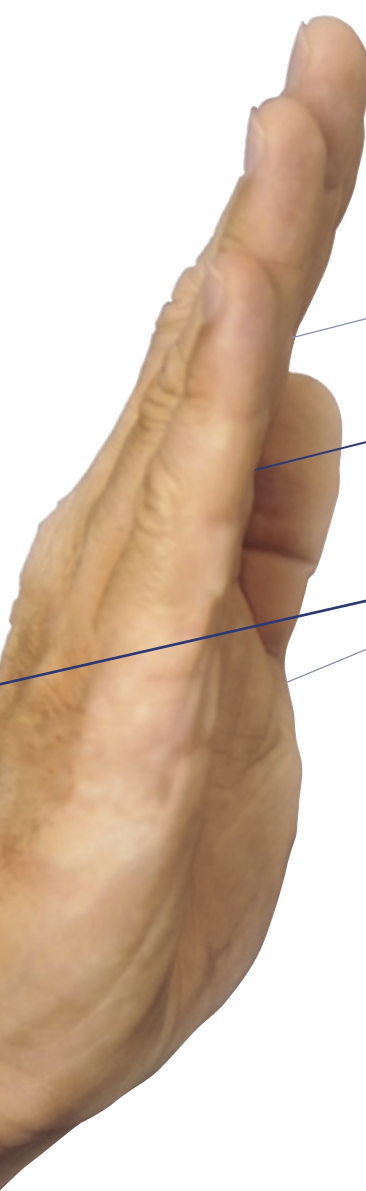




# FAB Europe Central

An Introduction





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## A NEW FLIGHT PLAN

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The sky above Europe is changing. The Treaty signed in December 2010 by six European States – Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland – represents a major step in harmonising what was once a diverse, multi-national and multifunctional airspace. The Treaty forms the legal framework for the implementation of a major part of the Single European Sky and covers the so-called Functional Airspace Block Europe Central or FABEC. The aim is to streamline routes, increase efficiency and cost-effectiveness, ensure capacity and reduce pollution within the airspace of the signatories of the Treaty.

FABEC traces its roots quite far back, but a key event in its history occurred in November 2008. A high-level group of civil and military air traffic officials from the six countries involved met in Bordeaux, France, and declared their intention to jointly reorganise air traffic management across national boundaries and according to existing traffic flows. FABEC serves as a perfect model, since it involves an area that carries the highest proportion of air traffic over the continent, and some of its most complex. Besides having to converge from various points of the compass, civil flights also have to share airspace with military aircraft.

Implementing FABEC is by no means a simple task, but it is a necessary one, which is increasingly being driven by global developments. A century ago, the air was literally empty, barring birds, the occasional hot-air balloon or Zeppelin, and a few hardy aviation pioneers. Things have changed considerably and each successive plan to maintain order in the skies has been subjected to the natural evolution of all systems. Today, a vigorous economy and a very real need for efficient mobility face an infrastructure mainly built up on the political landscape from the last century. It is time for a sustainable change and FABEC fits perfectly into the continuum of air traffic development in Europe.

One fact is incontrovertible: air traffic is growing. Current forecasts for 2016 suggest an increase from about 5.5 million up to some 7 million movements per year for the FABEC area alone. The organisations responsible for air traffic control must maintain their excellent safety track record, while ensuring capacity, punctuality and cost-effectiveness. The other concern is the environmental footprint of the industry. This brochure takes a look at the current situation in the air and on the ground. It will explore the requirements of the players involved, and describe how FABEC is meeting their demands. It will also expose some of the measures that are already in place and the developments that need to be completed in the wake of the signing of the Treaty in December 2010.

## THE SKY OVER EUROPE

When flying over Europe, the sky always looks empty. The space seems immeasurable, literally eternal. That's because a large and intricate system is in place on the ground ensuring that aircraft can move about freely, on schedule and with enough space on all sides to be safe.

