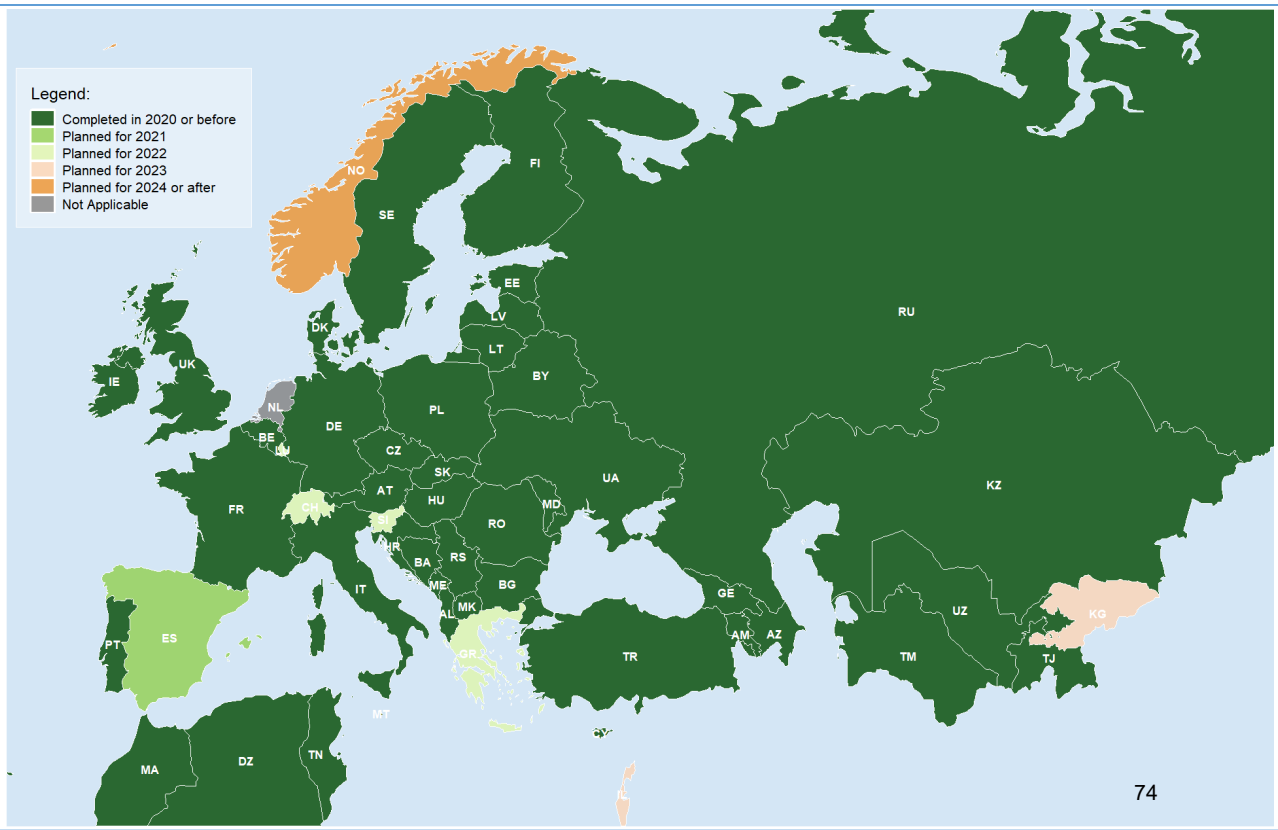
In most of the remaining States the deployment is aligned with the next scheduled upgrade of the ATC system (e.g. NO and GR). In Spain, APW is already in operational use in Barcelona, Seville, Canarias and Palma ACCs, while the implementation is still ongoing in Madrid ACC and it is scheduled for end 2021. In Slovenia, the system is already procured and installed, however operational deployment is delayed due to COVID-19. Netherlands reports APW as not applicable due to flat landscape.

APW function is also widely implemented across non-LSSIP States, with Kyrgyzstan planning to finalize implementation by end 2023.

New implementers in 2020:

UZ





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 2020):

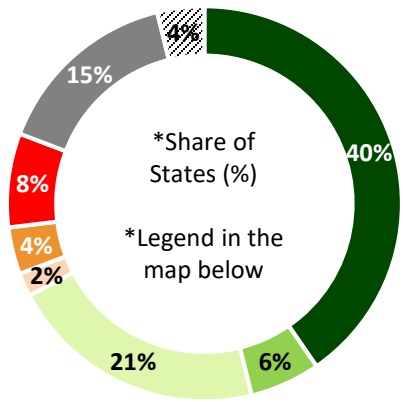
Approach Path Monitoring (APM) has been implemented in 40% of States/ANSPs across the ICAO EUR Region. As it is the case for other safety nets, the implementation is usually aligned with scheduled major upgrades or replacements of the ATC systems in ANSPs.

