ATC - Europe

Outlook

- ATC modernization continues in Europe under the Single European Sky (SES) program
- EUROCONTROL was reappointed to be the European Network Manager for the 10-year span between 2020 and 2029
- Poland and Norway became the 18th and 19th EUROCONTROL member states, respectively, to implement EUROAT
- COVID-19 has had a dramatic impact on previously set timelines for projects such as the Single European Sky ATM Research Joint Undertaking

Orientation

Description. European air traffic control (ATC) modernization efforts.

Sponsor

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Status. Ongoing modernization.

Application. Formation of a single homogeneous air traffic management system for all of Europe.

Technical Data

Characteristics. Currently, the European air traffic control system comprises member states that support at least 51 separate ATC centers.

EUROCONTROL, formerly the European Organization for the Safety of Air Navigation, is the primary organization engaged in the implementation of a unified European ATC network. It is sponsored by the European Civil Aviation Conference (ECAC).

Listed below are the major EUROCONTROL facilities:

Headquarters: Brussels, Belgium (operations and engineering directorates).

Maastricht Upper Area Control (MUAC) Center: Maastricht, the Netherlands (controls the airspace over Belgium, Luxembourg, the Netherlands, and the northern half of the former West Germany).

Central European Air Traffic Services (CEATS) Upper Airspace Control (UAC) Center: Vienna, Austria (controls the airspace over Austria, Bosnia & Herzegovina, the Czech Republic, Croatia, Hungary, Slovakia, Slovenia, and northern Italy-Padua).

Experimental Center: Brétigny-sur-Orge, France (simulation and research center for testing).

Institute of Air Navigation Services (IANS): Luxembourg (ATC personnel training and research).

Central Flow Management Unit (CFMU): Brussels, Belgium (responsible for balancing demand and

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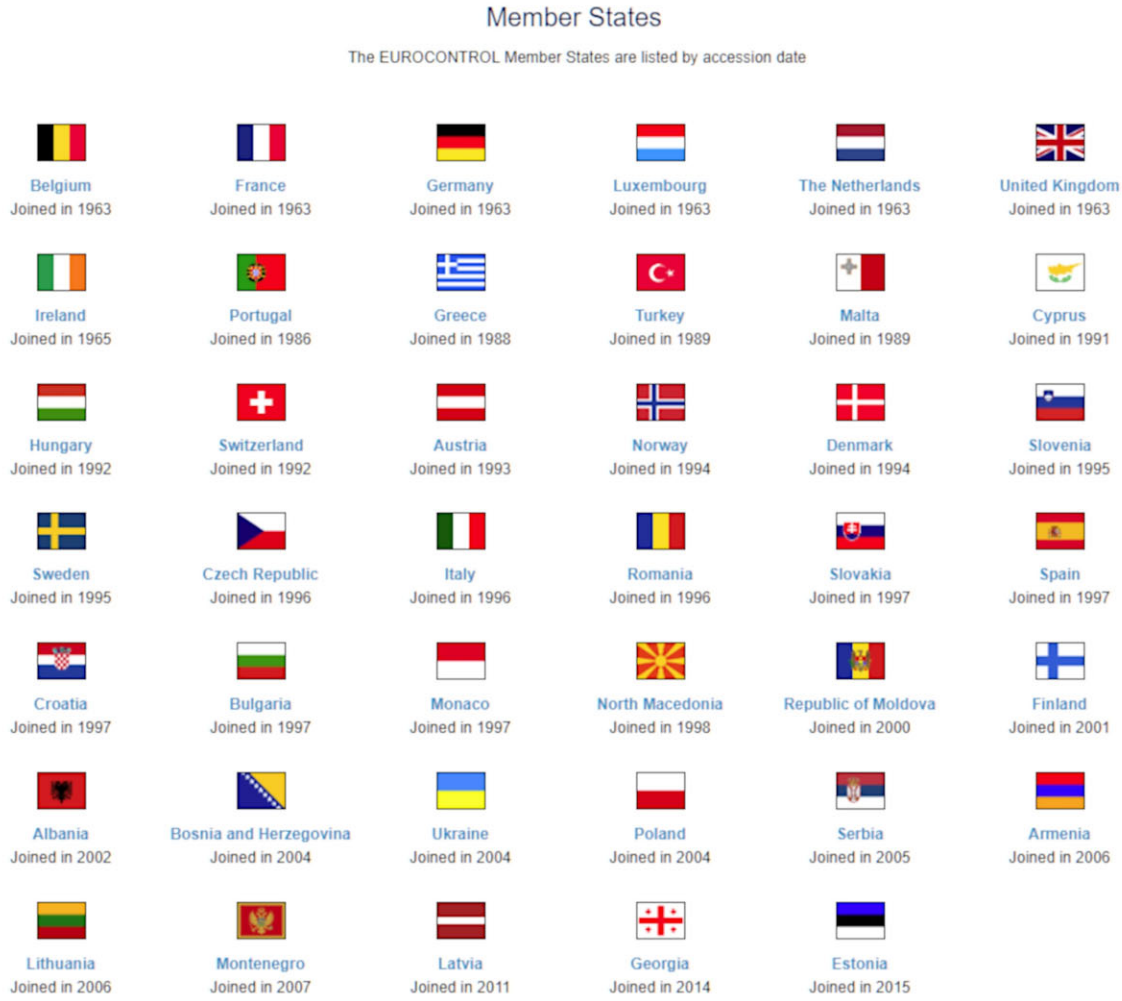
available airspace to reduce congestion in ECAC member states).

