Australia’s
Air Traffic Management Plan
2016
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1. Introduction

Air Traffic Management (ATM) is defined by the International Civil Aviation Organization (ICAO) as the “dynamic, integrated management of air traffic and airspace — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions”.

The international aviation planning framework was set out by ICAO with the formation of the Global Air Navigation Plan (GANP) in 2013 and the Global Aviation Safety Plan (GASP) in 2014. As well as setting key policy principles for ICAO States to follow, the GANP and the GASP emphasised the need for Regions and individual ICAO States to develop their own regional and national ATM plans and State Safety Programmes.

The Australian Air Traffic Management Plan (ATMP) outlines Australia’s current ATM system and the roles and responsibilities of Government agencies and industry. The future initiatives outlined in the plan are designed to enhance and maintain Australia’s air navigation system; delivering safety, efficiency, capacity and environmental benefits to the aviation industry and the community.

Importantly, the ATMP also sets out Australia’s key challenges, priorities and short, medium and long term objectives in ATM planning.

The ATMP supports Australia’s State Safety Programme which outlines Australia’s aviation safety framework and, along with the Australian Airspace Policy Statement, helps determine Australia’s key national ATM policy objectives and provides guidance to Australian Government agencies and industry in future ATM planning and investment.

As a signatory to the Convention on International Civil Aviation (the Chicago Convention) the ATMP confirms Australia’s commitment to consistency with ICAO Standards and Recommended Practices (SARPs). Where this is not the case, Australia will formally file a difference with ICAO.

The ATMP has been prepared cognisant of the often significant rate of change in global ATM technology and procedures and the need for significant lead times to allow Government agencies and industry to transition safely and effectively to changes in communications, navigation and surveillance (CNS) and ATM practices and procedures.

The ATMP supports ICAO’s key objective of more effective coordination of regional and global ATM implementation activities leading to the realisation of a seamless global ATM system.

The ATMP has been prepared by the Australian Government Department of Infrastructure and Regional Development, in consultation with other Government agencies, the aviation industry and the community and will be reviewed every five years.
2. Overview – Roles and Responsibilities

Air traffic management in Australia is carried out through a collaborative arrangement between a number of Government agencies and the aviation industry.

The Australian ATM system includes:

- communications and navigation, which is undertaken by a range of aircraft operators, on instruction from air navigation service providers in ICAO airspace Classes A to G;
- air and ground traffic surveillance, undertaken by Airservices Australia (Airservices) and the Department of Defence (Defence) through the Royal Australian Air Force (RAAF);
- meteorological information primarily provided by the Bureau of Meteorology (BOM); and,
- safety regulation by the Civil Aviation Safety Authority (CASA) and Defence.

Supporting Australian legislation and policy documents, which define and guide the roles and responsibilities of each participant in the Australian ATM system, are outlined below.

Airservices Australia – Airservices

The functions of Airservices are outlined in the Air Services Act 1995 and Air Services Regulations 1995 and include the provision of air navigation services, aeronautical information and aviation rescue and firefighting services at certain airports.

The Australian Government, through the Minister for Infrastructure and Transport, outlines its priorities for Airservices in a publicly available Statement of Expectations (SOE).

The Government expects that Airservices regard the safety of air navigation as the most important consideration in performing its functions and to focus on delivering core air traffic management and aviation rescue and firefighting services.

Additionally, as outlined in the SOE, the Government expects that Airservices will continue to:

- implement Government air traffic management and airspace policy initiatives;
- invest in future infrastructure upgrades and replacement programmes, including enhanced air traffic and surveillance services at regional airports;
- implement the Government’s environmental objectives; and
- undertake effective consultation with the industry and community.

Airservices develops a corporate plan which sets out its key initiatives, including those related to ATM, over a rolling five year period. The Airservices corporate plan is updated annually.

Civil Aviation Safety Authority - CASA

CASA’s primary role, as outlined in the Civil Aviation Act 1988, is the safety regulation of civil aviation operations in Australia and of Australian registered aircraft operating overseas.
In fulfilling its responsibilities CASA sets, audits and enforces safety standards, and promotes industry awareness and understanding of aviation standards and safety issues.

The Government, through the Minister for Infrastructure and Transport, also outlines its priorities for CASA in a publicly available SOE. These expectations reaffirm that the safety of passenger carrying operations should remain CASA’s highest priority.

CASA is updating Australia’s regulatory framework. The updates aim to provide safety measures that:

- can be found in one place;
- meet international best practice;
- are based on lessons learned from the past;
- are responsive to advances in global aviation;
- are developed in close consultation with industry; and
- provide achievable transition times to ensure industry is best placed to meet the new standards.

CASA’s priorities regarding ATM are:

- the development of standards, rules and operational concepts for ATM technologies and procedures as appropriate;
- the use of safety and risk assessment approaches;
- meeting ICAO ATM requirements (with any differences clearly noted) and international harmonisation; and
- training and education of CASA staff and industry.

CASA develops a corporate plan which sets out its key initiatives, including those related to ATM, over a rolling four year period. The CASA corporate plan is updated annually.

Under the Airspace Act 2007 and Airspace Regulations 2007, CASA, through the Office of Airspace Regulation (OAR), also has primary responsibility for the administration and regulation of Australian-administered airspace.

A significant role for the OAR is to conduct regular reviews of the appropriateness of airspace classifications, air traffic services and facilities.

**Department of Infrastructure and Regional Development - the Department**

The Department provides policy advice to the Government in relation to airspace and air traffic management matters, including advice on Airservices and CASA’s strategic direction, their planning, financial and operational performance, and their governance framework.

The Department also prepares, in consultation with other Government aviation agencies, industry and the community, the Australian Airspace Policy Statement for approval by the Minister for Infrastructure and Transport.
The Department also chairs the Aviation Policy Group (APG) and Aviation Implementation Group (AIG) which are Government aviation agency coordination forums on airspace and ATM matters, amongst other issues.

**Department of Defence - Defence**

Defence, primarily through the RAAF, provides air navigation services and infrastructure as well as air traffic services and rescue and firefighting services at military air bases.

Defence also provides air traffic services for civil aircraft transiting military controlled airspace and restricted areas surrounding all airbases, as well as controlling all aircraft at joint-user airports at Darwin and Townsville and at RAAF Base Williamtown.

Defence also operates an aircraft fleet that needs access to airspace to meet specific operational requirements and ensure national security.

**Australian Transport Safety Bureau - ATSB**

The ATSB is Australia’s independent transport safety investigation agency.

In terms of ATM, the ATSB’s investigations of aviation accidents and incidents can help identify relevant safety issues for appropriate follow-up safety actions by other Government aviation agencies and the aviation industry.

The ATSB is also involved in safety data recording, analysis and research, as well as raising safety awareness and facilitating safety action through a range of communication and education activities.

**Bureau of Meteorology - BOM**

The Bureau of Meteorology operates under the *Meteorology Act 1955*. Under the Chicago Convention, the BOM is also Australia’s designated Meteorological Authority and is required to ensure that aeronautical meteorological services are provided in accordance with the Annexes to the Chicago Convention.

Weather observations, forecasts and warnings for aviation in Australia are made in accordance with the standards and recommended practices set out in *Annex 3 – Meteorological Service for International Civil Aviation*. In fulfilling this mandate, the BOM works closely with Airservices and CASA.

Under the Civil Aviation Regulations 1988, Regulation 120, the Director of Meteorology may also authorise aviation meteorological service providers to provide meteorological observations and reports used in civil aviation.

