



International Civil Aviation Organization

WORKING PAPER

Reference to
AN-Conf/14-WP/89
28/06/24
English only

FOURTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 26 August to 6 September 2024

- Agenda Item 3: Air Navigation System Performance Improvement
3.1: Proposals to improve the efficiency of air navigation services contributing to LTAG

ENHANCING SEAMLESS AIR TRAFFIC MANAGEMENT BY ESTABLISHING A FRAMEWORK FOR CROSS-BORDER SERVICES

(Presented by Civil Air Navigation Services Organisation (CANSO))

Lines in the Sky

**Seamless Cross Border ATS: What
have we learned and why we
urgently need to make progress**

LINES IN THE SKY

**SEAMLESS CROSS-BORDER ATS:
WHAT HAVE WE LEARNED AND WHY WE
URGENTLY NEED TO MAKE PROGRESS**



**SHAPING
OUR
FUTURE
SKIES**

canso.org

Acknowledgements

This document was prepared by the CANSO Strategy and Integration Steering Committee.

In addition to the subject matter experts who contributed to the case studies, CANSO would like to thank the following organisations, whose representatives have invaluable contributed to the document:

- Firstfruits
- NATS
- LVNL
- FAA
- Bulatsa

Executive Summary

Aviation is an inherently international activity with organised traffic flows between major centres and between regions, and smaller flows providing broad connectivity. All of this supports the global economy and the movement of people and cargo. When things work well, it can all appear so seamless.

But while movements in the air are organised in predictable cross-border flows, the organisation and provision of air traffic management within the airspace itself remains largely a patchwork of different jurisdictions and service providers that mirror national boundaries.

It has long been recognised that organising airspace in line with technical and operational requirements will deliver operational benefits. ICAO Assembly Resolution A41-10 “Consolidated statement of continuing ICAO policies and associated practices related specifically to air navigation” Appendix G lays out a very strong commitment to, and guidance, for cross-border arrangements and delegations in the interest of “technical, operational, safety and efficiency considerations.” It considers both the delegation of all, or parts of, airspace to a neighbouring State, and even the joint establishment of “a single air traffic services provider to be responsible for the provision of air traffic services within ATS airspace extending over the territories of two or more States or over the high seas.”¹

Examples in line with the above remain the exception, but they do exist. This paper examines numerous instances in which cross-border air traffic services are operating (or are planned to be soon). These examples provide important lessons for how to navigate the complex arrangements needed.

The cases examined in this paper emerged for different reasons, including operational, political and economic. They don't all follow a single model for safety oversight, economic regulation or military coordination. They have very different governance models. But in each case, States persevered through complex arrangements, some of which took several years to resolve, with a strong focus on what made sense for the airspace.

It is hoped that this paper will both inspire stakeholders to examine opportunities for new or expanded cross-border ATS service arrangements with the potential to deliver benefit, and help illuminate successful models which offer valuable guidance on how to establish appropriate provisions. The cases could also be turned into a framework for future cross-border agreements at State and ANSP level reducing barriers to welcome change.

With sufficient will and commitment, it is hoped that new case studies emerge that will not take years. The imperative for cross-border ATS is changing, as airspace management performance needed to meet increasing capacity and sustainability requirements in the airspace and advanced concepts such as trajectory based operations require a higher level of seamless operations than have existed in the past.

¹ ICAO Resolution A41-10. Appendix G. “Delimitation of air traffic services (ATS) airspaces”

Contents

ACKNOWLEDGMENTS	2
EXECUTIVE SUMMARY	3
1. INTRODUCTION	
Purpose and Scope	4
Context	5
The Need to Remove "Lines in the Sky"	7
2. KEY CONSIDERATIONS: LESSONS LEARNED IN ACHIEVING SEAMLESS CROSS-BORDER AIR TRAFFIC SERVICES	
3. THE CASE STUDIES	
VALUE IN EXAMINING CASE STUDIES	18
TYPES OF CASE STUDIES EXAMINED	19
CATEGORY 1: SMALL BORDER ADJUSTMENTS	
Case Study: Static and Dynamic Cross-Border Arrangements for Geneva Airport	20
Case Study: FINEST	23
Case Study: DANUBE Functional Airspace Block	28
Case Study: United States-Canada Border Airspace	32
Case Study: NATS and Neighbouring ANSPs' ATS Delegations	34
CATEGORY 2: PROVISION OF ATS TO A NEIGHBOURING STATE	
Case Study: North Atlantic	36
Case Study: Bermuda	40
Case Study: Bahamas	42
CATEGORY 3: NEW ENTITY PROVIDING ATS IN MULTIPLE STATES	
Case Study: Roberts FIR	44
Case Study: ASECNA	48
Case Study: COCESNA	51
Case Study: MUAC	55
Case Study: Nordic Unified Air Traffic Control Company (NUAC HB)	60

1. Introduction

Purpose and scope

This publication has been produced by the CANSO Strategy and Integration Steering Committee (SISC SC) to highlight the gains available to global airspace performance from enhanced cross-border Air Traffic Services (ATS), removing any differences or constraints at the border to make the airspace truly seamless.

Cross-border ATS refers to the common provision of a service either side of a national border². It is not just that a similar service is provided, or some level of interoperability has been achieved in the customer experience – something achievable now through regulation and standardisation. It is the provision of an ATS service that crosses borders – either of a specific local scope, or a more national one.

ATS increasingly relies on integrated operations and underlying data services to deliver the required operational performance, enabling optimisation of trajectories for environmental and capacity purposes. But both ATS governance and operations are traditionally State-based, creating boundaries that are not optimised for traffic flows and demands and, in some cases, are unhelpful to them. Action is needed now to help overcome these barriers globally, enabling ATS to be better aligned to user needs to unlock both capacity and efficiency gains.

Encouraging the organisation of airspace and service provision in line with technical and operational requirements is the goal of this report. In many instances this goal could be served by increased use of cross-border arrangements.

This publication advances that cause by objectively examining examples of cross-border ATS service arrangements and identifying how the participants have managed to address common challenges, what can be learned from them, and making recommendations for the type of arrangements likely to deliver long standing successful arrangements.

Context

In exploring the issue of operational service provision across territorial boundaries, the legal framework and organisational structure enabling the seamless service is highly relevant.

The Convention on International Civil Aviation 1944 (“Chicago Convention”) states in Article 1 that each contracting State has “complete and exclusive sovereignty over the airspace above its territory”. Within this sovereign airspace, contracting States are also obliged to provide Air Navigation Services “to facilitate international air navigation in accordance with the standards and practices recommended or established from time to time...” as far as practicable (Article 28, Chicago Convention).

Article 28 of the Chicago Convention does not require States to provide the service themselves, but in enacting their responsibility, States must designate, regulate and supervise the service provision in accordance with the Convention and SARPs.

Designation therefore incorporates the right of control as a principle of the complete and exclusive sovereignty over the airspace above a State’s territory, and also refers to the responsibility to ensure adequate ATS. This is further established in ICAO Annex 11, which states in 2.1.1 that Contracting States shall determine those portions of the airspace where air traffic services will be provided and shall “arrange for such services to be established and provided in accordance with the provisions of this Annex”. States’ responsibilities are therefore of a regulatory and supervisory nature, and the designation process and structures put in place should enable this.

With the assurance of provision of adequate air navigation services being a State responsibility, this has historically been implemented by the State directly, with Air Navigation Service Providers being government departments or agencies of the national government.

² The paper will not explore liberalisation in tower services. While there are functional examples of this they generally are done as isolated examples undertaken via competitive contracting processes, not to create larger blocks of contiguous airspace. The paper will also not look at network manager roles which are more closely aligned to flow management unit, serving a coordination role but not directly providing ATC service (i.e. separation service and direct pilot-controller communications).

More recently, States have established autonomous entities, in part to separate responsibility for safety oversight from the service provider function. This is recognised as best practice in various ICAO guidance, including the Safety Oversight Manual.³

ICAO Doc 9980 notes that as of 2012, there were around 60 autonomous ANSPs globally, while in most other States, air navigation services continue to be operated directly by governments. Most of these entities provide air navigation services within the territorial borders of the applicable State and remain monopolistic within their territorial airspace volume.

Annex 11 clause 2.1.1 goes on to note that **a State may decide to delegate to another State the responsibility for establishing and providing air traffic services in its territorial airspace**. In the event of delegation, there is no derogation of national sovereignty, no loss of control over setting of requirements, and no automatic transfer of oversight for the safety and performance of the service⁴.

Annex 11 is therefore clear that there is no permanent transfer of sovereignty or responsibility from the Territorial State, although indemnification policies or joint agreements may be put in place in the State level agreement for liability purposes. The Delegated State may then designate an ANSP⁵ (Agency, authority, (foreign or otherwise) or private entity) to deliver the service.

The Convention also allows for the establishment of multilateral Treaties between multiple States, whereby the provision of ANSP is designated to a common provider.

While the individual States maintain their sovereignty of airspace, they may set pragmatic oversight and supervision agreements to ensure efficient and effective practices. This report examines several instances where this has occurred.

While delegation from one State to another is possible, more common is **the mechanism of a designated air traffic service provider (ATSP)⁶ delegating responsibility for providing certain air traffic services in a specific airspace volume to another ATSP**; for example, a territorial (national) ATSP delegating ATS for a specific portion of territorial airspace to the neighbouring ATSP.

This can be, and in the past has been, achieved through a Letter of Agreement between the ATSPs in question that focusses on operational and technical elements. Given the responsibility on the State contained in the Chicago Convention and Annex 11, and the sovereignty factors outlined above (e.g. national security and defence), the role of the State is not a mere formality. Agreements made at State level, or at least enabled by the State, will ensure that other entities are appropriately empowered to legally commit to the delegation of responsibilities.

In practice, however, many delegated ATS agreements do not involve a State Treaty historically. Bilateral State-level agreements are not always conducted when a cross-border service provision is discussed at ATSP level in Europe for example. There are some ATS provided in neighbouring States where no State agreement exists, and only operational and technical elements are dealt with in the LoA. Charging aspects may not be explicitly set out, with an understanding that a 'quid pro quo' exists in terms of revenue and costs.

In the 1990s (pre-Single European Sky), EUROCONTROL developed a Model Agreement on the Delegation of ATS for use by States, distinct to the ATSP Letter Of Agreement in order to provide an enhanced legal and regulatory framework for delegation of ATS. An ICAO State letter was issued in October 2000, regarding use of the Model Agreement.

³ Safety Oversight Manual, Doc 9734, paragraph 2.4.9

⁴ The providing State's responsibility is "limited to technical and operational considerations and does not extend beyond those pertaining to the safety and expedition of aircraft using the concerned airspace. Furthermore, the providing State in providing air traffic services within the territory of the delegating State will do so in accordance with the requirements of the latter..." (ICAO Annex 11, 2.1.1 note)

⁵ ICAO refers to all aspects of ANS in the State delegation example in Annex 11

⁶ The term Air Traffic Service Provider (ATSP) is used instead of Air Navigation Service Provider (ANSP) where the reference is to provision of air traffic control, advisory and flight information services rather than to a broader set of services

The State level Model Agreement framework includes:

- Authorisation of the delegated authorities (e.g. ATSPs),
- Application of rules and procedures,
- Financial arrangements,
- Civil liability allocation,
- Licensing and training,
- Treatment of State aircraft,
- Coordination and contingency procedures,
- Publication of information, and
- Accident and incident investigation procedures and communication.

The model agreement has since become largely obsolete in Europe although the framework can now be found in Annex 1 to Section 4 of the Common Format Letter of Agreement between ATS Units, edition 5 (15-10-2019), released by EUROCONTROL Network Management Directorate.

The need to remove “lines in the sky”

Cross-border ATS arrangements have been put in place through agreements at State and/or ATSP level. Many successful examples of operational performance gains and improved service delivery will be highlighted through the case studies examined in this paper.

However, the complexity of putting the legal and regulatory measures in place in line with legislative norms, can add time complexity, political factors and cost. These act as barriers to the progress on seamless cross-border ATS and in many instances affect its feasibility entirely as some issues are seen as too difficult to resolve.

The overall safety and efficiency of international air navigation requires that the airspace is organised, for ATS purposes, to satisfy technical and operational requirements. In the future this will be even more necessary as modernisation challenges and a drive to optimise flight trajectories will bring a more pressing requirement for coordination and harmonisation across borders. Fragmented airspace has been a significant

cause of inefficiency and remains a challenge for sustainability goals in ATM. For example, to realise its full potential, Free Route Airspace needs to be applied across State boundaries. Optimised approach and departure paths involving continuous descent or climb are made much more complex at airports where top of descent or climb occurs in another State's airspace.

As the industry moves towards 4D trajectory management in the future, the need for seamless airspace will become even more of an imperative. Differing capabilities along the route of flight in a Trajectory Based Operations (TBO) environment will hamper the achievement of benefits. Cross-border flight data flows and pre-tactical conflict resolution will become the norm, driving a requirement for more integrated ATS across State boundaries.

Designing airspace along common flows rather than State boundaries, with common ATS provided within these revised airspace structures is not a new concept. ICAO Annex 11 clause 2.11.1 (15th Edition) recommends that *“The delineation of airspace, wherein air traffic services are to be provided, should be related to the nature of the route structure and the need for efficient service rather than to national boundaries.”*⁷

Given the value that cross-border service arrangements can have for achieving future airspace goals there is significant value in providing clarity on how to achieve cross-border arrangements. Making global guidance available, to allow States and ATSPs to efficiently work through bilateral and multilateral agreements⁸, would minimise the complexities, risk and cost of change, and enable effective implementation.

Learning lessons from case studies can be an important means of identifying guiding principles for global guidance.

⁷ Further reference is made to the need for straight line boundaries to assist ATC data processing systems, and the need for suitably sited mutually-agreed transfer points

⁸ For example, following a similar process to the EUROCONTROL Model Agreements

2. Key Considerations: Lessons learned in achieving seamless cross-border Air Traffic Services

The key considerations outlined in this section are distilled from the case studies in this document. They reflect the outcome of countless hours of work in States and other organisations around the world in pursuit of seamless cross-border ATM operations while retaining effective oversight and appropriate safeguards and authorities.

The case studies represent unique operational models with unique considerations. We should, therefore, not be surprised that a single optimised model did not necessarily emerge. The optimised solution may look different – Europe is not the same as Asia-Pacific, and even Flight Information Regions (FIRs) within the region may bring localised variation. We should, therefore, be looking to design and implement a tool-box, not a single solution.

Two paradigms or worlds – airborne and ground – operate towards a single set of performance outcomes. There are emerging key challenges for the industry in the years ahead, requiring urgent effort to put in place a range of solutions to avoid the foreseen issues.

Airspace is a tale of two worlds. The first is the aircraft, flying across countries and oceans, operating in its own frame of reference with a defined on-board equipage. The second is the ground-based Air Traffic Services, developed within each country to meet its requirements, vertically integrated to assure performance through direct organisational control, divided by invisible “lines in the sky”.

Two systems, interconnected and dependent on each other to achieve the highest performance in terms of optimised flight paths.

The ability of two organisations to achieve seamless operational performance comes with significant challenges. While gains have been made historically through well-planned airspace/airway design navigational routings, letters of agreement bringing clarity to transfer procedures, and some information sharing, it is clear globally that there is more to do to

achieve the demanded performance and optimised trajectory for each individual aircraft. The prerogative to do so is growing, to improve sustainability, increase capacity and reduce costs.

The desired performance will only be achieved by compromise and by optimising the two perspectives, identifying the valid needs and trade-offs, and rigorously removing dividing lines that are present for historical and not operational reasons.

The airborne and ground system are evolving, with a common perspective possible through trajectory-based information sharing.

ICAO's Global Air Navigation Plan (GANP) and Global ATM Operational Concept (GATMOC, Doc 9854) call for a series of operational improvements to increase capacity, efficiency, predictability and flexibility, while ensuring interoperability of systems and harmonisation of procedures.

Central to the future development of the air navigation system are the coordination and transfer of data and information across multiple stakeholder networks, systems and facilities. This includes the ability of the ground and airborne system to share a common view of the aircraft's current and planned trajectory.

In sharing best practice and developing recommendations for the implementation of seamless cross-border ATS, we cannot ignore that the operational concept is evolving, and thus the drivers will change. If trajectory-based operations (TBO) are the future vision of ATM, they call for decision making capabilities on the basis of the end-to-end trajectory, and the capability for dynamic negotiation in flight, irrespective of territorial boundaries.

This is seen in the regional ATM plans, for example the Asia-Pacific Seamless ATM Plan developed by ICAO which includes cross-border cooperation for use of airspace, but didn't explicitly set out guidance on achieving organisational cooperation.

There are evidenced performance benefits when cross-border ATS issues are addressed.

The case studies evidenced clear performance benefits from the application of seamless cross-border ATS.

1. Safety benefits

Optimised conflict resolution by ensuring all necessary information is available for the conflict situations determined by the airspace strategy – rather than split between two ATSPs.

Avoiding the need for multiple transfers between ANSPs due to the complex contours of a national border (and thus FIR), which leads to safety and efficiency challenges and increases workload for both pilots and air traffic controllers. Danube FAB (Bulgaria/Romania), FINEST (Finland/Estonia), the US/Canadian FIR boundary and the arrangements on the United Kingdom (UK) FIR boundaries with neighbouring ANSPs are all examples of delegation of ATS cross-border to enable a better service.

2. Sustainability and efficiency benefits

Increased direct routings, including the use of Free Route Airspace across territorial boundaries, leads to savings on distance flown and fuel, creating environmental benefits from minimised emissions. While the implementation of FRA in Europe has occurred within national boundaries and in some limited instances is starting complex negotiations on cross-border FRA, FRA implementation within ASECNA airspace immediately gave cross-border application.

The Geneva case study also shows the benefit of seamless cross-border ATS for improved climb and descent operations, bringing noise and emissions benefits near the airport. The same is true for the US/Canadian border agreements, enabling better routings and bringing environmental benefits. On the UK / Ireland airspace boundary, the ATS delegation from NATS to AirNav Ireland is a key enabler supporting the capacity and efficiency of Dublin Airport approach.

