



*International Civil Aviation Organization*

**AUTOMATIC DEPENDENT SURVEILLANCE –  
BROADCAST SEMINAR AND TWELFTH MEETING  
OF AUTOMATIC DEPENDENT SURVEILLANCE –  
BROADCAST (ADS-B) STUDY AND  
IMPLEMENTATION TASK FORCE (ADS-B SITF/12)**



Kolkata, India, 15-18 April 2013

---

**Agenda Item 3: Outcome of AN Conf/12 on ADS-B related issues**

**FOLLOW-UP TO RECOMMENDATIONS OF THE  
TWELFTH AIR NAVIGATION CONFERENCE (AN-Conf/12) ON ADS-B**

(Presented by the Secretariat)

**SUMMARY**

This working paper reports on the relevant outcome of, and actions taken by, the Council of ICAO on the Twelfth Air Navigation Conference held in Montreal from 19 to 30 November 2012. The Conference agreed to a number of recommendations which call for further follow-up actions by ICAO, States, International organizations and Planning and Implementation Groups (PIRGs) as well as Stakeholders.

The meeting is invited to review and discuss the related recommendations on ADS-B.

**1. INTRODUCTION**

1.1 The Twelfth Air Navigation Conference (AN-Conf/12) held in Montréal from 19 to 30 November 2012 dealt with six agenda items. The meeting was attended by a total of 1 032 participants from 120 Contracting States and 30 observer delegations.

**2. RECOMMENDATIONS OF AN-CONF/12**

2.1 The Conference made fifty-six recommendations, often comprising a number of components, covering a variety of air navigation subjects.

2.2 On 28 January 2013, the Air Navigation Commission reviewed and acted under delegated authority on forty-eight of the recommendations and proposed action by the Council on eight recommendations.

2.3 Subsequently, the Council on 1 March 2013 considered and approved the report of the AN- Conf/12, as presented by the Air Navigation Commission. In taking action recommended by the Commission, the Council confirmed ICAO's role in the follow up, and called upon States, International Organizations, PIRGs and stakeholders to initiate action on specific recommendations as necessary. Following acceptance by the Council of the recommendations of the Conference, the Commission and the Air Navigation Bureau will now assign, as necessary, the work to the expert groups.

### **3. PROPOSED FOLLOW-UP TO THE RECOMMENDATIONS OF THE AN-CONF/12**

3.1 The scope of the follow-up action by planning and implementation regional groups (PIRGs) on the recommendations, in some cases, extends to States, International Organizations and other stakeholders. This distinction becomes clear when the required follow-up to the recommendations of AN-Conf/12 are examined in the **Attachment 1** to this Paper. It is considered that one of the first coordination efforts required by APANPIRG will be to assign the task of developing an implementation plan for the relevant recommendations and that a report be submitted to next meeting of APANPIRG as appropriate.

3.2 General introduction to the ASBU concept, related modules including some recommendations of AN Conf/12 is provided in the **Attachment 2** to this paper.

3.3 The ADS-B SITF is expected to study the relevant recommendations of the AN-Conf/12, initiate the follow-up action and submit the report to CNS Sub-group and APANPIRG.

### **4. ACTION BY THE MEETING**

4.1 In light of the above, the meeting, on the basis of its analysis of the Attachments, is invited to:

- a) note the outcome of the AN-Conf/12;
- b) note the actions taken by the Council as well as by the Air Navigation Commission under delegated authority on the recommendations of the AN-Conf/12; and
- c) discuss follow-up actions on the relevant Recommendations on ADS-B.

-----

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>Recommendation 1/1 – The draft Fourth Edition of the Global Air Navigation Plan (Doc 9750, GANP)</b></p> <p>That States:</p> <p>a) agree in-principle, with the replacement of the introduction by the high level policy principles as shown in the appendix and inclusion of other proposed improvements made at this Conference, into the updated draft Fourth Edition of the GANP;</p> <p>b) should have the opportunity to provide any final comments on the updated draft GANP to ICAO before it is considered by the ICAO Assembly in 2013;</p> <p>That ICAO:</p> <p>c) include the key air navigation policy principles presented in the appendix under “Global Air Navigation Plan” into the Fourth Edition of the <i>Global Air Navigation Plan</i> (Doc 9750, GANP);</p> <p>d) develop financial policies which support efficient acquisition and implementation of global air navigation services infrastructure and aircraft equipage;</p>	<p>a): Noted.</p> <p>b): Approved validation process of the new draft version of the GANP as proposed by the ANC.</p> <p>c): Approved as part of the GANP approval.</p> <p>d): Requested Secretary General to take appropriate action.</p>	<p>a) and c): Develop and review the new draft version of the GANP taking into account AN-Conf/12 recommendations.</p> <p>b): Noted.</p> <p>-</p> <p>d): Contribute to the definition of financial policies.</p>	<p>a) Note</p> <p>b) Note</p> <p>c) to g): Note</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>e) taking a total systems and performance-based approach, create a Standards and Recommended Practices development plan for the aviation system block upgrades including the establishment of agreed global priorities between the different blocks and modules;</p> <p>f) define a stable and efficient process for endorsement by the 38th Session of the ICAO Assembly, for updating the GANP that ensures stability in module timelines for any future updates; and</p> <p>g) ensure that the nature and status of the planning information in the various documents pertaining to the GANP are consistent and complete and allow due account to be taken of the inputs from ATM research, development and deployment programmes.</p>	e) to g): Noted.	e) to g): Approved and include in the Air Navigation work programme.	
<p><b>Recommendation 1/2 – Implementation</b></p> <p>That ICAO:</p> <p>a) through its regional offices, provide guidance and practical assistance to States and regions and sub-regions when they decide to implement individual blocks or modules of the aviation system block upgrades;</p>	a) to c): Noted.	a) to c): Consider including into the Air Navigation work programme and requested the Secretary General to take appropriate action.	a) to c): Note.