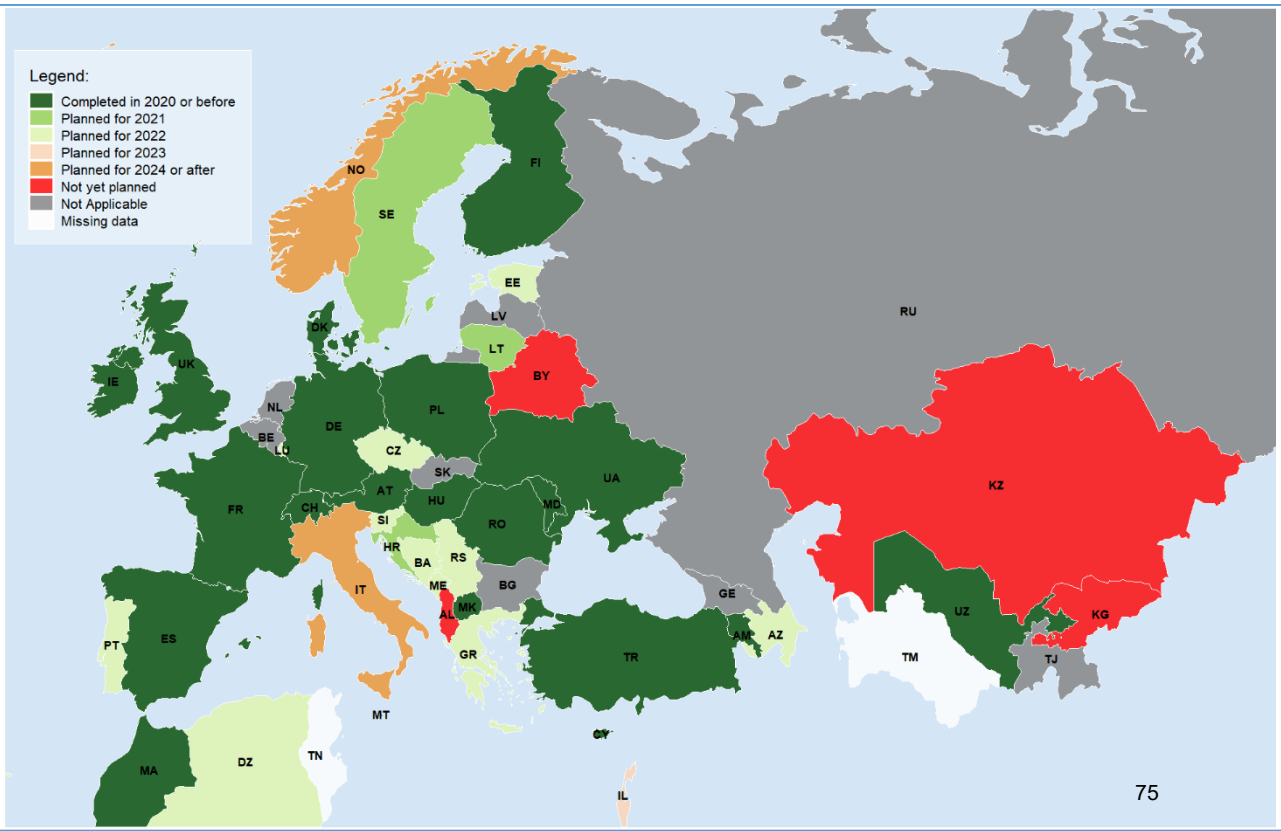
In some States (e.g. FR and PL) APM is embedded or represents a sub-function of the existing Minimum Safe Altitude Warning (MSAW). In Sweden, APM testing and validation is on-going as part of a new TopSky release and it is planned to be finalized in Q4 2021. In Croatia, APM function is available in the system, but the operational implementation has been delayed due to false and nuisance alerts which have a safety impact.

Among non-LSSIP States, APM has so far been implemented only in Uzbekistan as part of the automated ATC system “Managair“. The implementation in Algeria is scheduled for end 2022.

New implementers in 2020:

UZ





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 2020):

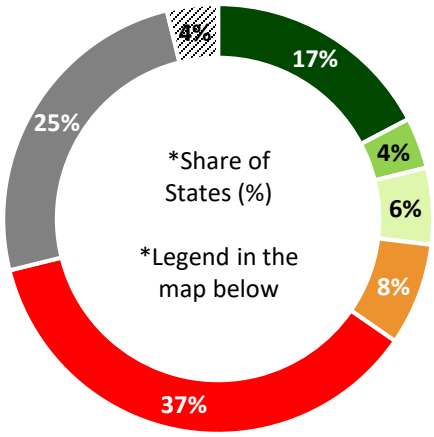
Enhanced STCA with down-linked parameters has so far been implemented only in 9 States (17%) of the ICAO EUR Region. Vast majority (>60%) still do not have plans for deployment or consider this functionality as not applicable.

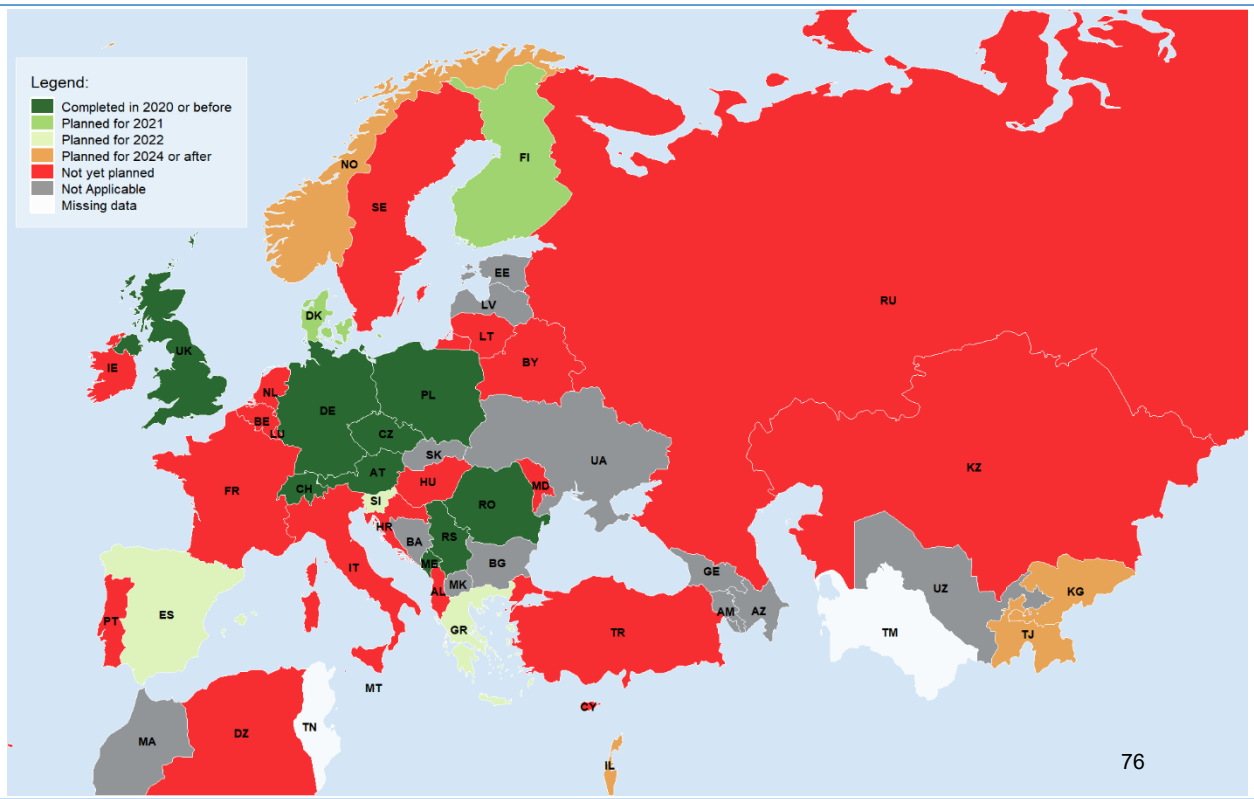
Implementation is planned/ongoing in 9 States, albeit at a relatively early stage. Among these, it is expected that Denmark and Finland will soon finalize implementation. Denmark is currently using the downlinked selected altitude as a vertical limiter for the STCA only in the buffer-area outside their FIR, with the expectation to use it inside the FIR by end 2021.