Central Route Charges Office (CRCO): Located at headquarters (clearinghouse for en route navigation charges for member states).

EUROCONTROL Member States. There are 41 member states: Albania, Armenia, Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, the Netherlands, North Macedonia, the Republic of Moldova, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, and the United Kingdom.

ECAC Member States. ECAC members include all EUROCONTROL members plus Azerbaijan and Iceland.

EUROCONTROL Comprehensive Agreement States. EUROCONTROL has comprehensive ATC agreements with Israel and Morocco.



EUROCONTROL Member States as of April 2021 (listed by join date)

Source: EUROCONTROL

Program Review

Single European Sky (SES) Launched

Launched in 1999, SES advocates that Europe's higher airspace be managed as a common resource to facilitate airspace restructuring on the basis of traffic requirements, not national boundaries. Through the merger of existing national regions, a single European flight zone covering all upper airspace would be created where a single set of rules applies.

Additionally, SES aims to standardize ATC training and integrate the management of military and civilian air traffic. SES recommends that the European Union play a more active role as an air traffic regulator and that the European Union Aviation Safety Agency (EASA) maintain responsibility for safety regulations.

SESAME & SESAR Programs

At the 2005 Paris Air Show, a Single European Sky Implementation (SESAME) Definition Phase team of 29 members was announced. The group is led by the Air Traffic Alliance (launched by EADS [now Airbus SE], Airbus, and Thales) and includes three airlines, 10 Air Navigation Service Providers (ANSPs), five airports, four manufacturers, and four associations. EUR60 million ($76.6 million) was allocated for the SESAME Definition Phase.

In November 2005, a new three-phase program, SESAR (Single European Sky ATM Research), was launched. The Definition Phase ran from 2005 to 2008. During the Development Phase (2008-2013), validation work was conducted and regulatory measures were outlined in order to implement the European Air Traffic Management (ATM) Master Plan. During the Deployment Phase (2014-2020), outcome-based changes to the European ATM system were made.

The SESAR Joint Undertaking (SESAR JU) body was created in 2007 to implement the SESAR Development Phase. The Development Phase had an estimated cost of EUR2.1 billion ($3.3 billion), to be shared equally among the European Community, EUROCONTROL, and industry (EUR700 million [$1.1 billion] each). The core development remained in operation until 2020, but membership was open to all public and private bodies in the field of air transport.

With the deployment phase coming to an end, SESAR JU has moved onto the next phase, taking place between 2021 and 2023. In this period, known as Wave 2, the SESAR JU will finalize research and investment efforts under the SESAR 2020 Program closely coupled with the EU's aviation policy. This work will lead to the delivery of the last batch of SESAR solutions in critical domains such as automation support, virtualization and trajectory-based operations. It will enable further industrialization and deployment of the key technologies and operational capabilities, and pave the way to future research and innovation activities in the ATM and aviation domains.

Wave 2 aims to enable the flexibility needed to align future research with the results of Wave 1 (the Deployment Phase), reassess relative priorities, and ensure the best value for money for the EU and delivery against SES goals. It will also aim to complete those candidate SESAR solutions that were not completed within Wave 1. Finally, it will allow for strategic input to scope new projects built on the results of ongoing research projects toward future solutions.

Wave 3 will follow the development of Wave 2 projects to meet the needs of the project that were not fulfilled.

Specific Initiatives

Reduced Vertical Separation Minimum. RVSM cuts the vertical separation between aircraft in half for certain flight conditions. RVSM increases airspace capacity and offers pilots more altitudes and routes in order to find favorable winds, save fuel, and reduce en route time. It also provides controllers with more options for managing traffic. In January 2002, a 1,000-foot RVSM came into effect for 41 European states and parts of North Africa. After one week of RVSM operation, ATC delays had dropped considerably, resulting in fewer missed connections.

ACAS II. The Airborne Collision Avoidance System is an air-to-air anti-collision system. ACAS II-equipped aircraft communicate with one another via the Mode S link and coordinate respective avoidance maneuvers. All turbine aircraft above 5,700 kilograms (12,500 lb) maximum takeoff weight or with more than 19 passenger seats must be equipped. The ACAS is also known as TCAS II Software Version 7.

Mode S Transponder. A Mode S transponder uses a unique 24-bit address to identify individual aircraft, and transmits periodically. By not continuously transmitting, garbled responses and FRUIT (false replies unsynchronized in time) are reduced significantly. The introduction of Mode S into operational service helps alleviate the shortage of secondary surveillance radar codes. SSR was introduced in Europe for widespread ATM use during the 1960s and 1970s.

Mode S is being deployed to areas subject to high traffic density. This initially includes Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland,

and the U.K. There are two stages of Mode S implementation: Mode S Elementary Surveillance (ELS) and Mode S Enhanced Surveillance (EHS). Mode S EHS applies to aircraft with a maximum takeoff mass greater than 5,700 kilograms (12,566 lb) or a maximum cruising true airspeed in excess of 250 knots.

