Global Air Navigation Services Performance Report 2014

2009 – 2013 ANSP Performance Results
The CANSO Global Air Navigation Services Performance Report 2014 is the collective effort of CANSO Member air navigation service providers (ANSP)s, which participate in this benchmarking effort on a voluntary basis.

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Disclaimer
This report has been compiled using data provided by the participating ANSPs. In order to facilitate comparability, data for each ANSP has been transformed to be consistent with standard definitions. The resulting data and comparisons have been produced solely for the use by ANSPs, and other interested parties, to assess and appraise performance in air navigation services provision. It is not intended that the data are used for any wider purpose, nor do the data provide a definitive assessment of any number, cost, time period or other metric relating to any ANSP’s process.

December 2014
Foreword

Measuring the performance of CANSO’s air navigation service provider (ANSP) Members is an important core activity for CANSO. It supports CANSO’s strategic objective of transforming global ATM performance, and is a central value-creating activity of Vision 2020. This is the fifth year that CANSO has produced this report covering cost efficiency, productivity and pricing and revenues.

This activity, undertaken jointly with Helios, for the first time, has secured a 20% increase in participation from our Members. The development of the report and increase in participation represent important steps towards creating an industry view on performance and demonstrates CANSO Member commitment to performance improvement.

It is the only global review of its kind and provides a timely and up-to-date analysis that will be of interest not only to our Members, but also to the wider aviation community.

The findings point to an industry mostly in recovery, with increasing traffic levels, and improving cost efficiency and productivity. In 2013 the majority of ANSPs reduced their cost per IFR flight hour. A number of these managed this in spite of decreasing traffic, a significant achievement.

Traffic trends varied markedly across the regions with Asia Pacific experiencing strong growth, while traffic growth in developed markets such as Europe and North America was low or even negative. Despite the regional differences there are some common drivers across the industry, notably air traffic controller (ATCO) employment costs, which have risen by an average of 4.8% per year in real terms between 2010 and 2013.

What the analysis is not able to show at this stage is the influence of investments and activities in areas such as safety, flight efficiency or quality of service, which were outside of this year’s data capture. This is something that I would like to bring in to the analysis in future years in order to build a more complete picture of performance and the drivers for improvement.

I am very encouraged that participation is up on previous years; this is a welcome response to the involvement of Helios, whose independent oversight and expertise has brought substantial benefits to the process.

I would like to thank the Global Benchmarking Workgroup (GBWG) and the Helios team for their hard work, and most especially all the participating CANSO Members that made this report possible.

Jeff Poole
Director General CANSO
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Introduction

Performance benchmarking is a complex activity that requires comparable, consistent, and validated data to be meaningful. As a voluntary exercise, it also requires anonymity to encourage high levels of participation if the results are to be in the public domain. The report has achieved a greater contribution rate than previous years and we have welcomed seven new ANSPs to the process from across the CANSO regions, giving the report an increasingly global perspective. While this improvement is welcome, the sample size is too small in some regions to enable reliable statistical analysis on a regional basis. For future reports we aim to build further trust and confidence in the process and secure higher levels of participation.

What is different this year compared with last year’s report?

This year there is a new section on industry trends and key messages (The Industry View, see page 12), which complements the detailed section showing performance at the individual ANSP level (The ANSP View, see page 41). The identified charts and the data-sharing activity available to participating ANSPs enable Members to study their own efficiency against that of other ANSPs and to identify opportunities for performance improvement. This activity supports Members in general benchmarking, identification of best practice and dialogue with stakeholders. ANSP members are able to opt-out of the identified ANSP View (Part 2) but all participants will appear in the anonymised charts in Part 1 and thus contribute to the discussion of industry trends and understanding of performance at an industry level.

Both Parts are built around the key performance indicator (KPI) structure set out in the CANSO Performance Framework (see page 16). The framework breaks down the financial cost effectiveness indicator and allows for a clearer view on performance drivers.

We have built on the work done in previous years to establish a standardised and common data collection process with accepted definitions for individual data elements. While there have been no major changes to this process, we have chosen a different presentation format for the main body of the report this year which captures global performance trends over the last one and three year periods. The result is a two-part report, with normalised data (to remove the impact of scale) and trend reporting that provides a global overview of financial cost efficiency.

Next steps

The robustness of this analysis will increase as the process matures and our understanding of the impact of external factors such as the regulatory and operating environment develops. Expanding this report into other performance areas is an important goal for the future.

We intend to develop the report further to give a richer view on performance, progress made, and the challenges faced by ANSP Members. We will build on the report in future years by offering more global indicators in this overview and by drilling down further into KPIs in the identified report.

1 Note that non-participating ANSPs do not have access to this data.
Performance in ANS provision

What does performance mean in the context of air navigation services (ANS)?

This report focuses on cost efficiency, a key part of the performance equation and an important measure for an industry driving to become more ‘business-driven’.

Measuring inputs and outputs

Performance comparison is usually based on a number of key performance indicators (KPI). To compare cost indicators between different providers, data needs to be normalised by output levels (e.g. costs/ IFR² flight hours). For cost indicators a decrease denotes a more efficient service. The efficiency of providers can also be compared using output/input indicators (e.g. IFR flight hours per ATCO³ hours). An increase in the indicator suggests more efficient service provision.

The traffic output measure used in the calculation of cost efficiency indicators is IFR flight

² Instrument Flight Rules
³ ATCO refers to ATCO in Operations (OPS)
hours. Whilst this is accepted as the main measure of ANS activity it does not provide a complete picture of the services provided, especially for those ANSPs which have a significant proportion of terminal activity.\(^4\)

ATCO hours are used as the input measure when comparing ATCO employment costs. A comprehensive benchmarking of this indicator would need to account for the institutional factors that may impact this variable, e.g. regulations regarding shift lengths.

**Performance comparison: an efficiency perspective**

Comparing performance between service providers is difficult to carry out convincingly. Each ANSP is subject to a variety of local, regional and global factors which mean that drawing conclusions from performance data for a particular year must be done with caution.

There are, however, techniques that can be used to help reduce the local, regional and global factors affecting ANSPs. One such technique is to present trend analysis, showing the comparison of percentage changes year-on-year. This presentation of the data reduces the emphasis on individual ANSP performance and focuses instead on the higher level industry performance factors to see if, as a whole, the performance of the industry is moving in the right direction. The anonymous presentation of data in this report is also important in mitigating problems of comparability between ANSPs, including methodological differences in cost allocation or accounting practices.

\(^4\) En-route services are generally accepted to result in lower ATCO workload than approach services when measured in IFR flight hours.
2013 Participation

This edition of the CANSO Global ANS Performance Report has achieved a greater global contribution than previous years. Data submissions were received from 30 ANSPs, including seven new participants (denoted *).

The 2013 data submission covers:

<table>
<thead>
<tr>
<th>IFR flight hours: 41.8 M</th>
<th>Airport movements: 10.3 M</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANS Costs: 16.95 BN USD</td>
<td>Number of ATCOs in OPS: 27,578</td>
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<table>
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<tr>
<th>Member</th>
<th>Country</th>
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<tr>
<td>ATNS</td>
<td>South Africa</td>
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<td>CAA Uganda*</td>
<td>Uganda</td>
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<td>Kenya Civil Aviation Authority*</td>
<td>Kenya</td>
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<td>Croatia Control*</td>
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<td>Isavia Ltd *</td>
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<td>NANSC*</td>
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<td>CARC*</td>
<td>Jordan</td>
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Figure 2 – Participating ANSPs

Nominal costs converted at 2013 exchange rates.
Global context

Aviation is a key sector in the world economy. It both drives and supports global economic growth.

On a global level the aviation market was boosted by strong growth in emerging markets, transporting approximately 3.1 billion people and 49.3 million tonnes of cargo according to the International Air Transport Association (IATA) in 2013. Airports Council International (ACI) figures show 4.6% growth in passengers compared with 2.4% growth in global GDP, reflecting the continued economic recovery after the financial and economic crises of 2008-2009.

For air navigation services (ANS) the key measures of activity are Instrument Flight Rules (IFR) flights, IFR flight hours and IFR airport movements.

While there is an evident link between the growth in passengers and ANS activity, the impact of passenger growth on ANS demand may be muted by either an increase in the average size of aircraft or load factor, as airlines strive for further improvements in operational efficiency. According to IATA figures this was the case between 2012 and 2013. Load factors rose across all regions with the global average increasing 0.4% to 79.5%. The increase in aircraft size is also indicated by the 4.8% growth in airline capacity (as measured by ASK). This means that while air traffic, measured by number of passengers, grew at close to the historic yearly average of 5%, the demand for ANS services grew markedly slower.

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6 See References for a description of sources
7 VFR (visual flight rules) traffic measures should also be included in a complete picture of ANS activity.
Data from ACI which records information from 1,989 commercial airports in 160 countries saw worldwide aircraft movements increase 0.6% in 2013 to 82 million, with mixed levels of growth across all six regions.

North America and Europe remained the largest traffic areas by movements, though both experienced negative growth in 2013. Asia Pacific showed the highest rate of growth of movements at 7.2%, markedly above that of any other region, boosted by economic growth and increasing domestic air travel. The second fastest growing region was the Middle East (3.7%) where the use of hub airports as focal points between East and West is further developing, following the rise of “South-South” trade links between Africa, the Middle East and Asia.