In some States (e.g. GR), the implementation is linked to the procurement and installation of new ATC systems, while others (SI and IL) already anticipate delays due to COVID-19 crisis.

New implementers in 2020:

None





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:

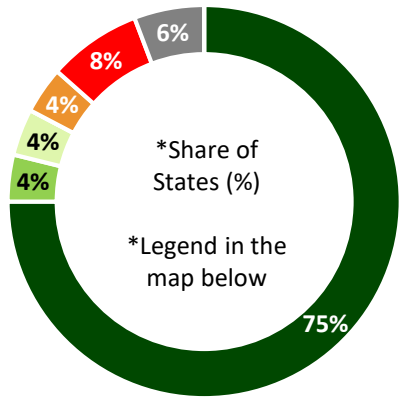
This element assists the air traffic controller in preventing collision between aircraft, using position data from ground surveillance and taking into account possible crew intents linked to traffic patterns and ATC practices in complex TMAs.
This enhanced STCA works the same as the basic STCA system 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.

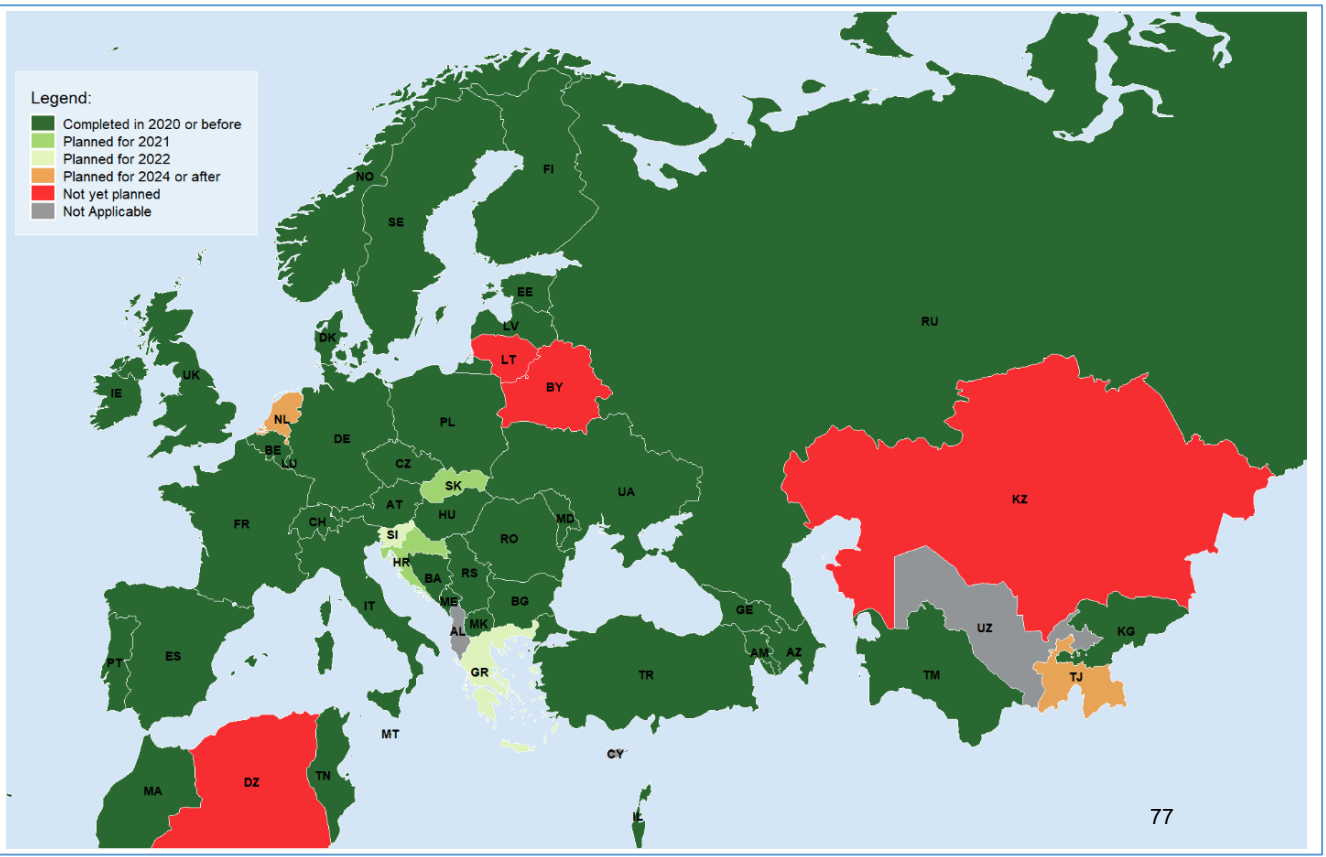
Implementation summary (end 2020):

It should be noted that MPL3 objective ATC02.9 addresses the implementation of STCA in TMAs in general, as well as, where necessary (e.g. complex TMAs), the deployment of more advanced functionalities (e.g. multi-hypothesis algorithms or other technical solutions).
In general, this element has been widely deployed throughout ICAO EUR Region, with 75% of States reporting full completion. However, **most of the ANSPs use the en-route algorithm** also for their TMAs, while only a few have implemented enhanced functionalities, including the so-called multi-trajectory functionality.
Among non-LSSIP States, the functionality has been deployed in Russian Federation, Turkmenistan, Tunisia and Kyrgyzstan, while the implementation is still ongoing in Tajikistan.

New implementers in 2020:

AZ, FI, IE, LU and RO





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.

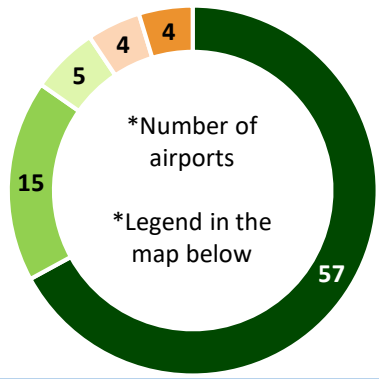
Implementation summary (end 2020):