A Lufthansa Boeing 737 flying between Frankfurt and Munich in January 2008 was the first aircraft to have its Mode S transponder-transmitted identity automatically correlated with the flight plan held by AT controllers. This development led to expanded city-pair flights based on Mode S by Deutsche Flugsicherung (DFS), the German ANSP, during 2008.

TAWS. The Terrain Awareness and Warning System is designed to provide pilots with increased situational awareness and to reduce accidents associated with Controlled Flight Into Terrain (CFIT). TAWS is required for aircraft exceeding 5,670 kilograms (12,500 lb) maximum takeoff weight or with more than nine passenger seats. TAWS installation must include GPWS (Ground Proximity Warning System) functions and an approved situational awareness display.

CASCADE. The Cooperative Air traffic services through Surveillance and Communications Applications Deployed in ECAC (CASCADE) was launched in 2005. CASCADE includes Automatic Dependent Surveillance-Broadcast (ADS-B) applications, Controller Pilot Data Link Communications (CPDLC) services, and various other datalink services. In the future, CASCADE will use Mode S and VHF Data Link Mode 2 (VDL-2), along with Aeronautical Telecommunication Network (ATN) infrastructure.

Link 2000+ utilizes CPDLC to enable controllers and pilots to transmit basic exchanges via text messages. Pilots can acknowledge messages by pressing a "Will Comply" button. Most standard messages are incorporated into CPDLC, thus freeing up frequencies and limiting voice communications to urgent messages. Additionally, CPDLC greatly reduces confusion between the ATC tower and pilots. The Maastricht UAC was the first station equipped for CPDLC.

VDL-2 is a controller/pilot datalink system that provides ATM information to pilots. By using the VDL-2 datalink, the workload of controllers is reportedly reduced by 75 percent, thus increasing ATM capacity by roughly 11 percent.

Flight International reported that 150 aircraft were already fitted with VDL-2 CPDLC services as of early 2008, and that an estimated 400 would be equipped by the end of that year. By June 2007, 350 aircraft had been equipped with CPDLC. CPDLC capability was mandated for 2009.

SWIM. The SESAR program envisions a System Wide Information Management system that enables flight crews, airlines, ANSPs, and departure/destination airports to make decisions collaboratively as situations develop. SWIM would most often be used for unforeseen events such as runway blockages and technical problems, and in poor weather conditions.

SESAR Definition Phase Completed

The third Definition Phase deliverable, the ATM Target Concept document, was accepted in November 2007. The report warned that failure to expand runway capacity at major airports would negate most of the capacity, efficiency, and environmental gains that are planned for Europe's future ATM system.

The ATM Target Concept represents a change from current practice with a shift to 4D (3D plus time) ATM. Aircraft operators will use satellite-guided 4D navigation to fly their preferred routes with much greater precision than is possible relying on ground-based navigation, as they do today.

EUROCONTROL accepted the SESAR fourth deliverable (D4), the ATM Deployment Sequence document, in January 2008. The document identified the operational improvements to be deployed between 2008 and 2020, as well as the R&D activities needed to support them. EUROCONTROL accepted the final two deliverables, the SESAR Master Plan and the 2008-2013 Work Program, in April 2008.

Central European Negotiations

The Functional Airspace Block (FAB) concept was developed in the first SES legislative package as one of the main means of reducing airspace fragmentation. The objective is to ensure that national airspace boundaries do not reduce the efficiency of air traffic flows and the provision of air traffic services in Europe.

In November 2008, civil and military ATM leaders from Belgium, France, Germany, Luxembourg, the Netherlands, and Switzerland agreed to build a common functional block of airspace to be called FABEC (FAB-Europe Central). At the same time, the respective ANSPs agreed to cooperate to eliminate national borders as the boundaries of airspace blocks. The redesigned FABEC airspace was implemented in 2013.

SES II

The second legislative package of the Single European Sky initiative, SES II, was endorsed by EU transport ministers and the European Parliament in March 2009. It introduced several enhancements to the existing SES

legislation. Its main new features include community-wide performance targets and national FAB performance plans, targets and incentives.

An SES II key recommendation is to fly more efficient routes, which SES II estimates would keep nearly 5 million tons of carbon dioxide out of the air per year. Additionally, improved coordination would reduce aircraft holding at takeoffs and landings, thereby reducing fuel consumption and emissions.

The full legislative package of SES II entered force in 2009.

In 2010-2011, rules and criteria were developed to address environmental, performance, fragmentation, and safety challenges. This follow-on eventually came to be known as SES2+, with the complete legislative proposal being published in June 2013 and the European Parliament adopting the package in March 2014.

16 Contracts Signed

In June 2009, EUROCONTROL announced that the SESAR JU had signed contracts with 16 partners totaling EUR1.9 billion over a period of seven years.

The contracts marked the beginning of execution of the SESAR program. SESAR's concepts include "trajectory-based operations," rolling network plans, introduction of an ATM intranet, integration of airport ground activities, automation support for air traffic controllers and pilots, and environmentally friendly operations.