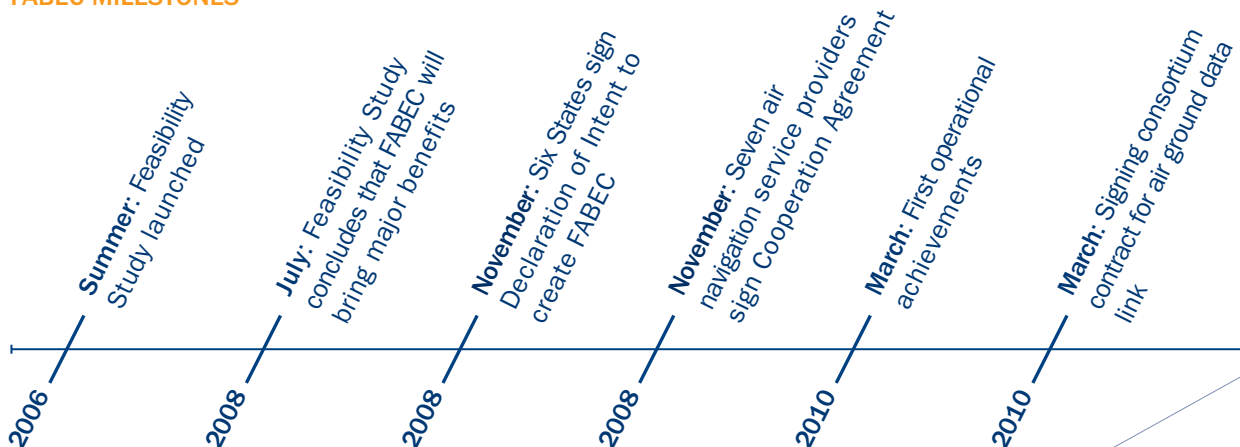
Air traffic control is the key to the safe and swift movement of aircraft. Highly skilled personnel and a variety of computer systems currently guide aircraft from sector to sector and across national borders, ensuring that they do not interfere with other flights that may be landing, taking off, or merely passing overhead. The men and women who ensure smooth operations must not only keep in mind the various altitudes and trajectories to guarantee safe flying, but also the aircraft themselves. The airborne fleets include anything from new Airbuses, older model Boeings, to business and regional jets by Bombardier or Saab.

There are many other elements that complicate matters. Some are unpredictable, for example, the weather. Others demand additional computations, like the areas above and around military air bases that are reserved for training pilots in their high-speed aircraft. Civil aircraft in the past mostly had to skirt these areas and avoid accidentally crossing borders. And finally, FABEC's air navigation service providers (ANSPs) are mainly organised on a national basis using their own technologies and individual processes when controlling the skies: ANA (Luxembourg), Belgo-control (Belgium), DFS (Germany), DSNA (France), LVNL (Netherlands), skyguide (Switzerland) and Maastricht Upper Area Control Centre.

The system is complex and costly, not only in terms of money, but also in terms of punctuality and environmental impact. The factor that is making a change imperative, however, is the steady and strong growth in air traffic over Europe since the 1990s, growth that was only slightly and temporarily impeded by the recession of 2008-2009 or spontaneous events like the ash cloud crisis. The drivers here are a rise in air cargo and, in particular, business travel. Thanks to sharp competition among airlines, cost for private travel has also dropped considerably over the past decades, with a corresponding rise in private air travel, individuals who take weekends in Rome or go shopping in London for a day or so. By the year 2016, the number of aircraft sharing FABEC airspace is estimated to increase from 5.5 million to approximately 7 million movements per year. In other words, the sheer amount of air traffic will have to be accompanied by a substantial increase of capacity.

The authorities have not ignored the problem. Far from it: at the end of the 90s, the European Commission launched the Single European Sky (SES) initiative as a way to meet the challenges facing air traffic management in the future. SES now involves the 27 nations of the European Union and 11 non-EU nations, including Switzerland. The objective is essentially to "restructure European airspace as a function of air traffic flows rather than according to national borders" to create

