The case for liberalising air traffic control

Purpose
Air traffic management (ATM) is a crucial component of aviation, ensuring the safe separation of aircraft as they move through the airspace. Under the Chicago Convention, each State has an obligation to secure the provision of ATM services in their airspace, to the extent practicable. In most States, the provision of these services has been delegated to a national air navigation service provider (ANSP).

Despite continuing advances in the technology available to ANSPs and high levels of ATM safety, the current structure of the ATM industry leaves much to be desired. There is a strong government influence and, as a result of the monopoly status of many ANSPs, a lack of competition in the industry. This has resulted in an ATM service that can be fragmented, opaque, charge prices that are often considered high, is at times resistant to change and where there are large variations in performance between different ANSPs.

The purpose of this document is to outline how the ATM industry could be transformed and improved through liberalisation. This should bring a number of benefits, as is demonstrated by the liberalisation of other similar industries. These include creating strong incentives for ANSPs to improve their efficiency, lower their prices, and provide services that better meet their customers’ needs, while continuing to offer a high – or even improved – level of safety.

The ATM industry is under-performing
Studies into the ATM industry have identified a number of performance issues. A report by the European Commission’s Performance Review Body highlights the problems of excessive profits, inefficient expenditure, slow adoption of new systems and technology, and a lack of liquidity in European ANSPs.¹ Meanwhile, the Air Transport Action Group (ATAG) has voiced concerns about inefficiencies in airspace as a result of congested skies worldwide, fragmented airspace and an ATM institutional framework rooted in the 1940s rather than the 21st century.² Many ANSPs have also been criticised by airlines for their high prices and for being slow to adopt new technologies that could reduce costs and improve safety.

The data available on ANSP performance supports these complaints. A 2015 report by CANSO shows that over half of the ANSPs surveyed increased their real unit costs between 2011 and 2014.³ In Europe, benchmarking data shows that many performance targets for flight efficiency, capacity and cost efficiency have not been met, while there is significant (and often unexplained) divergence in unit route charges between ANSPs. For example, unit route charges in French airspace are just under €68 but increase to almost €83 in neighbouring German airspace, despite the two sharing many common characteristics.⁴
The lack of competition in the ATM industry can explain much of the problem

Most ANSPs have some sort of statutory monopoly on providing ATM services in their country’s airspace. This is because, to a large extent, to date, ATM is considered to be a natural monopoly. This means that the high cost of building fully competing ATM networks would outweigh the benefits from any competition. However, even in cases where competition for some ATM services is feasible, government policy often limits the provision of the different elements of ATM to a single provider.

As a result of their monopoly status across a large proportion of their services, most ANSPs have relatively weak incentives to improve their performance. This is because airlines have no practical means to change supplier if they are not satisfied with the service received. ANSPs are not therefore subject to the sort of pressures on prices and quality observed in competitive industries, and have little incentive to develop business models that will drive customer benefits. If left unchecked, the result can be high prices, inefficient costs, under-investment, sub-optimal goods and services, and excessive profits.

In many industries where a firm has a monopoly, it is subject to economic regulation. This requires the firm to follow certain rules, and places restrictions – such as the maximum price the firm can charge for its services – in an attempt to make it behave more like a firm in a competitive market.

However, many ANSPs are currently exempt from this type of regulation. Even where economic regulation does exist, in many cases the ANSP is not sufficiently independent and separated from the economic regulator, which severely limits the effectiveness of the regulations. Poor economic regulation can also add considerable costs and inefficiencies.
The monopoly status of ANSPs has also, at times, led to management complacency and created a culture of resistance to change in the workforce. This often manifests itself in entrenched resistance and staff opposition to any significant changes, frustrating efforts to introduce reforms. For example, despite endeavours to consolidate the airspace, it remains highly fragmented in many parts of the world, thereby complicating the processes for aircraft transitioning between ANSPs and, in some cases, between sectors within the same ANSP.

The problems associated with the monopoly status of ANSPs are reinforced by ownership and governance structures. Many ANSPs are government departments or are in some other way publicly controlled. This can mean that they are incentivised to meet political and State-driven objectives, and are more answerable to the demands of their government owners than to the needs of the airline customers.

Explaining the performance issues of the ATM industry

Current industry structure
- Historic monopoly status
- Weak economic regulation
- Government control

Creates behaviours
- Weak incentives to improve performance
- Resistance to change
- Management respond to demands of government rather than airline customers

Under-performance of ATM industry
- This includes:
  - High prices
  - Inefficient expenditure
  - Fragmented airspace
  - Lack of transparency
  - Slow adoption of new technologies
Liberalisation of the ATM industry may drive much of the necessary change

Greater liberalisation of the ATM industry would help address many of the performance issues facing ANSPs. Liberalisation would mean greater competition and the relaxation of ownership and control rules. Together, these would bring the industry into the 21st century, and encourage a more customer-focused ATM service.