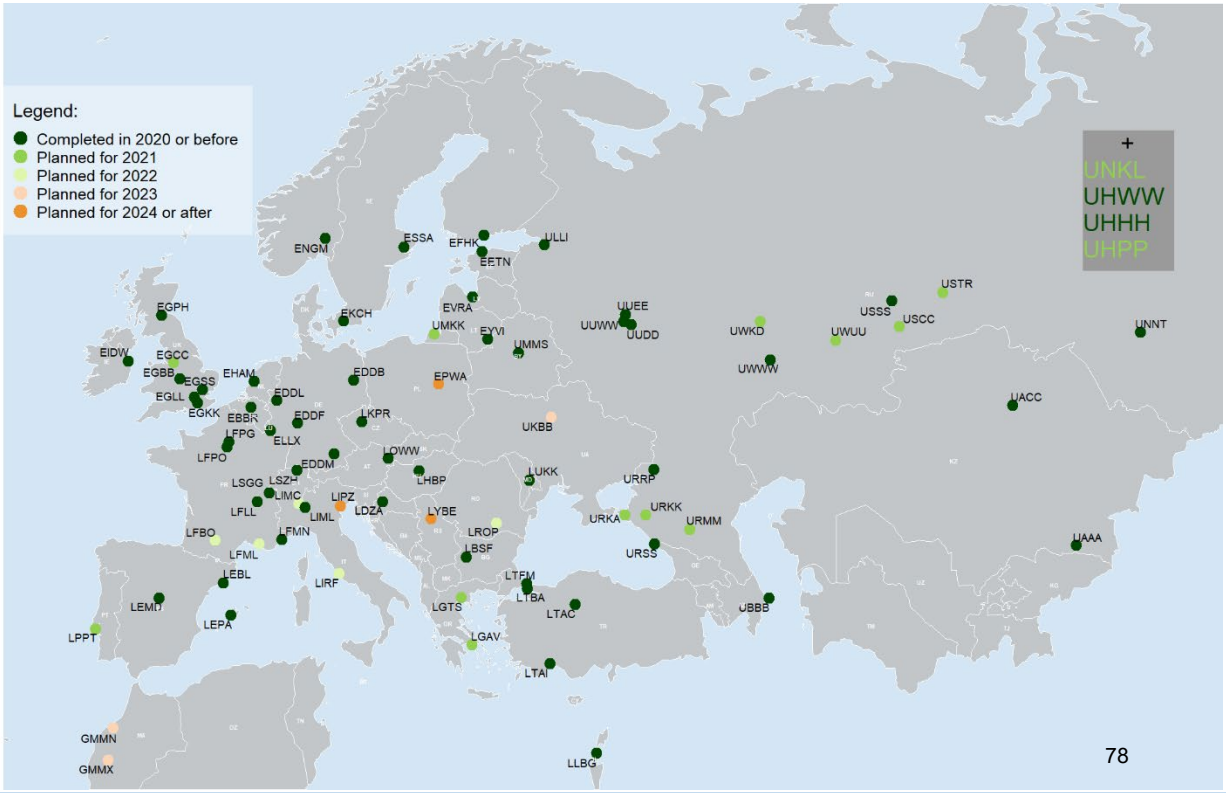
The implementation of the element has continued to progress despite the COVID-19 pandemic with even more airports (15) expecting to be ready in 2021. This is very encouraging as this functionality is essential as the fundament unlocking more advanced A-SMGCS features which might be required once the traffic will recover.

The interest is quite high also in non-LSSIP reporting States, with a number of airports that have already implemented A-SMGCS Surveillance in Belarus, Kazakhstan and Russian Federation.

New implementers in 2020:

EDDB, LTFM, LUKK





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.

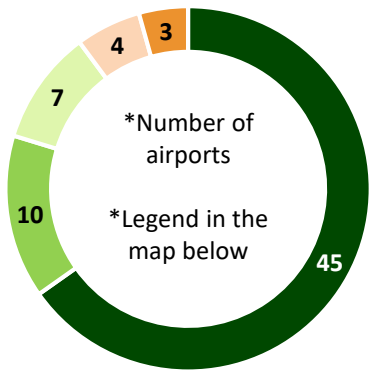
Implementation summary (end 2020):

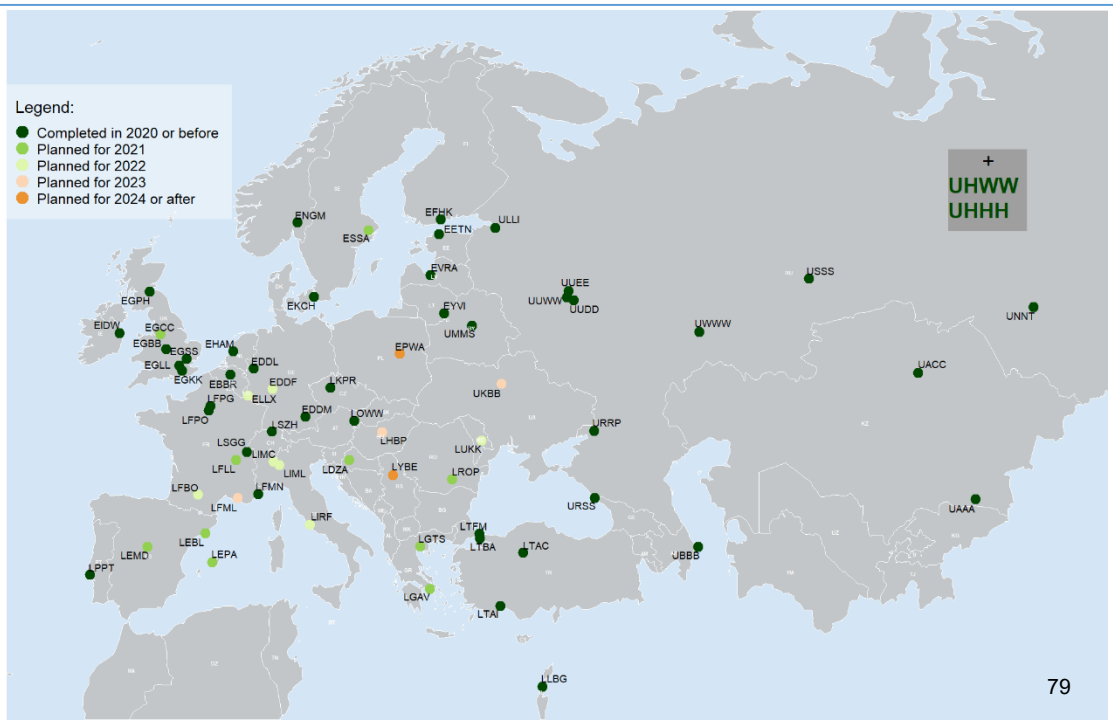
This functionality has been characterised by a constant growth of its applicability area over the last years, as more and more airports decided to implement the element, in order to accommodate the growing levels of traffic. The number of airports that have implemented this element so far is 45, with another 10 expected to finalize implementation in 2021.

This increase of the applicability area was limited in 2020, due to the substantial reduction of traffic caused by the COVID-19 pandemic. However the progress is expected to resume, driven by the predicted traffic recovery.