European FABs – Nine European Skies

As of September 2009, initiatives had been launched to create nine FABs across Europe, as follows:

Baltic FAB – Lithuania, Poland

Blue MED (Mediterranean) FAB – Cyprus, Greece, Italy, Malta (Albania, Egypt, and Tunisia as associate partners, Jordan as an observer)

Danube FAB – Bulgaria, Romania

FAB Central Europe (FABCE) – Austria, Bosnia & Herzegovina, Croatia, Czech Republic, Hungary, Slovak Republic, Slovenia

FAB Europe Central (FABEC) – Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland (U.K. as a collaborative partner)

Northern Upper Area Control (NUAC) – Denmark, Sweden

Northern European FAB (NEFAB) – Denmark, Estonia, Finland, Iceland, Norway, Sweden

SW Portugal-Spain FAB – Portugal, Spain

FAB U.K.-Ireland – Ireland, the U.K.

Signing Up for PENS

As of March 2010, EUROCONTROL and 13 ANSPs had signed up for the Pan-European communications Network Service. PENS will allow the ANSPs to exchange operational ATC voice and data communications in a seamless manner. Air transport information technology provider SITA was selected as the PENS network service provider in October 2009.

In October 2010, all European Aeronautical Information System (AIS) Database (EAD) services were migrated from a dedicated IP network to PENS. This involved migrating 29 customer sites, in addition to the IT and operational sites (Frankfurt, Madrid, and Vienna). PENS is now fully operational, carrying data for both CFMU and EAD applications.

At the end of 2010, plans were developed for the so-called SESAR virtual private network. The VPN would become part of the ANSP backbone on PENS. This infrastructure was implemented during the first quarter of 2011. Its objective is to validate new applications being developed by the SESAR partners. This VPN was initially used for the work packages related to the SWIM infrastructure.

Following a common procurement action, EUROCONTROL and 41 industry partners, primarily Air Navigation Service Providers (ANSPs), launched a program in April 2018 with BT, a telecom operator in the U.K., for the provision and management of a secure and highly resilient New Pan-European Network Service (NewPENS). The 10-year contract has an estimated value of more than EUR50 million.

The NewPENS network is designed to connect around 100 locations in 47 countries in the EUROCONTROL region, as well as neighboring countries, allowing transfer of business-critical data. Operation will be built on BT's IP network, with mission-critical connections running on a dual-core infrastructure, allowing connectivity to be physically and logically separated.

NewPENS will succeed PENS, which was launched in December 2009. The original PENS program provided a backbone for cross-border data and voice communications for the network manager, ANSPs, and other ATM operators.

4D and Other New Programs

As part of the SES initiative, four-dimensional en route aircraft trajectory management was introduced on some routes. This results in improved arrival control in particularly busy terminal airspace.

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In 4D navigation (the fourth dimension is time), an aircraft arrives at waypoints and its destination precisely when the system expects it to.

The strategy in delivering early components of the system is to ease new, technology-enabled procedures into use gradually, route by route, so confidence can be gained in the system before it is deployed more widely.

The first step in delivering these programs was implemented in June 2020 with the release of EUROCONTROL Network Manager update 24.0. This update set the framework in place for the integrated Network Management (iNM), the EUROCONTROL Network Manager's "transformational" new program, which will be progressively deployed from 2022 onward.

EUROCONTROL Activity

In December 2014, EUROCONTROL announced that following the successful implementation in December 2013 of a Variable Division Flight Level (vDFL) in the eastern part of the airspace managed by the MUAC, the concept had been further deployed to cover the airspace of the Netherlands and northwest Germany – the so-called DECO sectors – as of December 11.

The vDFL concept allows for a more flexible and dynamic distribution of traffic between upper and lower sectors (from 24,500 ft to an unlimited flight level) with a view to increasing efficiency.

2015-2016

In February 2015, the European Commission announced that it was supporting the Centralized Services (CS) with funding from the Trans-European Transport Network. (EUROCONTROL states that the CS "typically involve handling data and range from a service for trajectory planning in four dimensions to support for an improved and pan-European approach for effectively sharing airspace between civilian and military traffic.)

Frank Brenner, director general of EUROCONTROL, said, "This is good news for Europe, as advanced technology coming out of the Single European Sky ATM Research program will now be supported both in content and financially by the European Commission. These are technologies that will be implemented centrally beyond the borders of the EU and for all of the 41 EUROCONTROL member states."

The EUROCONTROL member states, meeting in Brussels in December 2015, decided to extend the mandate of EUROCONTROL to include the operation of military ATC services, in addition to the current civilian services, out of the EUROCONTROL MUAC. This mandate covers airspace over northern Germany (Hannover UIR) and the Netherlands (Amsterdam FIR).

Also in December 2015, EUROCONTROL announced that the European Commission would be supporting the "ATM Data as a Service," or ADaaS, three-year project between Slovenia Control and EUROCONTROL's MUAC. The project contributes to the SES initiative by addressing the deployment of new technologies and best practices. The project develops and deploys a prototype to demonstrate that ATM data can be provided as a service by one distributed ATM system to one or more civil Air Traffic Service Units.