3. Cost efficiency benefits

Economies of scale and scope result from organisational convergence in the provision of ATS, including in the areas of procurement (single system and infrastructure), training (single training school) and oversight. Even when maintaining two ATSPs for cross-border ATS, there can still be cost benefits from optimised controller rostering (e.g. FINEST).

Nonetheless, recent attention on the resilience and continuity of ATS has led to increased need for contingency solutions.⁹ These contingency solutions are increasing costs for some cross-border solutions – for example, in Roberts FIR and FINEST – but of course are intended to bring long-term performance benefits in terms of the service resilience. It is a judgement whether the overall cost-benefit is positive.

Conversely, increased use of cross-border arrangements for the specific purpose of contingency is a potential not fully explored that may significantly increase resilience at reasonable cost.

One case study (FINEST) also noted that constraining the cross-border ATS arrangement to certain sectors did not actually simplify the work required, instead limiting the potential benefits of dynamic ATS assignment compared to moving the arrangement to cover the entire FIRs of both States. In other words, the set-up work¹⁰ needing to be done for a small area can be the same as the work for a much larger area, which can then bring larger benefits.

⁹ The drivers can include the need for operational service continuity, but also the need for tactical reversion in case of disruption (e.g. disaster recovery) and strategic reversion in light of geopolitical changes (i.e. re-basing the ATSP in your own territory)

¹⁰ For example, agreements at State, regulator and ATSP level

Three Categories of Cross Border ATS Arrangements

Three categories of cross-border ATS were identified in the case studies.

The simplest examples can be small cross-border adjustments in airspace to optimise traffic flows and air traffic services (CATEGORY 1)

Several case studies referred to airspace on the border of a State where a logical partitioning of the ATS means that the neighbouring ATSP should provide services in that airspace, bringing more efficient traffic flow management and safer airspace. These arrangements can be dynamic or static, meaning that responsibility for managing a piece of airspace might shift between two ATSP depending on operational conditions (i.e. wind direction shifting the arrival departure runways at an airport), or be a more permanent assignment. Often, this is because of an airport on or near the boundary, or it could be that a major route in upper airspace traverses the territorial boundary in a way which the aircraft would pass several times between the ATSPs if the service followed the boundary precisely. Danube FAB is a good example of the latter case.

For the US-Canadian example, an overarching State-level treaty gave the framework and authorisation for the (future) development of segments of delegated ATS as thought necessary for operational reasons. A 50-mile limit (distance from border) was imposed to control the scope of the future delegations. Many smaller delegations of ATS were then defined, often focused on efficient and safe airport arrival and departure flows.

The Geneva and UK case studies are another example of relatively small static cross-border adjustments in airspace. Although in the case of Geneva, it is combined with a more unusual dynamic allocation explored below.

In the case of the UK FIR boundaries, multiple ATS delegations between the UK ANSP and those of France, Ireland, The Netherlands, Denmark, Norway, Iceland and also the Maastricht Upper Air Centre (MUAC) contribute significantly to the efficient delivery of busy cross-border traffic flows.

This is particularly the case when it comes to the management of arrivals and departures around busy airports that are located close to FIR boundaries, where ANSPs have come to rely on these delegations to enable more efficient management of the growing volume of traffic inbound to the London area, Dublin and Amsterdam in particular.

Many other bilateral delegations exist for small portions of border airspace, often operational for decades. Sometimes, these agreements may have been developed historically at ATSP level and not have the adequate State level agreement in place. This can lead to challenges if a change or disruption occurs, for example in the case of an accident within the airspace which is controlled by the non-territorial ATSP. Without a consistent liability convention (as in the case of air transport with the Montreal Convention), this lack of State-to-State interface may need closer attention in years to come.

States and ATSPs may seek to delegate ATS for the entire FIR to a neighbouring ATSP (CATEGORY 2)

Under ICAO Annex 11, a State may delegate the provision of ATS in its territory to another State.

Case studies below dealing with this type of arrangement include Bahamas, Bermuda and the North Atlantic. Often such arrangements focus on upper airspace, however in Bermuda's case, the entire approach and enroute environment is delegated to the FAA, enabling a seamless provision of ATS (given Bermuda sits in the middle of a FIR managed by the FAA). This type of arrangement depends on the State recognising that a third-party is better positioned to provide the service. It may be an historical decision, as in the case of Bahamas, where the United States provided the function as the Bahamas declared independence.

More recently, several States have initiated a move toward self-determination/self-sustainability. The discussions have focused on whether national operational control, and possible economic gain, would provide an opportunity for self-reliance. Any proposal must be assessed in consideration of the performance and cost benefits that could be achieved by a seamless cross-border ATS.

The single cross-border organisation brings a true seamless operation of ATS, but tends to involve the creation of an entirely new entity (CATEGORY 3)

Genuine seamless cross-border ATS comes from a common governance and organisational alignment. A single organisation enables the planning and operation of services irrespective of territorial boundaries. This is enabled uniquely at a State or regional level, as explored in Section 1

In the case of Roberts FIR, they noted that an organisation with strong control over its own operations and plans is key in delivering the resilient service, enabling a high degree of autonomy in making decisions based on business requirements and service needs. They also recognised that they required complex structures for tripartite governance, management and oversight to enable this strong operational control.

The obvious extension of this logic suggests a single global ATS service provider. But this doesn't take account of national factors such as liability, military / defence considerations, trust of third parties, oversight considerations. There are also issues around reversion capability (e.g. due to geopolitical risk).¹¹

In the early days of EUROCONTROL, plans were made for a single European Upper Area Control structure, with centres in Shannon, Maastricht (MUAC) and Karlsruhe. It didn't proceed in full partly due to the issues above. So how have the collaborations such as MUAC, Roberts FIR, COCESNA and ASECNA overcome these issues to succeed as single ATSPs providing seamless services cross-border?

In short, the answer appears to have been that the benefits outweighed the disadvantages and constraints. In several cases, it is because the territorial airspace would have led to severe fragmentation and complexity of services for a typical aircraft route, due to the relative sizes of airspace involved (for example, Netherlands, Belgium and Luxembourg in the MUAC case) i.e. the benefits were too large to ignore. It is also because certain constraints did not materialise – for example, in some States, the air defence needs were minimal in the 1960s and 1970s meaning this did not factor into the decision making to the extent it does in other States.

The economic prerogatives can be solved through the Treaties and ATSP agreements. For example, some States look for a quid pro quo arrangement; seeking to balance the provision of services in each other's airspace such that the overall costs are balanced (e.g. Danube FAB, FINEST). Others seek to solve the issue through more complex hiring arrangements – for example Roberts FIR seeks to hire ATCOs equally from each of the participating States.

A word of caution is raised by the NUAC (Nordic Unified ATC Company) example. This created an umbrella company within which enroute services for Denmark and Sweden were provided. A decision-making "layer" was created, with benefits including common reporting for enroute services and material savings on insurance costs (i.e. economies of scale). But NUAC did not change much operationally beneath the layered corporate structure, with many aspects remaining within national interfaces (e.g. operational staff and leadership, industrial relations, etc). Without clear operational benefits, the agreement ended and the initiative was dissolved after less than a decade.

¹¹ Reversion in case of disasters can be solved in a single organisation, with multiple decentralised facilities designed to provide service continuity. But there is also the case of reversion to territorial service provision in case of a change in the relationship between States, such that the collaboration agreement (Treaty) breaks down

Dynamic cross-border arrangements for specific operational ATS needs can unlock wider change

Recently, the growing requirement for optimised performance and evolving information sharing enablers have led to some specific examples of dynamic cross-border ATS. This generally entails a dynamic tailoring of the ATSP providing the service in a particular piece of airspace, dependent upon prevailing traffic flows at the time. Two ATSPs (companies) are maintained, possibly due to the difficulty of larger changes or the State drivers outlined above.

Example case studies of dynamic cross-border ATS included Geneva and FINEST. In the Geneva example, the wind direction determines the best ATSP to coherently manage a particular flow crossing between Swiss and French airspace. In FINEST, the inbound/outbound traffic flows from Helsinki were the initial driver for dynamic cross-border sectorisation.

FINEST combines some of the case study categories mentioned above. It aims to have a single rostering arrangement, licencing, ATM system and oversight regime, but the ATS is shared between two companies. Thus, it contains many of the features of the single cross-border organisation in CATEGORY 3 above, but without the creation of the single entity.

In recent years, Europe has also been exploring the benefits of capacity-on-demand, which would apply these dynamic cross-border arrangements on a larger scale, matching demand to capacity on a more granular basis day-to-day. Each of these examples are being driven by performance goals, providing cost-efficient capacity in the airspace on a time-limited basis.

To enable dynamic cross-border ATS in relatively small sectors still takes extensive dialogue and a set of agreements that can act as the basis for much more. For example, some of the examples pointed to the need for harmonised safety oversight including change management. In the case of FINEST, discussions on unit endorsement concluded that the FIRs of both countries could be covered by a single endorsement. The ATSPs involved noted that many of the topics under discussion at State or regulatory level were valid no matter how large the dynamic area became.

The operational complexity of dynamic cross-border ATS may limit the benefits. For example, rostering can be challenging if an ATSP is not sure exactly how many sectors will be controlled by its staff in the near, mid-term. There is therefore a need to plan strategically, which limits the flexibility of the arrangements over time. There is also a need to maintain recency for licencing, which can impact rostering and the optimisation of staffing.

Of course, dynamic cross-border ATS implicitly entails air traffic control centres either side of the border. This can be beneficial for contingency arrangements, giving an ability to revert, but has a cost implication.

State responsibilities, regulatory and oversight models can be adjusted to fit the context and need, while still staying in line with legislative norms

States must be able to satisfy their responsibilities, including supervision and oversight obligations, for any cross-border ATS. While these can be raised as a barrier to any cross-border agreement, the case studies show that pragmatic solutions are possible, and in line with ICAO Annex 11.

A State-level agreement or treaty helps to set the high-level principles within which the cross-border ATS can take place. In Europe, within the EU single market, this is provided by the Single European Sky and associated aviation safety regulations. These establish an area of mutual recognition of certificates and licences that frame bilateral or multilateral agreements between ATSPs enabled by Article 10 of the EU Regulation No 550/2004. These more detailed agreements setting out operational principles and any specific applied delegated services and can be regularly reviewed (e.g. annually) to assess if the arrangements are working from an operational or business perspective.

In the absence of supra-national frameworks, regulatory oversight issues have the potential to complicate cross-border service provision. ATSPs that are involved in service provision across multiple legal jurisdictions or regulatory areas without State-level agreements could be subject to duplicated oversight, as is the case around the UK FIR boundary. In accordance with ICAO Annex 11 States need to oversee ATSPs providing ATS within their jurisdictions unless States agree reciprocal acceptance of certification and oversight.

State-level agreements can identify liability issues and provisions, both in tort and for criminal liability. For the latter, it may matter who brings the case for criminal liability. Staff associations will want clarity. In the case of FINEST, the situation was resolved through meetings with the national prosecutors of each involved State, enabling reasonable ways forward to be found for various scenarios.

Other aspects to be looked at include the alignment of Aviation Acts in each State, the need for coherent insurance policies with adequate coverage, and the licencing requirements for cross-border ATS provision.

State level agreements must also bring clarity to the roles of oversight, supervision and wider regulation. The case studies have shown that the potential models for supervision and oversight can include:

- A single regulator (and State) carrying the responsibility for the overall situation, for example as in the case of the Dutch regulator for MUAC;
- Territorial regulation and oversight, whereby the responsibility for oversight is delineated by the airspace being controlled, rather than by the jurisdiction of the providing ATSP (e.g. ASECNA);
- A clear division of responsibilities and tasks, whereby the agreement includes a dividing up of tasks between the involved States and their regulatory bodies;
- Parallel oversight, duplicating key functions and enabling audits and oversight from both State regulators (e.g. FINEST, Danube FAB, UK FIR boundary delegations);
- A situation where the responsibility moves over time, enabling equitable treatment between each party to the agreement (e.g. Roberts FIR and COCESNA, where the governance functions move between each country on a two-year cycle). COCESNA noted that the regular turnover of key personnel can disrupt planning continuity, but this is mitigated by clarity of the strategic vision.

The case studies identified a range of tangible and valid ATS issues which can be solved. Guidance material and best practice would help States and ATSPs explore these issues comprehensively

Any organisation attempting a joint venture or merger encounters a series of organisational and service delivery challenges that must be solved. ATSPs are no different. At the simplest level, clarity must be sought regarding the stakeholders buy-in and alignment of operational procedures. Any cross-border ATS must be shown to be acceptable to social partners (including for job security), achieved through transparent dialogue about the proposed changes. Danube FAB and FINEST pointed to lessons learnt around transparent dialogue with social partners.

The organisational change should not be underestimated, including the willingness to change (at leadership and group level) and a recognition that structures and decision-making processes may also need to change. Clearly, the creation of a new entity will entail huge change, but even changes within an existing organisation must be planned and resourced carefully.

The ATSPs involved should ensure they have a clear training plan in place, and the necessary capacity to enact it. Contingency arrangements must be clear, including for failure or degraded modes as well as in case of severe disruption. This may adjust dependent on operational and political need, usually developed through a business impact assessment and captured in the Business (and Service) Continuity Plan. Roberts FIR and ASECNA are currently exploring potential cross-organisation contingency measures.

From an economic perspective, the ATSPs must be clear about the economic regulation being applied, and the appropriate use of charging zones – for example, does the cross-border ATS have charges collected by the territorial or delegated ATSP, and where are the costs incurred?

There was a difficulty recognised in implementing a system for the reimbursement of costs incurred by an ANSP in the cross-border sector from another charging zone. The system can be aligned to the operational provision, such that costs borne are collected in charges by the effective ATSP, or it can be done by national boundary (or FIR). Danube FAB noted an issue for enroute cross-border ATS where vertical segmentation may complicate the situation (i.e. a base or ceiling exists for the airspace where delegated ATS is being provided).

Finally, ATSP insurance was recognised by respondents as an issue to clarify and resolve. There may be material opportunity from cross-border ATS provision, with insurance policies being aligned and potentially combined, enacting savings as in the case of NUAC. However, care must be taken with specific national requirements – for example, minimum “Special Drawing Rights” (SDR) for the insurance to meet legislation.

For each of the issues above, templates and guidance material on the approaches and solutions available would help spur the appropriate dialogue and actions for ATSPs looking at cross-border ATS.

The sovereign requirements for each State must be understood, and act as a basis for future agreements

It has sometimes been the case that sovereignty concerns have been seen as a barrier to the progress of seamless air traffic services, something to be overcome. Political issues are valid, but as has been made clear, the legal framework and change management realities support the right and responsibility of the State to determine any cross-border changes – or indeed to revert them where appropriate given a changing context. Delegation is in itself a sovereign act. The delegating state does not give up sovereignty when delegating service provision to an adjacent State or to another service provider.

ATSPs should therefore seek to engage the State as early as possible when a cross-border ATS issue or opportunity arises. State-level issues should be understood in depth, such that the framework for the cost-benefit calculation is clear to all parties, and can be communicated effectively to all parties as the cross-border changes are worked on.

The case studies have shown that these State-level drivers and constraints should not be treated as binary blocking points. In each area, people have solved the valid trade-offs with innovative and feasible solutions.

- There must be strong military cooperation, including an understanding of national defence procedures with security connotations. Civil-military cooperation at the operational level should seek to gain clarity on whether military ANS should be delegated, or the proposed arrangement only includes civil ANS.

- Information sharing cross-border needs to be done in accordance with applicable standards to build trust. For example, this could include ISO27001 (Information Security Management System) compliance, and the ability to audit the third-party ATSP and State regularly to assure appropriate processes and protections are in place. This issue is likely to grow in coming years with the need to share real-time trajectory information cross-border.
- There are significant benefits from the seamless cross-border ATS for the military and defence, in particular when looking at capacity-constrained airspace and the evolving needs of the military for training. New flexible-use airspace can be created cross-border (or near-border) which may have been unfeasible operationally without the seamless cross-border arrangements (e.g. Danube FAB reported this as a benefit).
- Concerns around jobs and competency development within the State leads to a clear cost-benefit for any outsourced ATS. In the case of delegated ATS to a single entity, efforts can be made to retain a balance, spreading recruitment from across the contributing States as in the case of Roberts FIR, or allocating certain functions on a rotating basis, as in the case of COCESNA.
- More recent contingency requirements, driven by service continuity concerns, may be enabled by cross-border agreements that use existing infrastructure to provide the necessary contingency. Where a single entity needs to provide contingency, either within a State or as a cross-border ATSP, the contingency centre requirements tend to add cost.
- Economic aspects such as cost allocation and charging can be tailored to the agreement. In this case, “form follows function”¹² – the structure of the agreement, including financially, can follow the strategy and operational purpose.
- Regulatory aspects such as national oversight obligations in accordance with ICAO SARPs. For efficient oversight that does not involve duplication of processes by multiple national regulatory authorities, the States will need to establish regulatory working arrangements or, ideally, fuller bilateral mutual recognition agreements.

¹² A principle of modernist architecture design attributed to Louis Sullivan, which could be re-written as “purpose-driven design” when talking about services or organisations.

As with any collaboration delivering mission-critical operational services, seamless ATS will be built on a common understanding of policy objectives, open communication and relational trust and assurance, all of which must be underpinned by legal arrangements

For seamless cross-border ATS to be realised, all parties need to be able to communicate in a way which helps common understanding of the objectives of each participating ATSP and State. Firstly, clarity on key drivers need to be understood within the State, including from non-aviation parties (e.g. defence, labour, tax). These can then be communicated with clarity in case of any cross-border ATS discussion. While there may not be agreement, the communication should aim to build trust and recognise the need for all parties to have assurance that their requirements are understood and taken into account.

Several case studies stressed the need for intensive and transparent communication to take place. This may start at leadership level, but should rapidly include key functions such as heads of units.

Engagement of the State (ministry), regulator and defence at an early stage of discussions was seen to be a key factor of a successful cross-border ATS initiative. The time taken for these discussions should not be underestimated; it may take 4-5 years.