New implementers in 2020:

LTFM





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 2020):

The functionality addressed by the element is not yet implemented anywhere in the EUR Region and for the time being it has quite a 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.

New implementers in 2020:

None

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

ATM Master Plan Level 3:	AOP12 – Improve Runway and Airfield Safety with Conflicting ATC Clearances Detection and Conformance Monitoring Alerts for Controllers

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 2020):

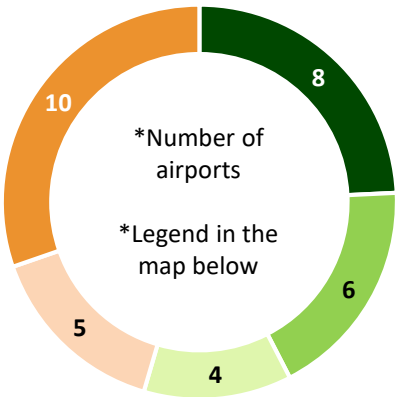
The implementation is progressing, albeit slowly, with several airports planning to increase the complexity of their A-SMGCS systems and upgrade from A-SMGCS RMCA (Runway Monitoring and Conflict Alerting) service, already implemented or in deployment at 69 locations, to systems allowing the detection of conflicting ATC clearances as well as conformance monitoring.

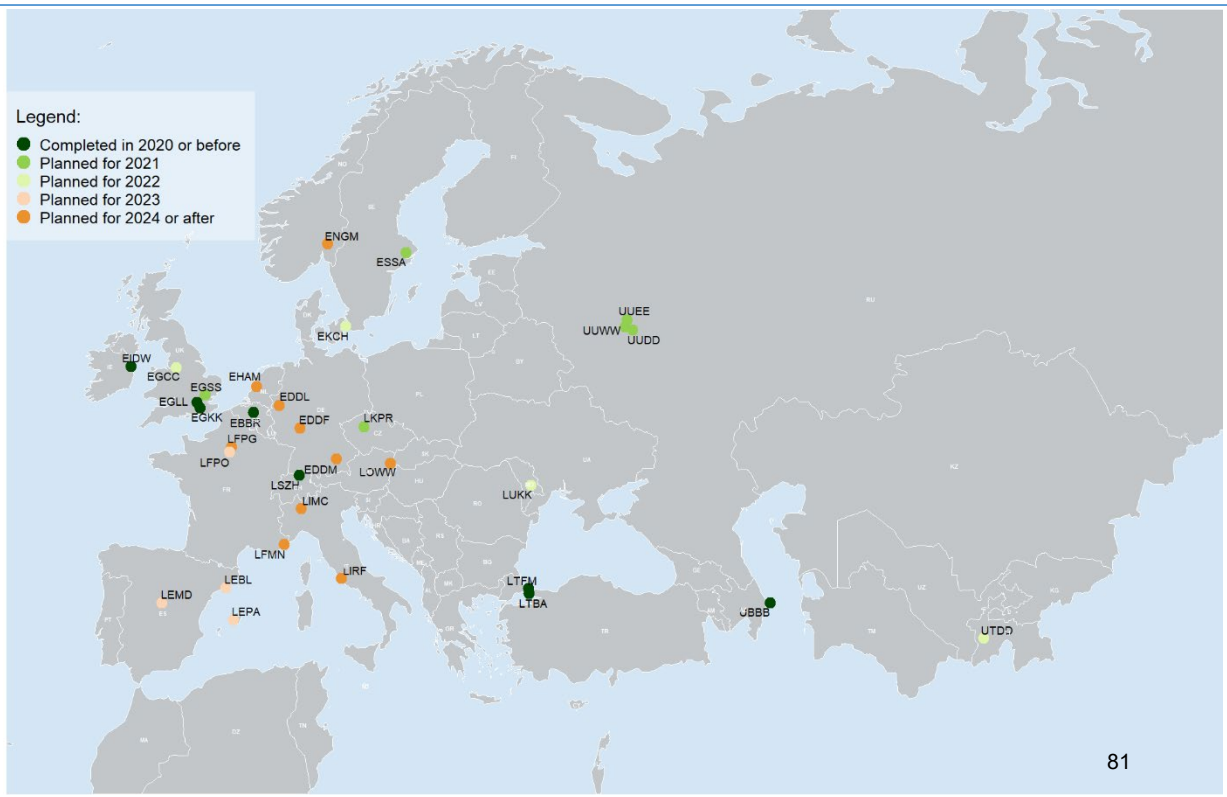
Such systems are already deployed at 8 locations, 2 more than last year (vs. RMCA available at 45 locations) with 15 more expected to become operational till 2023.

The main driver for implementation is the increased level of traffic at busy and complex airports as well as the opportunity offered by the deployment of new A-SMGCS systems.

New implementers in 2020:

EIDW, LTFM





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 2020):

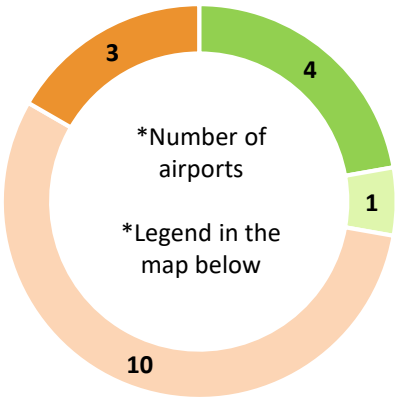
The functionality is expected to be deployed at a limited number of airports in the EUR Region. Currently it is not in operational use anywhere in the Region while very few airports have plans to implement it before 2024.