**Industry**

The aviation industry, which operates and maintains the aircraft which fly in Australia’s airspace, has a number of key roles in Australia’s air traffic management system.
These roles include providing safe and efficient aircraft operations, investment in air navigation and communications systems and equipment which increasingly rely on satellite-based technology and the attraction, training and retaining of skilled personnel.

Aerodrome operators also support air traffic management through investment in ground-based systems which enhance the safety and efficiency of aircraft operations.

To ensure a fully effective and efficient air traffic management system it is important that industry and Government work collaboratively to provide the necessary standards, services, facilities, equipment and specialised personnel to meet Australia’s future ATM requirements.

**Coordinating/Consultation Forums – Government Agency and Industry**

**Aviation Policy Group (APG) and Aviation Implementation Group (AIG)**

The APG brings together the Secretary of the Department (Chair), the Chief Executive Officer of Airservices, the Chief Executive Officer of CASA and the Chief of Air Force.

The APG is not a decision making group as each individual agency retains their respective legislative and regulatory responsibilities and authority. However APG provides a CEO-level forum for effective inter-agency policy coordination and consultation on aviation-related issues including airspace and air traffic management.

The AIG is a working group of senior officials from each APG agency. It is responsible for coordinating and following up issues identified by the APG including preparing coordinated advice and reports back to APG for consideration.

The APG and AIG also takes advice and input from other Government and industry organisations, including the ATSB, BOM and the Australian Strategic Air Traffic Management Group (ASTRA).

**Australian Civil-Military Air Traffic Management Committee - AC-MAC**

Airservices and Defence have established the AC-MAC as a harmonisation forum to oversee synchronisation and collaboration of Australia’s civil and military air traffic management and aviation rescue and firefighting services, including their enabling facilities and infrastructure.

**Airspace and Infrastructure Users Group**

The Airspace and Infrastructure Users Group is a joint CASA/aviation community forum for the development of regulations and standards pertaining to airspace, air traffic control, communications/ navigation/ surveillance/ air traffic management (CNS/ATM) and aerodromes.

The Group provides advice to CASA on the Airspace Regulations and the following Civil Aviation Safety Regulation (CASR) Parts:

- **Part 65** - Air traffic services licensing;
- **Part 139** - Aerodromes;
• Part 143 - Air traffic services training providers;
• Part 171 - Aeronautical telecommunication service and radio navigation service providers;
• Part 172 - Air traffic services providers;
• Part 173 - Instrument flight procedure design; and
• Part 175 - Aeronautical information management.

**Australian Strategic Air Traffic Management Group – ASTRA**

ASTRA is a key industry advisory body dedicated to participation in the development of an optimum air traffic management system for Australia. It is comprised of industry stakeholders including representative of aircraft and airport operators from a range of industry sectors, staff associations, Airservices and observers from other Government agencies.

ASTRA facilitates industry consideration of a range of aviation issues and provides a forum to help develop coordinated industry positions on ATM issues to APG and AIG.

**Bureau of Meteorology (BOM) / Aviation Industry Consultation**

The BOM undertakes regular consultation with industry through the annual Bureau of Meteorology/Aviation Industry Consultative Meeting and specific working groups on a range of topics, such as matters related to ATM and airspace management. Participants in these groups include Airservices, CASA, the Department of Infrastructure and Regional Development, the Department of Defence and various aviation industry sectors.

Airservices and the BOM also consult regularly through the Bureau of Meteorology/ Airservices Australia Working Group (BOM/AsA WG). This group provides a forum for consultation and exchange of information on all aspects of aviation meteorological services and reports directly to the Bureau of Meteorology / Airservices Australia Steering Committee.
3. Key ATM Policy and Reference Documents

Australia’s ATMP is consistent with broader aviation safety and specific airspace and air traffic management policies outlined as follows.

State Safety Programme

Annex 19 of the Chicago Convention requires contracting States to develop and implement a State Safety Programme (SSP). An SSP is the management system for the regulation and administration of safety by the State.

Australia’s State Safety Programme can be found <here>.

Australian Airspace Policy Statement

The Australian Airspace Policy Statement (AAPS) outlines the Australian Government’s objectives and strategies for civil airspace administration.

The Government considers the safety of passenger transport services as the first priority in airspace administration.

The AAPS also outlines specific airspace policy objectives:

- support for ICAO’s Global Aviation Safety Plan and Global Air Navigation Plan and use of ICAO airspace classifications;
- the appropriate level of air traffic management services at regional aerodromes regularly served by passenger transport services, as determined by CASA; and
- effective cooperation between CASA and Australia’s air traffic service providers; Airservices and Defence.

The AAPS outlines the Government’s airspace strategy which is risk based, engendering evidence based decision making and supported by robust data collection and analysis in determining Australia’s future airspace needs.

The AAPS sets out airspace criteria thresholds (e.g. total passenger and aircraft movements) which act as triggers for aeronautical risk reviews to be carried out by CASA, in consultation with the public, industry and other Government agencies.

Further information on the AAPS can be found on the Department of Infrastructure and Regional Development’s website at www.infrastructure.gov.au

Communications, Navigation and Surveillance

With the increased availability of satellite based technology in modern aircraft and international support for adoption of Automatic Dependent Surveillance Broadcast (ADS-B) technology, CASA commenced industry consultation on emerging aircraft surveillance technology with the release of a public discussion paper in 2004.
In 2007 CASA subsequently released a Notice of Proposed Rule Making (NPRM) for formal stakeholder consultation and a Notice of Final Rule Making was issued in 2009.

In 2012 CASA then finalised Civil Aviation Order 20.18 (CAO) which was made in September of that year.

The CAO establishes mandatory avionics equipage in specified categories of aircraft operating in particular classes of airspace or at particular major aerodromes.

Initiatives include the mandatory installation of ADS-B, Mode-S and Traffic Collision Avoidance Systems (TCAS) technologies as Australia transitions to use of the Global Navigation Satellite System (GNSS) as the primary means of navigation from February 2016.

These mandates are further described in the section entitled Satellite Based Technology.

**Aeronautical Information Publication (AIP)**

Contracting States to the Chicago Convention are required to provide a document which records the State’s aeronautical information, known as the Aeronautical Information Publication (AIP).

The details of air traffic services, including the details of the manner in which the services are to be provided, are published in the Australian AIP for:

- a flight information area or a flight information region; or
- a control area or a control zone; or
- airspace of any class; or
- a controlled aerodrome.

The assessment of flight priorities (AFP) is published in Australia’s AIP. The AFP sets out how Airservices’ air traffic controllers regulate aircraft operations to ensure efficient sequencing of aircraft.

Further information on the Australian AIP can be found at http://www.airservicesaustralia.com/publications/aeronautical-information-package-aip.
4. Key Challenges, Priorities and Objectives

Challenges Ahead

Australia will continue to face many safety, efficiency, capacity and environmental challenges in the future air traffic management of Australian airspace.

To meet these challenges, Government agencies and industry will need to invest in new and upgraded infrastructure and equipment, the ongoing maintenance of these ATM facilities and systems, and in recruiting, retaining and training skilled personnel required to perform ATM functions.

Demands on ATM system capacity

The Australian international, domestic and major regional airline passenger market has experienced strong growth over the last decade.

The Bureau of Infrastructure, Transport and Regional Economics forecasts that over the next fifteen years growth will continue but with variations between different aviation sectors. For example, a steadying of growth in regional Australia with a reduction in demand from the resources sector, will require an ongoing assessment of the appropriateness of the level of services provided, particularly where there is falling passenger and aircraft movements.