As the demand for air travel increases, the industry faces a number of challenges including airport and airspace congestion, fuel price volatility and increasing greenhouse gas emissions. For example, high traffic growth can lead to capacity concerns, putting pressure on infrastructure and requiring high rates of investment to keep up with forecast demand. This also extends to ensuring that airport capacity and airspace capacity increases are balanced.

Trends in traffic also provide an important context for analysing ANS performance. Increasing traffic is conducive to improved cost efficiency and an unexpected decrease in traffic will tend to worsen efficiency indicators, especially in the short term where costs are less flexible.
Key Messages -
Financial Cost Efficiency

Rising traffic and increased efficiency overall

Between 2012 and 2013 the industry as a whole experienced low but positive traffic growth. However this was not the case for all ANSPs: 42% of the sample experienced decreasing IFR flight hours.

The majority (62%) of reporting ANSPs reduced their cost per IFR flight hour, a key indicator of efficiency. The average cost per IFR flight hour fell from USD502 to USD498 between 2012 and 2013 for continental services and USD90 to USD89 for oceanic services.

Some positive response to the challenge of traffic elasticity

In an industry where cost flexibility is difficult to manage, a reduction in unit costs while experiencing falling traffic is a major achievement. 15% of the sample (rising to 21% when considering 2010 to 2013) achieved this.

Conversely 12% of the sample increased their cost base faster than the increase in traffic - this may have been due to the need to invest in additional capacity, but some ANSPs still need to focus on controlling costs.

Rising ATCO employment costs for a majority of ANSPs

In this analysis three key indicators make up ANSP reported costs: ATCO productivity, ATCO employment costs per ATCO hour and costs per IFR flight hour (excluding ATCO employment costs).

While 54% of ANSPs reported improving ATCO productivity, a higher proportion (65%) reported increasing ATCO employment costs per ATCO hour.
Revenues highlight reporting inconsistencies

On the revenue side, more ANSPs report increasing revenues than ANSPs reporting decreasing revenues. Set against the indicators of predominantly falling costs per IFR flight hour, this raises some questions, particularly for those 27% of ANSPs that report increasing revenues with decreasing costs.

However, the data received may not be showing the full picture. For instance, it does not account for cost recovery cycles where higher revenues may be justified to compensate for costs under-recovered in previous years. Additionally, incomplete reporting on categories such as the cost of capital and the exclusion of exceptional cost items means that increasing revenues may reflect an increase in overall provision costs, even if this is not currently evident in the data. These inconsistencies need to be addressed in future to produce a reliable revenue picture.

ATCO employment costs an ongoing concern

The average index of real ATCO employment costs per ATCO hour has risen 4.8% CAGR between 2010 and 2013.

So while the majority of ANSPs appear to be succeeding in reducing cost per flight hour, the industry is not succeeding in controlling ATCO employment costs, which are rising faster than productivity gains.
Summary

This report is the first step in the process to maximise the value of the CANSO Global ANS Performance Report to CANSO members. The report and associated data collection and sharing activities will continue to support and drive performance improvements in the air navigation services (ANS) industry.

The findings point to an industry mostly in recovery, with increasing traffic levels, and improving efficiency and productivity. In 2013 the majority of ANSPs reduced their cost per IFR flight hour, a number of these within a difficult context of decreasing traffic, a significant achievement.

Traffic trends varied markedly across the regions with Asia Pacific experiencing strong growth, while traffic growth in the more developed markets of Europe and North America was negative. Despite the different regional contexts there remain some common drivers across the industry, notably ATCO employment costs which have on average risen by 4.8% per year in real terms between 2010 and 2013.

2013 data, while not supporting cost economies of scale in ANS provision, gives evidence of a positive relationship between operational scale and ATCO productivity. There is no evidence of a relationship between capital intensity and productivity once scale is accounted for. It will be interesting to further consider the link between performance and investment as the industry continues to invest in the latest technologies to align with regional programmes and Aviation System Block Upgrade (ASBU) implementation timelines.
Evolution of the report

This report presents a new perspective and analysis of the data submitted as part of the CANSO Global ANS Performance Report. This activity currently focuses on cost efficiency, which is a key part of the ‘performance’ equation. Efficiency is an important measure for an industry that is striving to become more ‘business-driven’. However, it is a narrow perspective on which to base judgements. To conduct a comprehensive comparison (benchmarking) of performance, comparable data covering capacity, safety and flight efficiency as well as the operational and institutional environment would need to be collated and included in the analysis.

There are four areas of development for the report with the aim of creating a more complete view on global ANS performance.

Consistency: there needs to be continued development of a consistent data set based on well understood and globally applicable data definitions. This year’s analysis highlights the importance of working towards consistent reporting of cost categories and a clearer understanding of the revenue data.

Context: there needs to be understanding and, where possible, accounting for the impact of external factors in performance analysis. A distinction should be made between controllable and uncontrollable factors.

Scope: there should be consideration of other areas of performance, such as flight efficiency and safety. A complete picture of performance should also include customer outcomes such as ANS charges and delay costs as well as predictability\(^8\).

Focus on key issues: this year’s key messages highlight the importance of understanding the drivers of ATCO employment costs. The report should also focus on tracking the progress of the industry in areas such as the implementation of new technology in line with the ICAO ASBUs.

Participation: a larger sample size allows for a more robust evaluation of industry trends and discussion of regional performance trends and context. An increased sample size is also beneficial for the internal data-sharing activity between participants.

\(^8\) The importance of the ‘total economic’ view of ANS including all the impacts of costs and quality of service on users is increasing acknowledged within the industry, including for the European Commission.
Performance Framework: ANS cost efficiency

The cost efficiency data presented in both The Industry View and The ANSP View is structured around the CANSO Performance Framework which draws on the work of the EUROCONTROL Performance Review Unit (PRU).

As a more high level discussion of performance The Industry View includes Levels 1 and 2 below only. The ANSP View provides a more detailed picture and includes the three levels of the framework shown below. This may be expanded in future years depending on the requirements of Members.

Level 1

Cost efficiency KPI: 
\[
\frac{\text{Costs}}{\text{IFR hours}}
\]

Level 2

ATCOs in OPS costs

ATCOs in OPS employment cost per ATCO hour

ATCOs in OPS employment costs

ATCOs in OPS hours

ATCOs in OPS productivity

IFR hours

ATCOs in OPS hours

2A

2B

Costs excl. ATCOs in OPS employment costs

Non ATCOs in OPS staff costs

Non-staff operating costs

Depreciation costs

Capital costs

Costs excl. ATCOs employment costs

IFR hours

2C

Level 3

Unit ATCOs in OPS employment cost

ATCOs in OPS employment costs

No. ATCOs in OPS

3A

Annual Working hours per ATCOs in OPS

ATCOs in OPS hours

No. ATCOs in OPS

3B

IFR hours per ATCOs in OPS

IFR hours

No. ATCOs in OPS

3C

Figure 5 - CANSO ANS Performance Framework

The framework is designed as a tool that will enable ANSPs to better understand the drivers of the trends in their cost efficiency performance.

Level 1: The unit cost (cost per IFR hour) of ANS provision, presenting an indication of cost efficiency.

Level 2: This defines the key contributors to the unit cost, which are the costs of providing the service, broken down into ATCO employment cost and remaining costs (total cost, less ATCO employment cost).

Level 3: Breaks down ATCOs in OPS productivity and ATCOs in OPS employment costs per ATCOs in OPS hour into the constituent parts, to provide detail on IFR hours, annual working hours and employment cost per ATCO in OPS.
The high level indicator is broken down into three indicators which together drive the change in unit cost: a decrease in cost per IFR flight hour must be caused by at least one of: a decrease in ATCO employment cost per ATCO in OPS hour (2A); an increase in ATCO hour productivity (2B); or a decrease in other costs per IFR flight hours (e.g. reduction in non-staff operating costs or depreciation costs).

The relationship between the two levels is shown below. Dividing ATCO employment costs per ATCO hour (2A) by ATCO hour productivity (2B) gives ATCO employment costs per IFR flight hour. Summing this figure with all other costs per IFR flight hour (2C) gives unit cost per IFR flight hour (1). Analysis of the three Level 2 indicators therefore provides a picture of the drivers of the high level unit cost indicator giving an important insight into areas for performance improvement.

\[
\frac{\text{ATCOs in OPS employment costs}}{\text{ATCOs in OPS hours}} \quad \text{(2A)} + \quad \frac{\text{Costs excl. ATCOs in OPS employment costs}}{\text{IFR hours}} \quad \text{(2C)} = \quad \frac{\text{Costs IFR hours}}{\text{IFR hours}} \quad \text{(1)}
\]

**Figure 6 - Breakdown of Costs per IFR Hours**

In Level 3 ATCOs in OPS employment costs are broken down into three indicators which drive ATCOs in OPS employment costs per ATCO in OPS hour (2A) and ATCOs in OPS productivity (2B) and thus also ATCOs in OPS employment costs per IFR hour (2A/2B).