### FABEC MILESTONES





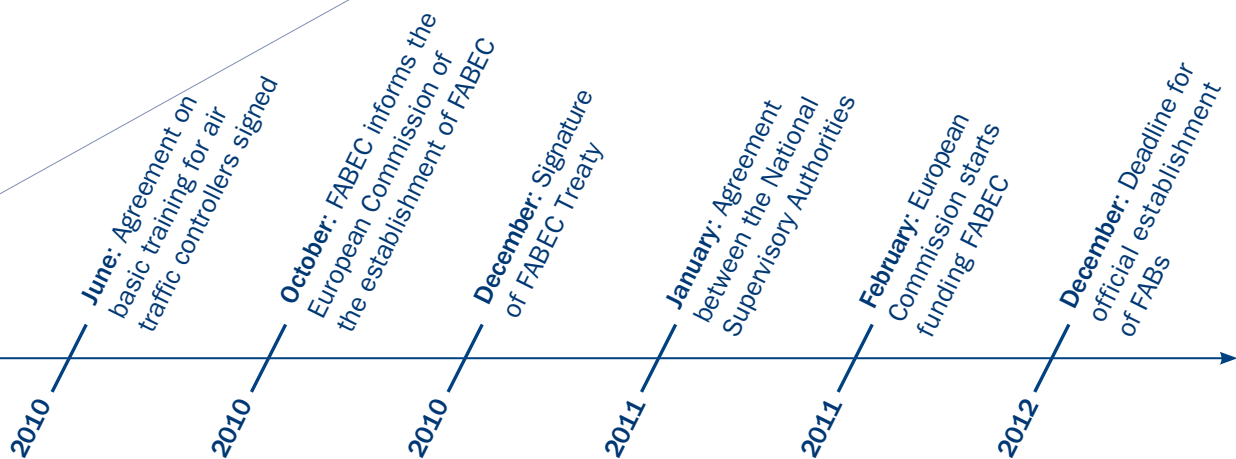
Nantes Airport, France

functional airspace blocks (FAB). The largest and most ambitious project is FABEC, the Functional Airspace Block Europe Central, which covers six States – Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland. The United Kingdom is acting as a collaborative partner because its airspace is adjacent to FABEC airspace and London serves as a major air traffic hub.

The FABEC area is particularly challenging. This 1.7 million square-kilometre area of Europe is used currently by about six million flights per year. This is comparable to the northeast of the US – the area around New York and Washington. FABEC represents around 55% of all flights on the European continent. The routes are complex and frequently involve several national airspaces; FABEC also comprises some of the world's largest airports, notably Charles de Gaulle in Paris, Amsterdam and Frankfurt. In addition, there are about 400 military or special airspaces, so suddenly the big sky seems a lot smaller. An aircraft flying from London to Munich, for example, might move across French, Belgian and Luxembourg airspace before entering German airspace. All the while, it will have to be integrated into heavy north-south traffic, synchronised with climbing and landing aircraft, and rerouted around restricted areas. So implementing FABEC is not a question of pulling a few switches. It is a process that has taken years of intense cooperation by many organisations and individuals and will continue to do so as it evolves.



Tower Geneva, Switzerland



## GOALS AND PLAYERS

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Mobility, once a privilege, has become a necessity in our society today. From business travellers to vacationing families, everyone expects rapid and efficient travel, preferably on time and, above all, safe. The expected growth in traffic, however, was seen as jeopardising the stability of the current system. Hence, an SES II package was agreed upon by the European Parliament as the way to take service quality to a higher level by setting high operational standards.

The air transport sector involves a number of players who, at times, may have conflicting interests. The passengers have rather straightforward needs; they wish to travel on time and safely. The airlines, including logistics firms, are in competition with each other and interested in lowering costs and increasing revenue and market share to maximise profits in their special segment. Governments, for their part, have to ensure that long- and short-term policies are being carried out and that regulations are being complied with. This not only applies to safety rules, but also, for example, to environmental standards, which are becoming stricter. Last, but not least, there is the other big player in the skies, namely the military, which needs space for training to ensure mission effectiveness.

### One horizon for all

Common ground was found in the operational necessities of having to cope with the expected traffic increases. A fundamental change in approach was required rather than business as usual. This called for some concrete plan with which to work. In 2006, a group of up to 230 experts from various ANSPs launched an 18-month feasibility study that integrated the views of all the stakeholders. Based on a set of objectives to ensure that FABEC would address the issues mentioned above, a set of proposals was agreed to meet those objectives and bring FABEC in line with the requirements of SES.

The one overarching issue that allows no compromise is safety, of course. FABEC must guarantee the same high levels of safety – or higher – as ever. As for cost savings, the feasibility study revealed that the best strategy lay in optimising airspace design, i.e. improving flight profiles and ensuring punctuality in arrivals and take-offs. In addition, uniform technologies and further cooperation in training would also contribute to savings but hardly as much.



Geneva Airport, Switzerland



Le Bourget Airport, France

What FABEC did change fundamentally, however, was the role of the military. For the first time, the concerns and needs of the air forces were also taken into consideration and integrated into a broad concept of air traffic management. In fact, military personnel have always been actively involved in designing FABEC's airspace. Cooperation is in fact crucial, since the most sustainable way to really make civil flights more efficient is by allowing them to use military airspace. By the same token, FABEC aims to improve mission effectiveness, which is quite a tough criterion for success.

## On the runway

The targets defined by the study are not set in stone, rather they are seen as initial benchmarks and a means to trigger important improvements in the existing system. They also pave the way to the next step, namely preparing a common FABEC performance plan to set concrete targets for the years 2012-2014 in the areas of safety, costs, environmental impact and capacity consistent with the EU-wide goals that the Commission set in cooperation with Member States at the end of 2010. Furthermore, military mission effectiveness will also be part of the performance measured. Based on objectives defined in the common performance plan, FABEC partners will steer the programme and contribute their share to the ambitious European objectives.