Growth in recent years at some capital city airports such as Sydney, Brisbane, Melbourne and Perth has placed pressure on ATM infrastructure capacity which has already seen a number of efficiency initiatives put in place by Airservices and airport operators. Several of these airports have future plans for significant runway works while a future Western Sydney Airport will increase capacity but also raise ATM and airspace management issues in the Sydney basin.

It will also be important that in planning for future civil aviation capacity requirements the geographical location of some of our major civil airports near military air fields, will require close cooperation between Airservices and Defence to ensure mutually beneficial results are achieved meeting both civil and military aviation demand.

Operational Issues

Australia’s area of ATM responsibility covers 11 per cent of the world’s airspace and with vast volumes and distances across continental and oceanic airspace. Australia has become an early adopter of satellite based technologies to provide surveillance coverage and navigation over large parts of the continent where previously there was no surveillance coverage.

Australia has mandated the installation of ADS-B by all Instrument Flight Rules (IFR) aircraft by 2017 which will provide a significant improvement to surveillance for the vast majority of air passenger transport operations in Australia.

While some visual flight rules (VFR) aircraft are adopting this technology, risk based approaches will need to continue where IFR and VFR aircraft operations mix around the country including in and out of our regional airports.
In uncontrolled airspace, pilots are often not visible to air traffic control but must still follow visual flight rules or instrument flight rules. In uncontrolled airspace controllers do not provide separation but provide a Flight Information Service and Traffic Information Service to aircraft flying on instrument flight rules and on request to aircraft flying on visual flight rules.

Australia continues to see the increased application and ownership of Remotely Piloted Aircraft Systems (RPAS). Over the next fifteen years covered by this plan, RPAS are expected to have an increasingly significant operational role in the aviation industry in both civil and military applications with vast numbers of potential users.

As the role of RPAS are defined and developed and the technology continues to undergo rapid development, regulatory and operational responses will be needed to ensure they are managed safely and accorded the appropriate agreed priority relevant to the operation.

The automated sense-and-avoid capability of RPAS will potentially provide a technology driver for self-separation with traditional manned aircraft. While such a self-separation concept is still some way off, the increased demand for RPAS operations in all types of airspace will need to be safely facilitated and not adversely affect “traditional” modes of aircraft operations.

**Infrastructure/Technology**

Investment in new, and the ongoing maintenance of existing, infrastructure and technology will continue to be required to ensure a safe, efficient and advanced ATM system.

The Australian Advanced Air Traffic System (TAAATS) was built in the 1990s and commissioned in 2000. TAAATS has had more than 200 incremental system changes since it was first commissioned. The system requires replacement if it is to meet future ATM civil aviation traffic demands.

With future military ATM systems also coming to the end of their operating life, Airservices and Defence are working together under the OneSKY programme to implement an integrated national ATM system.

**Workforce Capability**

While investment in infrastructure and technology will increase the capacity, quality and capability of our ATM system, air traffic facilities and services ultimately are operated and oversighted by skilled air traffic personnel. Air traffic controllers and pilots will need to participate in ongoing training to work with a more advanced ATM system.

ICAO recognises a shortage of skilled aviation professionals is developing and is encouraging States to establish programmes to train the next generation of aviation professionals.

Part of this initiative realises that recruitment processes will need to change in line with the shifting skill baselines for personnel to operate and oversight the evolving systems. This will create challenges for Airservices and Defence, as our air navigation service providers; for aircraft and airport operators, and for CASA as the aviation safety regulator.
Environmental Impacts

While modern aircraft are increasingly quieter and more efficient than their predecessors, greater numbers of aircraft movements especially over urban, populated areas in the major cities will continue to present environmental challenges for ATM in Australia.

ATM can offer potential benefits for environmental management including use of less environmentally sensitive flight paths to reduce aircraft noise impacts and achieve better emissions outcomes. However, it is recognised that any proposed changes to existing operations, including the development of new airports, runways or procedures require detailed consultation with the community and industry before they are finalised and implemented.

Global Priorities

Global Air Navigation Plan - GANP

In 2013 ICAO produced the Global Air Navigation Plan 2013-2018 (GANP 4th Edition), in essence a global plan to help guide States to increase the capacity and improve the efficiency of the global civil aviation system.

The GANP articulates ICAO’s ten key air navigation policy principles; to which Australia is committed:

1. Commitment to the implementation of ICAO’s Strategic Objectives and Key Performance Areas;
2. Aviation safety is the highest priority;
3. A tiered approach to air navigation planning;
4. The Global Air Traffic Management Operational Concept (GATMOC);
5. Global air navigation priorities;
6. Regional and State air navigation priorities;
7. Aviation system block upgrades (ASBUs), modules and roadmaps;
8. Use of ASBU blocks and modules;
9. Cost benefit and financial issues; and
10. Review and evaluation of air navigation planning.

Further information on these principles can be found at Appendix 1.

The GANP applies a rolling 15 year strategic methodology to support a harmonised global air navigation system. It guides States in leveraging existing technologies and anticipating future developments based on operational objectives agreed by the State in consultation with industry. This is done through a series of ASBUs.

The ASBU methodology is a programmatic and flexible engineering approach that allows States to advance their air navigation capacities based on their specific operational requirements and promotes the near and long-term global interoperability of States’ air navigation solutions.
The GANP obliges States to map their individual programmes against the ASBU system, and in return, provides them with a far greater certainty of investment.

The GANP also provides tools for States to develop comprehensive business case analyses as they seek to realise their specific operational improvements.

ASBUs are divided into four performance improvement areas:

- Airport operations;
- Globally interoperable systems and data;
- Optimum capacity and flexible flights; and
- Efficient flight paths.

Each performance area has four blocks, separated into five yearly intervals, which contain a number of modules (see Figure 1).

![Figure 1: Aviation System Block Upgrade schematic](image)

Importantly, individual States determine which modules in each block they need to implement, and then work through the blocks, upgrading their systems in a globally cohesive manner. A particular initiative may be completed in a single block, or may be progressively implemented across a number of blocks.

The implementation of ASBUs requires collaboration among States through Planning and Implementation Regional Groups (PIRGs) to coordinate initiatives with applicable regional air navigation plans. Australia is a regular and significant contributor to the Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) and its sub-groups.

In addition, ICAO is developing a comprehensive plan for the development of SARPs and guidance material to support the ASBUs as appropriate.
Australia is working towards implementing the ASBU blocks and modules that align with our operational ATM priorities and circumstances.

To assist in this task, Airservices has implemented four operational groups, incorporating representatives of the aviation industry, to guide the work required in the four performance areas. Australia is also working with our neighbours to further develop and implement the coordinated Asia-Pacific Seamless ATM Plan and to guide member states within the region with their ATM planning.

Australia has already implemented a number of the technologies and practices contained in Block 0 and Block 1. These include:

- Air Traffic Flow Management/Collaborative decision making;
- Performance based Navigation Approach;
- ATS Surveillance;
- ATS Surveillance with data integrated;
- ADS-Contact and Controller Pilot Data Link Communications (CRDLC);
- ATS Inter-facility Data Link Communications (AIDC);
- Aeronautical Information Management;
- Civil Military use of special use airspace;
- Strategic Military coordination; and
- Tactical Military coordination.

Three further ICAO documents which support the implementation of the GANP are the:

- Global Air Traffic Management Operational Concept (GATMOC);
- Manual on Air Traffic System Requirements; and the

Australia uses these documents to help guide its ATM development activities.