There is significant precedent for the liberalisation of industries that were previously considered to be monopolies. This includes the telecommunications, energy and rail industries in many parts of the world, as well as the airline industry (see the Appendix for more information). The success of liberalisation in these industries, combined with technological advances in ATM - such as the emergence of satellite-based systems - strongly suggests that there is significant potential for the liberalisation of the ATM industry.

Liberalisation has a high potential to disrupt the ATM industry. Some ANSPs may consider this a threat. For example, liberalisation and the resulting competition may cause some concerns about the risks to jobs, the viability of supply of ATM services (particularly in uneconomic airspace), and safety standards. Similar concerns were voiced in the lead-up to the liberalisation of the airline industry; the vast majority of which later proved to be unfounded.

Liberalisation will provide opportunities for those ANSPs who are willing to adapt and innovate. This includes opportunities to expand into new markets, to work collaboratively, and to secure rewards for better serving airline customers. Learning from the experience of liberalisation in other sectors, and therefore ensuring the process of liberalisation is undertaken in a controlled manner, will also help ensure that many of the risks associated with liberalisation can be addressed and mitigated.
Greater competition in ATM could generate significant benefits for customers

Standard economic theory notes that competition between firms for the provision of goods or services generally results in better outcomes than if those goods or services were provided by a single supplier (i.e., a monopolist). This is because competition requires firms (in this case, ANSPs) to distinguish themselves from rivals in order to retain, or even increase, their market share as well as the overall size of the market.

Greater competition in ATM would generate downward pressure on prices. ANSPs would be incentivised to offer more attractive prices than their rivals in order to gain market share. This would have wider benefits for passengers and the aviation industry as a whole. This is because lower ATM fees paid by airlines should, in turn, lead to lower fares for passengers and stimulate aviation activity that results in increased choice for travellers.

ANSPs would also have a stronger incentive to improve their cost efficiency so as to compete on price without compromising safety. This may include, for example, identifying opportunities to collaborate or consolidate with other ANSPs to exploit economies of scale in areas such as training and development, back-office services, and the specification, development and procurement of equipment.

Competition would also drive ANSPs to differentiate themselves by their service offering and quality, adapting to the needs of their users and resulting in a more customer-focused ATM service. ANSPs would have strong incentives to make the necessary improvements in quality, adopt new technologies, innovate, and undertake investments that enable them to meet the demands of their customers in order to retain or even increase their customer base. This has the potential additional benefit of further stimulating innovation in the wider aviation industry.
What would competition in ATM look like?
We have identified a number of areas in the ATM industry where we consider it would be feasible to introduce greater competition in the short to medium term. This includes areas where we consider suppliers could compete for the right to be the sole provider of a particular service (competition for the market), and where suppliers could compete directly with each other to provide specific services to individual customers (competition in the market).

Unbundled data, training and infrastructure services
Many of the supporting services that enable an ANSP to perform its ATM role could be unbundled and outsourced. This is already occurring in some countries. It includes the provision of aeronautical information such as meteorological, environmental, mapping and flight plan data. Competition for the provision of training services should also be encouraged as should, wherever possible, competition for the provision and maintenance of the infrastructure.

Outsourcing has been present in the US since the 1980s, with flight service stations, ADS-B, training and data communication services now provided by private suppliers. Many ANSPs in Europe that are seeking to make cost savings have also started to unbundle non-core services including training, meteorology, aeronautical information management, maintenance, engineering and surveillance. However, there is significant scope for further unbundling, especially with advances in technology.

Terminal Air Navigation Services (TANS)
Competition for TANS would require ANSPs to compete (for example, through a tender process) for an exclusive contract to operate tower services at a particular airport for a fixed period of time. This can include aerodrome services as well as potentially approach services. It may also extend to data processing and analysis services on behalf of the airport and individual airlines, as well as operating local flow control services that could streamline airport operations.

Markets for TANS are already being developed in a number of countries, including Germany, Spain, Sweden, the UK, and the US. However, there is still significant progress to be made to fully open up tower services at all airports to competition in these markets, and to include all tower-related services in the TANS market.