In July 2016, *Flight International* reported that Europe's grand air traffic management project may finally be coming together as years of research translate into action. Strategic changes such as assessing navigation charges to flights as a whole rather than in a series of discrete phases have also been encouraging to airlines. Operationally, however, European airspace is still defined by a tangle of national borders laid down largely before the invention of the airplane.

Twelve years after its legislative framework was assembled in the form of four EU regulations (SES I), the SES was at a turning point as the new technologies and processes developed under the SESAR program started to be deployed. The SESAR program would receive the bulk of the EUR3.8 billion ($4 billion) to be allocated by the EU to the SES program between 2004 and 2020.

Philippe Merlo, director of air traffic management at EUROCONTROL, said, "Today we are at the most sensitive moment because we have started the SESAR deployment and we have the budget to deploy it. We can implement a new ATM infrastructure and make a real step forward, so it's really up to the SESAR deployment manager not to miss this unique opportunity."

2017

In February 2017, *Flight International* reported that, based on a recent European air traffic pilot project, the European ANSPs, airports and airlines soon could see concrete operational benefits from two otherwise vague concepts – big data and machine learning.

As part of a nine-month TopLink demonstration project conducted under the auspices of the European Commission's SESAR 2020 program, Thales says it was able to decrease the impact of weather on airport capacity by 15 percent and estimated time-of-arrival uncertainties by 75 percent, to approximately ±3 minutes from ±12 minutes, according to preliminary data.

The project, which officially ended in September 2016, involved four airlines – Air Corsica, Air France, Brussels Airlines and Hop! – as well as ANSPs from Austria, Croatia and France and Charles de Gaulle and Paris Orly airports. The big data captured by Thales included worldwide weather information provided by Meteo France (France's national meteorological service) as well as aeronautical and flight information from airlines and airports.

"We're moving air traffic management from stovepipes to information-sharing and looking at trends to be able to do tactical management," said Mark Palmer, innovation director for ATM with Thales. He compared the nascent "digital transformation" of ATM to the early days of Google Maps, which started as a simple map in 2007 but has grown into an application that takes disparate data and generates outputs that are useful to consumers. "This is about bringing all the data into a single system and doing something smart with it," he said.

2018

EUROCONTROL's Maastricht Upper Area Control Center and the members of the iTEC Alliance (Germany's DFS, Spain's ENAIRE, and the U.K.'s NATS) signed a Memorandum of Understanding to jointly develop components to enable interoperability between their ATM systems in service of the SES project. The March 2018 MoU would enable the joint development of the Flight Object Manager (FOM) and System Wide Information Management (SWIM) node to allow future flight trajectory data exchange, something essential to the SESAR concept. European Commission Common Project legislation dictates that this functionality is to be implemented by 2025.

In April 2018, EUROCONTROL experienced a major issue with its Enhanced Tactical Flow Management System (ETFMS). The outage of the service meant that flight plans filed with the service were lost and had to be refiled with the agency. The ETFMS outage was caused by an incorrect link between new software testing and live system operation, leading to the loss of all current flight plans. It was announced that due to contingency procedures, safety was not compromised at any time.

Lyon-Saint Exupéry became France's first Airport Collaborative Decision Making (A-CDM) installation in May 2018. The A-CDM concept makes it possible for airport partners (ANSs, airlines, ground handlers, and airport operators) to collaboratively make operational decisions in order to optimize airport functions.

In the aftermath of the ETFMS outage, a contract to develop, maintain, and support the Network Manager Operations Center systems was signed by the Sopra Steria Consortium (composed of Sopra Steria and Eurocity). The May 2018 contract would task the Sopra Steria Consortium with developing software in EUROCONTROL's ETFMS flight and integrated Initial Flight Plan Processing System domains. In addition, the Innovdata Consortium (composed of Cegeka and Thales) was contracted to provide software assistance for the ENV (Airspace Environment) system. The contracts for the systems were split in order to provide greater agility in facing complex IT challenges. Contracts were for an initial five-year period, with two optional one-year period extensions.

Also in May 2018, EUROCONTROL signed a contract with Thales Belgium to set up and manage security services. The contract followed the placement of cyberattacks as second on a list of the dangerous events most likely for 2018 in the World Economic Forum's Global Risks Report.

EUROCONTROL wishes to incorporate "big data" computation as part of its post-operational analysis and business intelligence activities. This effort, known as Sector Opening Table Architect, was organized under the organization's ATC2ATM Program, which is designed to bridge gaps between ATC functions and air traffic flow and capacity management to achieve further transit volume and efficiency. Planned tasks for the Sector Opening Table Architect tool will include "historical controller workload reports, assumed traffic loads, traffic bunching and clustering, unanticipated traffic, weather data, slot adherence data, STRATFOR predictions, and other data points." EUROCONTROL announced Sector Opening Table Architect in June 2018.

In September 2018, EUROCONTROL and NATO announced an agreement to work closer to enhance flight efficiency, airspace capacity, and military mission effectiveness with an eye to maintaining balance between economic and defense requirements. Details on the agreement were not disclosed, but it is said to build on a Memorandum of Cooperation (MoC) signed in 2003 and a practical working arrangement established in 2014. The two bodies were joined by the Civil Air Navigation Services Organization (CANSO) in Europe, which also sought to handle airspace capacity issues. This collective action was founded on the assumption that traffic is expected to grow 1.9 percent per annum over the next 20 years and the fact that real-world delays reached a record high in 2018.