**Global Aviation Safety Plan - GASP**


The GASP sets out the global air navigation safety objectives, including specific milestones and priorities to be addressed by State and regional aviation safety planners.

To support this work, the GASP provides a framework to assist States and Regions in making improvements to safety and outlines implementation strategies and best practice guidance material to assist States and Regions tailor solutions to address the global objectives and priorities.

The GASP outlines short, medium and long-term objectives:

- **By 2017:** Implementation of an effective safety oversight system.
- **By 2022:** Full implementation of the ICAO State safety programme framework.
- **By 2027:** Advance safety oversight system including predictive risk management.
The GASP also sets out three global safety priorities:

1. Improving runway safety;
2. Reducing the number of controlled flights into terrain (CFIT) accidents; and
3. Reducing the number of loss of control in-flight accidents.

Australia’s ATMP is consistent with the policy principles and priorities outlined in the GANP and the GASP.

**Global Air Traffic Management Operational Concept - GATMOC**

Australia supports closer alignment with the vision of an integrated, harmonised and globally interoperable ATM system, as presented by ICAO in its Global Air Traffic Management Operational Concept (GATMOC).

GATMOC outlines the concept of an integrated and global ATM system based on clearly established operational requirements.

GATMOC is intended to guide the high-level implementation of communication, navigation, surveillance and air traffic management technology by providing a description of how the emerging and future air navigation system should operate.

The concept components of GATMOC include airspace organisation and management, aerodrome operations, demand and capacity balancing, traffic synchronisation, conflict management, airspace user operations, and ATM service delivery management.

**Regional Priorities**

Australia participates in, and will continue to support numerous regional fora and initiatives, to work towards a seamless airspace across the Asia-Pacific Region. For example, Australia is an active participant in the Asia Pacific Seamless ATM Planning Group which is currently updating the Asia Pacific Seamless ATM Plan.

The purpose of the Asia Pacific Seamless ATM Plan is to facilitate seamless ATM operations in the Asia Pacific region. The Seamless ATM Plan provides a framework for transition to a seamless environment utilising the research and experiences of other regions such as Europe and North America. The plan has two performance objectives: preferred aerodrome/airspace and route specifications; and preferred ATM service levels, which will be implemented in two phases by November 2018.

Australia also assists in the development of ATM capabilities with our regional partners. Australia works closely with our nearest neighbours, Indonesia and Papua New Guinea under formal development programmes. In addition, Australia provides assistance to other regional neighbours when requested and where we have the capacity and resources to assist.

More broadly, Australian aviation agencies participate in a wide variety of regional ATM groups that contribute to the safety, efficiency and capacity of the Asia-Pacific Region.
Australia’s ATM Priorities

Safety will always be the most important consideration of Australia’s ATM system and this requirement is included in legislation covering the operations of Airservices and CASA.

Aviation safety is also enhanced through the delivery of an effective, efficient and responsive ATM system.

Enhancements to our ATM system, if properly designed and implemented, can achieve safety, efficiency and capacity benefits, as well as help minimise environmental impacts (noise and emissions) of aircraft operations, provide better access for aircraft and enhance security.

The Australian Government’s key policy priorities for our ATM system are:

1. increased adoption of advanced technology and infrastructure investment;
2. increased alignment with ICAO SARPs;
3. civil-military ATM harmonisation;
4. regional aviation safety based on risk assessment;
5. the recruitment, retention and training of skilled personnel; and
6. effective management of environmental impacts from aviation operations.

1. Adoption of Advanced Technology and Infrastructure Investment

The majority of Australia’s current civil aviation infrastructure assets are owned and managed by Airservices, comprising 1079 buildings at 684 sites, valued at over $1 billion.

The infrastructure that supports The Australian Advanced Air Traffic System (TAAATS), Airservices’ current air traffic management system includes two major centres in Melbourne and Brisbane, four terminal control units and 29 towers at international and regional airports around Australia.

Airservices also maintains over 200 navigational aids around the country as of May 2016.

A major priority for the Australian ATM system is Airservices delivering an over $1 billion major capital expenditure programme over the next five years. The programme includes rebuilding and maintaining core capabilities and retiring certain assets such as selected navigation aids at the end of their lifespan.

Key elements of the capital expenditure programme and expected time frames for transition and completion are:

- OneSKY – 2018-2021;
- Sydney Terminal Control Unit (TCU) modernisation – 2017-2020;
- Integrated Tower Automation Suites – 2017-2018;
- Melbourne and Brisbane Air Traffic Service Centres (ATSCs) extensions – 2017-2018;
- Aeronautical Data Interchange Network (ADIN) upgrade – 2020;
- ADS-B ground station expansion – 2020.

Australia will continue to adopt proven advanced technology and international standards.
The decision to adopt technology applications will continue to be on the basis of well-developed safety cases, appropriate risk analysis, the development of detailed operational concepts and robust implementation plans factoring in the cost-benefits of these applications and their application to the Australian aviation environment.

Australia is supporting the wider application and use of modern surveillance technology, including satellite based technologies such as ADS-B and satellite navigation technology such as the Global Navigation Satellite System (GNSS). However, as is the case in other leading aviation countries, Australia will maintain a robust ground-based back-up surveillance capability, including radar, to protect against vulnerabilities from over-reliance on one system.

The wider adoption of advanced technology is integrally linked with the transition from route-based navigation using terrestrial navigation aids to area navigation using satellite navigation. The adoption of these applications will not only enhance aviation safety but can also generate efficiency, capacity and environmental benefits.

Future ATM capabilities will support:

- a national satellite and ground based, efficient, flexible ATM system utilising air-to-ground data link surveillance for air traffic separation;
- aircraft utilising satellite navigation as the primary means, without the need to resort to ground based aids in normal situations;
- the ability of air traffic surveillance to provide traffic conflict avoidance; and
- more efficient manoeuvres, whereby pilots use measures such as flexible routing, in trail climbs, aircraft sequencing and merging on approach.

**OneSKY**

Airservices and Defence are currently collaborating on the installation of an integrated national air traffic management system. The OneSKY Programme, will bring opportunities for greater harmonisation of civil and military aviation procurement, provision of services, and training and has significant potential safety, operational and financial benefits for both civil and military aviation users.

Airservices, in collaboration with Defence, will deliver an integrated civil-military air traffic management control system (CMATS). This system will enable a new level of safety, and operational and cost efficiency, while also reducing delays for the travelling public and providing opportunities to improve environmental outcomes.

OneSKY Australia is scheduled to commence roll out in 2018 and be fully implemented by 2021. Implementation will also mean a single flight information region for all of Australia’s airspace, allowing greater use of flexible airspace and user preferred routes.

**Future Airspace System**

Airservices will continue to operate from two major centres in Brisbane and Melbourne, each providing redundancy and surge capability for the other.
A new capability for strategic and pre tactical air traffic flow management will provide network operations within Australian administered airspace, and coordinate the network of flights between other regional Air Navigation Service Providers (ANSPs).

To implement these changes Airservices in conjunction with Defence have launched a programme known as the Future Airspace System (FAS) which is looking to enhance the safety, efficiency and capacity of all aspects of ATM. FAS includes a redesign of the manner in which aircraft arrive and depart in terminal airspace, the way they interconnect between busy city pairs and other regional and remote locations and will reflect new aircraft navigation systems, performance-based navigation and optimum climb and descent flight paths.