Brussels ACC, Belgium

FABEC has evolved organically as a performance-driven programme with precise targets and milestones. Its various initiatives and solutions are in many cases self-sustaining – airspace re-design leads to lower costs and reduced environmental impact for example. Like a jigsaw puzzle the whole picture is becoming reality by putting thousands of pieces together. Although all details are not visible yet, it is clear that FABEC is a solution that will function at operational, technical, legal, financial and regulatory level. And first achievements are visible. Some projects have already been launched that are showing encouraging results.

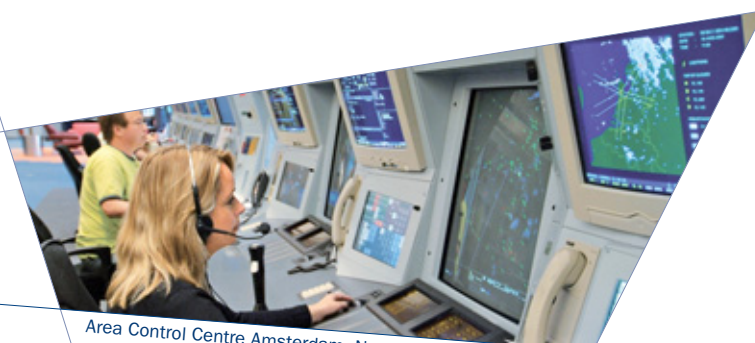
Traditionally, the gap between military and civil needs has always appeared unbridgeable. Today, FABEC has about 400 restricted airspaces spread around its area. Each one represents a fixed point that must be calculated into civil routes. Civil and military needs are in fact in a kind of competition. But, for some time now, change has been visible.

From the beginning, FABEC has set a new and unique rapprochement between the civil and military air navigation service providers (ANSPs). Both parties came together at one side of the table. A new approach setting the scene for creative solutions built up on trust and common goals. Of course, this development needs time – but it is based on sustainable roots. Civil-military cooperation began in Germany long ago, for instance, with military personnel given leave for civil duty, and civilians controlling military flights – albeit not where national security is concerned. A similar process took place in Switzerland. In France, military personnel are currently being introduced into civil control centres, and in Belgium proposals are on the table to do the same. The Netherlands have declared their intent to shore up civil-military cooperation. So cooperation inside FABEC is made by people working together.

### Night-time savings

Bringing the military on board has permitted a number of projects to be carried out on the way to implementing FABEC, including the so-called Night Route Network. The routes for night-time aircraft operators, in particular cargo carriers, were straightened out, as it were. Focus was on reducing the distances flown between the major cargo airports Paris, Liège, Cologne, Leipzig and Amsterdam.

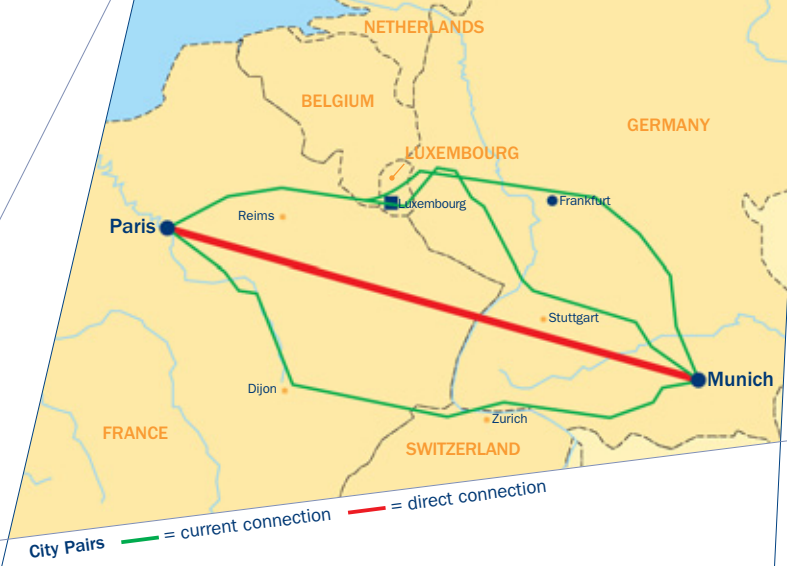
Why is the military an important player? Because air bases tend to close during the night, and all civil aircraft are allowed to fly over what used to be restricted airspace forcing them to skirt around the zone. The flights must be registered a day earlier, but this can be done far more efficiently than previously. A total of 189 proposals were made for the Night Route Network, to date 115 have been implemented. This enables the airlines to reduce the distance flown by about 800,000 nautical miles, which corresponds to 4,800 tonnes of fuel saved, or reduced emissions of 16,000 tonnes of CO<sub>2</sub>.