As part of the move toward SES, EUROCONTROL and the A6 Alliance of ANSPs (composed of Germany's DFS, Italy's ENAV, Poland's PANSA, Spain's ENAIRE, the U.K.'s NATS, and a joint consortium of France's DSNA and Switzerland's Skyguide) released a white

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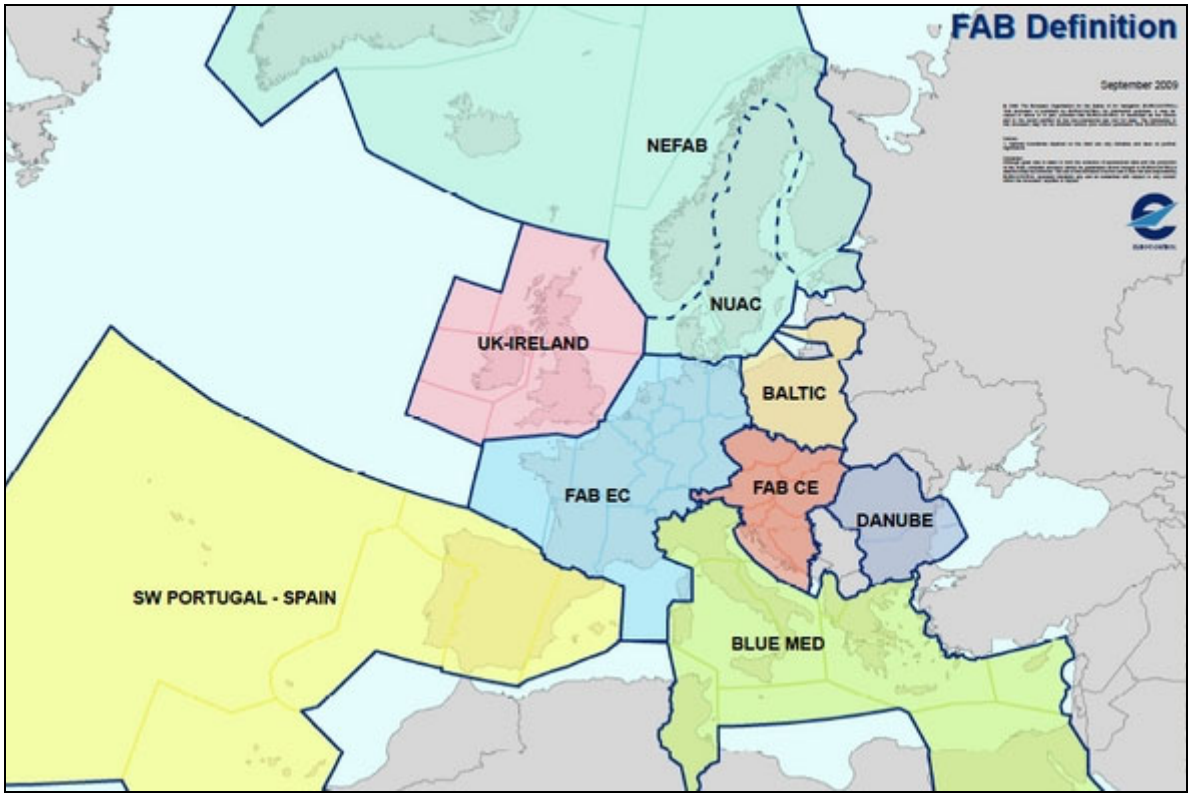
paper to launch a joint initiative to establish a "digital backbone" for Europe's ATM systems and technology. The white paper, released in September 2018, called for the SES digital backbone to underpin essential data exchange infrastructure in order to create an over-arching framework for all SES implementation projects. The initial plans would build on the NewPENS approach in order to expand to other key system projects like datalink and SWIM components.



The Functional Airspace Blocks (FABs) of Europe

Source: EUROCONTROL

Funding

Date	Funding Summary
Jul 1989	European transport ministers release $64.2 million, four-year budget to set up EUROCONTROL, an ATC centralized information system, in Brussels.
Sep 1989	$5-$10 billion deemed by Association of European Airlines (AEA) to be required for startup of ATC modernization/integration program.
Mar 1992	$612,000 ECAC aid approved for new Eastern European members.
Jun 1993	$28 million budgeted by EC to develop standardized European ATC system.
Jun 1996	$123 million budgeted for PHARE (Program for Harmonized ATC Research in Europe) program over 10 years, with EUROCONTROL providing 50 percent and the partners sharing the rest.
1999	Central European Air Traffic Services (CEATS) to be funded by a joint venture of the service providers in each member nation. Expected to be worth more than $100 million.