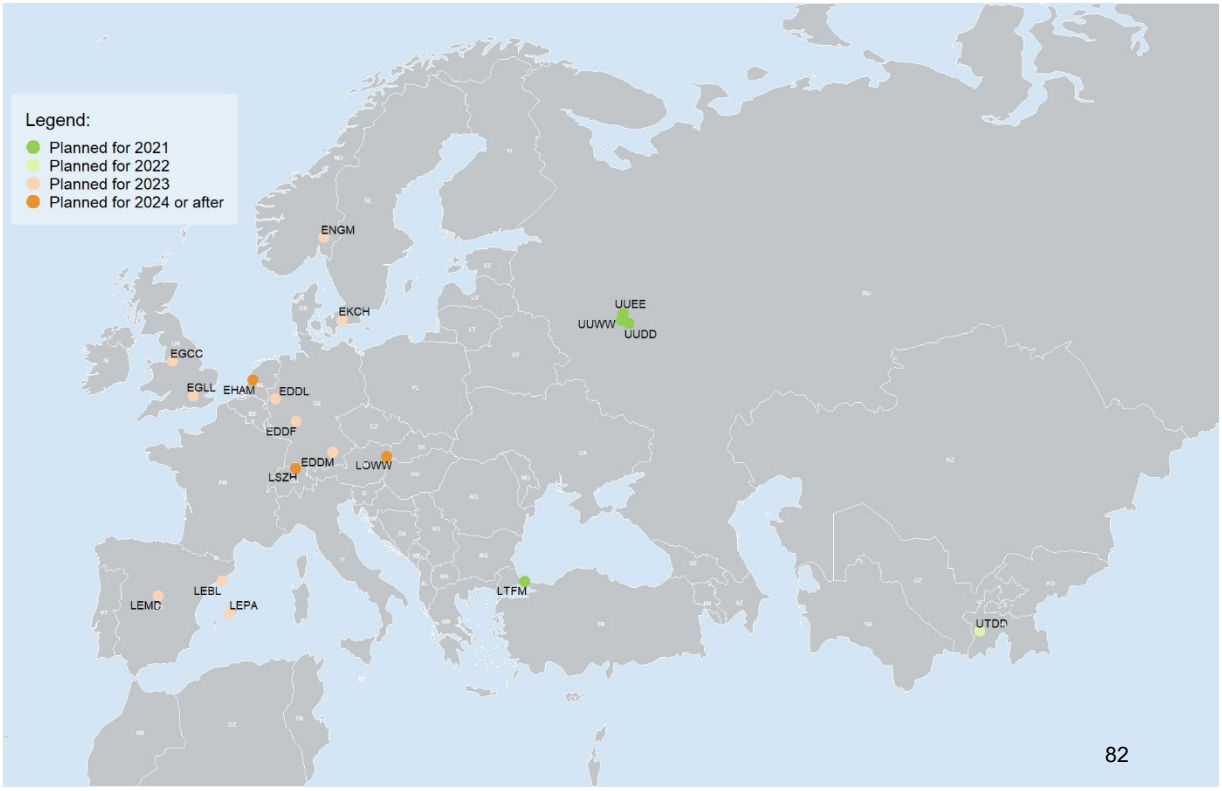
The justification for the low interest in deployment is mostly because the lack of operational needs, as this functionality would be beneficial only at particularly complex, busy airports.

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

New implementers in 2020:

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

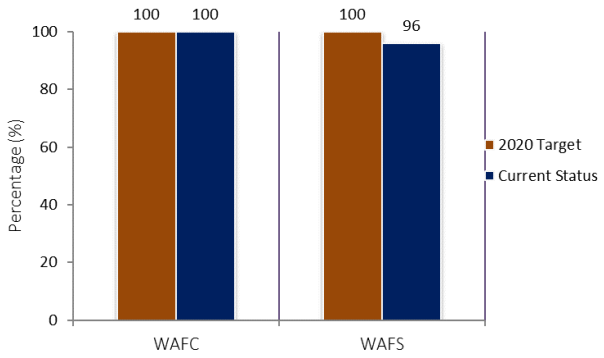
Applicability consideration:

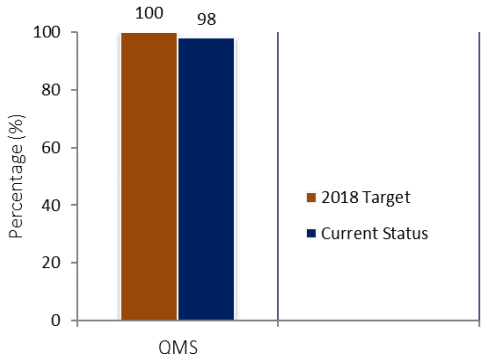
Applicable to traffic flow planning, and to all aircraft operations in all domains and flight phases, regardless of level of aircraft equipage.

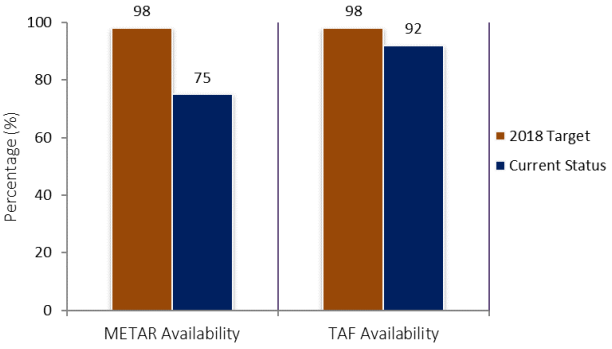
Elements	*Applicability*	*Performance Indicators/Supporting Metrics*	*Targets*
WAFS	***All States***	Indicator: % of States using WAFS data. Supporting metric: number of States having implemented SADIS FTP	100% by Dec 2020
QMS	***All** States*	Indicator: % of States having implemented QMS for MET Supporting 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

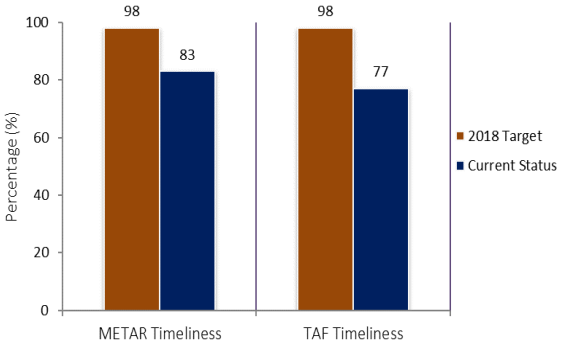
SIGMET Format	***All** with a FIR*	Indicator: % of States providing SIGMET format in accordance with WMO AHL in the List of EUR SIGMET and AIRMET headers Supporting metric: number of States providing SIGMET format in accordance with WMO AHL in the List of EUR SIGMET and AIRMET headers	100% by Dec 2020
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

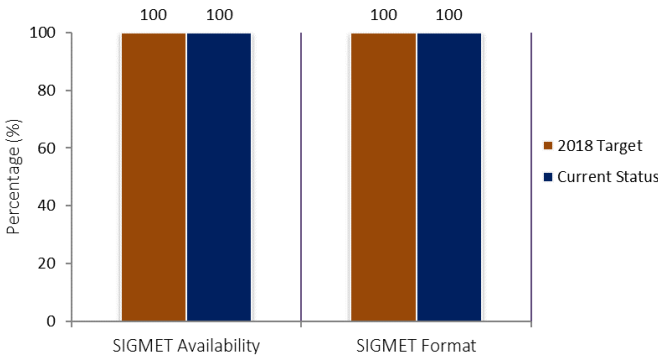
B0-AMET Status of implementation in the EUR Region