FAS will also assist in realising the full capacity of the available airspace to the CMATS system and work will be undertaken collaboratively with Defence to ensure the current and future capability requirements of Defence are included in all airspace, operational and procedural development and redesign, and in close consultation with CASA and industry.

FAS will continue to be delivered incrementally to 2025.

**Satellite based technology**

Australia is committed to the adoption of GNSS to enhance safety and efficiency in Australia’s airspace. Australia began adopting and implementing the use of GNSS since 1994, approving the use of GPS to assist in the navigation of Australia’s vast airspace and continues to mandate measures which will harness the benefits of GNSS.

CASA established a number of mandates for the adoption of satellite based technology.

These were as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>Mandate</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 December 2013</td>
<td>Operations at/above flight level 290 requires ADS-B.</td>
</tr>
<tr>
<td>6 February 2014</td>
<td>New aircraft flying IFR must be equipped for GNSS navigation and to transmit ADS-B.</td>
</tr>
<tr>
<td>4 February 2016</td>
<td>Existing aircraft flying IFR must be equipped for GNSS navigation. Mode-S transponder required to operate at BNE, SYD, PER or MEL.</td>
</tr>
<tr>
<td>6 February 2016</td>
<td>Any aircraft flying IFR in classes A, C or E airspace within 500nm north to east of Perth Airport must be equipped to transmit ADS-B.</td>
</tr>
<tr>
<td>2 February 2017</td>
<td>All aircraft flying IFR must be equipped to transmit ADS-B.</td>
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</table>

Currently, all aircraft operating above FL290 in Australia must be equipped with ADS-B avionics and Mode-S transponders. By February 2017 all Australian aircraft operating IFR are required to be equipped with ADS-B.

These initiatives have and will continue to move Australia away from a dependency on ground based navigational infrastructure and half of the ground based navigation aids in Australia will be decommissioned. The remaining navaids will form a back-up navigation network, which is intended to run until at least 2025.
The benefits of ADS-B include:

- significantly improved surveillance coverage;
- voice reporting no longer required;
- enabling more aircraft to operate safely in the same volume of airspace;
- greater flexibility in allocating preferred levels/altitudes;
- improved incident, emergency and search and rescue response; and
- the ability for organisations to efficiently track their aviation related assets and operations in real-time.

Additionally, ADS-B IN (ADS-B reception by aircraft) can be used as a pilot situational awareness tool and enabler of new operations using airborne separation assistance systems.

Satellite based technology has allowed Australia to implement an aircraft tracking trial in accordance with principles developed by ICAO in February 2015 encouraging operators, States and air navigation authorities to more effectively track aircraft.

Throughout Australian airspace, including our vast oceanic regions, all passenger aircraft are now tracked by Airservices every 14 minutes using Automatic Dependant Surveillance-Contract (ADS-C). This can be increased to near real time if the aircraft deviates from its cleared route or altitude or reports experiencing difficulties.

Performance Based Navigation- PBN

GNSS is also the enabling technology for Performance Based Navigation (PBN), the highest priority project under the GANP.

PBN is an area navigation procedure which uses on-board systems to guide pilots and allow for better surveillance by air navigation service providers. PBN defines aircraft navigation requirements in terms of the accuracy, integrity, continuity and functionality required for the proposed operations.

PBN can improve safety, facilitate optimal flight routes (e.g. around high terrain or avoid noise sensitive areas), save fuel, reduce greenhouse gas emissions, and allow for higher traffic densities. PBN can also enable the optimal use of parallel runways; an issue important to Australia’s capital city airports as they continue to expand to meet forecast growth.

Following extensive consultation with industry on navigation authorisations, CASA has produced the Australian PBN Implementation Plan which describes Australia’s commitment to the delivery of a future PBN based airspace model. PBN will be used for precision navigation, instrument procedure design and resultant air traffic separation standards.

The introduction of PBN approaches will significantly enhance safety at airports as new procedures are implemented, straight-in approaches are significantly safer than circling approaches while the use of vertical guidance adds a further layer of safety protection.

PBN encompasses two broad area navigation families: area navigation (RNAV) and required navigation performance (RNP).
The RNP navigation specifications require on-board performance monitoring and alerting, whereas the RNAV specifications do not require on-board performance monitoring and alerting. (RNAV performance is monitored through air traffic control (ATC) surveillance).

Australia is also implementing PBN based approach capabilities such as approaches with vertical guidance (APV) Baro-VNAV technology. Runway aligned lateral navigation only approaches are also available where APV using Baro-VNAV cannot be achieved.

The following ICAO diagram shows how navigation specifications have been adopted by Australia to contribute to global harmonisation of aviation safety regulations:
Off Air Route Operations

Off air route operations (OARO) allow aircraft to fly more efficient routes, rather than along fixed lines guided by ground based navigation aids.

In Australia, Airservices continues to implement two types of OAROs; Flextracks and User-Preferred Routes (UPR). Flextracks are routes between specific city pairs, published daily by Airservices.

The tracks are available to flights between the designated city pairs and are designed, having regard to forecast wind conditions, to maximise aircraft fuel efficiency. Flextracks can also be used to enhance air traffic control separation assurances.

A UPR is a track generated by an Aircraft Operator for a specific flight to take advantage of meteorological and atmospheric variables to save fuel, time, costs or workload. Due to the significant complexity this brings to traffic separation, UPR operations are currently limited to areas of low traffic density in oceanic airspace. The introduction of automated delegated conflict detection technology may broaden the use of UPR in Australian airspace.

Trajectory Based Operation (TBO) represents a shift from traditional ‘clearance-based’ air traffic control based on managing airspace, to trajectory-based control where aircraft are managed within their known capability envelopes.

The TBO concept envisages that aircraft will fly negotiated trajectories and the current air traffic control environment will transition to trajectory management where changes to the trajectory are negotiated giving consideration to the business impact and the efficiency of the network at large.

TBO forms the cornerstone for ATM optimisation, resulting in increased flight safety, improved airspace availability, air transport efficiency and economy, as well as environmental benefits. The concept is one of improving throughput, flight efficiency, flight times, and schedule predictability through better prediction and coordination of aircraft trajectories.

On Ground Operations

An important component of ATM capacity building is the smooth and efficient management of aircraft in the airport environment. To that end, Airservices will continue to implement a number of airport based initiatives designed to enhance air traffic flow management (ATFM), without compromising safety, to reduce delays for all airspace users.

Understanding that coordination and cooperation between many stakeholders is required to create a sustainable system, Airservices, in collaboration with industry is implementing an ICAO initiative referred to as Collaborative Decision Making (CDM).

CDM will improve air traffic management by sharing information and data between airport operators, airlines, ground handlers, BOM and air traffic control. With access to greater information in real time participants can make more reliable decisions regarding resource management.
One component of implementing enhanced CDM was the introduction of a new advanced air traffic flow management (ATFM) application which will simultaneously manage traffic flows at multiple airports. This application, Harmony for ANSP’s, evaluates changing runway capacity resulting from forecast weather events and other predictable variables, and accepts real-time updates to schedule data to display the most up-to-date demand/capacity information at monitored airports. This provides airlines and air traffic controllers with an enhanced capability to predict traffic management issues.

The application also supports a Ground Delay Program, which identifies when an air traffic demand/capacity imbalance occurs and allows aircraft to be held on the ground at the point of departure, rather than in an airborne holding pattern. This will save airlines fuel costs and will also reduce CO2 emissions in the environment and improved predictability.