Date	Funding Summary
Apr 2000	European Commission, European Space Agency, and industry given the go-ahead, with an initial EUR100 million ($89.5 million) in funding, to prepare for a private-public partnership to develop and deliver Galileo, Europe's contribution to the next-generation Global Navigation Satellite System.
Jun 2005	EUR60 million ($76.6 million) allocated in support of the Definition Phase of the SESAME program.
Nov 2005	SESAR is launched. The Definition Phase (2005-2008) was awarded $50.4 million in funding. It was funded jointly by EUROCONTROL and the European Commission under a Trans-European Network Transport Plan. The Development Phase began in 2008 and ran to 2013, and the Deployment Phase began in 2014 and would run to 2020.
2006	The Clean Sky JTI research and technology program was allocated a budget of about EUR1.6 billion ($2.4 billion) over seven years. Clean Sky was officially launched in Feb 2008.
Feb 2007	The SESAR Development Phase was backed by EUR2.1 billion ($3.3 billion) from the EC, EUROCONTROL, and industry.
Jun 2009	The SESAR JU signed 16 contracts, worth EUR1.9 billion, for development of the new European ATM system over a period of seven years.
Feb 2014	The EC announced that it was supporting the CS with funding from the Trans-European Transport Network.

Worldwide Distribution/Inventories

The ATC – Europe report is restricted to the area covered by the member states of **EUROCONTROL**.

Forecast Rationale

EUROCONTROL is implementing the Single European Sky (SES) initiative as part of its efforts to streamline air traffic control in the region and increase airport capacity. Under a set of incremental changes and technology enhancements, efficiency, capacity, and safety are set to improve significantly. These steps are laid out in Service Levels running from 0 to 5 that began to come into effect in 2008.

The SES initiative is moving slowly. For example, a datalink is central to the SES research program SESAR. But analysis of the technical capabilities pursued by EUROCONTROL – based on VDL Mode 2 and the Aeronautical Telecommunication Network – has raised serious concerns over performance degradation and reliability.

EUROCONTROL director general Frank Brenner acknowledges the "difficulties" surrounding initial deployment of a datalink in Europe.

Constructing a single ATM system like the SES is a daunting task, with delays inevitable. Consequently, the SES program can be expected to be implemented at a steady but slow pace.

EUROCONTROL: 2019 through 2020

Following on from a March 2018 MoU, EUROCONTROL and the iTEC Alliance signed a collaboration agreement in March 2019 to help meet growing air travel demand. The collaboration would see joint development of the FOM and the SWIM node, which will underpin future SES exchanges of flight trajectory data.

A Dassault Falcon 20 research aircraft took flight in March 2019 equipped with a fully functional L-band Digital Aeronautical Communications Systems (LDACS) demonstrator. This marked the first test flight of LDACS, a future terrestrial datalink technology. The testing was set up within the MICONAV German national project that includes Rohde & Schwarz and a consortium of iAd GmbH and BPS GmbH, and is directly relevant to a SESAR 2020 program under Project PJ-02-01 (Future Communication Infrastructure Terrestrial Data Link).

EUROCONTROL was reappointed as the European Network Manager for air traffic functions of SES in May 2019. This sets up EUROCONTROL to manage SES functions for the period 2020 through 2029.

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In mid-June 2019, Naviair and Austro Control became the first ANSPs to migrate to the NewPENS system, marking the first step in the transition from PENS to NewPENS. Around 100 locations across 47 countries and 41 ANSPs in EUROCONTROL will eventually be connected through NewPENS.

In July 2019, EUROCONTROL announced that beginning in December 2019, military air traffic controllers of the Belgian Ministry of Defense and civil controllers at the Maastricht Upper Area Control (MUAC) center would be using the upgraded MUAC ATM system, known as Shared ATS System (SAS2). This would coordinate efforts between civil and military air traffic management.

EUROCONTROL began pre-operational demonstration of ADS-C data transmission in late July 2019. At the time, it was announced that Air France, British Airways, Iberia, Novair, Thomas Cook Airlines, and Wizz Air would soon join the demonstration efforts. The initial testing was conducted in EUROCONTROL's MUAC area, with 24 controllers participating.

In August 2019, EUROCONTROL made its first digital AIS data set available for public review. The data set comprises the first examples of the necessary data coding specifications that EUROCONTROL is developing using the Aeronautical Information Exchange Model (AIXM). A similar set of guidelines for the Obstacle data set is being developed, and the issuance of coding rules for Instrument Flight Procedures data sets is to follow. The EUROCONTROL specifications were set to be released after a formal consultation process that was to be started toward the end of 2019.

In September 2019, EUROCONTROL released its 2018 Network Manager Annual Report. In it, EUROCONTROL revealed that European traffic was up 3.8 percent over 2017, with more than 11 million flights conducted for the first time.

October 2019 saw EUROCONTROL's MUAC and NATS begin cross-border arrival management, dubbed XMAN, for London Gatwick Airport. Cross-border arrival management is a key part of SESAR 2020 Project PJ25 – xStream.

EUROCONTROL released the European "ATM Master Plan Level 3 Implementation Plan" and report in October 2019. The main planning tool for setting Europe's ATM priorities and developing a shared vision for SES, the Master Plan is structured into three levels: Executive, Planning & Architecture, and Implementation.

In November 2019, Poland became the 18th member state to implement EUROAT, the EUROCONTROL Specifications for Harmonized Rules for Operational Air Traffic under Instrument Flight Rules. A further eight member states announced their intention to join EUROAT by the end of 2020, and in late January 2020, Norway became the 19th member state to implement EUROAT.