Where competition for tower services does exist, it is broadly considered to be a success. In Spain, changes in the provider of TANS are estimated to have resulted in cost savings of around 50%, while in Sweden savings of 30-40% have been reported. In the UK, changes in the provider of TANS are also considered to have reduced costs significantly while maintaining highly efficient operations. Furthermore, it has reported to have resulted in the incumbent ANSP (NATS Services Limited) becoming more customer-centric, adopting cost-saving measures and accepting performance-linked payments in a broad range of markets.
Franchised en-route services

There is scope for competition between ANSPs for the contract to provide ATM services in a specific country or a sector within a country. Similar to TANS, the successful ANSP would then have the exclusive right to provide en-route (and potentially approach) services in the airspace for a fixed period, subject to meeting specific performance indicators.

This model has been adopted in upper Kosovan airspace and in the Middle East, where private contractors provide ATM services using the government-owned infrastructure. The model means that the State maintains ultimate control of the airspace, thereby avoiding any concerns about the State’s ability to exercise sovereignty over its own airspace.

This concept would be particularly attractive in regions where skills and experience in ATM are lacking, or where the scope to exploit economies of scale is limited. However, the benefits of this sort of competition for the market would also be applicable in more developed airspace. Recent developments in ATM technology would also enable this service to be provided remotely, using virtual centres.

Oceanic services

There is significant potential for competition between providers in oceanic airspace. The increasing use of automation in this airspace, including self-separation, enables aircraft to take over much of the traditional role of controllers. Instead, ANSPs could compete with each other to provide individual airlines with the necessary data to enable them to self-separate and plan their routes over oceanic airspace. This could be extended to the provision of ADS-B data for free-routing, where this exists. As with competition for en-route services discussed above, it is also possible for many sectors of oceanic airspace to be competitively tendered.

Liberalisation will provide opportunities for those ANSPs who are willing to adapt and innovate
Flow management

Flow management relates to the optimisation of the flows of traffic across the network, or particular regional or airport-level parts of the network, using the surveillance and communications infrastructure.

In Europe, this role has been centralised to some extent. Eurocontrol, on behalf of the European Commission, is responsible for optimising traffic flows according to airspace capacity across Europe’s 41 Flight Information Regions (FIRs). Elsewhere, this type of network management remains far more distributed. There are however some initial discussions on the potential to create a centralised role in the Middle East.

There is significant scope to open up the flow management role to competition. This includes the allocation of departure or arrival times and the coordination of local airspace networks into a regional continuum. The role could be tendered on a cross-border, regional or cross-regional basis. Major airports can also have a flow management process that ties in with regional network management.

Longer-term

In the longer-term, technological advances (such as those emerging from the NextGen program in the US and SESAR in Europe) and the successful introduction of competition in ATM may enable competition to be expanded into other areas of an ANSP’s activities, including further competition for the provision of en-route services. It is worth noting that the delivery and design of ATM services may also change as the aircraft avionics become increasingly sophisticated. This would allow much of the work that has historically been performed on the ground to be more accurately performed in the cockpit.
For competition to be effective, ANSPs should operate as corporatised entities

In order for competition in ATM to be successful, ANSPs need to act like commercial entities. Currently, many ANSPs remain closely controlled by their governments, meaning they do not have the autonomy or flexibility to respond to competition.

This issue can be best achieved through the corporatisation (also known as commercialisation) of the ANSP, whereby the ANSP is given greater managerial and financial authority. This encourages the ANSP to behave more like a private-sector firm, ensuring a focus on customer service and performance alongside good governance. It also helps ensure the separation of service provision from regulation, thereby avoiding obvious conflicts of interest.

There are several alternative options for the structure, ownership and management of corporatised air navigation services. This includes fully publicly owned entities, co-operatives, and public-private partnerships as well as functionally separate ANSPs. It may also involve privatisation, although corporatisation does not require that the ANSP is transferred to private ownership.

The considerable diversity among ANSPs means that there is no ‘one size fits all’ solution. Different national and regional cultures, levels of maturity in the organisation and business models, levels of traffic density and complexity, and ATM technology and infrastructure may lead to different optimal structures and governance models.

A number of ANSPs have been successful corporatised already, and the concept of corporatisation is widely supported by ICAO, airlines and by CANSO. Where it has occurred, the corporatisation of ANSPs is generally considered to have been a success. One study of ten corporatised ANSPs worldwide found that the change in structure resulted in, amongst other benefits, a greater focus on the needs of the ANSPs’ customers, improvements in service quality and a reduction in costs.