ATCOs in OPS employment costs per ATCO in OPS hour (2A) can be calculated by dividing the unit employment cost per ATCO in OPS (3A) by the average number of hours worked per ATCOs in OPS (3B):

\[
\frac{\text{ATCOs in OPS employment costs}}{\text{No. ATCOs in OPS}} \quad \text{(3A)} = \quad \frac{\text{ATCOs in OPS employment costs}}{\text{ATCOs in OPS hours}} \quad \text{(2A)}
\]

**Figure 7 - Breakdown of ATCOs in OPS Employment Costs per ATCO in OPS**
ATCOs in OPS productivity (2B) can be calculated by dividing the average number of hours controlled per ATCO in OPS (3C) by the average number of hours worked per ATCO in OPS (3B):

\[
\frac{\text{IFR hours}}{\text{No. ATCOs in OPS}} \div \frac{\text{ATCOs in OPS hours}}{\text{No. ATCOs in OPS}} = \frac{\text{IFR hours}}{\text{ATCOs in OPS hours}}
\]

Figure 8 - Breakdown of IFR Hours per ATCO in OPS Hours

Level 3 also provides a different way of breaking down the drivers for ATCOs in OPS employment cost per IFR flight hour. ATCOs in OPS employment costs per IFR flight hours can also be calculated by dividing the average unit employment cost per ATCOs in OPS by the average number of IFR hours controlled by each ATCO in OPS.

\[
\frac{\text{ATCOs in OPS employment costs}}{\text{No. ATCOs in OPS}} \div \frac{\text{IFR hours}}{\text{ATCOs in OPS hours}} = \frac{\text{ATCOs in OPS employment costs}}{\text{IFR hours}}
\]

Figure 9 - Breakdown of ATCOs in OPS Employment Costs per IFR Hours

These levels represent the initial structure for the KPIs in this report. This will be developed in future years to include other KPIs that underlie the currently reported KPIs. This development will be dependent on both the currently available data within the submission system, and the ability to define and collect new data elements.
Part One
The Industry View
**Introduction to Part One: The Industry View**

This section contains de-identified trend analysis of the data and aims to provide a view of the industry overall rather than the performance of individual ANSPs.

**Section contents**
- Structure and key performance indicators
- Methodology
- Introduction to the data presentation: how to use the charts
- One-year performance charts
- Three-year performance charts
- Discussion of other contributory factors to cost efficiency performance

**Key Performance Indicators**

The following table presents the key performance indicators (KPIs) that are presented within this section. In addition to the four KPIs presented in levels 1 and 2 of the CANSO Performance Framework, the section includes unit ANS revenue per IFR flight hour. While ANS revenues do not give the entire picture of revenues streams relevant for the ANSP they provide one indicator of profitability and price.

<table>
<thead>
<tr>
<th>KPI</th>
<th>Numerator</th>
<th>Denominator</th>
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<th>3 Year</th>
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*Figure 10 - KPI table*
Methodology

Principles and terminology

Correction for inflation: all financial items included in this report are corrected for inflation. Unless stated otherwise reference to costs implies real costs. Real costs are calculated for each country using the country specific inflation rate for each year taken from the IMF World Economic Outlook database. Values are inflated to 2013 real prices using an inflation index.

Exchange rate conversion: the analysis is based on national currency figures. The use of trends means that there is no need to convert data and avoids any distortion caused by changes in the exchange rate.

Where figures are stated in USD data is converted using the 2013 mid-year exchange rates from Oanda.

Equal weighting of all providers: averages and index figures are calculated by equally weighting all participating members.

Trend analysis

Sample size: for analysis based on costs the sample size is defined as the set of ANSPs that submit sufficient data to calculate the four main KPIs shown in the CANSO Performance Framework. For revenues this sample was further refined to include only the ANSPs that submit data for the four efficiency KPIs and for ANS revenues.

Inclusion in the 2012-2013 data analysis requires data submission for 2012 and 2013. Inclusion in the 2010-2013 data analysis requires data submission for 2010 and 2013. Inclusion in the four-year industry index requires submission of all four years (2010 to 2013 inclusive).

Separation of continental and oceanic data: due to the different nature of providing oceanic compared to continental services, ANSPs that provide both oceanic and continental services are considered as two separate services. While this will lead to greater weight given to ANSPs that provide both services it was decided to include both areas, while presenting them separately from a performance analysis perspective.

Growth rates: growth rates are calculated as the compounded annual average growth rate (CAGR), taking the nth root of the total percentage growth rate, where n is the number of years in the period being considered.

Industry index calculation: cost indices are calculated by first converting all data to 2013 prices. The data is then normalised (2010 = 100). Following the principle of equal weighting of all ANSPs the index values are then averaged for each year to give an 'industry index'.

Contributory factors

Sample: the analysis is based on 2013 data only. Data is in nominal USD.

Regression techniques: relationships are evaluated using simple regression analysis based on absolute, log-linear and log-log function forms. The log form was included to assess the robustness of any relationship. Additionally, it allowed for the inclusion of all data points: it is an accepted method of plotting values over an extremely wide range with less distortion; in this case from tens of thousands of IFR hours to tens of millions. Multiple regression\(^9\) was used only in the case of capital intensity when scale was also included as a second explanatory variable for cost per IFR flight hour.

\(^9\) Using more than one explanatory variable
Significance: the statistical significance of variables is considered at a 95% confidence level.

Bias: the limitations of the analysis are acknowledged. The sample size is insufficiently large to fully assess the proposed relationships. The indicators included are driven by a number of interacting factors which are not captured in this analysis. Statistically significant results may be solely due to the correlation of unobserved variables with the explanatory variable(s) included.
Industry View: Charts

This section includes the detailed charts showing the trend performance of reporting ANSPs over the period 2012-2013 and 2010-2013. The charts are preceded by a discussion of the new data presentation and how it should be interpreted.

How to use the charts
This section presents two types of scatter plots showing anonymised trend performance across the five main indicators, the first four following the CANSO Performance Framework:

- Cost per IFR flight hour (1)
- ATCO in OPS employment cost per ATCO in OPS hour (2A)
- ATCO in OPS productivity (2B)
- Costs (excluding ATCO in OPS employment costs) per IFR flight hour (2C)
- ANS Revenues per IFR flight hour

Chart Key

1 point for 1 ANSP. Oceanic and continental services are shown separately.

Orange indicates improved efficiency (i.e. decreased cost per IFR flight hour or increased productivity)

Purple indicates a worsening of efficiency (i.e. increased cost per IFR flight hour or reduced productivity)

Note that for the ANS revenue per IFR flight hour a decrease is denoted in purple. This is to differentiate between the two quadrants. As noted in the key messages the current data on ANS revenues is not sufficiently understood to make judgements on performance.
**Example ANSPs:**

A. Increase in cost per IFR flight hour in the context of an increase in IFR flight hours.

B. Decrease in cost per IFR flight hour in the context of an increase in IFR flight hours.

C. Decrease in cost per IFR flight hour in the context of a decrease in IFR flight hours. This is especially notable in an industry where cost flexibility is difficult to manage.

D. Increase in cost per IFR flight hour in the context of a decrease in IFR flight hours.

**Chart Type 1**

Shows distribution to change in cost per IFR flight hour compared to change in traffic.

- The change in traffic (e.g. IFR flight hours) is presented on the x-axis and the change in cost per IFR flight hour on the y-axis.

- The dotted line shows the average change in cost per IFR flight hour across the sample.

- The bottom half below the x-axis shows a decrease in cost per IFR flight hour.

- This distinction is shown using the colour coding.

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**Figure 11 - Chart type 1 example**
Chart type 2

Shows the change in the two factors making up the indicator (e.g. costs/IFR flight hours).

- The denominator (e.g. IFR flight hours) is presented on the x axis and the numerator (e.g. costs) on the y axis.
- The dotted line shows where the percentage change in the denominator is equal to the percentage change in the numerator and therefore where the indicator remains constant.
- The half to the bottom right of the dotted line always shows a reduction in the indicator.
- This equates to a worsening in performance for cost/IFR flight hour indicators but an improvement in performance for the productivity indicator.
- This distinction is shown using the colour coding.

Example ANSPs:
Increase in cost per IFR flight hour due to:

i. An increase in costs greater than the increase in flight hours.

ii. An increase in costs and decrease in flight hours.

iii. A decrease in flight hours greater than the decrease in costs.

Decrease in cost per IFR flight hour due to:

iv. A decrease in costs greater than decrease in flight hours.

v. A decrease in costs and increase in flight hours.

vi. An increase in flight hours greater than increase in costs.
Global Performance Trends:
One year trend 2012 to 2013

This section presents the one year trend charts between 2012 and 2013. The order of the charts follows the performance framework: level 1 and level 2.

2012-2013

Cost efficiency

Indicator 1: Cost per IFR flight hour

Sample Size: 26

Formula: Costs/IFR flight hours

Figure 10 plots the change in IFR flight hours against the real change in unit costs between 2012 and 2013. The change in real unit costs is put into the context of the change in traffic: for example those in the top right hand quadrant experienced a real increase in unit costs in the context of an increase in IFR flight hours.

The average unit cost across all ANSPs reduced by 0.3% in real terms between 2012 and 2013 and 62% of the sample decreased their unit cost in the year. Furthermore, 58% of the sample experienced an increase in IFR flight hours. Of those experiencing increasing traffic, 88% reduced their real unit cost.
15% of the sample decreased cost per IFR flight hour in a context of decreasing IFR flight hours. This is especially significant in an industry where cost flexibility is difficult to manage.

Figure 14 - Costs per IFR flight hour 2012-2013 real
Cost efficiency

Indicator 2A: ATCO employment cost per ATCO in OPS hour

Indicator 2B: ATCO hour productivity

The following two graphs present the two ATCO employment cost indicators (2A and 2B) using the same style as above: i.e. breaking each indicator down to give the numerator (y axis) and denominator (x axis) as the two drivers.