Prioritising consultation to ensure staff involvement, through social forums and other mechanisms, can help optimise the operational design, improve the transition arrangements, improve buy-in to the change, and enhance the training and certification aspects. Consultation with airspace users to clarify and scope the benefits was also recognised as important (e.g. for Danube FAB).

The case studies also highlighted the possibility for ongoing improvement or adaptability within the collaborations, based on different mechanisms and drivers:

- Setting up a framework agreement within which detailed operational initiatives can be developed. This occurred in the US-Canadian border case study and is also characteristic of the Functional Airspace Block set up in Europe.

- Setting the expectation that adaptation may be required as the detailed cross-border solution is implemented and lessons are learnt in practice. This has been the case in ASECNA for the 2010 Treaty updates, and in MUAC, where the 2022 updated agreement sought to embed greater organisational control and decision-making for operational purposes and business objectives.

While bilateral agreements can be put in place, they would be helped by a regional foundation for cooperation and collaboration in seamless operational service provision

The global ATM sector has progressed a number of initiatives to align strategy and practice in the provision of ANS, not least through the CANSO CATS vision and ICAO GANP, GATMOC and regional plans (e.g. APAC Seamless ATM Plan). These are supported by activities around information sharing, System Wide Information Management, and the push towards Trajectory Based Operations.

These tend to identify the operational concept elements and enablers, but do not speak to the organisation or service provision optimisation that may be needed to achieve the performance goals.

In some regions, there is identified lack of coherence in areas of policy, legal and regulatory structures, funding and financing mechanisms, procurement and processes. This leads to difficulties in aligning operations.

Coordinated transformation must therefore include organisational and service provision alignment with the performance goals, traffic demand, and expected benefits of the new operational concepts.

This coordinated transformation is best held by ICAO, who can speak into State and ATSP domains, and credibly develop and disseminate best practice guidelines on achieving the seamless cross-border ATS.

Regional frameworks, with solutions and examples tailored to the region, would help States and ATSPs identify the need for dialogue on the issue, and potential mechanisms to achieve their common business objectives. The frameworks could set out common regulatory, liability and insurance approaches, common trusted views of information (including data privacy and security), likely national issues, and organisational options to meet the regional strategy.

Conclusion

Cross-border service arrangements are complex things to negotiate and design. They involve multifaceted operational factors from airspace design, radar and communications coverage, resourcing and training and sometimes even language. They necessitate appropriate legal, liability mechanisms and appropriate safety and economic oversight. Sovereignty rights and civil military coordination must be carefully considered.

And yet as the case studies below detail, these challenges have and can be overcome.

ICAO is well placed to provide common guidance and frameworks and template agreements to aid States in shaping complex agreements. Such tools might facilitate the process for States looking to consider changes to airspace but unsure where to start.

It is hoped that this paper and the examination of the case studies below encourage States to examine the potential to deliver important operational benefits through increased cross-border arrangements. Our ability to meet future airspace challenges will be well served if they do.

Value in Examining Case Studies

Lessons with regards to the establishment of cross-border ATS service arrangements, including how best to deal with liability, safety and economic regulation, assurance of performance, civil military collaboration and other sovereignty needs can be best learned from examining case studies of existing cross-border arrangements in which these issues have already been considered. These case studies can also provide important insight into the benefits that may be realised by expanding cross-border arrangements in other areas. For that reason, this report includes an extensive examination of existing cross-border arrangements.

Information for the case studies was collected from research and interviews with senior representatives from both States and ANSPs. A discussion guide was prepared to ensure common information was collected across all case studies to ensure comparability. However the particularities of any specific case study make some topics not applicable, or warrant additional exploration of certain topics unique to that example.

Discussion Guide - issues to be assessed

1. Details of Case – Describe the specific cross-border service arrangement that is being examined, including what specific services and airspace are included and what countries are involved.

2. Background origins – Describe the origins of how the cross-border arrangement came about. If relevant what drove the consideration to change the status quo at the time? Was there a problem that needed to be solved?

3. Nature of the legal agreement – Details regarding formal or informal agreement(s) that govern the cross-border arrangement (MOU, Service Level Agreement, contract, treaty, or legislation). Clarify the legal vehicle through which the service provider is designated.

4. Timeframe – Is the cross-border services arrangement permanent, temporary, or dynamic? Is a term defined in existing written agreements?

5. Insurance and liability – Describe how liability issues are handled and whether it is addressed in formal or informal agreements. Are there any special insurance requirements in place? What if any provisions are in place for contingency?

6. Performance – Describe any performance standards included in the agreement (i.e. service availability, operational performance, etc.).

7. Economics – Describe the provisions for calculating and levying ATS charges and economic regulation. Describe any special provisions for employment. Does the service provider employ staff in more than one country or provide the cross-border service from a single jurisdiction. Are there any requirements in legal agreements for employment levels in specific countries, where training is done, or where headquarters is located?

8. ATC licencing – Who is the authority for issuing licences and regulating training?

9. Safety regulation – Describe provisions for safety regulation of the cross-border service provider and any unique arrangements (operator's license, accident investigation).

10. Military cooperation – Describe relevant provisions for civil-military cooperation including any meaningful differences cross-border (FUA, airspace reservations, closure etc.)

11. Political – Is the public broadly aware of the existence of cross-border service arrangements or is the arrangement fairly behind the scenes. Was there public knowledge when it was first established? Has the cross-border service arrangement ever been a public issue (public trust and assurance). Is the current arrangement equally supported by governments cross-border. Have there ever been points in time where changing it (revoking it, expanding it or renegotiating the arrangement) was considered.

Types of Case Studies Examined

As case studies were identified and work on explaining the arrangements in place expanded it became clear that the case studies fell into three broad categories:

1. Small border adjustments
2. An ANSP in a country providing ATS service entirely over its neighbour, often focussed on upper airspace
3. The establishment of an entirely new entity to provide ATS services over multiple countries

Small border adjustments

Formal national borders often follow complex terrain landmarks such as winding rivers that are not easily applicable to airspace boundaries. For that reason it is fairly common for arrangements to be made between ANSPs or directly between bordering operational units to simplify airspace design to a more practical arrangement that reduces workload and provides local operational benefits. In some cases airports are located adjacent to international borders such that complexities arise with hand offs of arrival and departure flows.

Many ANSPs have established practical cross-border arrangements between neighbours that simplify airspace design and ATC workload and complexity for pilots. These deliver important local benefits with relative minor adjustments in airspace boundaries. The case studies below examine only a few of such arrangements in existence.

Provision of ATS to a Neighbouring State

In several instances an ANSP in one country is designated as the service provider over a neighbouring country. Often these arrangements are focussed on upper airspace with the neighbouring country continuing to provide ATS services below an established altitude, as well as tower services.

Such arrangements can reduce airspace fragmentation and provide a more seamless enroute service provision, particularly over countries with a smaller geographic size. Operational efficiencies in service provision may also be realised, such as in overall personnel requirement as well as in training, infrastructure and system requirements.

New Entity Providing ATS in Multiple States

In several important examples States have collaborated to establish an entirely new entity which is designated as an ATS service provider over multiple countries. These are in many cases complex arrangements. The organisations themselves often have interesting histories and robust provisions for governance and oversight.

With the exception of one, the cases examined in this category have been successful and longstanding with much to teach about broader government cooperation. They have solved real world problems, often providing economies of scale resulting in lower overall service provision costs and supporting improved service quality.

The case studies below are organised in accordance with the above categories. Each type provides benefits and is worthy of broader consideration and application.

CATEGORY 1: Small Border Adjustments

Case Study: Static and dynamic cross-border arrangements for Geneva Airport

Title	Static and dynamic cross-border arrangements for Geneva Airport
States involved	Switzerland and France
Synopsis	Specific sectors of the Geneva TMA over French territory are delegated to Swiss ANSP Skyguide. More recently, this has included a dynamic delegation of airspace to optimise a departure procedure from Geneva Airport, with an airspace sector moving from the control of DSNA to Skyguide dependent on the runway-in-use at Geneva.

Introduction

The sectors of the Geneva TMA (SFC*-FL195) over French territory are delegated to Swiss air traffic units since 1960. This is a static delegation of services for a large portion of airspace.

Additionally, a couple of years ago, the *Direction des Services de la navigation aérienne* (DSNA) and Skyguide implemented a dynamic system for optimising a departure procedure from Geneva Airport, close to the French border. Departures from runway 04 engage the shift of a specific volume of airspace from Skyguide's air traffic control centre to DSNA ACC enhancing capacity and safety of departures. When Geneva operates runway 22 the airspace sector management reverts to Skyguide.

This reduces the complexity of the coordination needed between the sectors and avoids the need for level offs to be given to the aircrafts. It is called dynamic airspace delegation because the airspace is under the control of Geneva ACC or Marseille ACC depending on runway use in Geneva. This dynamic delegation of services is done for a (smaller) portion of airspace, within the larger static delegation.

Background origins

Geneva International airport is located northwest of Geneva and on the border of Switzerland and France. The closest area centre is in Marseille (FLMM) and the climb and descent are affected by proximity to the Alps. CNS limitations meant that it made sense to pass the air traffic services responsibility to Geneva (LSAG) in that area.

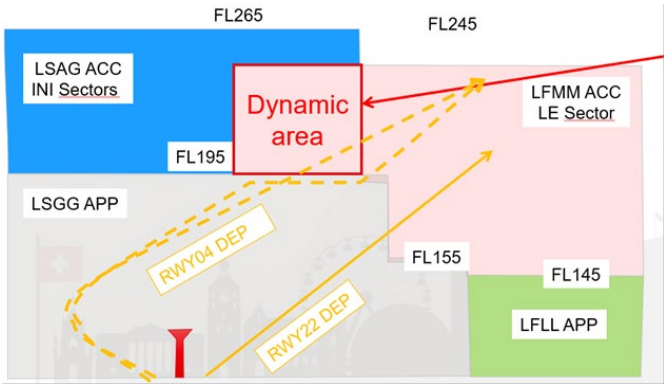


Figure 1

The two countries have collaborated well on operational issues. In 1956 the runway in Geneva needed to be extended. For that to occur an exchange of territory between Switzerland and France was required. France gave Geneva land to extend the runway that is now operational. The other part of the agreement was that France got a direct road access to the airport.

Over time, the French airspace for which services were delegated to Switzerland grew in size due to operational needs for and around Geneva airport. In addition, efficiency considerations were essentially triggering the reflections around the dynamic delegation detailed above (Figure 1).

Legal basis

A Treaty between the French and Swiss States defines high level principles around the delegation of services between the two states. The FABEC Treaty (among all FABEC states, which also includes France and Switzerland) also serves as a foundation to the simplified delegation of services, merely by reflecting the rules defined by the airspace regulation of the Single European Sky. Nevertheless, the Swiss and French States have further defined their ways of functioning, in particular with regards to the management of the environmental dimension, i.e. mainly noise emissions, which has to be particularly considered in the French perspective.

Hierarchically below the above-mentioned treaties between States, there are arrangements laid down in Letters of Agreement or similar instruments among the ANSPs to allow for the delegation of services. The legal vehicle for this is a multilateral agreement among the FABEC ANSPs which defines the framework principles applicable to any cross-border service delegation within the airspace of FABEC. In addition, DSNA and Skyguide have a specific bilateral annex to this agreement clearly defining the services which are delegated (around Geneva as well as the Basel area in which DSNA provides services).

Skyguide and DSNA meet at least once a year to specifically assess if arrangements are working for both parties. Apart from the official arrangements there are regular meetings to discuss strategic, operational, technical, environmental and safety aspects as well as radar data exchanges between the two service providers, as well as other technical constructions such as common networks.

Liability for causes related to service provision has been transferred to, and lies with the effective service provider, although the ANSP having delegated the services, as well as the State over the territory of which the liability cause occurs may bear residual liabilities. The FABEC ANS agreement applicable in cross-border situations lays down the liability condition. In this particular case, the French state acts as its own insurer, while Skyguide is privately insured.

As far as contingency is concerned, the ANSPs have agreed that the (contingency) plan of the effective service provider applies in cases of contingency. This is to say that Skyguide applies its own solutions for the recovery of the service also over French territory, a situation less complex than having different rules for the same portion of the airspace.

Performance and accountability

There are no directly binding performance standards defined by the delegation of services itself. However, the performance of the respective airspaces is dealt with through the national performance plans which apply by cascading down the European performance targets, as part of the EU performance scheme. Hence, there has been no need to specifically define different performance targets and metrics for the airspaces in which services are delegated.

Financing and charging

There is a 5-year agreement between DSNA and Skyguide on ATS charges, which runs in parallel to the reference period of the EU performance scheme to ensure financial alignment and predictability.

Charges are centralised in EUROCONTROL Central Route Charging Office. Charges are based on State borders, meaning that DSNA is entitled to, and thus technically receiving the charges. Skyguide is paid by a so called “French envelope”, as part of the above-mentioned financial agreement. Thus, charges are billed to airspace users in accordance with the relevant FIR.

Social and political factors

Cross-border ATS responsibility can increase complexity in the relationships among stakeholders. This is particularly true in this case with regards to the subject of aircraft noise and its impact on communities living around the airport.

Circumstances have required that stakeholders in France are handled by different means than the ones within Switzerland and in some cases different consultation procedures may apply. Often the community living around the French part of Geneva airport send their complaints to the French Minister who then contacts their counterpart in Switzerland. It has been particularly important for Skyguide and Geneva Airport to communicate proactively about the reasons for route and procedure choices, noise, emissions, including attending meetings in France.

However, this would also have been the case even if delegated airspace arrangements were not in place given the proximity of a major airport to the territory of another State.

Safety regulation

Skyguide controllers managing cross-border airspace are licenced in Switzerland by the Federal Office of Civil Aviation. There are no specific safety oversight provisions related to the cross-border arrangement. However supervisory authorities have concluded special arrangements covering the conduct of (possibly joint) audits.

Civil-military cooperation

In France there are two different entities for the provision of civil and military air navigation services, while in Switzerland, both functions reside with Skyguide.

The two States remain sovereign in their national airspace and can take decisions regarding airspace classification, temporary restricted zone etc. They also remain fully responsible for the military air navigation services above their own territory (this part is not delegated, only the civil ANS is). Furthermore, in case of an aircraft not replying to ATS communications, it is the French air force that will intervene in the airspace above French territory. So, Skyguide is in contact with the French air force for all parts over French territory.

The arrangements between ATS providers are defined via an OPS letter of agreement. There is an agreement between Marseille ACC, Paris ACC and Skyguide. Further, the Franco-Swiss Treaty clarifies at State level the air traffic service delegation on the basis of ICAO Annex 11.

Skyguide and DSNA in cooperation with the military stakeholders are developing tools and procedures to better manage, in a cross-border manner, the airspaces related to the use of the military training area "CBA25" (a cross-border training area). This form of advanced cross-border AMC coordination will be a priori, a first in Europe.

Lessons Learned

A long-lasting partnership between Skyguide and DSNA focussed on the operational needs of a growing airport enabled a static airspace delegation to evolve into an innovative dynamic airspace arrangement that furthers the safety and efficiency benefits.

Case Study: FINEST

Title	FINEST
States involved	Finland and Estonia
Synopsis	A yet to be formally established initiative in which cross-border ATC service between Finland and Estonia will be restructured and dynamically assigned to either ANSP.

Introduction

FINEST is a collaboration between Fintraffic ANS (Finland ANSP) and EANS (Estonian ANSP), along with the relevant States, regulators and stakeholders including the military. Its objective is to achieve optimal performance in the areas relating to the service provision, cost-efficiency, capacity, flight efficiency, environmental sustainability, continuity and safety.

Under the initiative, cross-border airspace between Estonia and Finland will be merged consisting of the Flight Information Regions (FIRs) of Helsinki and Tallinn between FL95 and FL660. The airspace has been restructured and new ATC sector configurations have been established for better supporting air traffic flows. The air traffic sectors in this airspace will be established on the basis of traffic flows, regardless of the national borders. The provision of air traffic services in these sectors will be dynamically transferable between the ACCs (Area Control Centres) of Tallinn and Helsinki. There are no sector-based ratings. Everyone in Helsinki and Tallinn are licensed to work in each other's airspace enabling a true virtualised assignment of airspace.

Background origins

Discussions have been occurring to develop collaboration and establish FINEST for the past 10 years. In 2018, based on common interest, a decision was taken to commence wider cross-border cooperation and FINEST programme was formally initiated.

One of the problems to be solved by FINEST was challenges with the airspace structure that led to inefficient operations and a concern about the management of increasing capacity. With the current border, Helsinki and Tallinn arrivals and departures often "clip" the adjacent FIRs. The implementation of free route airspace means that flights do not enter

via pre-defined points which adds to operational complexity at the border area. FINEST allows the ANSPs to combine the sectors independently of the FIR boundaries, but aligned to operational flows.

Five operational simulations have validated the operational benefits of the future design and arrangement. When EUROCONTROL assessed the simulations, they also noted that safety benefits were resulting. Real time simulations also showed that better organisation of sectors potentially lead to more environmentally friendly trajectories. The procurement of a common flight data processor helped to unlock the use cases.

The two ANSPs considered whether to limit the arrangement to certain sectors, or move to entire FIR / airspace. Limiting the arrangement to only certain sectors would not simplify the work required and would limit potential benefits of dynamic assignment. For that reason a decision was made to establish the arrangement based on the full airspace of each ANSP, giving far more options.

The original intent to have the cross-border arrangement finalised and in operation in 2022 has been missed. Currently FINEST is being readied for deployment by ANSPs, but they are awaiting State (including military) approval, even though this was secured at the beginning of the programme. Work is now ongoing through a working group at Ministerial level, including the ministries with responsibility for transport, and the ministries of defence.

Legal basis

A State level agreement is in place relating to the NEFAB, with an appendix dealing with ATS cooperation. A separate State level agreement is now being formed for the specific FINEST cross-border initiative. Four ministries are involved, including on each side the ministries overseeing transport (lead) and defence (support). Once finalised they will remain two companies with two sets of employees but with a delegation agreement enabling the delegation of ATS cross-border on a dynamic basis.

There is a separate NSA agreement for incident reporting and change management processes.

FINEST have also tried to ensure that any needed changes to Letters of Agreement with other ANSPs in the region are minimal (e.g. Sweden).