Area Control Centre Amsterdam, Netherlands



Luxembourg Airport, Luxembourg



## City Pairs

The concept of the City Pairs is similar to the Night Route Network – with a few big challenges added, like a high traffic volume during daytime and lots of military activities. Regular frequent flights between certain major cities were examined carefully to determine whether their routes could be shortened. The military has to be involved in order to determine which military airspaces can be used and when. While a longer period of observation will be needed to determine exact figures, enough data has already been collected to suggest that relatively small changes can have quite a large cumulative effect on lowering emissions and saving fuel. One concrete example is the connection between Paris and Munich, which was tested from November 2009 to July 2010. The route was reduced by 34 nautical miles, saving on average 204 kg of kerosene and 680 kg of CO<sub>2</sub> per flight.

## As on earth

Perhaps the most representative idea of what air-space design might look like in the future is the AMRUFRA project. The acronym refers to Amsterdam East sector, Ruhr sector and the Langen sector near Frankfurt am Main, a particularly busy zone in FABEC. The project was implemented by the combined forces of DFS, LVNL, Maastricht UAC and the Dutch and German military. The departures from Frankfurt and Amsterdam were split laterally and optimised. This was achieved by removing virtually the national borders and redistributing the routes between the Netherlands and Germany. A crucial aspect was negotiation with the military to reshape a military airspace located near the border to form the first Dutch-German military Cross Border Area (CBA). Although it is a relatively small piece of airspace, a change in the German Constitution was necessary to complete the project. In fact, AMRUFRA is an excellent example of what FABEC demands from Member States because it combines operational solutions with a legal framework – and implements the idea of air traffic management across national borders.

City Pairs, Night Route Network and AMRUFRA are examples of FABEC at work, and they have already provided measurable results. Ulrich Schulte-Strathaus, Secretary General of the Association of European Airlines, praised AMRUFRA for providing “Increased capacity – fewer delays – lower costs – lesser environmental impact”. As FABEC evolves, the number of such projects will grow and serve as a means to maintain a learning curve. At some point, however, governance becomes an important issue.



## THE HIGHER LEVELS OF COOPERATION

From the standpoint of its people, its languages and its cultures, Europe is indeed a fascinating patchwork continent. Without losing any of its diversity, however, it has managed to create a single market and to break down custom barriers. By signing the FABEC Treaty in December 2010, the idea of the Schengen Agreement is now becoming a reality in the core of the European airspace. AMRUFRA, City Pairs and Night Route Network are the first visible steps. These projects with very specific scopes demonstrate that the theoretical can be made practical. Like the pieces of a large puzzle, they will gradually fall into place to produce a bigger picture.

### Free flow

What is already clear, however, is that the key to achieving the performance level required by the EU is to find joint solutions for the existing bottlenecks. They are mainly located at the intra-FABEC boundaries where dense traffic flows and military requirements collide with the nationally-oriented organisation of air navigation services. So cooperation on many levels, civil-military, for example, and among various national air navigation service providers is a must. A number of airspace redesign projects were launched, starting geographically in the south at the border triangle formed by Switzerland, France and Germany, and following the route to the north along the German borders to Luxembourg, Belgium, the Netherlands and up to the German Bight in the North Sea. Together with its British partners, FABEC is also redesigning the dense route structure between south England and the Continent – a historical bottleneck known as the FABEC/Dover interface. These particular airspace programmes, which will be implemented in the coming years, are major stepping stones on the way to elaborating larger airspace design strategies within FABEC boundaries as well as on its borders.

These operational projects demand a complete redesign of the airspace under consideration, the dissolution or modification of some military areas and – in one particular case – creation of a joint Franco-German military airspace. Some of these projects may seem fairly straightforward in their conception, but executing them is a fairly complex business. Simulations of the interface between FABEC and the southeast of England (Project West), for example, will begin in 2011. Three routes instead of two are to be introduced between the UK and the control centre in Reims, France. In a second phase, a military cross border zone, which is currently used by the Belgian and French military, will be reshaped. Thanks to the principles of the flexible use of airspace, routes here can be optimised further. Implementation of these changes is scheduled for winter 2012/13 after they have been validated.

A typical win-win situation will arise from a military Cross Border Area created from the resectorisation and optimisation of airspace over the Netherlands and Germany. By 2015 at the latest, a military area located near Arnhem will disappear. At the same time, the military will be given a section of airspace mainly above the North Sea large enough to accommodate training for the brand-new Eurofighter.