Figure 15 - ATCO employment cost per ATCO in OPS hour 2012-2013 real

65% of the sample experienced an increase in ATCO employment costs per ATCO in OPS hour in the year.

Note that two respondents reduced ATCO costs by 10-15% while maintaining ATCO hours. This could be explained by changes in working agreements or a reduction in overtime.

11 One ANSP is not shown on this diagram due to the magnitude of the changes observed.
54% of the sample increased ATCO productivity during the year. 67% of those experiencing an increase in IFR traffic increased ATCO productivity. While 36% of those experiencing decreasing traffic also increased productivity.
2012-2013

Cost efficiency

Indicator 2C: Costs excluding ATCO in OPS employment costs per IFR flight hour

Sample Size: 26

Formula: Costs excluding ATCO in OPS employment costs/IFR Flight Hours

In addition to ATCO employment costs which are covered in indicators 2A and 2B, above, the cost per IFR flight hour is driven by non-ATCO employment costs, non-staff operating costs, depreciation costs and capital costs. All of these items are captured within this category. The weight of this category within ANS provision costs varies between providers.

46% of the sample reduced their real costs (costs excluding ATCO employment costs) between 2012 and 2013 while 65% reduced their real cost excluding ATCO employment cost per IFR flight hour.

82% of those that reduced their real unit cost between 2010 and 2013 experienced a real reduction in unit cost excluding ATCO employment costs per flight hour.

Figure 17 - Costs excluding ATCO costs per IFR flight hour 2012-2013 real
The four previous figures give an overview of the cost efficiency performance between 2012 and 2013. Within the context of performance we also consider the trend in ANS revenues and its comparison with traffic trends. While ANS revenues do not give the entire picture of revenues streams relevant for the ANSP they provide one indicator of profitability and price. 68% of the sample increased their real unit revenue between 2012 and 2013 while 59% increased their total real ANS revenues.

58% of those experiencing increasing traffic showed an increase in real ANS revenues per IFR flight hour. Notably 80% of those experiencing a decrease in IFR flight hours between 2012 and 2013 increased their real unit revenue per IFR flight hour, offsetting the impact of the fall in traffic. 50% of those experiencing decreasing traffic increased their total real ANS revenues.

12 Two ANSPs are not shown on this diagram due to magnitude of the changes observed.
Global Performance Trends:

Three-year trend 2010 to 2013

This section looks at the three-year trend from 2010 to 2013. The three-year view was chosen as a compromise between a higher sample size and the number of years over which the trend analysis is done. Costs are again adjusted for inflation using a three-year inflation index.

A longer term view on cost efficiency performance is especially important in industries such as air navigation where costs may be inflexible over a one-year period. A three-year view gives more scope for service providers to adjust to traffic trends or to implement measures to improve cost efficiency.

This section follows the presentation and order used in the one-year trend section. To ease comparability with the previous section the data is presented in compounded annual average growth rates (CAGR). The use of a CAGR rate shows clearly the overall trend between 2010 and 2013, however it extracts from the fluctuations that may have taken place over the intervening years, which are likely also to be important in understanding performance trends.

The sample size is smaller than for the one-year trend analysis as a lower number of ANSPs submitted data in all years from 2010 and 2013 compared to just 2012 and 2013.

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13 The compounded annual average growth rate is calculated by taking the nth root of the total percentage growth rate, where n is the number of years in the period being considered.
2010-2013
Cost efficiency
Indicator 1: Cost per IFR flight hour
Sample Size: 24
Formula: Costs/IFR flight hours

The above graph plots the change in the IFR flight hours against the real change in unit costs between 2010 and 2013. The change in real unit costs is put into context of the trend in traffic: for example those in the top right hand quadrant experienced a real increase in unit costs in the context of an increase in IFR flight hours.

Figure 19 - Cost per IFR flight hour and traffic trend 2010 to 2013 real

Average unit cost fell by -0.6% per annum in real terms between 2010 and 2013.
50% of the sample decreased their unit cost between 2010 and 2013.
The second chart shows traffic and costs as the two drivers of real unit cost per IFR flight hour. Those to the left and above the black dotted line experienced an increase in unit cost per IFR flight hour.

63% of the sample experienced an increase in IFR flight hours. Of those experiencing increasing traffic 60% reduced their real unit cost. Of those experiencing decreasing traffic in the year 56% reduced their cost per IFR flight hour. Overall 21% of the sample decreased cost per IFR flight hour in a context of decreasing traffic. This is especially significant in an industry where cost flexibility is difficult to manage. Comparison with 2012-2013 data (15% of the sample decreased cost per IFR flight hour) indicates increasing cost flexibility over the longer period.
2010-2013

Cost efficiency

Indicator 2A: ATCO employment cost per ATCO in OPS hour

Formula: ATCO in OPS employment costs/ ATCO in OPS hours

Sample Size: 24

Indicator 2B: ATCO hour productivity

Formula: IFR Flight Hours/ATCO in OPS Hours

67% of the sample experienced an increase in ATCO employment costs per ATCO hour in the year.

Figure 21 - ATCO employment costs per ATCO in OPS hour – 2010-2013 real
54% of the sample increased ATCO productivity over the three year period. 80% of those experiencing an increase in IFR traffic increased ATCO productivity. 11% of those who had decreased traffic increased ATCO productivity.
In addition to ATCO employment costs which are covered by indicators 2A and 2B above, the unit cost per IFR flight hour is driven by non-ATCO employment costs, non-staff operating costs, non-staff costs, depreciation costs and capital costs. All of these cost categories are captured within this category. The weight of this category within ANS provision costs varies between providers.

42% of the sample reduced their real costs excluding ATCO employment costs between 2012 and 2013 while 67% reduced the unit cost.
The four previous figures give an overview of the cost efficiency performance between 2010 and 2013. Within the context of financial performance we also consider the trend in ANS revenues and its comparison with traffic trends. While ANS revenues do not give the entire picture of revenue streams relevant for the ANSP, they provide one indicator of profitability and price.

60% of the sample increased their real unit revenue between 2010 and 2013 while 70% increased their total real ANS revenues.

58% of those experiencing increasing traffic showed an increase in real ANS revenues per IFR flight hour. Notably 62% of those experiencing a decrease in IFR flight hours between 2010 and 2013 increased their real unit revenue per IFR flight hour, offsetting the impact of the fall in traffic.

One ANSP is not shown on this diagram due to the magnitude of the changes observed.
Contributory Factors

2013 data, while not supporting cost economies of scale in ANS provision, gives evidence of a positive relationship between operational scale and ATCO productivity. There is no evidence of a relationship between capital intensity and productivity once scale is accounted for.

One of the main areas for future development is in understanding, and where possible, controlling for the impact of external factors in performance analysis. This section considers a number of other contributory factors and assesses the current evidence for the impact of scale, capital intensity and regulatory environment and legal status in ANS performance. The Part One methodology provides further details on the analysis discussed in this section.

![Figure 25- The impact of external factors](image)

Scale and cost efficiency

The relationship between scale and efficiency is an interesting one. While it might be expected that ANS provision would be subject to economies of scale, the current sample data for 2013 shows no robust evidence of a negative relationship between cost per IFR flight hour and scale (IFR flight hours controlled).

Scale and ATCO productivity

2013 data does, however, suggest a positive relationship between scale and ATCO productivity. It is important to note that while the data gives evidence of a statistically significant relationship, the benefits of scale are, from an operational perspective, linked to the size of the centres. The relationship may therefore be due to the fact that larger ANSPs on average operate larger centres. The data is currently not available to assess if this is the case.

Capital intensity and ATCO productivity

Although data shows limited improvement in ATCO productivity between 2010 and 2013, investment in new technologies is expected to increase the capacity of ATCOs to control more flights.

However, the data gives no evidence of a relationship between capital intensity (proxied by the Net Book Value (NBV) of fixed assets per IFR flight hour) and ATCO productivity (IFR flight hours per ATCO hour) once scale is accounted for.

There are a number of caveats that need to be acknowledged. First, assets and investment were only added to the data submission for 2013, while this data should be assessed over the whole asset cycle. The number of participating ANSPs that submitted asset data is small. Any relationships should be investigated further as the data set grows.
Additionally, the indicator used in this analysis measures the observed productivity rather than the productivity capability of controllers. The implementation of new technology may increase the productive capacity of an ATCO (i.e. they are able to control an increased number of flights per hour). However even if productive capacity has increased this may not be evident in the data as actual traffic controlled per ATCO hour may remain relatively unchanged. This is especially plausible in a context of low traffic growth, as is currently the case.

Furthermore, there are a number of factors that are not accounted for in the analysis. There are many other drivers for productivity including staff management. There is also a wide range of other reasons for investing, for example, to improve safety or increase capacity.

Regulation environment and legal status

The current dataset has insufficient variance in the data available on regulatory environment and legal status to draw conclusions on the impact on cost efficiency. This is an area for further investigation in future years.
Part Two

The ANSP View
Introduction to Part Two: The ANSP View

This section contains identified presentation of ANSP performance indicators for 2013 and for the trend over 2009-2013. ANSPs can opt-out of the graphics and are able to provide contextual comment, if applicable, including the exceptional events during the year or items that may impact the comparability of data.