Under the proposed agreements any operation or activity outside controlled airspace is still a national concern (e.g. FIS), and needs to be provided in national language as well as English. This was written into the Aviation Act (in Estonia), where national language needs to be able to be used below a certain Flight Level (e.g. FL140).

In establishing arrangements for dynamic assignment of cross-border airspace liability was a key discussion point as the assignment is analogous to subcontract. The NEFAB State Level Agreement sets out the principle of national liability and FIR liability stays ultimately with the State. Insurance will need to be adjusted and consideration has been given to a joint insurance contract. But this currently on hold until there is an implementation date for FINEST.

The topic of criminal liability was considered separately. Much work was needed with the lawyers and unions to understand the case if a controller was to be sued when providing cross-border services. The two ANSPs got the national prosecutors from each State and organised a seminar with the ATCOs and unions to talk through the process and case studies of various scenarios. This helped to find reasonable ways forward.

ATS charges are not impacted as the charging zones do not change. It is presumed that as long as airspace assignment is done in a dynamic manner, with areas of responsibility assigned in a planned way on a quid pro quo basis, there should not be too much impact

by the end of the year and therefore no need to transfer money to either side.

Performance and accountability

The ANSPs are still reporting performance on a national basis (e.g. cost efficiency). But understanding the area of responsibility will help them to know the impact of the cross-border ATS delegation on that performance.

The original idea was to have a pre-defined pool of resources to handle traffic in either place, and use them dynamically. However, it has not been straightforward to implement.

At the start of cross-border service provisioning, consideration is being given to the need to define the areas of responsibilities with each of the ACCs beforehand (pre-tactical), so they know which portion of the airspace they will have in advance. This will help with planning resources and rostering (e.g. if one ANSP has training ongoing), ensuring performance measurement is realistic and feasible. Additionally, the ATCOs need to retain currency / recency on each of the areas (e.g. Helsinki controllers working in eastern Tallinn piece of airspace), which again leads to a balanced apportioning of ATCOs cross-border (see licensing discussion).

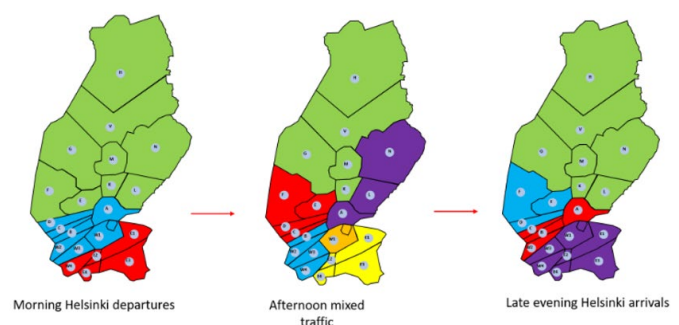


Figure 2 Conceptual example of dynamic configuration of airspace and ACC Areas of Responsibility¹³

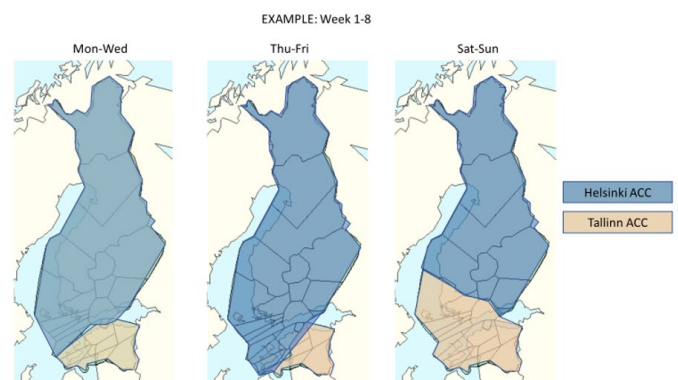


Figure 3 Example dynamic configuration scenarios

¹³ <https://www.eans.ee/en/tegevused/arendustegevused/finest>

Contingencies are enabled through the main FDP set-up, across two operational platforms and one Disaster Recovery (not co-located, but still operational). Options exist for the whole airspace to be controlled from either of the locations (e.g. night time operations), but they must still plan for both centres to be manned, to meet the criteria to “re-trench” operations or transfer services if needed.

This will limit savings and may increase resource needs overall if each centre has to have sufficient staff on hand to handle all airspace. There is also a subcontract dealing with the ATCO hours, in practice working out through a quid pro quo arrangement.

Social and political factors

There remains broad support for the FINEST initiative and hopes that it will deliver significant benefits.

Safety regulation

National Supervisory Authorities in each State signed an agreement, and remain responsible for their own FIRs. There is no change to the operator’s license. However, the possibility of subcontracting must be allowed in license conditions.

The States aim to have consistent and common management processes, but there may be specific ways of implementing that. For example, in one country, if you make minor changes to adaptation in the FDP, you don’t need to go through the full process of change management (it’s considered a minor continuity change). That wasn’t the case in the other country. So they aimed to harmonise the procedures and levels of escalation, to serve ANSPs in a common and harmonised manner.

The processes were defined early on. The safety reports go to the necessary parties, for example particular ACCs and the necessary government authorities. It is anticipated that for many things ANSPs will submit duplicate reports to both National Supervisory Authorities in parallel.

A National Supervisory Authority coordination group was established and ran for five years with six sub-groups with experts working together, on topics such as airspace, reporting, and licensing.

The ANSPs identified that they needed to demonstrate that all ATCOs have worked in all parts of the airspace to retain currency on the license. Current licenses enables national ATCOs to work in any sector in their FIR. They have a unit endorsement (e.g. EFIN) which stays the same, but the airspace is no longer a Finnish or Estonian FIR, but covers the FINEST airspace. The ratings don’t change (services provided). The current regulation does not support how FINEST might be implemented, so it was a big task to work with EASA to get something that the National Supervisory Authorities would be happy with.

Civil-military cooperation

As mentioned above, the establishment of the FINEST initiative is awaiting the resolution of certain issues of civil-military cooperation. The ANSPs have a set of pre-conditions from the States and militaries that they must be able to stop the cross-border collaboration, cut off the link, and be able to work within a certain time-frame to control their own FIR.

For airspace management, both countries have a national facility responsible for reservations and airspace closures with systems making this visible in both ACCs.

The cross-border sharing of military flight related data and the need for support in ensuring defence concerns in relation to national sovereignty are still under consideration. As both centres remain staffed, there would still be supervisory functions available in the national FIR, with appropriate chain of command. The national FIR’s supervisor might then take over in these circumstances, or the Airspace Management Cell. For data sharing cross-border it is undesirable to have filters, as you need the full picture if you’re controlling the airspace. Military defence would like to build in some sort of auditing function, where they can ensure that the data accessible from overseas is stored in an appropriate manner. But this is complex as one State’s military has no authority to audit a foreign based company. There is a separate State level agreement on data confidentiality which could be used to ensure the transfer and control of restricted data. Both States are also progressing towards ISO 27001, and aligned on cybersecurity compliance.

Lessons Learned

Until FINEST is fully implemented it is difficult to determine with any certainty how it will evolve and in which of the 3 categories it best fits. At a minimum it will involve adjustments to the border to deliver local benefits and therefore has been placed in Category 1. However there is a potential for a much greater impact.

While there are important lessons with respect to complexity, both legally and operationally, the lessons of operational deployment remain unclear. This initiative has been driven by a strong vision at senior levels but has been held up at this point by civil-military issues and contingency arrangements that may limit operational benefits.

When implemented, FINEST will represent a unique arrangement that warrants close attention.

Case Study: DANUBE Functional Airspace Block

Title	DANUBE FAB
States involved	Romania and Bulgaria
Synopsis	Cross-border sectors along the border between Romania and Bulgaria provide efficiencies in local traffic management.

Introduction

Following the establishment of DANUBE Functional Airspace Block (DANUBE FAB) in 2012 the two partner States of Romania and the Republic of Bulgaria implemented two cross-border sectors on 11th December 2014, the first time that cross-border sectors have been implemented under a FAB framework. In the two cross-border sectors, operational 24/7, the two States have delegated the provision of air navigation services to the national ANSP of the partner State – demonstrating the level of trust and cooperation between the two FAB partners.

The national ANSPs BULATSA and ROMATSA have shared the provision of each of the air navigation services between them within the cross-border sectors. Above FL 245, air traffic services, communication services and surveillance services are provided by the cross-border ANSP, while navigation, meteorological and aeronautical information services continue to be provided by the territorial ANSP.

The first cross-border sector, Sector DF 1, controlled by BULATSA over Romanian territory allows safe and efficient circumnavigation of a new military area close to the border and optimises descent procedures into two Bulgarian airports (Burgas and Varna). The second cross-border sector, Sector DF 2, controlled by ROMATSA over Bulgarian territory, reduces transfer of control workload between ACCs, and increases controller’s ability to tactically control aircraft surrounding restricted areas. Previously, westbound traffic crossing the border had to re-enter Bulgarian airspace multiple times due to the complex contours of the national border. The new cross-border Sector DF 2 moves the sector boundary southwards, removing the need for multiple transfers between ROMATSA and BULATSA, and eliminating the manual input to the ATM System which was required to enable the system to cope with multiple crossings. This reduces potential confusion from erroneous messages and enhances safety, while reducing controller workload. Both cross-border sectors create more direct routes which have driven real savings in terms of distance flown.

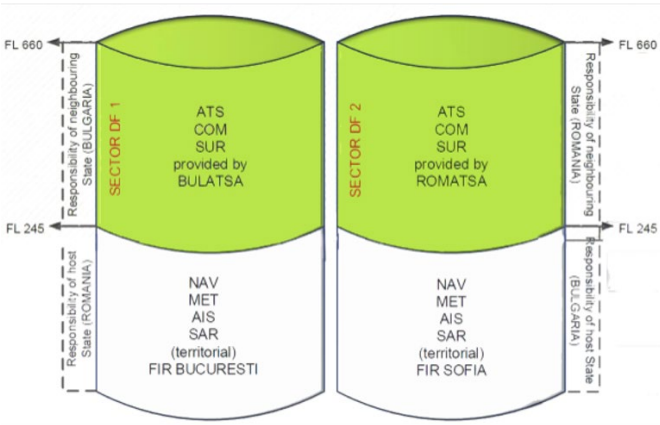


Figure 4 Organisation of cross-border services¹⁴

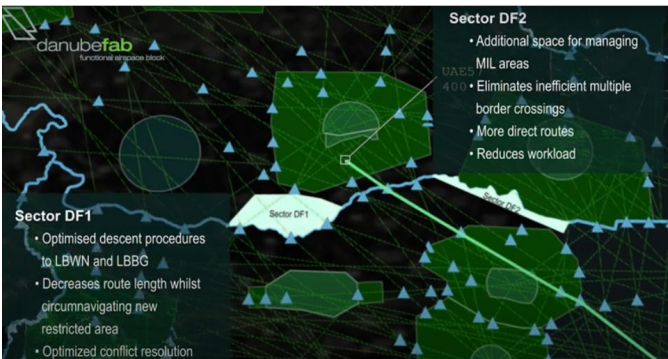


Figure 5 Cross-border sectors¹⁵

¹⁴ <https://www.danubefab.eu/>

¹⁵ <https://www.danubefab.eu/corporate-video>

Background origins

DANUBE FAB cross-border sectors are configured based on operational needs, optimised use of airspace within DANUBE FAB irrespective of national boundaries, representing a further step towards the defragmentation of European airspace, demonstrating DANUBE FAB's commitment to the Single European Sky, particularly in relation to the airspace design principles, required in Commission Implementing Regulation (EU) 2019/123 of 24 January 2019 laying down detailed rules for the implementation of air traffic management (ATM) network functions and repealing Commission Regulation (EU) No 677/2011.

The intent to optimise operations between the airspace boundaries of the States has been a long-term goal of DANUBE FAB, which is formalised in the State Agreement for the establishment of DANUBE FAB which was signed in Brussels on 12 December 2011 by the governments of Romania and Bulgaria. The two partner States implemented two cross-border sectors on 11 December 2014, the first time that cross-border sectors have been implemented under a FAB framework.

The sectors optimise conflict resolution, reduce the number of manual transfer procedures between ACCs and improve management of restricted areas, enhancing capacity and safety and improve routes based on traffic flows and optimise descent profiles, bringing savings for airspace users in terms of distance flown and decreasing environmental impact.

Legal basis

The legal basis for the cross-border service provision in the DANUBE FAB is as both a State agreement, a "Joint Designation Act" signed by the Ministers of Transport from each State and an ANSP Cooperation Agreement between the ANSPs of BULATSA and ROMATSA. The Joint Designation Act established the cross-border sectors as a permanent arrangement.

Under the Agreement each service provider is responsible and liable for the services it provides in the cross-border sectors, under the national laws of the State in which the services are provided. Each ANSP has taken the necessary steps to guarantee that their insurance policies provide adequate coverage for service provision within the cross-border sectors.

The financial framework for the cross-border sectors was a key consideration since the parties identified significant difficulties in implementing a system for the reimbursement of costs incurred by an ANSP in the cross-border sector from another charging zone. A pragmatic and simple solution was agreed by all parties as follows:

- Both States agreed to change the charging zones along the CBS boundaries.
- Both States accepted that the enroute charging zones cannot be changed during a reference period and fixed them for a period of 5 years over RP2. The charging zones were extended for RP3 as per a Decision of the DANUBE FAB Governing Council 42/10.06.2019.
- Both States accepted that charging zones cannot be segregated using vertical limits. Despite the cross-border sectors being above FL 245, the ANSPs accepted this shortcoming and changed the whole charging zone from the ground upwards.

Performance and accountability

The performance standards applicable to services in the cross-border sectors are those defined in the Performance Scheme of the European Union.

Social and political factors

The DANUBE FAB has the mechanisms to allow decisions to be made at the highest political level based on the proposals of working level committees utilising clear communication channels, as well as similarly effective horizontal communication channels between the Ministries of Transport, Ministries of Defence, NSAs and ANSPs. This enables consensus to be reached between FAB stakeholders, decisions to be proposed and escalated upwards to the Airspace Policy Body and Governing Council, and work delegated downwards effectively in short timescales.

This close working relationship allowed all of the innovative changes to be proposed, discussed, approved and implemented quickly and efficiently, from the decision to go ahead with implementation from the Governing Council in February 2013, through to full operations in December 2014.

Consultation is a vital component to ensure staff involvement in the FAB, and manage any reluctance which may arise, particularly for aspects such as cross-border services. Through the regular Social Consultation Forums within the DANUBE FAB, which take place on a 6 monthly basis, social partners and professional organisations were informed on the plans for cross-border sectors, with all suggestions and concerns taken on board to help optimise the operational design of the sectors and improve the transition arrangements, such as through enhanced training and certification. Consultation with Airspace Users was also key to ensure the end users were consulted about the proposed benefits of the CBS establishment. The initiative was very well received by airspace users.

Safety regulation

The CAAs of the Republic of Bulgaria and Romania jointly provide the necessary safety oversight.

Civil-military cooperation

While the provision of air traffic services in the cross-border sectors is the responsibility of the neighbouring State, civil-military coordination is a sovereign responsibility. It was agreed to retain civil-military coordination within the national boundary of each state, and the neighbouring ACC in control of the CBS is duly informed of actions to be taken in response to military requirements. An accompanying

letter of agreement on coordination procedures between national Airspace Management Cells was jointly established from both civil and military perspectives, which specifies the relevant processes required for pre-tactical airspace management.

The introduction of a new military prohibited area (DEVESELU), just north of the Romanian/Bulgarian border intersected major traffic flows. The subsequently revised route structure, designed to circumnavigate the prohibited area introduced a conflict point just as traffic enters north into BUCURESTI FIR. The new cross-border Sector DF 1 moves the SOFIA ACC boundary northwards, allowing this conflict point in Romania to be foreseen and handled within a single sector by BULATSA. This increases controller ability to manage hazardous conflict situations, increasing safety, and reduces coordination between the two ACCs to communicate potential conflicts, reducing workload and therefore increasing individual controller capacity.

The arrangement also provided additional airspace in which to manage traffic conflicts. Military areas within BUCURESTI FIR are very close to the national border, and tactical intervention is often needed to coordinate traffic with the Romanian military. Sector DF 2 moves the previous sector boundary southwards allowing additional space and time for ROMATSA to tactically coordinate traffic around military areas, reducing workload and increasing safety.

Lessons Learned

The establishment of cross-border sectors in this instance optimised conflict resolution, reduced the number of manual transfer procedures and provided additional airspace to manage restricted areas which lowered controller workload, therefore enhancing capacity and improving safety. The FAB structure in which the cross-border sectors were established necessitated a complex arrangement of oversight, in part because this was but one initiative of the overall functional airspace block.

Case Study: United States-Canada Border Airspace

Title	US Canada Border Airspace
States involved	United States of America and Canada
Synopsis	Long standing arrangements for air traffic control near the Canada US border adjust airspace boundaries in line with operational requirements.

Introduction

Canada and the United States share the longest international border of any two States in the world, at 8,891 km (5,525 mi) long. In some locations along the border either country may control airspace over the others territory. These arrangements are driven by operational efficiencies and which organisation is best placed to provide the service.

Background origins

In December 1963, the governments of Canada and the United States of America negotiated a treaty titled “Aircraft control near the common boundary”. The States recognised the importance of providing efficient, safe, and orderly control of air traffic near the common boundary between the two countries. It was agreed that it would be beneficial for the United States of America to provide air traffic control above the territory and territorial waters of Canada, and for Canada to provide air traffic control above the territory and territorial waters of the United States.

The treaty stipulated that the air traffic control administrative authorities for each country were authorised to formulate agreements when they agreed that it was desirable for one State to exercise air traffic control over the other States to ensure efficient, safe, and orderly management of air traffic. These airspace agreements would be limited to within 50 nautical miles of the common boundary and would be applied in segments that benefited both countries. Further, the control of air traffic in these segments would be in accordance with the regulations of the country over which the aircraft are operating and each government would inform the other of any changes in their regulations. Authorisation was delegated to subordinates of the administrative authorities to develop the technical and operational details for air traffic control in these segments. In 1996 air traffic control in Canada was privatised to the non-share

corporation NAV CANADA. This did not disrupt cross-border arrangements and prior provisions remained in place via the transfer agreement.