Airservices is also undertaking a national program, in collaboration with airport and industry stakeholders, to address growing demand at Australia’s major airports. The Airport Capacity Enhancement project (ACE) identifies opportunities, on a location by location basis, to increase the utilisation of existing infrastructure to increase runway capacity. These opportunities focus on the areas of:

- improving arrival spacing;
- standardising terminal speeds;
- reducing runway occupancy times and pilot response times; and
- improving communication between airport partners.

To date, ATM initiatives have been implemented by Airservices in Melbourne, Perth and Brisbane, with further strategic plans to improve capacity and efficiency performance developed for those airports.

A similar programme has been developed for Sydney through the Sydney Airport – Air Traffic Management Strategic Planning Group (SASPG). Sydney Airport is generally acknowledged to have reached capacity at peak times and the SASPG, comprising Airservices, airport and airport user representatives, works collaboratively to identify and implement actions to improve the flow of traffic through Sydney Airport.

**Air Traffic Services Centres**

Airservices has been rolling out a program of consolidating Terminal Control Unit (TCU) functions into the two major air traffic service centres in either Brisbane or Melbourne.

This consolidation will support the implementation of OneSKY. Adelaide and Cairns TCU operations are proposed for consolidation in 2017 subject to the approval of a safety case by CASA.

Consolidation of the Sydney operation will be considered once work on the Western Sydney Airport has progressed further.

The TCU function in Perth will remain in Perth for the foreseeable future to retain appropriate redundancy in the system.
Aviation Weather Services

BOM’s Aviation Weather Service enhances the safety, regularity and efficiency of national and international aviation operations through the provision of accurate, timely and relevant forecasts, warnings and information for aerodromes and enroute operations.

BOM provides meteorological services for civil aviation and Defence in Australia in accordance with the SARPs set out in Annex 3 and Australian requirements. These include meteorological observations and reports, forecasts, hazardous weather advisories and warnings, climatological information and environmental intelligence.

In support of an efficient and effective ATM system the BOM has embedded meteorologists in the Sydney TCU and the Airservices National Operations Centre (NOC) and is implementing meteorological input into ATFM.

In 2014 BOM completed a review of Aerodrome Forecasts (TAF) that established a methodology for determining the criteria for which aerodromes would receive a TAF service and the required level of service.

The review also recommended upgrades to the meteorological observational infrastructure and enhanced TAF reporting at a number of aerodromes based on thresholds including passenger numbers and aircraft movements. Upgrades to the meteorological observational infrastructure will also provide additional aviation weather services to industry. The next scheduled review of TAF services is scheduled for 2017 and every 3 years thereafter.

In 2015 a review of trend forecasts (TTF) was undertaken by a stakeholder working group. This review proposed that major Australian civil and Defence airports that currently have TTF service should transition from a TTF and 6-hourly issued TAF to a three-hourly issued TAF service. The decision on whether to implement this proposal will be the subject of ongoing consideration by BOM in consultation with Government aviation agencies and industry.

Approach with Vertical Guidance - APV

APVs are instrument approach procedures which utilise lateral and vertical guidance. ICAO supports the introduction of APV as a means of reducing controlled flight into terrain (CFIT) and runway overrun accidents. APV can be conducted by using either barometric based vertical guidance (Baro-VNAV) or satellite based augmentation systems (SBAS).

Australia released a Baro-VNAV policy paper for public comment in December 2015. The paper proposes that APV using Baro-VNAV be initially introduced at 109 Australian airports that are served by regular public transport and passenger transport operations, and where the necessary weather and transmission equipment is in place.

It is expected that, after considering stakeholder comments, a final policy and proposed implementation schedule will be completed by 30 June 2016.

SBAS complements existing GNSS systems by enhancing their accuracy, integrity, continuity and availability.
Several flight regions are already using SBAS systems, including the European Geostationary Navigation Overlay Service (EGNOS) in Europe, the Wide Area Augmentation System (WAAS) in the United States and the GPS Aided Geo Augmented Navigation (GAGAN) across the Indian sub-continent. SBAS has broader applications than just air navigation and, overseas, is used by defence, agriculture, road, rail and maritime transport improving its cost-benefit value.

In May 2011 the Department, in consultation with other aviation agencies and portfolios, conducted a review examining the efficacy of an Australian SBAS capability for completing APV coverage in Australia.

The main finding of the review was that, at that time, on the basis of information currently available, it is difficult to justify the significant investment involved in establishing SBAS in Australia to cover aviation operations at smaller aerodromes.

The review supported the increased adoption of APV at Australian aerodromes and supported the development of a Baro-VNAV implementation plan.

The review did not rule out future consideration of establishing an SBAS capability in Australia, if strong multi-sectoral demand for such a capability were to emerge and SBAS coverage provided by other administrations were expanded significantly in the region.

The Department will review the potential for SBAS application in Australia in the second half of 2016 in consultation with other portfolios and mindful of regional (including in New Zealand) and global developments in SBAS and other technologies.

2. Closer Alignment with ICAO Standards and Recommended Practices and use of International Best Practice

ICAO continues to encourage all States to better plan and harmonise the enhancement of safety, environmental and operational efficiency of future ATM and navigation systems.

In particular Australia supports the ICAO initiatives of:

- precision navigation enhancing aviation safety and also allowing more efficient use of airspace;
- instrument approach procedures that provide vertical guidance, enabling significant safety and service enhancements at aerodromes;
- tracking of flights through flight regions at no less than every 15 minutes;
- enhanced collision risk mitigation primarily through the expansion of air traffic surveillance including the wider application of satellite-based surveillance technology; and
- navigation capabilities that support optimum aircraft routes reducing fuel burn with attendant economic and environmental benefits.
The AAPS supports the use of the internationally-recognised ICAO airspace classification system (Class A to G airspace) in airspace administration. ICAO SARPs also provide an important basis for airspace administration. Any deviations from the SARPs will be well justified, documented and formally notified to ICAO as a filed difference.

The AAPS also outlines that CASA is expected to adopt international best practice in airspace administration, including adopting proven international systems that meet our airspace requirements, recognising international airspace systems include a range of characteristics that should be considered, and implemented as appropriate in Australian airspace.

3. Civil-Military ATM Harmonisation

The implementation of CMATS under the OneSKY programme will enable significantly greater situational awareness for both Airservices and Defence air traffic control. The integrated, common systems will facilitate efficiencies and safety of operations in line with the FAS concepts. Airservices is working in collaboration with Defence to design and implement the system and is leading the procurement of the new ATM system.

The Government continues to encourage initiatives which support the further adoption of the flexible use of airspace concept. Flexible airspace aims to maximise the use of available airspace volumes while providing the required segregation for non-compatible activities.

Building on the work of CASA and Defence, the Office of Airspace Regulation (including a Defence representative) in collaboration with Airservices and industry will continue to identify opportunities for more flexible use of civil and Defence administered airspace.

These initiatives are fully consistent with the increased commonality and interoperability of our future ATM systems. Flexible airspace approaches can have environmental as well as safety and efficiency benefits for airspace users and communities living in noise affected areas.

4. Regional Australia - Aviation Safety

The appropriate level of air traffic management at regional aerodromes regularly served by passenger transport services is a specific Government airspace policy objective.

CASA uses the passenger and aircraft movements criteria contained in the AAPS as a trigger for completing a risk review of airspace classification. These reviews are undertaken in consultation with Airservices, other Government agencies, industry and the community.

Airservices also continually monitors growth in aviation activity at regional locations.

Using the criteria contained within the AAPS as a guide, Airservices undertakes detailed analysis of the current and future aviation activity at regional aerodromes to facilitate planning for the introduction of appropriate technology and the development and implementation of appropriate procedures.