Section contents
- Key performance indicators
- Participants that have opted in to the identified ANSP View and 2013 IFR flight hours controlled
- Methodology
- Continental performance
  - Cost efficiency and productivity (Levels 1 and 2): 2013
  - ATCOs in OPS employment cost analysis (Level 3): 2013
  - Cost efficiency and productivity (Levels 1 and 2): Trend
- Oceanic Performance
  - Cost efficiency and productivity (Levels 1 and 2): 2013
- Joint continental and oceanic performance
- Price and revenues

Key Performance Indicators

The following section presents 2013 and trend data for both continental and oceanic activities in line with the CANSO Performance Framework levels 1-3. The section also includes ANS revenues and an example price indicator.

The following table gives a list of indicators included in this section of the report with their CANSO Performance Framework reference, where applicable, and the figure references.
### Joint Continental and Oceanic Cost efficiency Performance Indicators

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<th>Figure References</th>
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<td>Cost</td>
<td>IFR Flight Hours</td>
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<td>Cost of capital and depreciation as a percentage of costs</td>
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<td>Employment cost of ATCOs in OPS as a percentage of costs</td>
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### Revenues and Price Indicators

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<td>ANS revenues per IFR flight hour</td>
<td>ANS revenues</td>
<td>IFR flight hours</td>
<td>Figure 48</td>
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<tr>
<td>Example consolidated price for 1000km Flight for A320</td>
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<td>2013: Figure 51</td>
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</tbody>
</table>

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15 At this time there are not enough ANSPs with sufficient years of data in oceanic operations for any charts in this area. The column is left in place to show that these graphics will be produced when there is sufficient data.
### Participants

The following tables give the list of ANSPs that have opted into the identified section of the report on performance indicators, including new participants (denoted *).

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<th>Total IFR Flight Hours 2013 (Oceanic)</th>
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<tr>
<td>Isavia*</td>
<td>9 760</td>
<td>199 668</td>
</tr>
<tr>
<td>DANS/Serco(^\text{16})</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

\(^{16}\) DANS provides approach and tower services only, and therefore does not report IFR hours.
Methodology

Data collection: CANSO Members provided data for this analysis. The format of the data submission remains the same as in previous years with the addition of a general information sheet. Data on capital expenditures and NBV of fixed assets have also been added. While asset and investment data have limited use in a one-year context, the GBWG is looking to further develop related indicators after a number of years’ worth of data have been collected. ANSPs are able to revise data submitted in previous years. The data submission workbook includes validation calculations that ANSPs are encouraged to consult in the data collection phase.

Data processing: data have been processed by the Helios CANSO Support Team. Data were subject to a one-step validation check for significant changes, potential errors or omissions. Data are subject to continued revision by participating members.

Data presentation: In this section ANSPs are presented in the graphs in order of decreasing IFR flight hour volume, be it continental, oceanic or combined. This makes it possible to perceive relationships based on ANSP size, as expressed in IFR hours. This also places similar sized ANSPs in proximity to allow for easier comparison.

Separation of continental and oceanic data: information is provided both for continental and oceanic air navigation services, where applicable. Each of these environments has different challenges associated with providing ANS. For example, it is more straightforward to provide ground infrastructure for communications and surveillance services in continental airspace than it is over vast oceans.

However, in some areas there are similarities between oceanic and continental ANS environments. Regions of land with relatively low traffic density and minimal ground-based surveillance and communications infrastructure operate under procedural air traffic control, which is similar to oceanic operations.

Performance indicators are first presented for continental and oceanic services separately due to the different nature of providing oceanic compared to continental ANS. This is followed by the number of joint indicators selected following discussions within the GBWG.

Growth rates: data are presented from 2013 and then for the one and five year trends. The five year trend is calculated as the compounded annual average growth rate (CAGR). The use of a CAGR rate shows clearly the overall trend between 2009 and 2013. However, it extracts from the fluctuations that may have taken place over the intervening years, which are also important in understanding performance trends. The entire dataset is available to all participating ANSPs to enable closer analysis and evaluation of performance trends.

Note that this is a change in methodology from previous years’ reports where the average annual change was calculated from the individual annual changes.

The trend analysis is also presented for all ANSPs in a single graphic, which represents a change from previous years when these trend charts were presented by size grouping of the participating ANSPs.

17 The five year trend uses 5 years of data and 4 years in growth terms.
18 The compounded annual average growth rate is calculated by taking the nth root of the total percentage growth rate, where n is the number of years in the period being considered.
Exchange rate conversion: ANSPs submit data in their chosen currency. For KPI comparison, data are presented in USD. 2013 KPI data are converted at the Oanda 2013 exchange rate (mid-point rate during the year). The trend data are converted at the 2009 exchange rate in line with previous years’ methodology.

PPP correction: salaries and the cost of living vary extensively around the world. One way to correct for this is by using purchasing power parity (PPP). Employment costs for ATCOs in OPS are corrected using the International Monetary Fund (IMF) PPP conversion rates. For countries that submit data in non-national currencies, their submission is converted to the national currency before the PPP conversion. There are, of course, limitations to this approach, such as where the cost of living varies widely within a country and may be higher or lower in the region where ANS offices are located.

19 The IMP PPP rates can be used only where data are in national currency.
Cost Efficiency and Productivity

This section presents the cost efficiency and productivity indicators for continental and oceanic services in line with the CANSO Performance Framework. This section also includes a number of joint continental and oceanic KPIs.

Cost efficiency provides an indication of the balance between operational effectiveness (ATCO productivity) and the cost of providing the service. For example, an operationally effective ANSP with relatively high costs can be as cost effective as a less operationally effective ANSP with lower costs, and vice-versa.

The simplest indicator of cost efficiency is the cost of providing ANS services per IFR flight hour. However, there are many factors that also influence this indicator and a lower cost per flight hour is not necessarily indicative of improved overall performance.

Much of the observed cost difference is due to economic differences which the ANSP may not be able control. This includes labour contracts, both salary scales and working conditions (such as hours), as well as governmental regulations on pension management and mandatory financial controls. In addition, ANSPs also have different costs per flight hour due to differences in traffic complexity.

As noted in the introductory discussion on ANS performance, the comparison of cost indicators should be considered in the context of external factors and other performance areas (see Figure 1). The absolute cost indicator also does not account for the quality of service provided by the ANSP: there are costs associated with providing a safer and more punctual service. This report provides only part of the overall picture of the air navigation service.

Costs are broken down to consider the employment cost of ATCOs in OPS per ATCOs in OPS hour and all other costs. The majority of staff cost is made up of the cost of ATCOs in OPS, as the central safety-critical and highly-skilled staff members.

The key indicator of ANS productivity is IFR flight hours per ATCOs in OPS hour. This KPI for productivity can provide useful insights into ANS performance. However, there are also occasions when factors beyond the control of the ANSP can cause low levels of productivity. ATCOs in OPS productivity is driven by the complexity of the airspace served and on the ANSP’s ability to utilise its ATCOs in OPS resources. Flexible rostering and the adaptation of the airspace configuration to open and close sectors according to evolving traffic patterns are both key elements of this resource utilisation. Furthermore, advances in technology are now focusing more than ever on reducing the workload of the ATCOs in OPS to enable them to control more aircraft in a given period in a given volume of airspace.

The flexibility of adapting sector opening hours to traffic patterns is also crucial. This requires some flexibility within rostering and a good understanding of the expected operations to ensure the right level of capacity is provided at the right time. Low productivity can result from spare capacity being provided and the low utilisation of available resources. This can be a particular problem for ANSPs controlling less dense and less complex airspace. A further contributing factor is a high level of seasonal variability, where an ANSP may find it difficult to cope with considerable differences in demand between, for example, summer and winter.

Complexity of airspace is a key driver of ATCOs in OPS productivity. Lower airspace, with lots of climbing, descending and crossing traffic represents higher ATCOs in OPS workload than upper airspace where aircraft are flying at more consistent altitudes and on non-crossing routes.
Therefore, an ANSP operating a high proportion of sectors in lower airspace or with numerous busy airports with complex approach sectors is likely to have lower ATCOs in OPS productivity than an ANSP focussing more on overflights at higher altitude.
Continental Cost Efficiency and Productivity: 2013

2013

Cost efficiency

Indicator 1: Cost per IFR flight hour (USD)

Continental

Formula: Costs/IFR flight hours

The 2013 average cost per IFR flight hour is 462 USD.

Figure 26 - Cost per IFR Flight Hour (USD)
2013

Cost efficiency

Indicator 2A: ATCOs in OPS employment cost per ATCO in OPS hour

Continental

Formula: Employment costs for ATCOs in OPS/ATCOs in OPS hours

The 2013 average ATCOs in OPS employment cost per ATCO in OPS hour is 69 USD.

While most ANSPs exhibit an increase when considering the PPP, NAV CANADA shows a decrease. This is a reflection of the relationship between the US $ and the Canadian $ which has undergone relatively large fluctuations in the past few years.

ANSPs such as AAI may appear to have lower salaries for ATCOs in OPS but the inclusion of PPP reveals that the apparent disparity is not as severe. On the other hand, ATCOs in OPS in DANS are experiencing a very high cost of living.
The 2013 average ATCOs in OPS hour productivity is 0.61 IFR hours per ATCOs in OPS hour.

Regulations to roster staff to accommodate peak traffic operations and sparse traffic in provincial airports contribute to the low ATCOs in OPS hour productivity for AEROTHAI. Initiatives to increase productivity and efficiency of staff management for air traffic control service at provincial airports are being put into place.
The 2013 average cost excluding ATCOs in OPS employment costs per IFR flight hour is 345 USD.
2013

Cost efficiency

Indicator 3A: ATCOs in OPS employment cost per ATCO in OPS

Continental

Formula: Employment cost for ATCOs in OPS/ATCOs in OPS

The 2013 average unit ATCOs in OPS employment cost is 107 000 USD.