Under the referenced treaty, the US, through the Federal Aviation Administration’s Air Traffic Organization, maintains letters of agreement (LOA) with NAV CANADA, Canada’s ANSP, to delegate air traffic control in segments of airspace over each country. A separate LOA is made between adjacent US and Canada area control facilities and delineates the specific segments for which control is delegated. The same LOA is used to denote coordination procedures, and a graphical depiction of the delegated areas is also included.

Figure 6 shows the section of Canada (i.e., Toronto ACC) where ATS is delegated to the US (i.e., Cleveland ARTCC). This delegation improved ATS efficiencies and streamlined service to aircraft operators.

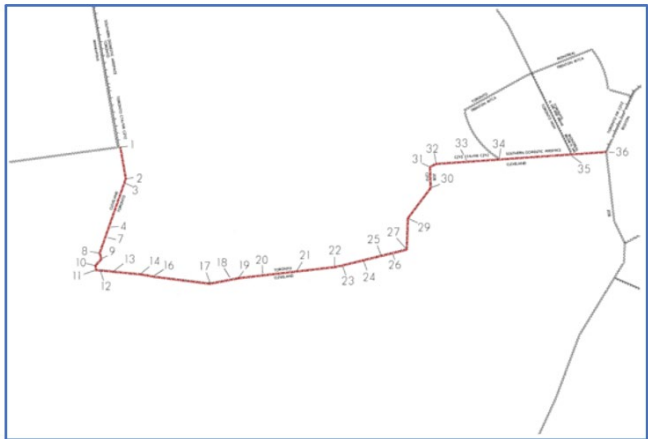


Figure 6

Figure 7 is a graphical depiction of the airspace the US (i.e., Seattle ARTCC) delegates ATS to Canada (i.e., Vancouver ACC.) Given Vancouver International Airport's proximity to the US – Canada border, this additional delegation enables Vancouver ACC to more efficiently manage the north-south arrivals and departures for the primary and secondary airports of Vancouver, Victoria and Abbotsford, British Columbia.

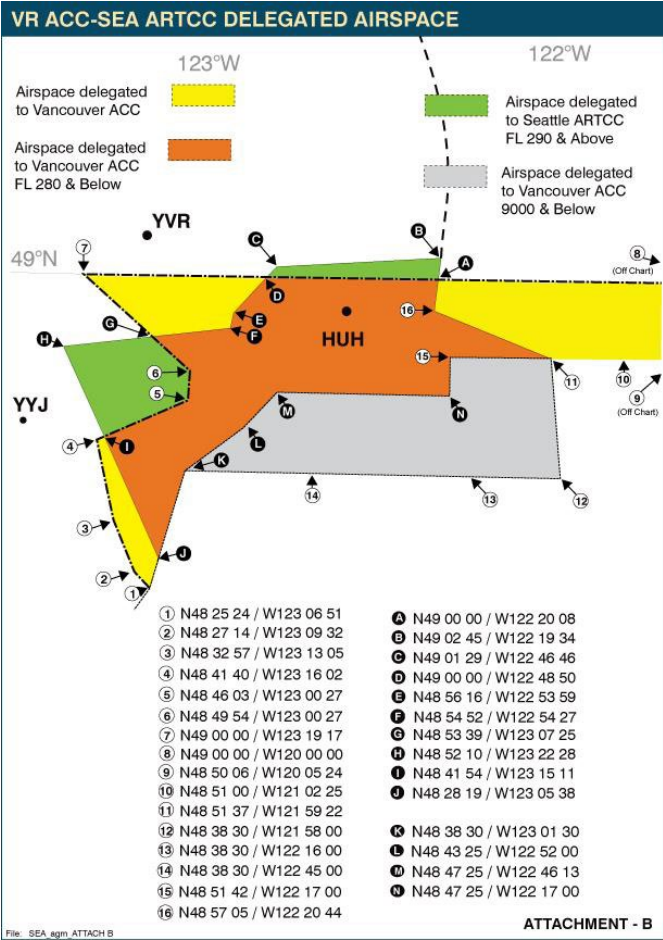


Figure 7

Legal basis

The treaty referenced above provides the legal framework within which organisational Letters of Agreement and facility agreements exist.

Social and political factors

There have been no social or political factors affecting the arrangement beyond limited aircraft noise complaints from communities living near the border and affected by international traffic managed by the other State's ANSP.

Case Study: NATS and neighbouring ANSPs' ATS delegations

Title	NATS and neighbouring ANSPs' ATS delegations
States involved	UK, Ireland, France, The Netherlands, Denmark, Norway, Iceland
Synopsis	Long standing arrangements for delegated air traffic services in airspace around the UK FIR boundaries in line with operational requirements.

Introduction

NATS has several air traffic services (ATS) delegation arrangements with adjacent ANSPs with each delegation having its specific operational driver.

In the United Kingdom (UK) and the European Union (EU) / European Economic Area (EEA)¹⁶, the respective legal frameworks require ANSPs to be certificated by national regulators to provide service within the airspace of the State. While the UK was a member of the EU, the mutual recognition arrangement that existed within the EU/EEA enabled ANSPs to provide service in neighbouring airspace on the basis of their national ANS certificate.

When the UK withdrew from the EU, NATS had to secure certification from the European Union Aviation Safety Agency (EASA) in order to continue to provide services in the airspace of EU/EEA Member States. Likewise, EU/EEA ANSPs have had to obtain certification from the UK Civil Aviation Authority (CAA) and are now subject to CAA oversight. These regulatory processes are on top of the certification required for all ANSPs by their respective national authorities. NATS and neighbouring ANSPs are therefore now operating under dual regulation and oversight from CAA and EASA and subject to oversight approvals and audits by both.

Background origins

The ATS delegations around the UK FIR boundaries have different drivers and origins. In most cases the delegations have been developed to enhance operational efficiency as traffic volumes have risen over time. These arrangements contribute significantly to the efficient delivery of busy cross-border traffic flows, particularly when it comes to the management of arrivals and departures into busy airports that are

located close to FIR boundaries. Here the receiving ANSP is able to take control of inbound flights at an earlier point relative to the FIR boundary in order to position and sequence the traffic efficiently. Over several decades of operation using ATS delegations, NATS and neighbouring ANSPs have come to rely on these delegations to enable the growing volume of traffic inbound to the London area, Dublin and Amsterdam in particular.

ATS delegations also exist in lower airspace to allow national energy industries to operate helicopter traffic to and from oil and gas infrastructure in the North Sea. These delegations are needed where the maritime boundaries do not coincide with the FIR boundaries.

Legal basis

The ATS delegations are governed by separate and specific Letters of Agreement (LoA) between the air navigation service units involved based on the EUROCONTROL model agreement template. These are endorsed by national supervisory authorities and mirrored by separate memoranda of understanding between the respective national regulators. LoAs define the operational parameters and coordination procedures to be applied between NATS' units and the different neighbouring centres.

¹⁶ The European Economic Area (EEA) agreement comprises the 27 EU Member States plus Iceland, Norway and Liechtenstein, extending the single market and related laws and regulatory provisions to those countries.

Performance and accountability

There are no performance standards specified in the LoAs; nor are there any financial transactions associated with the ATS delegation arrangements. Service received by airspace users within the volumes of airspace subject to ATS delegations is charged at the unit rate established for each FIR irrespective of delegated service arrangements and flows to the national designated ATSP.

National performance regulations apply for NATS in the UK. Where adjacent ANSPs are operating in the European Single Sky, performance aspects fall under the EU Performance and Charging Regulation *Commission Implementing Regulation (EU) 2019/317 of 11 February 2019 laying down a performance and charging scheme in the single European sky and repealing Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013*.

Social and political factors

The public is not generally aware of the ATS delegations.

There are also no employment issues associated with ATS delegations as the delegations are effectively extensions into FIRs immediately adjacent to national areas of responsibility. The service provision is managed through airspace design and operational procedures within the relevant ATS unit as documented and agreed in the LoAs.

Safety regulation

UK and EU air navigation service certification regulations, separately applicable in the UK and in the EU apply to ANSPs providing delegated services.

Under UK regulations all ANSPs providing air navigation services in UK airspace need to obtain a certificate from the UK CAA and are then subject to applicable oversight processes against the UK regulations. Similarly, NATS has obtained certificates from EASA under EU regulations and for the purpose of the provision of those delegated services is subject to the relevant EU certification regulations. At the point at which the UK left the EU, regulations governing ANSP certification were broadly similar. Since then, both the UK and EU have introduced changes to regulations which have created divergences. This introduces challenges for all ANSPs concerned. At the current stage the situation

creates additional compliance activity, but in future, where regulations may diverge more significantly, ANSPs may experience greater difficulties complying with two sets of regulations simultaneously. A more sustainable solution is likely to be required to support ATS delegations longer term.

Regarding ATCO licensing, each national competent authority acts as the licensing authority and training organisation certification authority. Licences in EU and EEA States are issued in accordance with the European Commission Regulation (EU) 2015/340 laying down technical requirements and administrative procedures relating to air traffic controllers' licences and certificate. UK licences are issued in accordance with equivalent UK regulations. UK replicated the EU regulation with only minor modifications when the UK withdrew from the EU.

Lessons Learned

The ATS delegations are long-standing arrangements that pre-date air navigation service certification requirements in the EU and UK. Prior to UK's withdrawal from the EU, arrangements were governed by the common EU regulatory framework. The UK's departure from the EU has resulted in complexities and issues that have presented challenges for an otherwise operationally beneficial arrangement supported by all operational parties. Cooperation at State level and between regulatory authorities can mitigate these issues, but will take time to agree and embed.

CATEGORY 2: Provision of ATS to a Neighbouring State

Case Study: North Atlantic

Title	North Atlantic
States involved	Canada, Iceland, Denmark
Synopsis	Upper airspace over Greenland is managed by neighbouring countries of Iceland and Canada in a longstanding arrangement that is under notice of being dissolved.

Introduction

An agreement provides for Iceland and Canada to provide area control service, flight information services and alerting services on a 24 hour basis in the airspace above FL 155.

NAV CANADA provides service to the delegated area from its Gander Area Control Centre which also controls delegated oceanic airspace within the Gander FIR. ISAVIA provides service from its enroute centre in Reykjavik. The airspace over Greenland is integrated into the FIRs managed by the two ANSPs and not managed as a separate FIR.

Below the area of delegated airspace (below FL195) Naviar provides air traffic services with some services provided via third parties.

International overflight volumes in the subject airspace can vary widely based on the location of the jet stream on a daily basis. For efficiency reasons (time and fuel) aircraft generally try to benefit from the jet stream winds transiting eastbound and to avoid its headwinds transiting westbound. This can result in significant westbound flows in what would be Greenland airspace on some days, and low traffic volumes on other days.

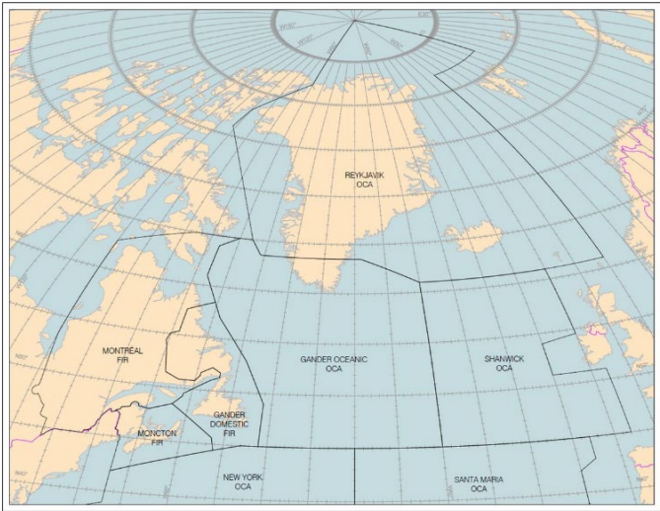


Figure 8 Flight Information Region Boundaries in North Atlantic

Background origins

Greenland is a self-governing overseas administration of the Government of Denmark. In 1963 at a time traffic in the area was growing, an arrangement was put in place to enable management of upper airspace over Greenland by the neighbouring countries of Iceland and Canada. Iceland and Canada both had neighbouring airspace and experience in providing oceanic services. The arrangement has persisted in part because it seemed a logical arrangement given traffic flows in the areas.

Legal basis

This arrangement is codified in an international treaty called Exchange of Notes Between the Government of Canada and the Government of Denmark Concerning Air Traffic Control over Southern Greenland which delegated the southern portion of the airspace to Canada and the Air Services Agreement between Denmark and Iceland.

The treaties contain no particular arrangements governing insurance and liability of ATS providers operating in the airspace covered by these treaties.

When established, the arrangement had no end date, but provision was made for parties to withdraw with 1 year notice, or shorter notice with the agreement of all parties. In 1996 when Canada privatised its air traffic control function it delegated to NAV CANADA all services it was previously responsible for providing, including the services subject to the treaty with Denmark.

Performance and accountability

Reporting on certain aspects of service provision such as safety is to the North Atlantic Systems Planning Group (NAT SPG) which was the first regional planning group established by ICAO. The NAT SPG maintains a NAT Air Navigation Plan and provides an important forum for regional discussions on service needs.

Economic Regulation

The financing arrangements are perhaps the most complex and novel part of this arrangement. Multilateral treaties provide for the joint financing of air traffic control, communications, and meteorological services in Greenland, Iceland, and the Faroe Islands for civil aircraft crossing the North Atlantic Ocean above the 45th parallel north. Early arrangements were established in 1956 and updated in 1982 and 2008 (Agreement on the Joint Financing of Certain Air Navigation Services in Greenland and Agreement on the Joint Financing of Certain Air Navigation Services in Iceland).

Twenty-five States with aircraft operating in the North Atlantic are parties to the Agreements, including Denmark, and Iceland who contribute five per cent of the operating costs of the aviation services. All States whose aircraft make a significant number of North Atlantic crossings are invited to adhere to these Agreements.¹⁷

Since 1974 most of the costs are recovered from airspace users, with NATS, the air navigation service provider in the UK, providing charging and collection services.¹⁸ A portion of the costs which is not allocable to international airspace users is recovered from the States that are parties to the Agreements based on the percentage of North Atlantic crossings performed by commercial aircraft operators from those States.¹⁹

Costs for service provision in the relevant southern portion of the Gander FIR are recovered through NAV CANADA oceanic and communications service charges as part of its overall cost allocation and are not accounted for separately. The treaty between Denmark and Canada specifically provides that “no charges, additional to charges applicable under Canadian law for other services provided by Canada shall be imposed for the services performed under this agreement; provided, however, that nothing in this clause shall be deemed to authorise the imposition of charges under Canadian law in respect of aircraft operating between Europe and Greenland, Greenland and Europe or operating exclusively within the Greenland airspace”.

¹⁷ https://www.icao.int/sustainability/Documents/jf_accord_en.pdf

¹⁸ <https://www.nats.aero/do-it-online/denmark-iceland-charge-rates/>

¹⁹ <https://www.icao.int/sustainability/Joint-Financing/Pages/danish-icelandic-agreements.aspx>

Safety regulation

Iceland and Canada remain the authority for licencing of air traffic controllers employed by their ANSP, oversight of training programs, and general safety oversight including granting the operating licence to the service providers. There is no special provision in legal agreements for safety regulation or special audit powers of the delegated service providers by Denmark or authorities in Greenland.

In the event of an accident in the delegated airspace, Denmark would be the lead investigator, likely with participation from the relevant safety investigation body from the State providing the service.

Social and political factors

Given the long history of this cross-border service arrangement in the strategically important piece of airspace that is the North Atlantic, it evolved with the evolution of air traffic control itself. As a result, its existence had not been particularly high in the public consciousness over past years.

However, recently the arrangement became a political issue linked to self-determination. In 2009 Greenland passed a Self-Government Act which recognised its right to have the option to become a sovereign country in the future. In July 2022, in response to a request from Greenland, the Danish government announced its intention to establish an area control centre in Greenland and to cancel the current arrangements with Iceland and Canada once that facility is operational.²⁰ Since the announcement, notice has been provided under the relevant Treaties that the service will be repatriated to Greenland in 2031.

Denmark has stressed that this change will “normalise” the airspace and reduce fragmentation by establishing a single, unified FIR encompassing upper and lower airspace. However given that the majority of traffic is overflight traffic in upper altitudes, this will create a new fragmentation in upper airspace.

It is the Danish Government’s stated intention that an entirely new enroute centre be established in Nuk Greenland, which will be initially operated by Naviar the Danish ANSP, with the potential for it to be transferred in the future to Greenland. At this point in time, Naviar has been asked by the government to conduct a pre-project, which is currently being finalised.

Lessons Learned

This is an example of a successful cross-border arrangement that, for reasons unrelated to service needs, may potentially be altered. The rationale for altering the current airspace arrangement appears not to be driven by the traditional competencies. Whilst the proposed change in service is being considered by all relevant parties, in accordance with the cancellation provisions of the Treaty, the competencies of aviation safety, efficiency and cost effectiveness are unlikely to be enhanced by the proposed change to the existing cross-border arrangement for service over Greenland.

Therefore, it is hoped that the decision to alter this arrangement is reconsidered, and that any future discussion will recognize the benefits of such arrangements.

²⁰ July 2022 <https://www.aviation24.be/air-traffic-control/greenland-to-get-its-own-air-traffic-control/>

Case Study: Bermuda

Title	Bermuda
States involved	United States of America, United Kingdom, Bermuda
Synopsis	Provision of enroute and approach services by the FAA Air Traffic Organization in Bermuda airspace

Introduction

The island state of Bermuda lies wholly within the oceanic Flight Information Region managed by the Federal Aviation Administration's Air Traffic Organisation (FAA ATO). The FAA provides both enroute air traffic control services in Bermuda airspace, and approach services to its international airport.

Background origins

After the United States Department of Defence closed its naval base in Bermuda, in 1995, the US and FAA entered into agreements with the United Kingdom and Bermuda, respectively, for providing ATS²¹. Bermuda and the FAA renegotiated their agreement in 2014.