EUROCONTROL Maastricht



Langen Control Centre, Germany



Upper Area Control Centre

## How to use the airspace best

Redesigning airspace is just one of the key strategies to be implemented in FABEC. The other is optimising existing networks and managing traffic flows to make them more efficient. Today thousands of flight plans are managed by the Central Flow Management Unit of EUROCONTROL covering an area extending from the Urals to the Azores and from Sicily to the North Cape. While keeping a bird's eye view is important, there is room for improvement.

In December 2009, the first FABEC trials in a combined civil air traffic flow management and military airspace management took place to validate a centralised function that could provide detailed pretactical planning to schedule flights more efficiently. The idea is to establish a "unit in between", as it were, to carefully plan flights one to seven days ahead of time. By using common tools, the FABEC partners can easily design rapid solutions to relieve an overloaded sector, or reroute aircraft to less frequented routes or sectors. They, after all, are especially familiar with their own airspace and when and where bottlenecks might arise. The new system will be tested live in the summer of 2011.

## Infrastructural considerations

Nowhere in air traffic is the image of a patchwork truer than in the technical infrastructure. Compliance with the FABEC roadmap and benchmarks means that legacy systems will have to be phased out on the basis of the existing investment and depreciation cycles to avoid extraneous costs to airspace users. New systems will have to meet future interoperability requirements and also pave the way to more competitive common procurement strategies. And first steps are already in place. A contract on the establishment of a common Air Ground Data Link infrastructure has been signed. And the first common technical FABEC specification has led to a first common procurement of voice communication systems. Again, cooperation is crucial for success, since the future technology needs to be planned, specified and validated by all parties.

## A new generation

In parallel with the convergence towards a common technical system, FABEC also requires a redesign of the training and qualification of air traffic controllers. Currently, the ANSPs involved have very different requirements for their students and a very different approach to training them. The research conducted in the course of the feasibility study shows that "a strong consensus on the training philosophy exists". And first steps have already been taken. ANSPs signed an agreement to introduce a common basic training for air traffic controllers. In addition, EUROCONTROL's Maas-tricht UAC will make use of the academies of the FABEC partners to train their air traffic controllers. And the German and Swiss air navigation service providers have launched initiatives to recruit trainees jointly. People are coming together to build up FABEC.

## FACTS AND FIGURES

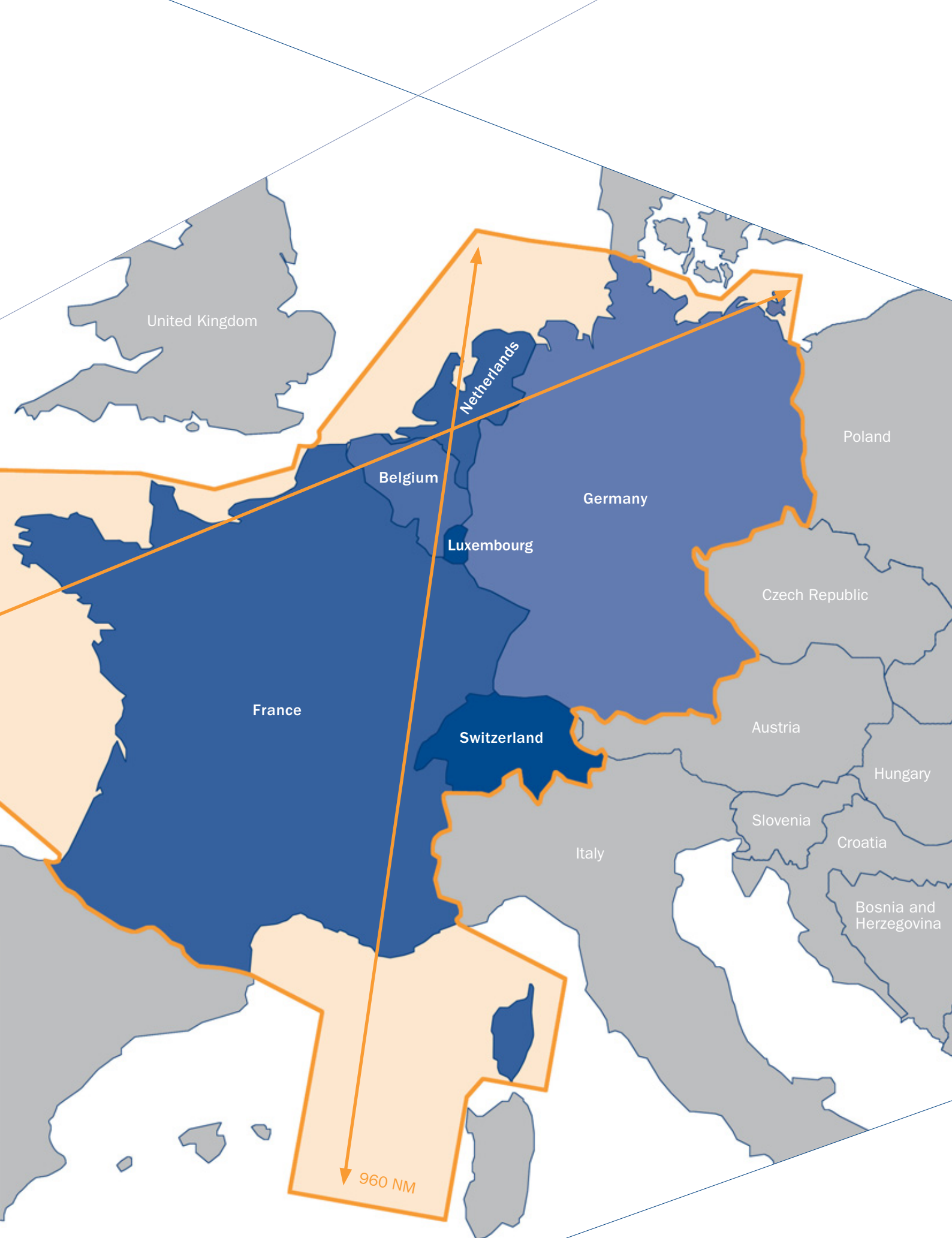
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The **Functional Airspace Block Europe Central** – **FABEC** – covers the lower and upper airspace of six States (**Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland**) located at the heart of the European continent. This airspace is one of the busiest and most complex in the world. Most of the large European airports and major civil airways and military zones are located in this area. Owing to its size and central position in Europe, FABEC is a cornerstone of the Single European Sky.