Figure 30 - Employment Cost per ATCO in OPS (USD)
2013 Cost efficiency

Indicator 3B: Annual working hours per ATCO in OPS

Continental Formula: ATCOs in OPS hours/ATCOs in OPS

The 2013 average annual working hours per ATCOs in OPS is 1,601 hours.

The 7.62% increase in annual working hours for AEROTHAI is largely due to 17.11% growth in IFR flight hours in 2013. With only 2.3% growth in the total number of ATCOs in OPS, overtime is necessary. In addition to the continuous traffic growth, dated automation of ATM systems combined with regulations to roster staff to accommodate peak traffic operations and sparse traffic in provincial airports contribute to the high number of working hours per ATCO in OPS. Initiatives to increase productivity and efficiency of staff management for air traffic control service at provincial airports are being put in place.

AEROTHAI looks forward to working closely with the GBWG/Helios analysis team to analyse potential differences in its rostering system to understand and improve performance in this KPI.
2013

Cost efficiency

Indicator 3C: IFR flight hours per ATCO in OPS

Continental

Formula: IFR flight hours/ATCOs in OPS

The 2013 average is 962 IFR flight hours per ATCO in OPS.
Continental Cost Efficiency and Productivity: Trend

Trend

Cost efficiency

Indicator 1: Cost per IFR flight hour (USD)

Formula: Costs/IFR flight hours

The blue bar represents the change over the last year in this indicator, while the red box represents the five year trend. Where there is no red box the ANSP did not submit sufficient years of data for a five year CAGR to be calculated. When the red box is higher than the blue bar then the cost per IFR hour for the ANSP is lower than the five year average. This may show the beginning of a new lower trend, or that the most recent year is lower and different from the overall trend. SMATSA is an example of this.

Conversely, ROMATSA and ANS Czech Republic may show the beginning of a new higher trend of the most recent year being higher and different from the overall trend.

In both cases it is not possible to determine what is driving the change in costs for the ANSP.

Figure 33 - Trend in Continental Cost per IFR Hour

The blue bar represents the change over the last year in this indicator, while the red box represents the five year trend. Where there is no red box the ANSP did not submit sufficient years of data for a five year CAGR to be calculated. When the red box is higher than the blue bar then the cost per IFR hour for the ANSP is lower than the five year average. This may show the beginning of a new lower trend, or that the most recent year is lower and different from the overall trend. SMATSA is an example of this.

Conversely, ROMATSA and ANS Czech Republic may show the beginning of a new higher trend of the most recent year being higher and different from the overall trend.

In both cases it is not possible to determine what is driving the change in costs for the ANSP.

20 In the case of AAI the five year trend point has been excluded as the scope of the data submitted has changed.
Trend
Cost efficiency
Indicator 2A: ATCOs in OPS employment cost per ATCO in OPS Hour

Continental
Formula: Employment costs for ATCOs in OPS/ATCOs in OPS hours

Figure 34 - Trend in Employment Cost per ATCO in OPS Hour
Trend

Cost efficiency

Indicator 2B: ATCOs in OPS hour productivity

Formula: IFR flight hours/ATCOs in OPS hours

Figure 35 - Trend in IFR Flight Hours per ATCO in OPS Hour
2013

Cost efficiency

Indicator 2C: Cost excluding ATCOs in OPS employment costs per IFR flight hour

Formula: Costs excluding ATCOs in OPS employment costs/IFR flight hours

Figure 36 - Trend in Cost Excluding ATCO Employment Cost per IFR Flight Hour

The five year trend for AAI has been removed due to a change in the scope of the data submission.
2013
Cost efficiency

Indicator 3A: ATCO in OPS employment cost per ATCO in OPS

The one year trend of negative changes in ATCOs in OPS employment cost are of particular interest in this graphic. There are probably underlying reasons associated with each ANSP, including changes in staff management, overtime practices and the relative proportions of junior and senior staff.
2013

Cost efficiency

Indicator 3B: Annual working hours per ATCO in OPS

Continental

Formula: ATCOs in OPS hours/ATCOs in OPS

Figure 38 - Trend in Annual Working Hours per ATCO in OPS

Trends for ANSPs on this graph will be influenced by a number of factors. The remarkable decrease for AAI may be as a result of an increase in trained ATCOs which has reduced the necessity for overtime hours. Given the significant growth in air traffic in India and the training time for ATCOs in OPS this trend may continue.

The one year trend is largely negative, this may be a result of a number of factors including better rostering control by ANSPs or a decrease in air traffic requiring less overtime.
2013

Cost efficiency

Indicator 3C: IFR flight hours per ATCO in OPS

Continental

Formula: IFR flight hours/ATCOs in OPS

The 14.5% annual growth for AEROTHAI is largely due to the 17% increase in traffic, while the number of ATCO in OPS grew 2%.
Oceanic Cost Efficiency and Productivity: 2013

2013

Cost efficiency

Indicator 1: Cost per IFR flight hour (USD)

Oceanic

Formula: Costs/IFR flight hours

The 2013 average cost per IFR flight hour for oceanic services is 97 USD.

This graph shows the significant difference in the costs to provide oceanic services as compared to continental services, see Figure 26 on page 49.
2013

Cost efficiency

Indicator 2A: ATCOs in OPS employment cost per ATCO in OPS hour

Oceanic

Formula: Employment costs for ATCOs in OPS/ATCOs in OPS hours

The 2013 average ATCO in OPS employment cost per ATCO in OPS hour for oceanic services is 105 USD.

Comparing this graph to Figure 27 on page 50 shows that oceanic employment costs per ATCO in OPS are normally higher than continental.

ATNS has a markedly lower employment cost since oceanic control is provided by ATSOs (air traffic service officers) with a different license level than air traffic controllers.
2013

Cost efficiency

Indicator 2B: ATCOs in OPS hour productivity

Formula: IFR flight hours/ATCOs in OPS hours

The 2013 average ATCO in OPS hour productivity for oceanic services is 3.7 IFR hours per ATCOs in OPS hour.

The apparently much lower productivity of the ATNS ATSOs is more indicative of the traffic volume than other factors.

The FAA ATO productivity represents the average over four very different oceanic areas: New York (Atlantic Ocean), which has a relatively high volume; Oakland (Pacific Ocean), which has a lower volume over a vast territory; Houston (Gulf of Mexico), which has a high volume in a relatively small area; and Alaska, which is a small oceanic area.

The higher productivity of NAV CANADA is indicative of the very high volume in the North Atlantic area where technological advantages can be gained.

Isavia is also part of this high volume North Atlantic area.

Airways New Zealand productivity is indicative of the high volumes between Australia and New Zealand.

ATNS’s lower productivity is indicative of the oceanic area covered, which includes the Southern Atlantic Ocean and the area to the South Pole. Both areas have very low traffic volumes.

Figure 42 - Oceanic IFR Flight Hours per ATCO in OPS Hour
The 2013 average cost excluding ATCOs in OPS employment costs per IFR flight hour for oceanic services is 67 USD.

Compare this graph to Figure 29 on page 52 where the average is 345 USD, reflecting the different nature of oceanic operations compared to continental operations.
Joint Continental and Oceanic Cost Efficiency

2013

Cost efficiency

Indicator: Cost per IFR flight hour

Formula: Cost/IFR flight hours

The 2013 average cost per IFR flight hour for combined continental and oceanic services is 452 USD.

Compare this average value to that from Figure 26 on page 49 where the average value is 462 USD, reflecting the influence of a small number of ANSPs that have oceanic services with lower unit costs.

In the chart there are six ANSPs with oceanic control areas: FAA ATO, NAV CANADA, AAI, Airways New Zealand, ATNS and Isavia.

Figure 44 - Combined Cost per IFR Flight Hour (USD)

The 2013 average cost per IFR flight hour for combined continental and oceanic services is 452 USD.

Compare this average value to that from Figure 26 on page 49 where the average value is 462 USD, reflecting the influence of a small number of ANSPs that have oceanic services with lower unit costs.

In the chart there are six ANSPs with oceanic control areas: FAA ATO, NAV CANADA, AAI, Airways New Zealand, ATNS and Isavia.

AAI provides some oceanic control but does not report this separately from continental services.
2013
Cost efficiency
Indicator: Cost per IFR flight hour
Formula: Cost/IFR flight hours

Comparing the trends in this graph with those of Figure 33 on page 56 will show the relative influence of the trend in oceanic costs for ANSPs that provide both services.
2013

Cost efficiency

Indicator: Cost of capital and depreciation as a percentage of costs

Continental and Oceanic

Formula: Sum of cost of capital and depreciation/costs

The 2013 average for both continental and oceanic services is 20%.

Figure 46 - Cost of Capital and Depreciation as a Percentage of Costs
Cost efficiency

Indicator: Employment cost of ATCOs in OPS as a percentage of combined costs

Formula: Employment cost of ATCOs in OPS / combined continental and oceanic costs

The 2013 average for continental and oceanic services is 24%.

Figure 47 - Employment Cost of ATCOs in OPS as a Percentage of Combined Costs
The two key performance indicators analysed for this key performance area are:

- ANS revenue per IFR fight hour.
- The example consolidated price per 1000km for an A320.