### Examples of current ANSP ownership models

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<thead>
<tr>
<th>Degree of government control</th>
<th>Examples of ANSP ownership models</th>
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<tbody>
<tr>
<td>1. Government department</td>
<td>Algeria, Brazil, China, France, Greece, Israel, Japan, Luxembourg, Kenya, Mexico</td>
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<tr>
<td>2. Government agency</td>
<td>Nigeria, USA</td>
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<tr>
<td>3. State enterprise</td>
<td>Australia, Belgium, Egypt, Netherlands, Portugal, Russia, Spain, Sweden, Thailand</td>
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<tr>
<td>4. Corporatised entity</td>
<td>Austria, Croatia, Estonia, Germany, Ireland, New Zealand, Norway</td>
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<tr>
<td>5. Partly privatised entity</td>
<td>Canada, Italy, Switzerland, UK</td>
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Alongside greater competition and corporatisation, there is a need for more effective performance-based regulation

In areas where competition is not currently feasible, desirable or politically acceptable and an ANSP therefore retains its monopoly status, these activities should be subject to effective performance-based regulation. This type of regulation creates incentives for an ANSP to improve its performance and produce appropriate outcomes. Rewards (typically financial) are offered for good performance, with penalties imposed if performance falls below a defined standard.

The use of performance-based regulation to encourage monopolists to behave like a firm in a competitive market is becoming increasingly standard in industries where firms have a monopoly. However, as discussed, many ANSPs are not currently subject to effective economic regulation.

Some sort of performance-based regulation may also be necessary in areas where competition is introduced but where an ANSP still retains significant market power. This may include cases where the ANSP has been awarded the exclusive right to operate a service as a result of competitive tender, or where alternative providers of ATM services require access to a national monopoly ATM infrastructure.

Regulation will also continue to be necessary in the areas of safety and standards to provide reassurance and ensure these are not compromised. Like other safety crucial industries, whether privately or publically owned, the State has a duty to its citizens to ensure that such services are provided as safely as reasonably possible and to at least a set of minimum standards. ICAO therefore currently requires States to provide safety oversight of ANSPs.

An additional consideration in the case of ATM is that the airspace is used by both civil and military users and that – at times of domestic unrest or even international conflict – it is important that the needs of the State and its armed forces can retain primacy. This should also be provided for in legislation and governance structures for the operation of airspace.

Many ANSPs are not currently subject to effective economic regulation
Where do we go from here?

The liberalisation of the ATM industry will not be an easy task. The innate conservatism of an industry built around safety, a natural desire to preserve the status quo, and other institutional, regulatory and legal barriers currently limit the ability of ANSPs to compete with each other. Political will to implement change is weak, particularly as the use of airspace is often wrapped up with considerations of state sovereignty. There are also a number of technical and practical issues that must be addressed before competition can be introduced in some areas. But this does not mean the goal of liberalisation is not worth pursuing.

There is clearly a need throughout the aviation industry for greater understanding of the potential for, and value of, liberalising ATM. For example, the key decision makers - governments and civil aviation regulators - need to be persuaded of the benefits to the economy and to passengers of enabling greater competition in ATM activities, and that these benefits should prevail over political and institutional barriers. At the same time, regulators – and the travelling public - will need to be convinced that safety will not be compromised.

The ATM Policy Institute has been created to fulfil this role by providing research on ATM policy issues. In particular, we intend to lead the debate on how to improve the efficiency and efficacy of ATM through market liberalisation, and to communicate the benefits of enabling ANSPs to compete with each other. The ATM Policy Institute will also act as a means for like-minded members of the aviation community to collectively pursue this goal and, through our workshops, to share ideas and research.

More information on the ATM Policy Institute can be found at www.atmpolicy.aero.
A number of industries that were previously considered to be monopolies have been successfully liberalised. These industries share many characteristics with ATM. For example, they are often considered to provide an essential service, and as a result many were government-owned and had a statutory monopoly. In other cases, competition was not thought to be feasible or desirable due to the high fixed costs of establishing rival businesses (ie, they were considered to be natural monopolies).

This appendix outlines how some of these industries were liberalised, and the resulting impacts on prices, quality and other aspects of the service.

**Airline liberalisation**

Prior to liberalisation, most airlines were state-owned carriers. There were strict rules about where and when carriers could operate, as well as how much they could charge. However, concerns about high fares, difficulties in establishing new routes, and industry inefficiency led to the deregulation of the domestic airline industry in the US in the late 1970s. Following this example, a series of reforms led to the creation of a Single European Aviation Market in the 1990s, and the opening up of a number of international routes to competition. Now, large parts of the airline industry are liberalised.