FABEC airspace is characterised by:

- a complex and dense ATS route network
- an area of 1.7 million km<sup>2</sup>, equalling 9% of the surface area of the European continent: the FABEC airspace has the dimensions of 960 NM (1,780 km) from north to south and 990 NM (1,835 km) from east to west
- 5.5 million flights per year, equalling 55% of all European air traffic
- traffic growth is forecast to reach close to 7 million flights by 2016
- about 400 military/special areas
- some 370 control sectors
- 14 area control centres (Brussels, Bordeaux, Brest, Marseille, Paris, Reims, Bremen, Munich, Karlsruhe, Langen, Maastricht, Amsterdam, Geneva and Zurich)
- some 240 airports operating Instrument Flight Rules (IFR)
- 3 major intercontinental hub airports (Paris, Amsterdam, Frankfurt) and proximity to the London airports
- a total of 17,700 civil employees, including 5,400 air traffic controllers, plus military staff





## THE FUTURE ON THE HORIZON

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**Is FABEC really new? Is it something unique and revolutionary? If it were, then it would not be the right solution for Europe's air navigation system.**

FABEC is an ambitious project, and it is the natural consequence of European integration and the rapid development of Europe's air travel. Its roots can be traced back to the 60s and 70s with the founding of control centres in Maastricht, Shannon and Karlsruhe. Barely three decades later, however, business and private needs converged to increase mobility. The result was overcrowding of European skies in the early 90s and chronic delays. This led to the decision to create the SES and reorganise air traffic along more sustainable lines. The inexorable unification of Europe provided the political impetus.

In the short term, the final steps for the establishment and implementation of FABEC will be taken. The ratification process of the FABEC Treaty is already ongoing. In addition to the Treaty, the States have in the meantime signed an agreement between the National Supervisory Authorities. This document covers aspects such as the supervision of air navigation service providers and the establishment of a FABEC performance management system. And the FABEC States have started to study the future institutional set-up and governance of air navigation services provision. Initial results indicate the need for a clear framework, including the creation of a common entity providing FABEC functions to enable the performance improvements required. States are aiming for a decision on this by summer 2011.

Beside those institutional questions, FABEC will deliver on the goals set by SES II – to provide capacity, avoid future bottlenecks, reduce costs and emissions, make flying more efficient and ensure military mission effectiveness, while maintaining the high safety standards that exist over Europe. It will do so by using synergies creatively and restructuring the current system to make it more streamlined and logical.

FABEC is being developed consistently and resolutely. Change is coming in well-defined and designed increments because today we have the means to project well into the future. Thus, FABEC will not only comply with the roadmap set out, meeting all its milestones and within budget, but it will also continue transforming itself as air traffic changes.