As of December 2019, the MUAC center began offering H24 free route airspace for the Belgium, northwest Germany, Luxembourg, and Netherlands area above FL245. This includes cross-border options with Germany and the Danish-Swedish functional airspace block. The development is part of the Functional Airspace Block Europe Central (FABEC) concept of operations, and is designed to ease traffic control operations through efficiency gains.

Also in December, members of the SESAR Deployment Alliance – airspace users, airports, ANSPs and the EUROCONTROL Network Manager – submitted a joint letter to the European Commission proposing a new partnership to manage the modernization and digitalization of the European ATM system. The EC was expected to launch a Call for Proposals in the first half of 2020 to put in place a new partnership for deployment as of January 1, 2021.

Before the end of the year, the 2020 edition of the European ATM Master Plan had received formal approval by the administration board of the SESAR joint undertaking.

On January 1, 2020, EUROCONTROL began using "actual route flown" (as recorded by the EUROCONTROL Network Manager) to establish the distance factor used in the calculation of route changes. The month also saw EUROCONTROL launch the new release of ARTAS, its ATM surveillance tracker and server. ARTAS 9.0.0 introduces new community-sourced features and addresses over 60 user-reported issues.

In February 2020, EUROCONTROL launched what it called its "largest-ever Call for Tender" to replace the operational systems used by the EUROCONTROL Network Manager. The goal is to move the Network Manager's legacy systems toward digital products based on an open digital platform.

Also in February, Aireon and EUROCONTROL signed a 10-year agreement for the provision of space-based ADS-B data. This followed several other space-based ADS-B data deals Aireon signed with international air traffic management providers during 2019.

EUROCONTROL released a statement in March 2020 confirming that a staff member at the MUAC center had tested positive for COVID-19. This was the first announcement that COVID-19 was making an impact

on European ATC capabilities. Over the coming weeks, as the virus continued to spread, people chose not to fly for safety reasons and airline flight numbers dropped worldwide, with traffic swiftly falling in the European area.

As of March 29, 2020, EUROCONTROL had ceased providing repetitive flight plan (RPL) service in its Flight Information Regions. This was a planned event designed to ensure that information such as aircraft registration; the 24-bit aircraft address; the capability/status of onboard communication, navigation, and surveillance equipment; and more would be provided to the Initial Flight Plan Processing System (IFPS) for distribution to ATS units.

In April 2020, as part of a move to alleviate the mounting difficulties facing airlines in the wake of COVID-19, EUROCONTROL member states agreed to a EUR1.1 billion package to defer ATC fees. EUROCONTROL revealed that daily traffic in the European airspace had declined 90 percent, and the dramatic reductions were likely to continue for some time to come. By deferring fees, EUROCONTROL hoped to reduce the financial burden on struggling airline operators.

In July 2020, despite the low number of flights taking place in Europe as a result of COVID-19, EUROCONTROL released EUROCONTROL Network Manager update 24.0, which it called a significant update to the software. The 24.0 update:

1. Supports enhanced management of priority flights.
2. Enhances the models for Free Route Airspace and interfaces for airspace utilization.
3. Improves data exchange between EAD and NM systems.
4. Makes the advanced flexible use of airspace even more dynamic.
5. Improves the "dynamicity" of air traffic flow and capacity management processes.
6. Takes a further step toward 4D trajectory management through the gradual implementation of FF-ICE (Flight and Flow Information for a Collaborative Environment).
7. Helps operational stakeholders meet the regulatory requirements of the Pilot Common Project.

The update was the first of several progressive steps toward the integrated Network Management (iNM), the EUROCONTROL Network Manager's new program.

In November 2020, EUROCONTROL's Experimental Center at Brétigny announced an initiative to create a European Network of Innovation Labs, with Brétigny acting as an Air Transport Innovation Hub. These labs are designed to accelerate innovation and "the uptake of digital SESAR solutions in aviation." The initiative envisions 20-30 labs at different locations across Europe dedicated to aviation stakeholders and aiming to improve the way EUROCONTROL serves and connects its operational partners. Meetings to establish this network took place between October 2020 and March 2021 with seven European airlines (Air France, easyJet, Ryanair, Swiss, Transavia, Vueling and Wizz Air).

In December 2020, EUROCONTROL was recertified by the EASA as an Air Navigation Service Provider for "the provision of AIS with EAD."

In March 2021, EUROCONTROL's MUAC successfully implemented a major overhaul of its airspace sector layout, which now better meets the European concept of free route airspace. The revamped airspace sector organization is designed to better support higher traffic levels as soon as commercial schedules resume. Benefits include a reduction in flight planning restrictions and the creation of several shorter flight-plannable route options. Simulations predict that, on the basis of pre-pandemic traffic, the change will, according to MUAC, "bring a weekly CO2 saving potential of 6,700 kilograms and offer flight-plannable gains of 280 NM." These savings are either directly achievable through explicit changes in the European Route Availability Document (RAD) or readily available thanks to improved alignment between sector boundaries and specific free route airspace (FRA) trajectories.

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