Overall, the liberalisation of the airline industry is considered to have been a success. Liberalisation has led to the emergence of new business models, including low-fare airlines. Numerous studies have identified the positive impacts that the increased competition has had. This includes significantly lower fares, increased traffic, an increase in jobs in aviation and related industries, increased foreign investment and growth in economic output. Meanwhile, many of the concerns voiced in the lead-up to airline liberalisation – including the potential negative impact on safety, jobs, connectivity and security - have proved to be unfounded.

**Telecommunications**

In many countries, the telecommunications market has been liberalised despite previously being considered to be a natural monopoly.

In some cases, the development of new technologies in the telecoms industry, such as cable or satellite, has enabled firms to establish separate rival networks to the monopoly incumbent.

Meanwhile, local loop unbundling (LLU) has enabled competition without the need for new entrants to build their own networks. LLU requires the incumbent monopoly provider to make its infrastructure available to other telecoms firms to use, for a fee that is generally determined by the economic regulator. Firms then compete on quality and price by combining their own equipment, software and retail services with access to the existing monopoly infrastructure, usually through the local telephone exchange.

The liberalisation of the telecommunications industry is estimated to have reduced prices, increased the uptake of broadband and resulted in higher average broadband speed. However, the large fixed costs of establishing rival networks and the value of network effects - whereby the more subscribers to a particular network, the greater the incentives for other subscribers to join - means that competition between rival networks is often limited to a few suppliers and to particular regions. While LLU largely avoids this issue, it has been slow to take off in many countries amid accusations of excessive pricing for access to the monopoly infrastructure and of delay tactics by the incumbent telecoms provider.
European passenger rail services
A number of European countries have liberalised their passenger rail services (many countries have also liberalised their rail freight services to some extent). The degree of liberalisation varies across countries, with some allowing competitors open access to the rail network (on-rail competition), and others using franchising to select a single provider for specific passenger services and routes. In both cases, competitors pay an access fee for using the rail network, which is usually operated and maintained by a government-owned monopoly.

Countries with on-rail competition for passenger rail services include Austria, the Czech Republic, Germany, Italy, Sweden and the UK. However, competition is generally limited to a few specific routes that are considered commercially viable (and therefore not subject to any public service obligations or subsidies).

Competitive tenders for passenger rail services have been introduced on various routes in Denmark, Germany, Italy, the Netherlands, Sweden and the UK. Individual routes and services are offered for public tender. Bidders are then assessed based on the amount offered (or subsidy required) for the right to operate the service, and on initiatives to improve the quality of service for passengers. The successful bidder then acquires the right to operate the service for a fixed period, with some contracts extending up to 15 years.

Where liberalisation has occurred, it is generally considered to have been successful. For example, on-rail competition has been found to lower fares, improve service quality (including, for example, the introduction of wi-fi and more frequent services), and result in efficiency improvements and increased demand for rail services.10 Meanwhile, competitions for rail franchises in Germany, Sweden and the Netherlands are estimated to have led to saving in public funds of as much as 20-30%.11

Energy sector
Many countries have liberalised their energy sectors with the aim of introducing competition wherever possible. This includes competition for the generation of energy and for the provision of retail services to end-consumers.

In those countries with liberalised energy sectors a wholesale market is typically created to enable competition for energy generation. This market allows individual generation companies to sell the energy they produce and for energy retailers and consumers to buy the energy they require at the lowest price offered. The energy is then transported through the national transmission and local distribution infrastructure (which are typically regulated monopolies).

Competition in the retail market for energy is created by allowing customers to choose between energy retailers, who attempt to differentiate themselves through price plans and products. These retailers then purchase energy from the wholesale market to fulfil the demands of their customers.

While the impact of liberalisation on energy prices is difficult to identify, various studies have found that it has led to the more efficient use of generation plants and the associated energy transmission assets. Labour productivity has also improved, although this has also resulted in job losses. Liberalisation is also found to have increased transparency, for example highlighting where cross-subsidies were occurring previously. In many cases, this has led to effective adjustments to countries’ energy policies.12

However, the sector still has significant potential to improve the level of competitiveness. Some markets are dominated by just a few generators, while government policies and restrictions can often distort the market, particularly for retail competition.
List of footnotes

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4 Performance Review Body ‘PRB Annual Monitoring Report 2014’ 2015; Eurocontrol Central Route Charging Office, adjusted unit rates applicable to August 2016 flights
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10 Competition and Markets Authority ‘Competition in Passenger Rail Services in Great Britain: Discussion Document’ 2015
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