Additionally, when traffic information services are mandated by CASA, Airservices is able to assist the aerodrome operator through the provision of systems and shared facilities where appropriate, such as at Ballina and Ayers Rock.
Airservices has also taken key initiatives at a number of regional aerodromes, including:

- additional ADS-B ground stations;
- introduction of RNP1 Standard Instrument Departure Systems (SIDS) and Standard instrument Arrival Routes (STARS); and
- introduction of Tower Situational Awareness.

5. Workforce Planning

Airservices and Defence will continue to take a number of initiatives to enhance their workforce planning and skills development for their respective ATM workforces. These initiatives include:

- development of skills and capacity to meet future technology and services;
- diversifying the workforce;
- increasing employee engagement;
- developing strong leaders;
- innovative recruitment campaigns;
- developing an Indigenous Employment Strategy;
- tailoring an engineering diploma to meet specific needs; and
- removing barriers to employment for people with a disability.

6. Managing Environmental Impacts

As well as safety and efficiency benefits, modern ATM systems can enable improved management of environmental impacts (noise and emissions) from aviation operations.

There are a number of other air traffic management operational procedures which have the potential to reduce emissions, including Flextracks; air traffic control sequencing; and continuous descent approaches to runways.

One of the major operational directions that will impact on international aviation is the transition to PBN. PBN specifications can support improvements in aircraft safety, efficiency and environmental performance.

Required Navigation Performance (RNP) procedures for arrival and departure flight paths potentially offer reduced environmental impacts through more efficient use of airspace.

In the 2015-17 Airservices Statement of Expectations the Minister outlined his expectation that Airservices will assist in implementing the Government’s environmental initiatives. This includes the wider use of RNP approaches at Australian airports, as appropriate, to enhance safety and efficiency, reduce emissions and minimise noise impacts.

Airservices is undertaking a number of projects which will provide benefits to the environment, in terms of noise reduction, carbon emission reduction and protection of the physical environment.
Airservices’ Environmental Strategy 2014-2019 outlines, at a high level, Airservices’ proposed actions and expected outcomes in the areas of aircraft noise, aircraft emissions and the natural environment. Airservices commits to continue to work with industry, the community and other Government agencies to design and implement strategies to reduce the impact of aviation on the environment where practicable.

Further information on Airservices environmental strategy can be found here - http://www.airservicesaustralia.com/environment

An example of the types of projects Airservices has been working on to achieve environmental outcomes are continuous descent operations (CDO) and continuous climb operations (CCO). CDO and CCO, made possible through the increasing use of PBN, have been shown to achieve significant reductions in environmental impacts. CDOs allow aircraft to descend to final approach using minimum thrust settings. This not only saves fuel and therefore carbon emissions, but also decreases noise levels around airports. Similarly, CCOs also reduce the amount of fuel used during take-off and the amount of noise generated.

Australia also participates in the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE). ASPIRE was created in 2008 to reduce the impact of aviation on the environment through a reduction in aviation greenhouse gas emissions through technological innovation and best practice air traffic management.

Similar in nature, the Indian Ocean Strategic Partnership to Reduce Emissions (INSPIRE) was formed in March 2011. The INSPIRE partnership is a collaborative network of partners and peer organisations dedicated to improving the efficiency and sustainability of aviation across the Arabian Sea and Indian Ocean Region.

The Government is committed to the effective distribution of information and effective consultation with the community on air traffic management environmental issues. The wider application of advanced air traffic management technology and procedures must be consistent with the Government’s policy of fairer noise sharing for communities living in the vicinity of airports and near flight paths. Airservices will undertake effective consultation with the community, industry and Government on the development and implementation of significant changes to air traffic services.

An independent Aircraft Noise Ombudsman (ANO) has been in place in Australia since 1 September 2010. The ANO’s role is to oversee Airservices’ handling of aircraft noise enquiries and complaints, monitor and review Airservices consultation arrangements and make recommendations for improvements where necessary. The ANO provides regular reports to the Airservices Board and produces a detailed annual report for publication.

In 2015 the role of the ANO was expanded to include the provision of an independent complaint and review mechanism for Defence aviation activities.
Future Objectives

Consistent with ICAO’s approach of setting out short, medium and long-term objectives, Australia has set out a number of objectives in relation to continuous improvement in our future air traffic management system as outlined below.

Given the rapid pace of change in ATM, Australia will focus heavily on its short and medium term objectives while having regard to the long-term objectives in the GANP.

Australia will continue to engage with ICAO and international aviation authorities to ensure best practice approaches to aviation safety management, the widespread adoption of PBN, and the development of highly automated ATM concepts supporting CDM.

Short Term (2016-2020)

- Implementation of CASA’s GNSS based surveillance and navigation mandates with full IFR mandate in February 2017.

- Roll out of APV approaches using Baro-VNAV at 109 aerodromes around Australia.

- Increased use of PBN such as Required Navigation Performance, Ground Based Augmentation Systems with approved ADS-B avionics and by February 2017 civil aircraft operating under IFR inside controlled airspace will be equipped with approved ADS-B avionics.

- Airservices and CASA continue to progress a range of work items for the ICAO Separation and Airspace Safety Panel (SASP) including:
  - new standards and procedures for parallel runway operations that include the use of GNSS Landing Systems;
  - the use of multilateration and ADS-B as alternatives to radar as a parallel runway monitoring technology;
  - new Performance-Based Navigation (PBN) separation minima for approved aircraft; and
  - developing new space-based ADS-B separation minima for oceanic and remote airspace.

- Airservices and Defence will continue to develop the integrated Civil-Military Air Traffic System (CMATS) to improve operational safety and efficiency, and manage the increasingly complex civil-military airspace requirements.

- Airservices will invest in critical new and upgraded air traffic infrastructure, facilities and services including satellite-based ATM technology.
• Airservices, in consultation with Defence, CASA and industry stakeholders, will continue to develop the Future Airspace System (FAS) which will provide the basis for the development of a standard operating environment for Australian airspace.

• FAS work will initially concentrate on designing and implementing the airspace concept for the parallel runways at Brisbane, Perth and Melbourne airports. These procedures will be worked in conjunction with Defence requirements to specifically meet the raise, train and sustain requirements required for national defence. Defence requirements will include current and future operational platforms, both manned and un-manned. This collaborative approach will assist in ensuring acceptably safe utilisation of airspace and air routes to get the most out of the capacity increases provided by the new civilian runways and current and future Defence operational and training requirement.

• Work towards a global annual average fuel efficiency improvement of 2% per annum as part of an ICAO initiative.

• Airservices and Defence will also develop a national infrastructure redundancy plan, catering for business continuity and national security requirements.

• Airservices and BOM will continue to develop a framework for meteorological input into efficient and effective ATFM for major, secondary and regional airports.

• Implementation of the digital exchange of the ICAO meteorological information exchange model (IWXXM).

• Updated SBAS review undertaken by Department of Infrastructure and Regional Development in conjunction with other APG agencies and other portfolios.

• Airservices will optimise conflict management initiatives throughout all technology and procedural improvements, for example, with the implementation of the Flight Plan Safety Net Alert.

• Increasing RPAS operations will continue to be safely addressed, both in terms of implementation of appropriate regulations and operational management.

• CASA will continue to examine the regulation of RPAS with the priority on safety but seeking to facilitate the efficiencies and innovations this developing technology can bring.