The agreement stipulated that the FAA New York Air Route Traffic Control Centre (ZNY) would provide ATS for air traffic transiting the Bermuda airspace. In addition, ZNY provides approach control services for Bermuda, until such time that the government of Bermuda is prepared to provide approach control services. ZNY maintains operational advantages by providing radar separation within the direct air/ground communication and surveillance coverage of approximately 180-mile radius around Bermuda. (See Figure 9).

The Bermuda Airport Authority provides tower air traffic control services for arriving and departing traffic extending up to eight miles from L. F. Wade International Airport.

Legal basis

Bermuda is a British overseas territory. Its constitution provides the island with formal responsibility for internal self-government, while the British Government retains responsibility for external affairs, defence, and security.

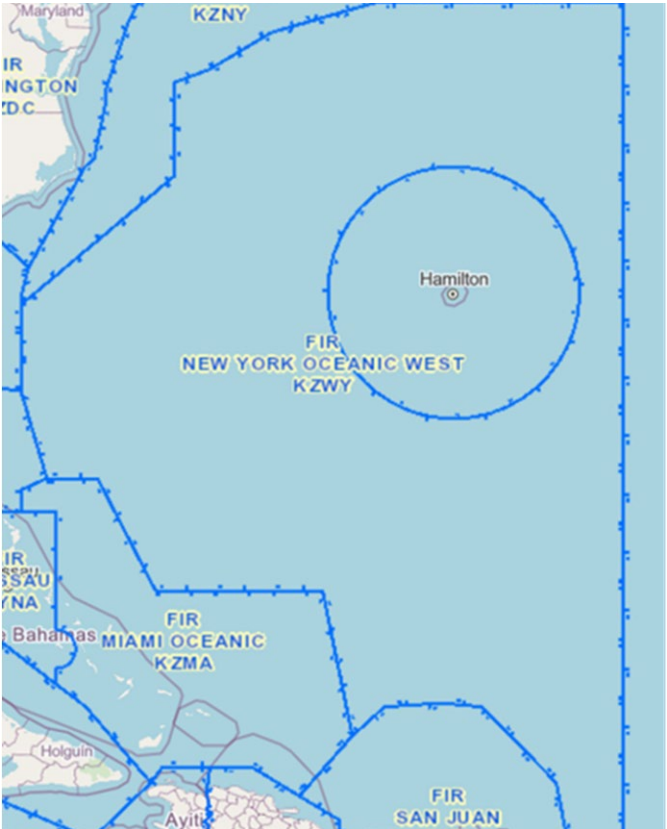


Figure 9 New York Air Route Traffic Control Centre (ZNY) Airspace Diagram, Encompassing Bermuda's Airspace

²¹ Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the United States of America Concerning the Facilitation of Air Navigation Services, 11 May 1995.

Performance and accountability

Safety and efficiencies are achieved via the use of FAA owned and maintained Communications Navigation and Surveillance (CNS) equipment. The arrangements include provisions for cost sharing for the FAA-owned equipment in Bermuda for the overall maintenance and operations of the equipment, including FAA logistics support, technical assistance, and periodic flight inspections. Additionally, the Bermuda Airport Authority (BAA) owns and maintains its own ATC equipment.

Safety regulation

Safety oversight is the responsibility of each respective State over their own service provider.

Civil-military cooperation

The US operated two military bases in Bermuda under the terms of an agreement with the UK government, providing its own air traffic control services. Both bases closed in 1995 and the former Kindley Field became the present Bermuda International Airport.

Lessons Learned

This case study demonstrates a practical and efficient way of arranging service provision for an island state whose airspace may be wholly encapsulated in an Oceanic FIR managed by another state. The vertical boundary enables efficient management of overflight traffic and sequencing of traffic to and from Bermuda in enroute airspace.

Case Study: Bahamas

Title	Bahamas
States involved	United States, Bahamas
Synopsis	The provision of air traffic control in upper airspace over the Bahamas is provided by the Federal Aviation Administration Air Traffic Organisation (FAA ATO). The arrangement is longstanding but was only recently codified.

Introduction

The FAA's Miami Air Route Traffic Control Centre (ARTCC) manages Bahamian upper airspace (depicted in Figure 10), while BANSAs Nassau Centre manages the Nassau Control Area/Flight Information Region (CTA/FIR) as (depicted in Figure 11).

The provision of ATS by Miami ARTCC and Nassau Centre are conducted in accordance with the operational LOA between the two facilities that outlines inter-facility coordination and cross-boundary procedures.

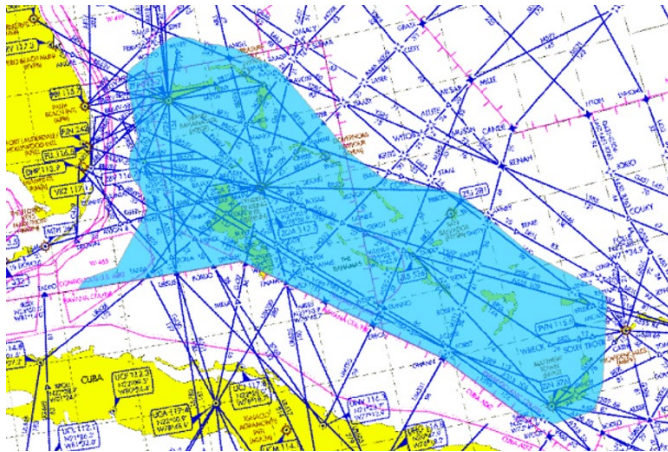


Figure 10

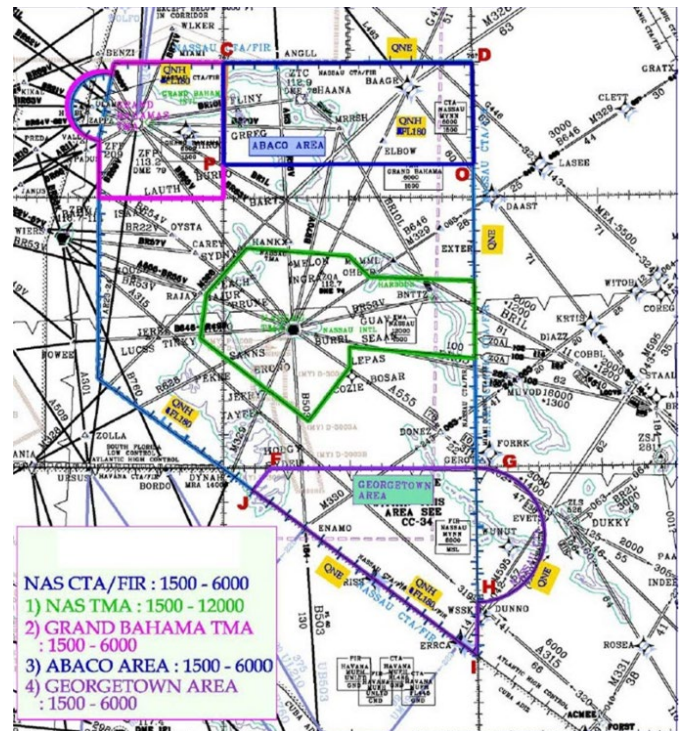


Figure 11

Background origins

Air traffic control in upper airspace has been provided by the FAA since the 1950s but the arrangement was never specifically codified in legal agreements. Formerly a British colony, The Bahamas became an independent country in 1973. It wasn't until the early 2000s that the governments of the U.S. and The Bahamas recognised the need to formally document this arrangement and began discussions.

Legal basis

After many years of negotiations, the Federal Aviation Administration (FAA) and Bahamas Air Navigation Services Authority (BANSa) signed an Air Navigation Services Agreement in 2021. The major provisions of this Agreement stipulate that the FAA provides ATS over The Bahamas sovereign airspace, formally identify the responsibilities for BANSa and FAA for management of the airspace, and the FAA CNS infrastructure, installed throughout The Bahamas, used by the FAA to provide ATS.

Lessons Learned

Historically informal agreements have in some instances operated and evolved. However, to help ensure standardisation and clarity for future operations, more formal arrangements and responsibilities are needed. As an example, the signing of an Air Navigation Services Agreement in 2021 between the two States, after over 60 years of operation, provides future certainty while maintaining the day-to-day service delivery.

CATEGORY 3: New entity providing ATS in multiple states

Case Study: Roberts FIR

Title	Roberts FIR
States involved	Guinea, Liberia and Sierra Leone
Synopsis	Roberts FIR provides enroute air traffic control and associated services from a single enroute centre in Liberia covering the territory of three African States.

Introduction

Roberts Flight Information Region (FIR) is a tripartite organisation responsible for the control and safety of air navigation in the combined upper airspace of Guinea, Liberia and Sierra Leone (see Figure 12). Services are provided from a single enroute centre. The FIR is 770,777 KM² an area 3 times larger than Maastricht Upper Air Centre (MUAC).

The headquarters of the Roberts FIR is located at the Roberts International Airport in Harbel, Lower Margibi County, Liberia.

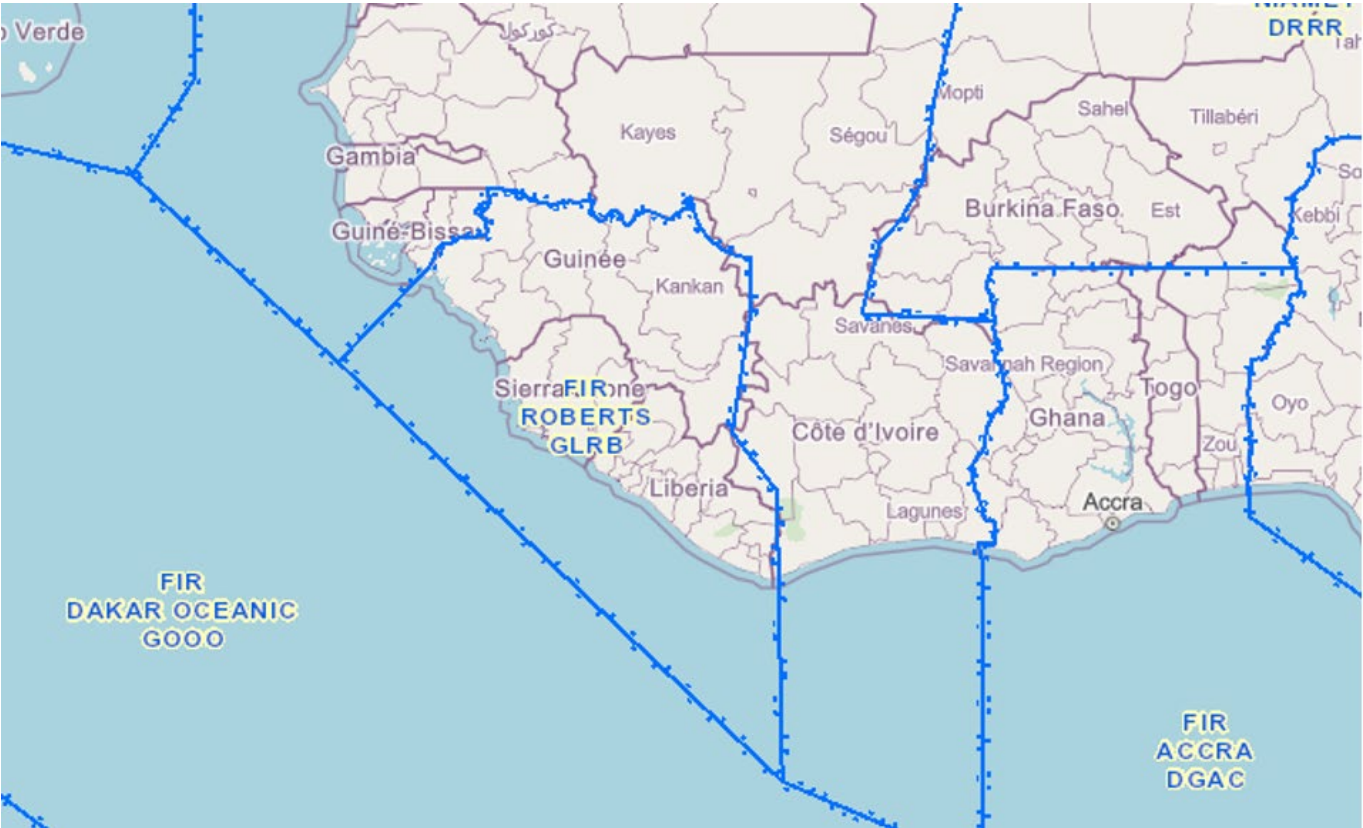


Figure 12

Background origins

The Roberts Flight Information Region was established on the 17th of January, 1975 when the three states of the Mano River basin – Guinea, Liberia, and Sierra Leone, set up a cooperative venture to provide air navigation services for enroute flights in their combined airspace. It took seven years, until 1982, for the transition of airspace, which was part of the Dakar FIR, to actually occur. The FIR was named after Roberts International Airport (also known as Robertsfield), which hosted the headquarters at its creation.

Initially Roberts FIR provided air traffic service to as low as 3,000 ft MSL, with Member States continuing to manage the lower airspace and local air traffic control towers as well as approach within their respective boundaries. In 2022 the responsibility of Robert FIR was officially adjusted to a floor of 10,000 ft, via an amendment to the Roberts FIR Aeronautical Accord, clarifying lower level responsibilities. There are plans to further reinforce this through changes to airspace structure to ensure alignment.

Roberts FIR also provides aeronautical information services and search and rescue coordination on behalf of member states and maintains a meteorological watch office.

While the Roberts FIR member states are responsible for search and rescue operations in its territory, the Roberts FIR being the designated RCC is responsible for coordination of search and rescue on behalf of member states and provides assistance to member states for search and rescue operations with other non-member neighbouring states.

The Roberts FIR lateral airspace definition is from: 09 00N-016 55W, 10 53N-015 05W then along the Guinea territorial border to point 12 30N-009W 20W, then along the limit of Bamako TMA to the point where this limit crosses meridian 008 00W, then along meridian 008 00W to point 10 10N-008 00W, then to points 07 30N-008 25W, 06 15N-007 27W, 00 00N-007 20W and 09 00N-016 55W.



Figure 13

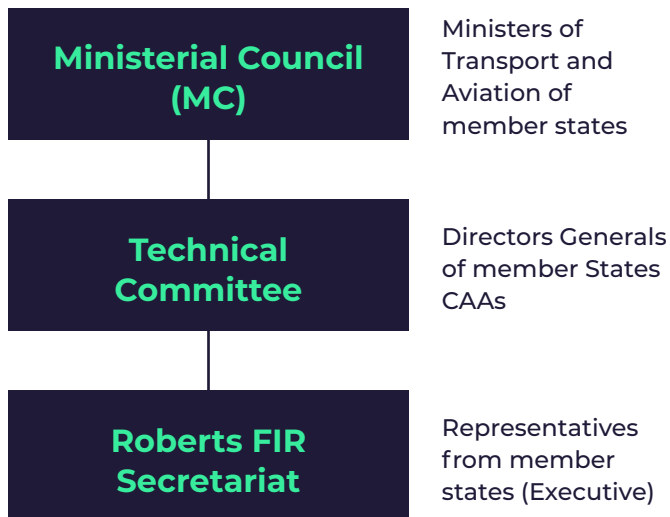
Legal basis

The Roberts FIR Aeronautical Accord is a document signed by the then Heads of States of Guinea, Liberia and Sierra Leone. It serves as the foundational document for the organisation's existence and sets out the detailed nature of a tripartite arrangement for governance, management and oversight. Clauses in the Accord provide for the possibility of dissolution however the cross-border arrangement was intended to be permanent.

The governance of the organisation contains specific arrangements for sharing of key management positions among the participating States. The positions of Secretary General, Deputy Secretary General for Technical Affairs (DST) and Deputy Secretary General for Administrative Affairs (DSA) are each held by a representative of each of the different states. The position of Secretary General and Deputy Secretary General for Technical Affairs rotates between the Republics of Sierra Leone and Guinea every 4 years, renewable once. The position of Deputy Secretary General for Administrative Affairs is filled permanently by the Republic of Liberia for a renewable term every 4 years.

Performance and accountability

The arrangement contains specific provisions for ongoing accountability to the consistent States. The Roberts FIR Secretariat reports on its performance to a Ministerial Council (MC) comprised of the three Ministers responsible for aviation in its member States through a Technical Committee (TC) comprised of the 3 Director Generals of Civil Aviation Authority (DGCAAs) of member states.



Social and political factors

Roberts FIR has a history of relocating its operations due to local conditions, including conflicts. The civil wars that erupted in the late 1980s and early 1990s affected two member states and put considerable pressure on Roberts FIR. The organisation was able to maintain an unbroken service while relocating personnel to Sierra Leone, and then Guinea, before returning to Liberia in 2008. The Ebola outbreak of 2014/15 again necessitated the temporary evacuation of personnel in order to maintain service.

The organisation is current in the process of establishing two additional enroute centres in Sierra Leone and Guinea with the intention that they would be maintained for contingency purposes in the event the enroute centre in Liberia needed to relocate. There are additional arrangements for regional contingency in which ASECNA would provide service in the airspace should critical incidents occur in which service could no longer be provided by Roberts FIR.

When hiring operational and non-operational staff, effort is given to retaining a balance with recruitment from all three partner States. If, for example, six new ATCOs are being recruited, an effort would be made to bring in two students from each of the three States. Often new ATC retirement is done by first asking the three States if they have ATCOs that may be able to transfer from local towers to the enroute facility. However local facilities are often unable to give up staff and ab initio students are brought in.

Economic regulation

While some initial funding was provided by member States at the time Roberts FIR was being established, the organisation now operates as an autonomous entity, fully funded by service charges paid by airspace users. Roberts FIR determines its costs and any proposed changes to service charges are approved by its constituent States following stakeholder consultation. Annual audits provide assurance of fiscal management to the governments that are party to the Accord.

There have been few changes to its service charges which were kept the same until 2017 at which time a change was made to include aircraft weight (MTOW) in the charging formula in consultation with users.

Safety regulation

Safety oversight is undertaken through a unique arrangement established in a separate Memorandum of Understanding between the three States.