The charging mechanism for ANSPs is generally designed to generate sufficient revenue over a given period of time, usually a year, to cover the forecasted costs. This is known as full cost recovery. Charging mechanisms generally follow ICAO’s Policies on Charges for Airports and Air Navigation Services, Doc 9082, which outlines the principle of ‘user pays’. ANSPs generally allocate costs such that a user only pays for the services they consume.

The costs for the year are generally forecasted based on the actual costs of the previous complete financial year and updated according to the latest information available. However, the number of flights and service units over which that cost will be recovered is not known and is based on traffic forecasts. Differences between actual and forecast traffic lead to the ANSP generating more revenue (over-recovery) or less revenue (under-recovery) than planned.

Not all ANSPs are subject to the same formulae for cost recovery either in terms of full cost recovery or whether using previous or future costs and revenues in the process. NAV CANADA, for example, uses full cost recovery based on a future year. The process uses a forecast of costs and revenues, whereby both are adjusted, as necessary, to achieve the required balance.

Many ANSPs are subject to economic regulation related to ANS charging. Such regulations place restrictions on the charges passed on to airspace users, by either capping the revenue that an ANSP may generate or the charge that an ANSP may levy on a flight. Economic regulation can also involve risk sharing, where the ANSP and airspace users share the risks associated with traffic fluctuations. For example, an ANSP over-recovering its costs would be expected to share this revenue, or a percentage of it, with the users in the following year, whereas an ANSP would only be able to pass on a proportion of an under-recovery of costs to the users. Upper and lower limits are usually placed on risk sharing to limit the exposure of ANSPs to the risks of drastically lower traffic than forecast.
2013

Revenues and Price

Indicator P1: ANS revenues per IFR flight hour

Formula: Continental ANS revenues/IFR flight hours

The 2013 average ANS revenue per IFR flight hour is 540 USD.

Figure 48 - Continental ANS Revenues per IFR Flight Hour
2013

Revenues and Price

Indicator P1: ANS revenues per IFR flight hour

Formula: Continental ANS revenues/IFR flight hours

Figure 49 - Trend in Continental ANS Revenues per IFR Flight Hour
2013

Revenues and Price

Indicator P1: ANS revenues per IFR flight hour

Formula: Oceanic ANS revenues/IFR flight hours

The 2013 average ANS revenue per IFR flight hour for oceanic services is 107 USD.

Figure 50 - Oceanic Revenues per IFR Flight Hour
2013

Revenues and Price

Indicator P2: Example consolidated price for 1000km flight for an A320

The 2013 average example consolidated price for 1000km flight for an A320 is 809 USD.

There has long been controversy over conditions for an example flight, particularly with respect to the distance. The current value of 1000 kilometres is a compromise. For smaller ANSPs such a flight is not possible, while for larger ANSPs such a flight is too short. Each ANSP sets its terminal and en-route charges according to its own conditions. Those with high terminal activity with respect to en-route activity will have quite a different charge structure from those with high en-route activity relative to terminal activity. Such considerations are not adequately represented in this chart.

Figure 51 - Example Consolidated Price for a 1000km Flight for an A320
2013

Revenues and Price

Indicator P2: Example consolidated price for 1000km flight for an A320

Figure 52 - Trend in Example Consolidated Price for a 1000km Flight for an A320
### Annex 1: Data Definitions

The following data definitions are based on the GBWG agreed data submission file for 2013.

#### Activity

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total IFR flight hours</td>
<td>Total number of controlled IFR flight hours in continental and oceanic airspace.</td>
</tr>
<tr>
<td>IFR flight hours (continental)</td>
<td>The sum of IFR flight hours (non-oceanic) controlled by an ANSP’s en-route centres (ACC) and approach control centres (APP). For any given flight, the flight hours controlled are derived from the difference between the entry time and the exit time (as derived from the last flight plan received) in the controlled airspace. Where measurement entry time and exit time differ from wheels-up and wheels-down, the ANSP may apply a factor of one minute per continental arrival and departure (revised from two minutes to one minute May 2007 based on clarification from EUROCONTROL and ASG).</td>
</tr>
<tr>
<td>IFR flight hours (oceanic)</td>
<td>The sum of oceanic IFR flight hours controlled by an ANSP’s en-route centres (ACC). For any given flight, the flight hours controlled are derived from the difference between the entry time and the exit time (as derived from the last flight plan received) in the oceanic controlled airspace.</td>
</tr>
<tr>
<td>IFR airport movements controlled by ANSP (continental)</td>
<td>The number of movements, arrivals and departures at all controlled facilities for the ANSP. This number will be used to add one minute to the IFR hours for ANSPs that do not record IFR hours from take-off to touch-down.</td>
</tr>
</tbody>
</table>
## Cost (Local Currency)

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total costs</td>
<td>The sum of operating costs, cost of capital and depreciation/amortisation.</td>
</tr>
<tr>
<td>Operating costs</td>
<td>Operating costs include: direct and indirect employment costs; non-staff operating expenses; and other costs incurred through the purchase of goods and services directly used to provide ANS services. This should include outsourced services such as communications, IT and external staff on short-term assignments. Other items that are usually included in operating costs include materials, energy, rent, and facilities and maintenance. The cost of providing meteorological services is excluded.</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>The cost of capital falls into two categories. The first is the interest paid to the providers of debt capital. The second is the appropriate cost of capital applied to equity capital. 1. For ANSPs with both categories the cost of capital is the interest expense on debt capital plus the cost of capital on equity built into the ANSP charges. 2. For ANSPs with only debt capital, the cost of capital is the interest expense. 3. For ANSPs with only debt capital, where the interest expense is borne by the government and not reflected in the accounts of the ANSP, the cost of capital can be imputed by applying the interest rate on overall government borrowing to the ANSP capital.</td>
</tr>
<tr>
<td>Depreciation/amortisation</td>
<td>Depreciation and capital lease amortisation expenses related to the total fixed assets in operation associated with providing ANS services. Depreciation is the decrease of an asset in value due to wear and tear through use, action of the elements, inadequacy or obsolescence, normally over a predetermined period (depreciation period/book life of the asset.) Amortisation is the gradual extinguishment of the cost of an asset by periodic (annual) charges to expenses, usually applicable to intangible asset (e.g. development costs). It excludes depreciation/amortisation costs associated with meteorological services.</td>
</tr>
</tbody>
</table>
### Staffing and Hours

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ATCOs in operations</td>
<td>The number of FTE ATCOs participating in an activity that is either directly related to the control of traffic or is a necessary requirement for ATCOs to be able to control traffic. Such activities include staffing a position, refresher training and supervising on-the-job trainee controllers, but do not include participating in special projects, teaching at a training academy, or providing instruction in a simulator. This includes first-line supervisors but does not include on-the-job training.</td>
</tr>
<tr>
<td>Total employment cost for ATCOs in operations</td>
<td>Total employment costs including gross wages and salaries, payments for overtime and other bonuses, employer contribution to social security scheme and taxes, pension contributions and other benefits for ATCOs in Operations. This should exclude: mission related expenditures, including travel expenditures and training fees, as these should be considered operating costs.</td>
</tr>
<tr>
<td>Average annual working hours for ATCOs in operations</td>
<td>The number of hours ATCOs in operations spend on duty in operations, including breaks and overtime. This figure could be available from a time-recording system (using for example first clock-in and last clock-out times); it could be computed from the roster plan; or it could be calculated by adding the average overtime worked in operations to the contractual working hours and subtracting the average time an ATCO is not on duty in operations.</td>
</tr>
<tr>
<td>ATCO in operations hours(^{22})</td>
<td>Average annual working hours for ATCOs in operations multiplied by the number of ATCOs in operations (continental).</td>
</tr>
</tbody>
</table>

\(^{22}\) Participating Members may also submit this figure and the average annual working hours per ATCO in OPS will be calculated by dividing total hours by the number of ATCOs in OPS.
### Price and Income

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total ANS revenue (continental)</strong></td>
<td>ANS revenue (continental) is ANS revenue (before adjustments from previous years) from the provision of en-route and terminal ANS services. Revenue is exclusive of oceanic ANS services, and non-ANS revenue sources.</td>
</tr>
<tr>
<td><strong>Total ANS revenue (oceanic)</strong></td>
<td>ANS revenue (oceanic) is ANS revenue (before adjustments from previous years) from the provision of oceanic ANS services. Revenue is exclusive of continental ANS services, and non-ANS revenue sources.</td>
</tr>
<tr>
<td><strong>Example consolidated price per 1000 km flight for A320</strong></td>
<td>The sum of en-route, approach, and terminal navigation charges for a theoretical continental flight of 1000 km (i.e. the distance between two airports is 1000 km). An ANSP with location-specific pricing will apply pricing related to highest IFR traffic (high demand) city-pair. ANSPs with a national pricing regime will apply these charges to the theoretical continental flight. Amount excludes taxes, such as value added tax (VAT).</td>
</tr>
</tbody>
</table>