Medium Term (2021-2025)

• Emerging technologies and their different uses will be supported by flexible design of performance based regulations to support delivery of safety and efficiency outcomes.
• Continued use of PBN which will require wider regulatory requirements, education and training programmes to ensure the safe use of satellite-based technology.

• Airservices and Defence Civil Military Air Traffic Management System (CMATS) will achieve final operational capability.

• With the implementation of OneSKY, develop a single flight information region for Australia.

• Full implementation of a collaborative, information-based service by Airservices.

• Airspace management concept work developed collaboratively by Industry, CASA, Airservices and Defence.

• Work to maintain carbon emissions at 2020 levels consistent with the International Air Transport Association’s Carbon Neutral Growth 2020 initiative.

• APV procedures available at all airports served by passenger transport operations where the necessary weather and transmission equipment is in place.

• Electronic surveillance of traffic by either aircraft or the air navigation service provider for all operations in controlled airspace.

• Planned new runway capacity at Brisbane, Melbourne and Perth airports, a potential new Western Sydney Airport and appropriate civil and military airspace and air traffic management arrangements put in place for each of these locations to enable safe and efficient operations at these locations.

**Long Term (2026-2030)**

• It is envisaged that satellite-based navigation will be the primary means of en route and terminal navigation for all IFR aircraft and will serve as the primary navigation source for approach to all airports.

• Trajectory-based control for all appropriate flights.

• Realisation of predictive risk management capability.

• APV guidance for all Australian IFR runways.

• Implementation of an ATM network operations plan by Airservices, in consultation with other Government agencies and industry.
Appendix 1

ICAO’s Ten Key Air Navigation Policy Principles

1. Commitment to the implementation of ICAO’s Strategic Objectives and Key Performance Areas.

ICAO Regional and State air navigation planning will cover each of ICAO’s Strategic Objectives and all 11 ICAO Key Performance Areas.

2. Aviation safety is the Highest Priority

In air navigation planning and in establishing and updating individual Air Navigation Plans, ICAO Regions and States will give due consideration to the safety priorities set out in the Global Aviation Safety Plan (GASP).

3. Tiered approach to air navigation planning

ICAO’s Global Aviation Safety Plan and Global Air Navigation Plan will guide and harmonize the development of ICAO regional and individual State air navigation plans.

ICAO regional air navigation plans, developed by the Planning and Implementation Regional Groups (PIRGs), will also guide and harmonize the development of individual State Air Navigation Plans. When developing their Regional Air Navigation Plans, PIRGs should address their intra- and inter-regional issues.

4. Global Air Traffic Management Operational Concept (GATMOC)

The ICAO endorsed GATMOC (Doc 9854) and companion manuals, which include, inter alia, the Manual on Air Traffic Management System Requirements (Doc 9882) and the Manual on Global Performance of the Air Navigation System (Doc 9883), will continue through their evolution, to provide a sound global conceptual basis for global air navigation and air traffic management systems.

5. Global air navigation priorities

The global air navigation priorities are described in the GANP. ICAO should develop provisions, supporting material and provide training in line with the global priorities for air navigation.

6. Regional and State air navigation priorities

ICAO Regions, subregions and individual States through the PIRGs should establish their own air navigation priorities to meet their individual needs and circumstances in line with the global air navigation priorities.

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7. **Aviation System Block Upgrades (ASBUs), Modules and Roadmaps**

The ASBUs, Modules and Roadmaps form a key Attachment to the GANP, noting that they will continue to evolve as more work is done on refining and updating their content and in subsequent development of related provisions, support material and training.

8. **Use of ASBU Blocks and Modules**

Although the GANP has a global perspective, it is not intended that all ASBU Modules be applied around the globe.

When the ASBU Blocks and Modules are adopted by Regions, subregions or States they should be followed in close accordance with the specific ASBU requirements to ensure global interoperability and harmonization of air traffic management.

It is expected that some ASBU Modules will be essential at the global level and therefore may eventually be the subject of ICAO mandated implementation dates.

9. **Cost Benefit and Financial issues**

The implementation of air navigation measures, including those identified in the ASBUs, can require significant investment of finite resources by ICAO Regions, subregions, States and the aviation community.

When considering the adoption of different Blocks and Modules, ICAO Regions, subregions and States should undertake cost-benefit analyses to determine the business case for implementation in their particular Region or State. The development of guidance material on cost benefit analyses will assist States in implementing the GANP.


ICAO should review the GANP every three years and, if necessary, all relevant air navigation planning documents through the established and transparent process.

The appendices to the GANP should be analysed annually by the Air Navigation Commission to ensure they remain accurate and up to date.

The progress and effectiveness of ICAO Regions and States against the priorities set out in their respective regional and State Air Navigation Plans should be annually reported, using a consistent reporting format, to ICAO. This will assist Regions and States in adjusting their priorities to reflect actual performance and address any emerging air navigation issues.
## Acronyms and Abbreviations

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<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>AAPS</td>
<td>Australian Airspace Policy Statement</td>
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<tr>
<td>ACE</td>
<td>Airport Capacity Enhancement Project</td>
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<td>AC-MAC</td>
<td>Australian Civil-Military Air Traffic Committee</td>
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<td>ADCD</td>
<td>Automated Delegated Conflict Detection</td>
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<td>ADIN</td>
<td>Aeronautical Data Interchange Network</td>
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<td>ADS-B</td>
<td>Automatic Dependent Surveillance Broadcast</td>
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<td>ADS-C</td>
<td>Automatic Dependant Surveillance-Contract</td>
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<td>AFP</td>
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<td>Aircraft Noise Ombudsman</td>
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<td>ANSP</td>
<td>Air Navigation Service Provider</td>
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<td>APANPIRG</td>
<td>Asia Pacific Air Navigation Planning and Implementation Regional Group</td>
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<td>Aviation Policy Group</td>
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<td>APV</td>
<td>Approach with Vertical Guidance</td>
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<td>ASAS</td>
<td>Airborne Separation Assistance Systems</td>
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<td>ASBU</td>
<td>Aviation System Block Upgrade</td>
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<td>ASPIRE</td>
<td>Asia and South Pacific Initiative to Reduce Emissions</td>
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<td>CCO</td>
<td>Continuous Climb Operations</td>
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<td>CDM</td>
<td>Collaborative Decision Making</td>
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<td>CDO</td>
<td>Continuous Descent Operations</td>
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<td>CFIT</td>
<td>Controlled Flight into Terrain</td>
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<td>CMATS</td>
<td>Civil-Military Air Traffic System</td>
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<td>Global Air Navigation Plan</td>
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<td>GASP</td>
<td>Global Aviation Safety Plan</td>
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<tr>
<td>GATMOC</td>
<td>Global Air Traffic Management Operational Concept</td>
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<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System</td>
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<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<tr>
<td>IFR</td>
<td>Instrument Flight Rules</td>
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<tr>
<td>INSPIRE</td>
<td>Indian Ocean Strategic Partnership to Reduce Emissions</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>IWXXM</td>
<td>ICAO Meteorological Information Exchange Model</td>
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<tr>
<td>LNAV</td>
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<tr>
<td>NOC</td>
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<tr>
<td>NPRM</td>
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<tr>
<td>OAR</td>
<td>CASA Office of Airspace Regulation</td>
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<td>OARO</td>
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<tr>
<td>PBN</td>
<td>Performance Based Navigation</td>
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<tr>
<td>PIRG</td>
<td>Planning and Implementation Regional Group</td>
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<td>RAAF</td>
<td>Royal Australian Air Force</td>
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