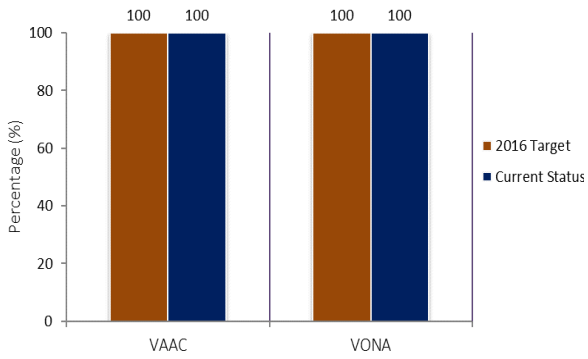




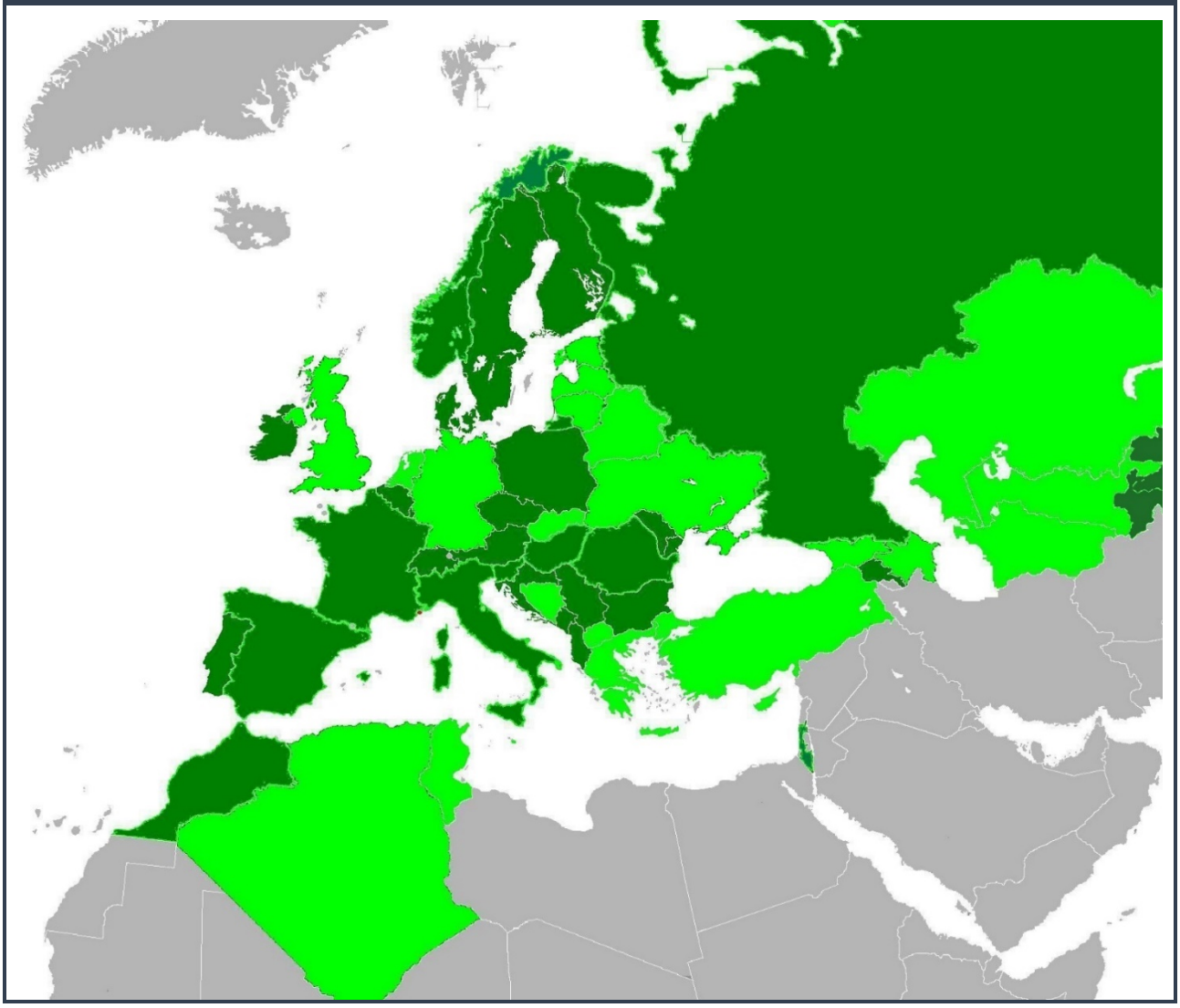








B0-AMET Status of implementation in the EUR Region



Legend

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

The progress for B0-AMET is acceptable (with approximately 90% implementation).

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

Yellow – identified in Feb monitoring 2020 (existed and status has not changed)
Amber – first identified in Feb monitoring 2021 (new)
Light Green – identified in Feb monitoring 2020 and corrected by Feb 2021
Dark Green – implemented correctly for both Feb 2020 and 2021 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
B0-AMET	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
B0-AMET	WAFS															
	QMS															
	METAR availability															
	TAF availability															
	METAR timeliness															
	TAF timeliness															
	SIGMET availability															
	SIGMET format															
	VAAC															
	VONA															
	WAFC															