### Assets and Capital Expenditure

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capex in the year</strong></td>
<td>Capex in the year is capital expenditure in the year, including capitalised labour, for assets relating to the provision of ANS services. It is the sum of capital expenditures for land and buildings, systems and equipment and intangible assets</td>
</tr>
<tr>
<td><strong>NBV of fixed assets</strong></td>
<td>NBV of fixed assets is the net book value at the end of year of assets related to the provision of ANS services. It corresponds to the gross book value of assets minus the cumulative depreciation at the end of year.</td>
</tr>
</tbody>
</table>
Annex 2: Acronyms and abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A320</td>
<td>Airbus A320 aircraft</td>
</tr>
<tr>
<td>ACC</td>
<td>Area control centre</td>
</tr>
<tr>
<td>ACI</td>
<td>Airports Council International</td>
</tr>
<tr>
<td>ANS</td>
<td>Air navigation services</td>
</tr>
<tr>
<td>ANSP</td>
<td>Air navigation service provider</td>
</tr>
<tr>
<td>APP</td>
<td>Approach control</td>
</tr>
<tr>
<td>ASBU</td>
<td>Aviation System Block Upgrades</td>
</tr>
<tr>
<td>ASG</td>
<td>Aeronautical Standards Group</td>
</tr>
<tr>
<td>ASK</td>
<td>Available Seat Kilometres</td>
</tr>
<tr>
<td>ATCO</td>
<td>Air traffic controller</td>
</tr>
<tr>
<td>ATM</td>
<td>Air traffic management</td>
</tr>
<tr>
<td>BN</td>
<td>Billion</td>
</tr>
<tr>
<td>CAA</td>
<td>Civil aviation authority</td>
</tr>
<tr>
<td>CAGR</td>
<td>Compound annual growth rate</td>
</tr>
<tr>
<td>CANSO</td>
<td>Civil Air Navigation Services Organisation</td>
</tr>
<tr>
<td>FTE</td>
<td>Full time equivalent</td>
</tr>
<tr>
<td>GBWG</td>
<td>Global benchmarking workgroup</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>IATA</td>
<td>International Air Transport Association</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
</tr>
<tr>
<td>IFR</td>
<td>Instrument flight rules</td>
</tr>
<tr>
<td>KPI</td>
<td>Key performance indicator</td>
</tr>
<tr>
<td>M</td>
<td>Million</td>
</tr>
<tr>
<td>NBV</td>
<td>Net book value</td>
</tr>
<tr>
<td>OPS</td>
<td>Operations</td>
</tr>
<tr>
<td>PBN</td>
<td>Performance-based navigation</td>
</tr>
<tr>
<td>PPP</td>
<td>Purchasing power parity</td>
</tr>
<tr>
<td>PRU</td>
<td>Performance Review Unit</td>
</tr>
<tr>
<td>Q1, Q2</td>
<td>First quartile, second quartile etc.</td>
</tr>
<tr>
<td>VFR</td>
<td>Visual flight rules</td>
</tr>
</tbody>
</table>
Annex 3: References

IATA data sources on traffic
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Airport-passenger-traffic-still-going-strong-air-cargo-inches-along-after-third-year-of-weak-growth

EUROCONTROL ATM Cost-Effectiveness 2012 Benchmarking Report

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http://www.eurocontrol.int/sites/default/files/publication/
# CANSO Members

CANSO – the Civil Air Navigation Services Organisation – is the global voice of air traffic management (ATM) worldwide. CANSO Members support over 85% of world air traffic. Members share information and develop new policies, with the ultimate aim of improving air navigation services (ANS) on the ground and in the air.

CANSO represents its Members’ views to a wide range of aviation stakeholders, including the International Civil Aviation Organization, where it has official Observer status. CANSO has an extensive network of Associate Members drawn from across the aviation industry. For more information on joining CANSO, visit www.canso.org/joiningcanso.

## Full Members - 87

- Aeronautical Radio of Thailand (AEROTHAI)
- Aeroportos de Moçambique
- Air Navigation and Weather Services, CAA (ANWS)
- Air Navigation Services of the Czech Republic (ANS Czech Republic)
- AirNav Indonesia
- Air Traffic & Navigation Services (ATNS)
- Airports and Aviation Services Limited (AASL)
- Airports Authority of India (AAI)
- Airports Fiji Limited
- Airservices Australia
- Airways New Zealand
- Alboncontrol
- Austro Control
- Aviron AS
- AZANS Azerbaijan
- Belgocontrol
- Bulgarian Air Traffic Services Authority (BULATSA)
- CAA Uganda
- Cambodia Air Traffic Services Co., Ltd. (CATS)
- Civil Aviation Authority of Bangladesh (CAAB)
- Civil Aviation Authority of Botswana
- Civil Aviation Authority of the Republic of Mongolia
- Civil Aviation Authority of Singapore (CAAS)
- Civil Aviation Authority of Swaziland
- Civil Aviation Regulatory Commission (CARC)
- Comisión Ejecutiva Portuaria Autonoma (CEPA)
- Croatia Control Ltd
- DCA Myanmar
- Department of Airspace Control (DGCTA)
- Department of Civil Aviation, Republic of Cyprus
- DFS Deutsche Flugsicherung GmbH (DFS)
- Dirección General de Control de Tránsito Aéreo (DGCTA)
- DSNA France
- Dutch Caribbean Air Navigation Service Provider (DC-ANSP)
- ENANA-EP ANGOLA
- ENAV S.p.A: Società Nazionale per l'Assistenza all’Aereo (ENAV)
- ENRICO
- Estonian Air Navigation Services Organisation
- Federal Aviation Administration (FAA)
- Finavia Corporation
- General Authority of Civil Aviation (GACA)
- Ghana Civil Aviation Authority (GCAA)
- Hellenic Civil Aviation Authority (HCAA)
- Instituto Dominico de Aviacion Civil (IDAC)
- Israel Airports Authority (IAA)
- Iran Airports Co
- Irish Aviation Authority (IAA)
- ISAVIA Ltd
- Japan Civil Aviation Bureau (JCAB)
- Kaz Aero navigacija
- Kenya Civil Aviation Authority (KCAA)
- Latvijas Gaisa Satiksme (LGS)
- Letové prevádzkové Služby Slovenskej Republiky, Štátny Podnik
- Luftverkeersleiding Nederland (LURNL)
- Luxembourg ANA
- Maldives Airports Company Limited (MACL)
- Malta Air Traffic Services (MATS)
- National Airports Corporation Ltd.
- National Air Navigation Services Company (NANSC)
- NATS UK
- NAV CANADA
- NAV Portugal
- Navair
- Nigerian Airspace Management Agency (NAMA)
- Ofice de l’Aviation Civile et des Aéroports (OACI)
- ORO NAVIGACIJA, Lithuania
- PNG Air Navigation Services Limited (PNGASL)
- Polish Air Navigation Services Agency (PANSAS)
- PT “Adem Jashan” - Air Control J.S.C.
- ROMATSA
- Sakaeratavikaita Ltd
- S.E. MoldIATSA
- SENEAM
- Serbia and Montenegro Air Traffic Services Agency (SMATS)
- Serco
- skyguide
- Slovenija Control
- State Airports Authority & ANSP (DHMI)
- State ATM Corporation
- Sudan Air Navigation Services Department
- Tanzania Civil Aviation Authority
- Trinidad and TobagoCAA
- The LVF Group
- Ukrainian Air Traffic Service Enterprise (UKSATSE)
- U.S. DoD Policy Board on Federal Aviation
- Viet Nam Air Traffic Management Corporation (VATM)

## Gold Associate Members - 10

- Airbus ProSky
- Boeing
- FREQUENTIS AG
- GroupEAD Europe S.L.
- ITT Exelis
- Lockheed Martin
- Metron Aviation
- Raytheon
- Selex ES
- Thales

## Silver Associate Members - 71

- Adacel Inc.
- Aerovox Inc.
- Aireon
- Air Traffic Control Association (ATCA)
- ‘Association Group of Industrial Companies “TIRA” Corporation
- ATAC
- ATCA – Japan
- ATECH Negócios em Tecnologia S/A
- Avelliant
- Aviation Advocacy Sarl
- Aviation Data Communication Corp (ADCC)
- AviBit Data Processing GmbH
- Avitech GmbH
- AZIMUT JSC
- Barco Orthogon GmbH
- Bruel & Kjaer EMS
- BT Pic
- Comsoft GmbH
- CGH Technologies, Inc
- CSSI, Inc
- EADS Cassidian
- EZDO Technologies GmbH
- European Satellite Services Provider (ESSP SAS)
- Emirates
- ENAC
- Entry Point North
- Era Corporation
- Ethihad Airways
- Guntermann & Drunk GmbH
- Harris Corporation
- Helios
- Honeywell International Inc. / Aerospace
- IDS – Ingeniería Dei Sistemi S.p.A.
- Indra Navia AS
- Indra Sistemas
- INECO
- Inmarsat Global Limited
- Integra A/S
- Intelsat Technologies Inc.
- International Aero Navigation Systems Concern, JSC
- Jeppesen
- JMA Solutions
- Jotron AS
- LAIC Aktüngesellschaft
- LEMZ R&P Corporation
- LFV Aviation Consulting AB
- Micro Nav Ltd
- The MITRE Corporation – CAASD
- MLS International College
- MovingDot
- NEC Corporation
- NLR
- Northrop Grumman
- NTT Data Corporation
- Núcleo de Comunicaciones y Control, S.L.U.
- Quintiq
- Rockwell Collins, Inc.
- Rohde & Schwarz GmbH & Co. KG
- RTCA, Inc.
- Rohde & Schwarz GmbH & Co. KG
- SAAB AB
- SAAB Sensis Corporation
- Saudi Arabian Airlines
- Schmid Telecom AG
- SENASA
- SITA
- SITTI
- Snowflake Software Ltd
- STR SpeechTech Ltd.
- Tetra Tech AMT
- Washington Consulting Group
- WIDE

Membership list correct as of 18 December 2014. For the most up-to-date list and organisation profiles go to www.canso.org/canso-members