According to that agreement safety oversight is the responsibility of one State at any given time, but responsibility for safety oversight rotates every 2 years subject to renewal when necessary. States who are not the lead at any one point in time continue to have the right to undertake an audit at their discretion.

In practice, in order to maintain oversight expertise and awareness CAA officials from States not currently leading safety oversight often join in on audit activities and any incident reports are copied to all States.

Roberts FIR is responsible for adhering to safety regulations in all three states. What would appear to be a complex arrangement is not because in practice safety regulations are the same in all three states and based on ICAO SARPS. One significant exception to this apparent overlap is that it has been agreed that Liberia will be the authority for issuing of ATCO licences due to the location of the enroute facility.

In 2018 CANSO awarded the CANSO Global Safety Achievement Award 2018 to Samba Dabor, Safety Manager, Roberts FIR for his exemplary work in establishing the ANSPs first safety management system (SMS).

Military Coordination

There are no formal arrangements for civil military coordination and this has been identified as a gap to be addressed. Roberts FIR has no authority to deal directly with militaries other than through States. That being said however, Guinea is the primary State with military aviation activities and it appears that coordination is working well. Airspace is reserved for their activities and returned to civil control when military exercises are completed in line with flexible use airspace best practices.

Lessons Learned

In general, while complex structures exist for tripartite governance, management and oversight, in reality the organisation operates with strong controls over its own operations and plans and is given a high degree of autonomy to make decisions based on business requirements and service needs. The arrangement represents a high degree of collaboration among the member States and a focus on the professionalism required to make decisions in the interest of the service.

Case Study: ASECNA

Title	Agency for the Safety of Aerial Navigation in Africa and Madagascar (ASECNA)
States involved	Benin, Burkina, Cameroon, Central Africa Republic, Congo, Ivory Coast, Gabon, Guinea Bissau, Equatorial Guinea, Madagascar, Mali, Mauritania, Niger, Senegal, Chad, Togo, Rwanda and Union of Comoros and France
Synopsis	A long standing arrangement in which a single international entity provides enroute services over 18 countries. The largest example of cross-border services globally.

Introduction

ASECNA is an ANSP headquartered in Dakar that is responsible for provision of air traffic control and related services in over 16.1 million square kilometres (1.5X the size of Europe). The airspace within its control is divided into six Flight Information Regions (Antananarivo, Brazzaville, Dakar Oceanic and Terrestrial, Niamey and N'Djamena); and contains 10 regional control centres, 57 control towers, 25 international airports, and 76 national and regional airports. The organisation has approximately 8,5000 employees delivering on its core mandate and secondary activities delegated by the States.

ASECNA is the largest example of collaborative management of airspace and the most longstanding of all cases examined. It is currently made up of 18 member States; 17 African countries and France, (for the TMA - Terminal Manoeuvring Area - of Saint-Denis-Gillot, included in the Antananarivo FIR). ASECNA is an important symbol of regional cooperation and integration.



Figure 14 AESCNA States

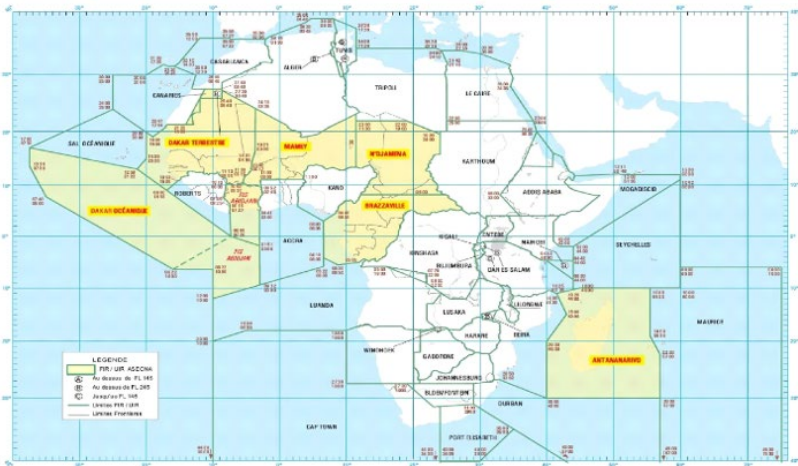


Figure 15 AESCNA Airspace

Background origins

In December 1959, Heads of State and Government from the federations of French Equatorial Africa (AEF), French West Africa (AOF) and from Madagascar met at Saint-Louis in Senegal and signed the Dakar Convention which established ASECNA.

At the time it was a tangible way for the nascent States (as independence was in the process of occurring and wouldn't be finalised until 1960) to work towards the achievement of a common objective. ASECNA was established as a way to prevent airspace fragmentation and achieve cost efficiencies for the emerging States at the time, to work towards the achievement of a common objective.

In 1974 a new agreement was signed that redefined the mission of the Agency, its statutes and organisation. In 2010, the Ministers of 18 member countries of ASECNA signed in Libreville, Gabon, a new agreement to further modernise laws governing the Agency, after threats from Senegal and Madagascar to withdraw from the Organisation.²²

In the celebration of ASECNA's 60th anniversary on 12 December 2019 ICAO Council President Aliu recognised ASECNA's establishment as marking "a key development for Africa and for international aviation, and one which represents one of the most important collective decisions on the cooperative management of airspace ever adopted." President Aliu stressed that the African ANSP's "collaborative model and pioneering leadership through the decades have been immensely important to civil aviation progress in Africa, and they have helped ASECNA States and Africa more broadly to harness and maximise the benefits of air transport on the basis of enabling regulatory environments and quality infrastructure."²³

Legal basis

ASECNA is an independent international legal entity and enjoys financial autonomy. Its Board of Directors is made up of one administrator from each Member State and is accountable to a Committee of Ministers that meet once per year. The Board define the general policy of the Agency and makes decisions on operational budgets and procurement.

The Director General of ASECNA is appointed by the Board for a 4 year term, renewable once. The Board also appoints the Accounting Officer and Financial Controller. An Audit Committee and Safety Control Committee ensure accountability to the Board on key issues.

Performance and accountability

Governed by the revised Dakar Convention from 2010, ASECNA primarily carries out the community activities provided for in Article 2 and, secondarily, manages the so-called national activities for the benefit of the individual member States (Articles 10 and 12).

ASECNA has developed a strategic orientation plan extending until 2030, and the General Director is mandated with a mission statement outlining performance objectives within that strategic orientation.

Upon assuming office, the General Director receives a set of specifications against which their performance is evaluated, in addition to performance criteria established by the governing bodies, namely the Board of Directors comprising Directors of Civil Aviation from member States and the Committee of Ministers.

Aeronautical royalties are calculated by the invoicing service of each Representations of ASECNA present in all members States and by the Financial Resources Department in charge of overflights invoices.

Furthermore, there exists an Accounts Verification Commission (CVC) overseeing financial resources and a Security Verification Commission (CVS) monitoring technical performance outlined in the Director General's roadmap.

The Director General bears sole responsibility for managing the Agency before the Statutory Bodies. While not the sole electee, they are exclusively accountable for the Agency's management. Consequently, they structure the organisation in alignment with the objectives entrusted to them.

²² https://applications.icao.int/postalhistory/asecna_agence_pour_la_securite_de_la_navigation_aerienne.htm

²³ ICAO. News Release, 13 December 2019. [ICAO leaders appreciate historic contributions to African and global aviation as ASECNA celebrates its 60th Anniversary](#)

Social and political factors

ASECNA's personnel are governed by a single statute applicable in all member States. The Agency's staff is diverse, comprising individuals from its eighteen member States. Employees may either be locals or expatriates from other countries depending in the country they have been designated to work in, all of whom remain members of the Organisation. Employees in each respective country are subject to the employment and labour laws and regulations governing that jurisdiction.

The segmentation of airspace into FIRs necessitates that the provision of air navigation services transcends the borders of a member State. Aviation regulations applicable within each airspace are governed by the country hosting the ATS centre responsible for managing that particular airspace. However, the establishment of an entity bringing together the civil aviation authorities of the member States (AAMAC) has facilitated the harmonisation of aeronautical regulations across the States.

Safety regulation

As an international organisation operating in multiple countries ASECNA is subject to the safety regulations mandated by its member States.

Each State issues licenses for personnel operating within its borders. For training centres, it's the civil aviation authorities where the schools are located that conduct inspections for the issuance of training licenses, and these licenses are accepted by other states. On-the-job training is delivered in each country under the supervision of each authority.

To ensure safety inspections, each member State may conduct operational service inspections according to its program. However, there is a growing trend towards the delegation of oversight activities to AAMAC on behalf of the States.

In the event of an accident, which falls under the jurisdiction of the States, each State is expected to have its own accident investigation body.

Civil-military cooperation

In each member State, there exists a Memorandum of Understanding between the Air Force and ASECNA. These MoUs aim to define responsibilities regarding the military's use of airspace, restricted areas, airspace closures, and other matters.

Lessons Learned

ASECNA is a unique model among those examined and is notable both for its size, longevity, and the fact that it remains, in most cases, subject to the laws and rules of each of the states in which it operates. ASECNA has repeatedly readapted itself to the new political and economic context when those occur over the years and can be used as a model of inter-State cooperation.

Case Study: COCESNA

Title	Central American Corporation of Air Navigation Services (COCESNA)
States involved	Costa Rica, Honduras, Guatemala, El Salvador, Nicaragua and Belize
Synopsis	An international not for profit entity that provides air traffic services in the upper airspace of the FIR Central America.

Introduction

The Central American Corporation of Air Navigation Services (COCESNA) is an International Organisation for Central American Integration, a non-profit public service entity with legal status and financial autonomy.

It was established on February 26, 1960, and is governed by a Board of Directors, which constitutes its highest collegiate body. The Board is composed of the Directors of Civil Aviation of each of the States that are signatories of the Constitutive Agreement and its functions outline the guidelines, plans, programs and projects of the Organisation. The main COCESNA executive is its Executive President, appointed by the aforementioned Board of Directors for a period of five years, extendable in a rotation system established by the same Member States. This model of regional integration makes COCESNA a unique Organisation in which the signatory States are directly represented making them an integral part of COCESNA.

COCESNA has exclusive rights over the provision of Air Traffic, Aeronautical Telecommunications, and Radio Aid services in the territories of the Central American Member States, along with other services stipulated in the regional plans entrusted to it by the Contracting Parties under an International Agreement. COCESNA's operations are primarily guided by the Standards and Recommended Practices (SARPS) of the ICAO.

Through its control center, COCESNA provides Air Traffic Services in the airspace of the FIR/UIR Central America. The Corporation operates the Air Traffic Control Center (ACC) with the call sign CENAMER CONTROL, as well as the Flight Information Center (FIC), which manages the aeronautical station known as CENAMER Radio. These facilities, operating under the responsibility of COCESNA, are responsible for Traffic Control Services, Air Advice, Flight Information, and Alerts, maintaining a continuous connection with the Rescue Coordination Center (RCC) of Central America.

The airspace under the responsibility of COCESNA consists of 2.6 million square kilometers, and includes the airspace of the Central American Upper Flight Information Region (UIR) and the lower maritime airspace in the Caribbean Sea and Pacific Ocean.

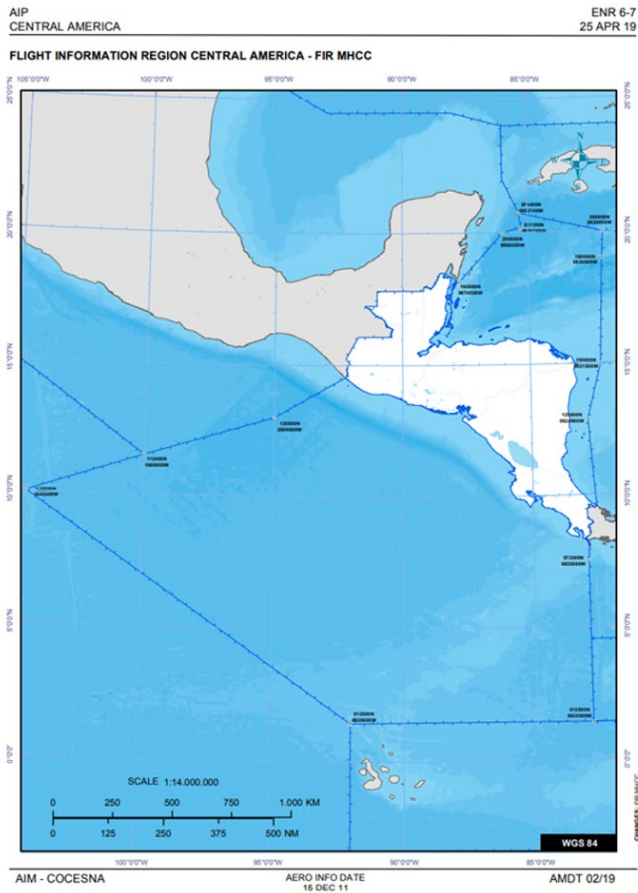


Figure 16 FIR Central America

COCESNA has coordinated the expansion of the Central American FIR/UIR a total of five times since its inception. The additional volumes of airspace are over Caribbean Sea and also over the Pacific Ocean, with the last FIR expansion being implemented on March 22nd 2001, during which the Mazatlán FIR assigned COCESNA part of its airspace.

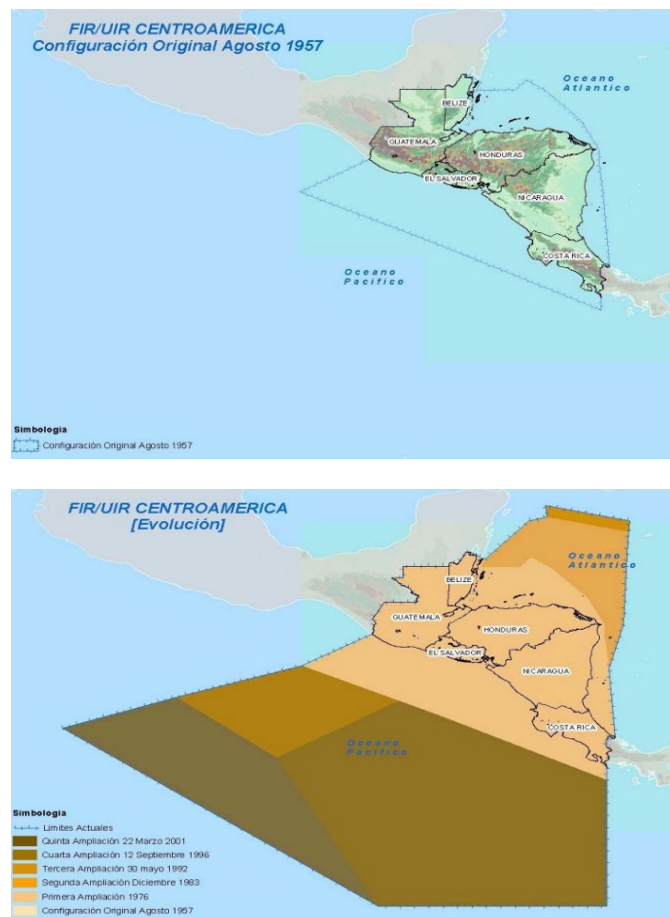


Figure 17 Evolution of COCESNA airspace²⁴

Background origins

Significant advancements in aviation at the end of the 1950s drove a need to modernise and strengthen the air navigation services in the region. In November 1959, a meeting was convened in Guatemala with the Directors of Civil Aviation for Central America at that time. During this meeting, it was unanimously agreed to organise a Diplomatic Conference with the aim of establishing a specialised regional organisation. This organisation would have the necessary human and financial resources to meet modern aviation requirements while unifying and coordinating regional intergovernmental efforts and actions that would benefit the users of these services.

The Conference of Director Generals of Civil Aviation took place in Tegucigalpa, Honduras from February 22 to 26, 1960. During this conference, the foundational principles of the Central American Corporation of Air Navigation Services (COCESNA) were officially established.

As a consequence of its nature and objectives, COCESNA's Constitutive Agreement was registered with the International Civil Aviation Organization (ICAO) on February 1, 1961, and with the United Nations (UN) on January 2, 1962 originally representing agreement between five countries. In 1963, COCESNA received official recognition from the Central American isthmus states through decrees and laws ratified by the Legislative Assemblies of each Member State. Belize formally joined COCESNA in 1996.

²⁴ ICAO Working Paper SCM/1-WP/04 FIRST UNASSIGNED HIGH SEAS AIRSPACE SPECIAL COORDINATION MEETING https://www.icao.int/SAM/Documents/2019-SCM1/SCM1_WP04%20COCESNA.pdf

Legal basis

As a result of the 1960 conference, the Contracting Parties signed the Articles of Agreement of

COCESNA that was subsequently ratified by the respective legislative bodies of the member States in 1963. The Corporation was created to promote the cooperation of the Central American States in improving safety, consolidating the organisation of air traffic services, aeronautical telecommunications and radio aids for air navigation, and ensuring the effectiveness of said services COCESNA's Corporate Statutes provide the outline of its legal framework. Some of the articles to highlight are the following:

ARTICLE 2. The Corporation will be governed by the following legal framework:

- a) The provision of the Convention
- b) The present Statute
- c) The provisions of international and community law
- d) The resolutions and/or agreements issued by the Board of Directors.
- e) The circulars issued by the Executive Management - CEO
- f) The Regulations and Code of Services

ARTICLE 4. The Corporation's Objective is:

- a) Provide the Civil Aviation Authorities of their Member States with an adequate structure to provide support services to air navigation, air transport and civil aviation in general; and
- b) Provide technical assistance and cooperation services to other States and related Organisations, to promote the efficient, sustainable, safe and orderly development of air transport.