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

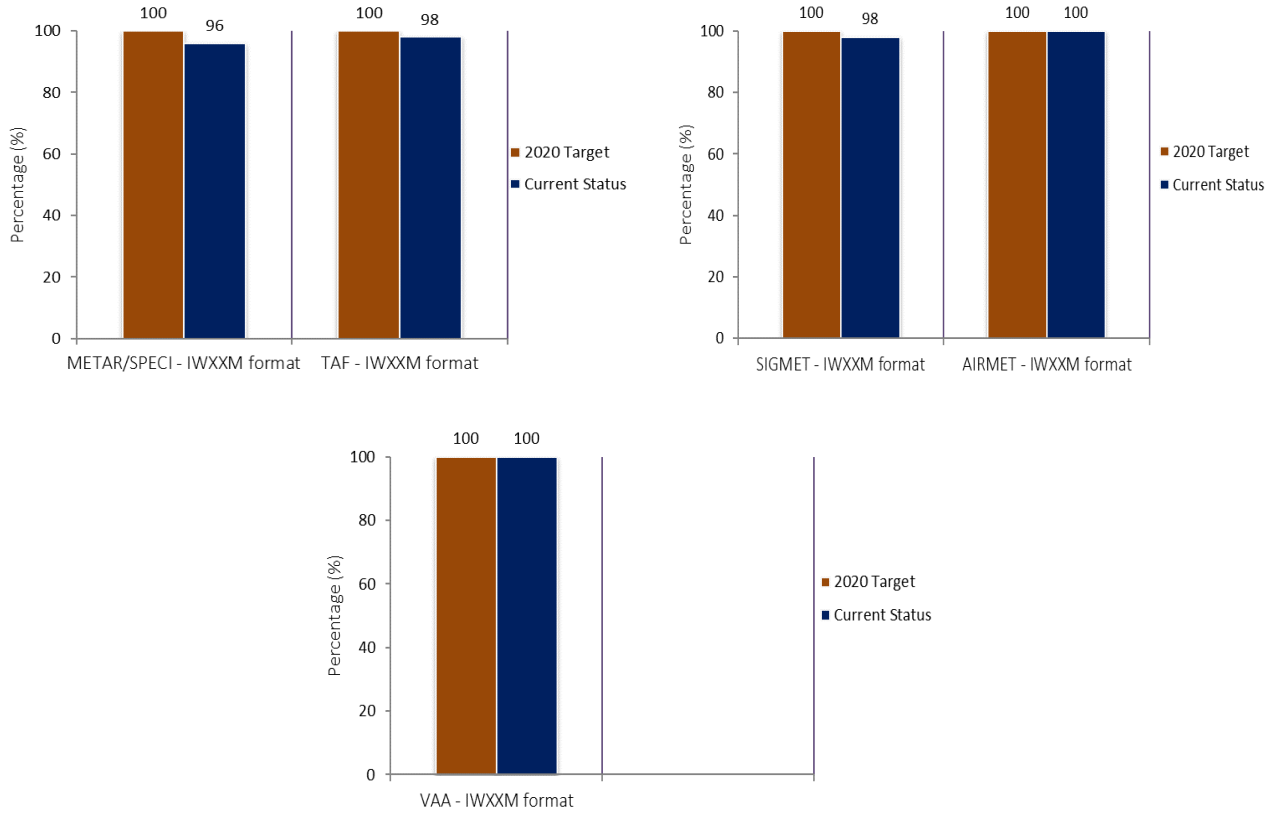
Applicable to traffic flow planning, and to all aircraft operations in all domains and flight phases, regardless of level of aircraft equipage.

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.

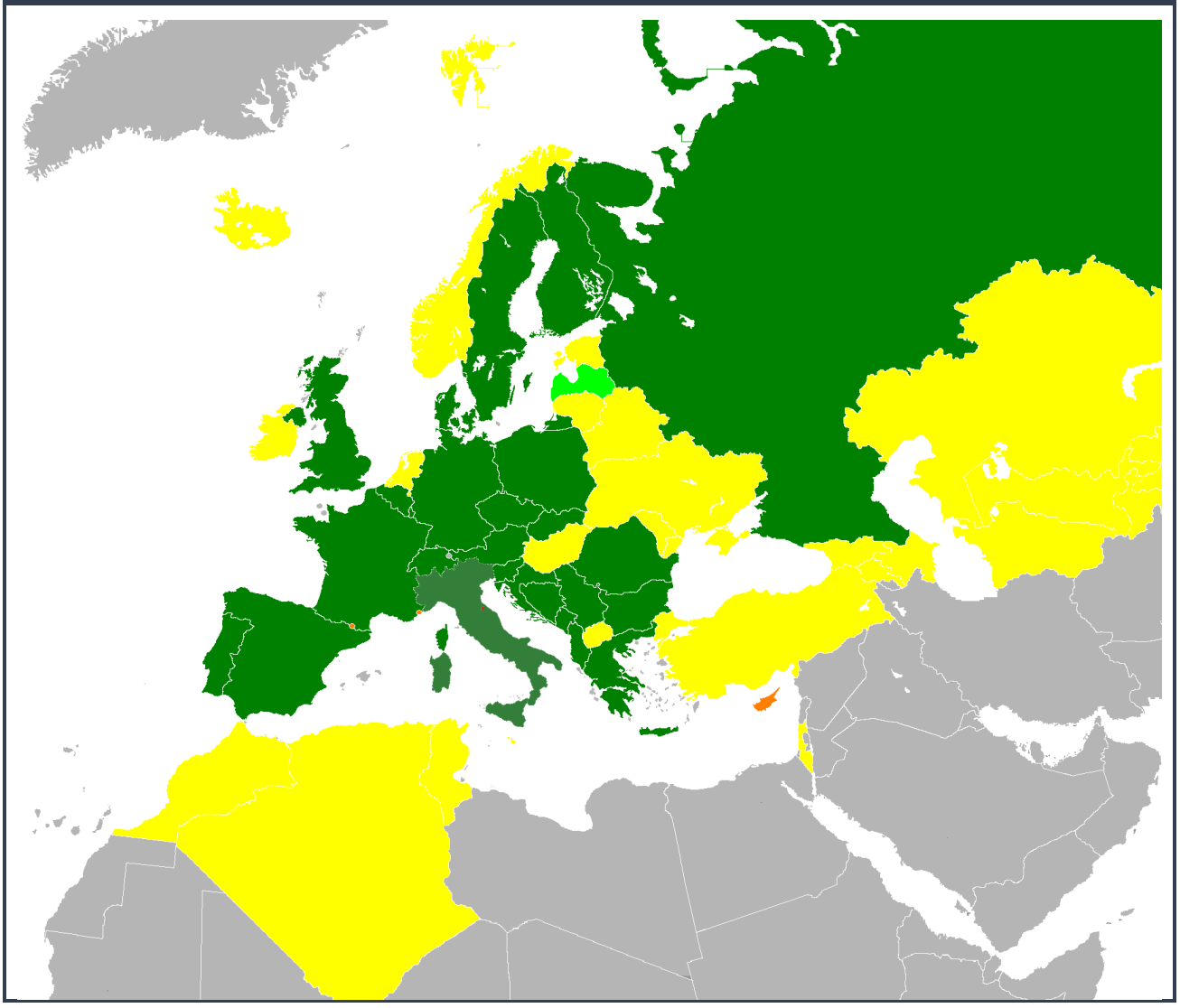
Elements in IWXXM format	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***
METAR/SPECI	*States where METAR/SPECI is required as per the EUR ANP Volume II, Table MET II-2*	Indicator: % of relevant States having implemented METAR/SPECI in IWXXM format Supporting metric: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



B1-AMET 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 B1-AMET 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
B1-AMET	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
B1-AMET	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
B1-AMET	METAR/SPECI															
	TAF															
	SIGMET															
	AIRMET															
	VAA															
	TCA															

Module	Elements in IWXXM format	Switzerland	Tajikistan	Tunisia	Turkey	Turkmenistan	Ukraine	United Kingdom	Uzbekistan
B1-AMET	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 high level 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 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, if required.

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