ACC Zurich, Switzerland

FABEC WILL KEEP  
PEOPLE MOVING.



**PHOTOGRAPHY**

- Belgocontrol, Belgium;
- Direction des Services de la Navigation Aérienne (V. Paul) (DSNA), France;
- DFS Deutsche Flugsicherung GmbH, Germany;
- Administration de la Navigation Aérienne (ANA), Luxembourg;
- Luchtverkeersleiding Nederland (LVNL), Netherlands;
- EUROCONTROL Maastricht Upper Area Control Centre (MUAC);
- skyguide, Switzerland

Leipzig/Halle Airport, Germany



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**DFS Deutsche Flugsicherung**

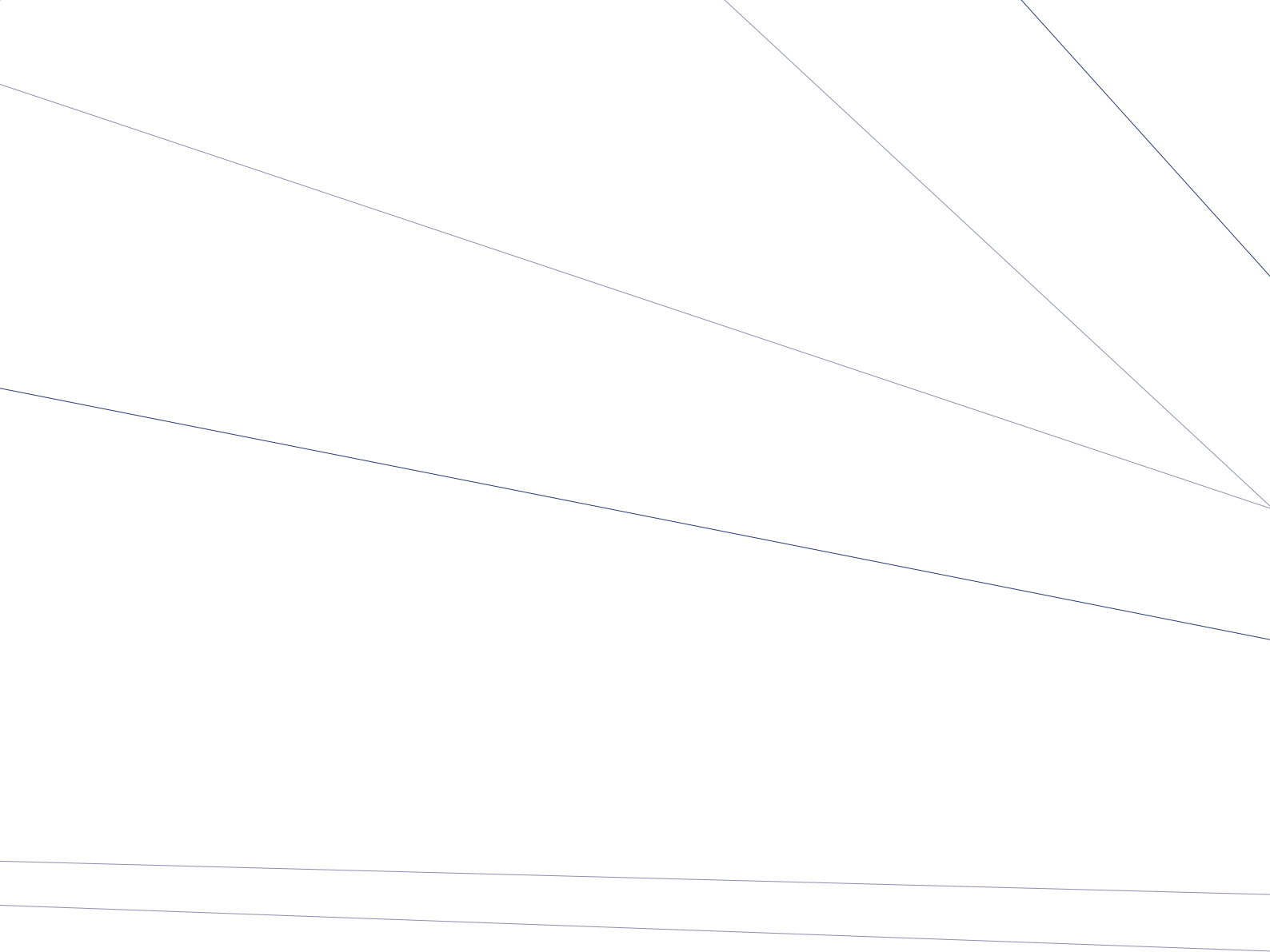
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