ARTICLE 5. To fulfill its objective, the Corporation will develop all the necessary functions, and in particular:

- a) Promote and support coordination and cooperation between its member states, for the safe development and better use of intra- and extra-regional air transport;
- b) Prepare economic and technical studies on navigation and air transport in the region;
- c) Promote greater exchange of technical and economic information between Member States, through timely notification;
- d) Support member states in compliance with the standards and recommended practices of the convention on international civil aviation, its annexes and matters relating to air transport.
- e) Promote agreements between its Member States that contribute to the execution of the ICAO regional and global air navigation plans.
- f) Support Member States in establishing air navigation facilities and services, infrastructure and equipment, in accordance with the approved strategic plan;
- g) Provide and promote the provision of intra- and extra-regional services, for which COCESNA has the capacity and competence in accordance with its objectives and functions, as well as the training of aeronautical personnel, in the specialties that the corporation has the capacity to provide courses, training and /or services must be duly certified by the competent authority, in cases where the regulations of each State require it;
- h) Sign cooperation and technical assistance agreements in the different fields of civil aviation;
- i) Provide technical and/or specialised opinion regarding matters submitted to your consideration;
- j) Contribute to the development and integration of regional air transport and its Member States; and, Safeguard the interests of its Member States in different global or regional forums, in matters within their competence, including the defense of their technical interests and their presence before the ICAO Council. Any State.

ARTICLE 20. To fulfill its objectives, the Corporation will have corporate dependencies, systems, units or management mechanisms in the territory of its Member States. These will depend administratively and operationally on the Executive Directorate-CEO.

In order to comply with its mandate, COCESNA has created three specialised agencies²⁵:

- ACNA: Central American Agency for Air Navigation is the portion of COCESNA that provides air traffic control services, telecommunications, aeronautical information and aids to air navigation. ACNA plans, coordinates and develops services and infrastructure for the efficient and safe provision of services.
- ACSA: Central American Agency for Aeronautical Safety. Based in Costa Rica the ACSA recommends, advises, guides and facilitates matter related to compliance with ICAO standards. ACSA helps support members states in meeting their regulatory obligations.
- ICCAE: Central American Institute for Aeronautical Training. Based in El Salvador, the ICAE was created in 2001 to meet the training needs of the region and has expanded its activities to become a major aeronautics teaching centre, not just in air traffic services. The training centre provides training to personnel from 21 countries and 69 different organisations.

Performance and accountability

The organisation is directly accountable to its Board of Directors, who constitute the Director Generals of Civil Aviation of its member states.

Social and political factors

The presidency of COCESNA is rotated among the Central American States of Belize, Costa Rica, El Salvador, Honduras, Guatemala, and Nicaragua, with each tenure lasting one year.

Safety regulation

COCESNA Member States monitor regulatory compliance annually through joint inspections with the participation of inspectors from each Central American country. The services under supervision are as follows:

- Air Traffic Service
- Aeronautical Maintenance Service
- Aeronautical Information Service
- Aeronautical Mapping Service
- PANS-OPS, and
- Search and Rescue

Lessons Learned

COCESNA has been a successful example of cross-border service delivery in an area which would have otherwise had heavily fractionalised sovereign airspace. It has made significant investments in modern ATM infrastructure and in supporting its member States and other entities within the region with training of personnel and other compliance issues.

Its governance processes necessitate turnover of key personnel regularly, a reality that can be disruptive on continuity of planning. But that has not negatively impacted the implementation of a strategic vision that has seen it be effective in its region and see its original airspace assignment grow.

²⁵ ICAO A40-WP/483 Information Paper Central America Corporation for Air Navigation Service (COCESNA) 60 Years of Service to International Air Transport.

Case Study: MUAC

Title	Maastricht Upper Area Control Centre (MUAC)
States involved	Belgium, Luxembourg, the Netherlands, Germany
Synopsis	Upper airspace control over a portion of four countries in northern Europe is provided by a central enroute centre managed by EUROCONTROL.

Introduction

The Maastricht Upper Area Control Centre (MUAC) provides civil and military air navigation services in the upper airspace from FL245 to FL660 of:

- Belgium (Brussels Upper Information Region)
- Luxembourg (Brussels Upper Information Region)
- the Netherlands (Amsterdam Flight Information Region) and
- the north-west of Germany (Hannover Upper Information Region)

MUAC is part of the international non-profit organisation European Organisation for the Safety of Air Navigation (EUROCONTROL) and is operated on behalf of four States – Belgium, Germany, Luxembourg, and the Netherlands.

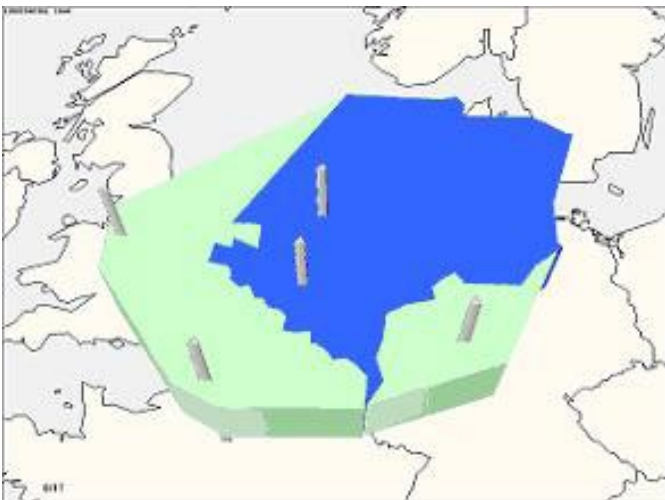


Figure 18

Background origins

The *International Convention relating to Cooperation for the Safety of Air Navigation* was first signed by representatives of Belgium, France, the Federal republic of Germany, Luxembourg, the Netherlands, and the United Kingdom on 13 December 1960 in Brussels and was ratified in 1963. Before the Convention entered into force in 1963, there were already indications that matters of national sovereignty would complicate the full implementation of the organisation's founding mission.

One of the founding aims of EUROCONTROL was to have an organisation that would be entirely responsible for the upper airspace in Europe. At the time 4 to 6 enroute centres covering the whole of Europe was envisaged. The idea got so advanced that EUROCONTROL constructed three centres, Karlsruhe, Shannon and MUAC with versions of the same flight data processing systems.

The agreement to set up MUAC as the first international air traffic control facility on Dutch territory was reached in 1964. MUAC began operations in 1972 and was first assigned responsibilities for airspace in Belgium and Luxembourg. In 1974, the upper airspace of north-west Germany and in 1986 that of the Netherlands were integrated into its area of responsibility.

Legal basis

Today the operation of facilities at MUAC is based on the “Agreement relating to the Provision and Operation of Air Traffic Services and Facilities by EUROCONTROL at the Maastricht Area Control Centre” (the “Maastricht Agreement”), signed on 25 November 1986.

MUAC is operated by EUROCONTROL on behalf of Belgium, Netherlands, Luxembourg, and Germany based on the “Agreement Relating to the Provision and Operation of Air Traffic Services and Facilities by EUROCONTROL at the Maastricht Upper Area Control Centre (Maastricht Agreement)”, signed 25 Nov 1986 by Belgium, Germany, Luxembourg, the Netherlands and EUROCONTROL. Based on the Chicago Convention and the Maastricht Agreement, each of the four States retains its specific responsibilities with regards to regulation and oversight within its own airspace serviced by MUAC. Regulation and oversight of MUAC are nevertheless exercised in a highly coordinated manner among the four concerned States.

The Maastricht Agreement was amended on 01.07.2022. This resulted in adaptations in the roles and responsibilities of the 4 MUAC States and the responsibilities and competencies of Director MUAC, giving both increased managerial authority over the operation of the Centre and the execution of its budget. The Maastricht Coordination Group (MCG) has been transformed into the Maastricht Decision Making Body (MDMB).

At regulatory level, decision-making and coordination between the MUAC States is mainly ensured through the MDMB. At supervisory level, the services provided at MUAC were certified according to the EU SES regulations by the NSA NL in cooperation with the NSAs of the three other States.

Based on the agreement of the 4 States NSAs regarding the oversight activities on MUAC (including the 4 NSA's Manual), the four States' NSAs work together concerning the Single European Sky-related supervision of MUAC. They cooperate within an NSA-Committee (NSA-C), which is responsible for all supervisory activities on MUAC and a Common Supervisory Team (CST), which exercises the applicable oversight functions.

The Dutch Military Aviation Authorities (MAA) perform the oversight on MUAC as an ANSP for military traffic and as a Training Organisation for air traffic controllers (ATCOs). The oversight of service provision to Germany for the military traffic is performed by the 4NSA committee, which includes the BAF (Germany) and is supported where needed by the German MAA.

Letters of Agreement define on operational level the coordination procedures to be applied between MUAC and the different neighbouring centres. Separate agreements (based on the FABEC article 10 template) are in place for all regions of delegated services outside of the official MUAC Area of Responsibility.²⁶

²⁶ <https://wiki.ivao.aero/en/home/atcoperations/muac>

Activity in ATM:	Organisation responsible	Legal Basis
Rule-making	The 4 States' regulators (Ministries of Transport or equivalent and Ministries of Defence from GE and NL)	The 4 States' national laws, the EUROCONTROL Convention and the Maastricht Agreement
Safety Oversight	ILT (CAA-NL), in coordination with the other 3 States' NSAs (incorporating the MAA of NL) within the 4 States' NSA Committee. For OAT in NL, the Military Aviation Authority (MAA), for OAT in GE, the German NSA (BAF).	The NL Aviation Act and other relevant NL national regulations empowering ILT (CAA-NL) as regards safety oversight. See details in LSSIP NL.
Enforcement actions in case of non-compliance with safety regulatory requirements	ILT (CAA-NL), in cooperation with the other 3 States' NSAs, within the 4 States' NSA Committee. For OAT in NL, the Military Aviation Authority (MAA), for OAT in GE, the German NSA (BAF).	The NL Aviation Act and other relevant national regulations empowering ILT (CAA-NL) as regards safety oversight of the NL-based ANS/ATM providers. OAT service provision accreditation in the Netherlands is based on the Military Aviation Requirements (MAR).
Airspace	The 4 State's relevant regulatory authorities, each per its own territory and concerned airspace.	The 4 States' relevant national laws, the EUROCONTROL Convention and the Maastricht Agreement.
Economic	Same as above	Same as above
Environment	Same as above	Same as above
Security	Same as above	Same as above
Accident Investigation	Same as above	Same as above

As MUAC is operated by EUROCONTROL, in theory all 41 Member States may be held liable for the activities of MUAC. For that reason the 4 MUAC States have indemnified the other 37 for the activities of MUAC Centre should liability occur. In addition, EUROCONTROL's insurance policy covers both the activities of the Network Manager and MUAC.

Performance and accountability

There are no performance standards mentioned in the Maastricht Agreement; however, MUAC falls under the EU Performance and Charging Regulation which sets performance targets in the key performance areas (KPA's) of safety, environment, airspace capacity, and cost efficiency.

EUROCONTROL produces annual accounts which provide a consolidated view of the Agency's financial situation and budgetary performance including the specific performance of MUAC which is identified in Part III of the Agency's accounts. It should be noted that the Performance and Charging regulations set targets either EU wide or at a State level and MUAC provides services over the airspace of four countries.

MUAC itself does not levy service charges for its services to airspace users, and as part of EUROCONTROL, MUAC is a non-profit entity. The MUAC budget is agreed by the four states and then contributions from the four States participating in MUAC are calculated based on an agreed cost-sharing formula. These costs then form part of the determined costs for each of the states concerned and so form part of the national unit rate.

At year end, the over/under payment of contributions is calculated by comparing the level of actual expenditure with the level of contributions paid. Any underspend is returned to the States in the following year.

Social and political factors

National law does not apply to EUROCONTROL and as MUAC is part of EUROCONTROL (an international organisation) it does also not apply to MUAC as well. Within that framework MUAC can employ staff from each of the EUROCONTROL member States. As per 31 December 2022 MUAC staff include citizens of 35 different nationalities.

Safety regulation

The Belgian Civil Aviation Authority (Belgian CAA), acting on behalf of the four States NSAs, is responsible for issuing licenses for Air Traffic Controllers (ATCOs) at Maastricht UAC. The following agreement was reached between the 4 States:

- The Belgian CAA acts as the licensing authority for ATCOs and student ATCOs.
- The Belgian CAA is the authority for certification of ATS training organisation at Maastricht UAC.
- The licences are issued in accordance with the Commission Regulation (EU) 2015/340 laying down technical requirements and administrative procedures relating to air traffic controllers' licences and certificate.

MUAC controllers hold a Belgian ATC licence for the delivery of services in Belgian, Dutch, German and Luxembourg airspace.

MUAC is subject to the Single European Sky (SES) legislation and certified against Implementing Regulation (EU) 2017/373 and its amendments. Safety oversight is done by ILT (CAA-NL), in coordination with the other 3 States' NSAs (incorporating the MAA of NL) within the 4 States' NSA Committee.

For OAT in NL, the Military Aviation Authority (MAA), for OAT in GE, the German NSA (BAF) are the competent authorities.

Civil-military cooperation

In 1975, the German military sector with the call-sign “Lippe Radar” was co-located at MUAC, and controlled military flights in the upper airspace over north-west Germany from Maastricht until 2017, when its staff and the task were fully integrated into the Maastricht Centre. In the same year, MUAC was also tasked with providing military air traffic control services in Dutch upper airspace. With this development MUAC has become the first cross-border civil-military air navigation service provider in Europe.

Although less military than civil traffic is handled by MUAC, the provision of support to military flights is a complex and work-intensive task. Since 2017, MUAC has cross-trained more than 95% of its operational personnel to provide air traffic control services to both civil and military customers. This includes supervisors, air traffic controllers and flight data specialists.

Furthermore, the MUAC Flexible Use of Airspace (FUA) Cell has been operational in Dutch airspace since 2020, responsible for tasks such as the daily publication of activation times of military areas and their updates in the Amsterdam FIR.

Lessons Learned

The establishment of MUAC demonstrated that there can be performance benefits when operating a large, multi-national, civil-military integrated ANSP where the overriding focus is on maximising efficiency for the network.

The regulations governing ATS in Europe are not written with an entity such as MUAC in mind. A high degree of coordination and a pragmatic approach from all parties prevents a fragmented approach to oversight and performance management.

With the support and consistency of governance from the four states, MUAC operates a substantial technical department and is able to innovate and create new tools and solutions in a relatively short time frame. This has resulted in an operational system and suite of support tools that are uniquely tailored to the user needs, enabling a high degree of ATCO performance and utilisation.

Case Study: Nordic Unified Air Traffic Control Company (NUAC HB)

Title	NUAC HB
States involved	Sweden and Denmark
Synopsis	A jointly owned company was established by two neighbouring ANSPs to provide air traffic services as a subcontractor at three enroute centres.

Introduction

The Nordic Unified Air Traffic Control company (NUAC HB) was established in 2012 as a jointly owned company by Swedish LfV and Danish Naviar to provide air navigation services in Swedish-Danish airspace. It was registered in Sweden as NUAC HB (Handelsbolag – a trading partnership).

The company managed operations at the three air traffic control centres, Copenhagen, Malmö and Stockholm, to provide ATS En Route across København and Sweden FIRs as a subcontractor to LfV and Naviar.

In 2019, LfV and Naviar decided to dissolve NUAC and to continue cooperation in more technical areas and through the existing Danish/Swedish FAB board and relevant sub-groups. As a consequence, the operations at the three air traffic control centres have returned to the parent companies LfV and Naviar.

Background origins

NUAC was established around the same time as the Danish/Swedish Functional Airspace Block (FAB) came into being. The aim, in conjunction with the already existing COOPANS ATM system cooperation – of which LfV and Naviar are both members, operating the same system platform at each of the three ACCs – was to drive greater cost efficiency through a common, integrated approach across the Danish-Swedish area. This was seen as both a necessity for economic reasons and as a pioneering project that represented an important step in the European Union's Single European Sky (SES) initiative aiming to harmonise air navigation service provision across EU airspace.

Legal basis

NUAC was registered in Sweden as a "Handelsbolag" (a trading partnership) jointly owned by LfV and Naviar. The organisation was underpinned by an operating agreement between LfV and Naviar, delegating authority in the common airspace to NUAC from the respective organisation. The operating agreement described the operational services to be delivered by NUAC HB, and the provision of personnel and infrastructure to be delivered by Naviar and LfV. LfV and Naviar remained owners of the assets underpinning the operations.

When established, the arrangement was not given a timeframe and was conceived as a permanent evolution. Staff at the 3 air traffic control centres under NUAC management were loaned from the parent organisations on unchanged terms of employment. Only NUAC senior management staff were directly employed by NUAC. ACC operational staff and operational leadership remained with LfV/Naviar as well as industrial relations between local management and unions. As such, there were only very few staff moves across boundaries / jurisdictions.

Performance and accountability

In the context of the European Union Single European Sky Performance and Charging Scheme, the Swedish and Danish States submitted a combined Performance Plan for the Denmark-Sweden Functional Airspace Block (DK-SE FAB) for the period 2012 to 2019 (the 1st and 2nd reference period of the EU performance scheme). The combined plan included service provision targets and plans for LFV and Naviar for both En Route services and Stockholm and Copenhagen approach services provided through NUAC HB and other Terminal ANS provision through the national ANSPs. Performance impacts, e.g. cost efficiency improvements that arose as a consequence of NUAC deliverables have effect on the Naviar and LFV contributions to the national cost bases. DK-SE FAB also had Performance Scheme targets for safety and enroute capacity.

A number of performance benefits were realised, e.g. the implementation of a harmonised Safety Management System (SMS) and associated harmonisation of a common Just Culture. Material savings in items like insurance were realised.

Calculating and setting ANS charges remained the responsibility of the parent organisations LFV and Naviar through their respective State departments and the EUROCONTROL Central Route Charging Organisation.

Social and political factors

The public was not generally aware of the NUAC initiative, neither when it was established in 2012 nor when it was dissolved in 2019.

Safety regulation

NUAC was certified by the Swedish Transport Agency, in collaboration with Danish Trafikstyrelsen, as an air traffic services provider. NUAC had its own certificate – parent organisations delegated authority to provide services in respective airspace. However, LFV and Naviar both retained individual local regulatory relations as well as the national designations.

Lessons Learned

This was an interesting attempt to establish a merged service provider through delegation to a newly formed third entity. However little changed beneath the layered corporate structures put in place over top of the structures during its seven years of existence, as evidenced by the ease with which the arrangement was dissolved.

Both prior and following the dissolution of NUAC good cooperation exists between the States and their air navigation service providers, particularly surrounding the common system development initiative COOPANS which remains in place.