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>b) establish a group and improved mechanism for interregional cooperation to ensure harmonization of air traffic management; and</p> <p>c) assist States and regions in training and capacity-building towards implementation of the relevant modules of the aviation system block upgrades.</p>			
<p><b>Recommendation 1/3 – Guidance on business cases</b></p> <p>That ICAO complete the development of guidance material on business case analysis, adopting such appropriate guidance material that may be already available or under development.</p>	Approved and requested the Secretary General to take appropriate action.	Contribute to the definition of business cases and related guidance.	Note
<p><b>Recommendation 1/4 – Architecture</b></p> <p>That ICAO:</p> <p>a) develop, for inclusion in the first update of the GANP after the 38th Session of the ICAO Assembly, a global ATM logical architecture representation in support of the GANP and planning work by States and regions; and</p> <p>b) develop a breakdown of the logical architecture of the ground system to the level needed to best address the global interoperability issues.</p>	a) and b): Noted.	a) and b): Approved and include in the Air Navigation work programme.	a) and b): Note.

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>Recommendation 1/5 – Time reference accuracy</b></p> <p>That ICAO define the accuracy requirements for the future use of a time reference and to prepare the necessary amendments to Standards and Recommended Practices.</p>	Noted.	Approved and include in the Air Navigation work programme	Note
<p><b>Recommendation 1/7 – Automatic dependent surveillance — broadcast</b></p> <p>That States:</p> <p>a) recognize the effective use of automatic dependent surveillance — broadcast (ADS-B) and associated communication technologies in bridging surveillance gaps and its role in supporting future trajectory-based air traffic management operating concepts, noting that the full potential of ADS-B has yet to be fully realized; and</p> <p>b) recognize that cooperation between States is key towards improving flight efficiency and enhancing safety involving the use of automatic dependent surveillance — broadcast technology;</p> <p>That ICAO:</p> <p>c) urge States to share automatic dependent surveillance — broadcast (ADS-B) data to enhance safety,</p>	a) to c): Noted.	a) to c): Noted and requested the Secretary General to bring to the attention of States.	a) to b): Note.
			c) States to share ADS-B data to enhance safety, increase efficiency and achieve seamless surveillance and

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
increase efficiency and achieve seamless surveillance and to work closely together to harmonize their ADS-B plans to optimize benefits.			to work closely together
<p><b>Recommendation 1/8 – Rationalization of radio systems</b></p> <p>That ICAO and other stakeholders to explore strategies for the decommissioning of some navigation aids and ground stations, and the rationalization of the on-board communications, navigation and surveillance systems while maintaining safety and coordinating the need for sufficient system redundancy.</p>	Noted.	Approved and include in the Air Navigation work programme.	States and IOs explore strategies for the decommissioning of some navigation aids and ground stations, and the rationalization of the on-board CNS systems, while maintaining safety.
<p><b>Recommendation 1/9 – Space-based automatic dependent surveillance — broadcast</b></p> <p>That ICAO:</p> <p>a) support the inclusion in the Global Air Navigation Plan, development and adoption of space-based automatic dependent surveillance — broadcast surveillance as a surveillance enabler;</p> <p>b) develop Standards and Recommended Practices and guidance material to support space-based automatic dependent surveillance — broadcast as appropriate; and</p>	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note.

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
c) facilitate needed interactions among stakeholders, if necessary, to support this technology.			
<p><b>Recommendation 1/10 – Automatic dependent surveillance — self-organizing wireless data networks</b></p> <p>That ICAO consider the use of self-organizing wireless data networks based on VDL Mode-4 technology taking into account:</p> <p>a) possible technical advantages;</p> <p>b) whether it satisfies any unmet operational need; and</p> <p>c) its impact of forward and retro-fit on the global air transport fleet.</p>	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note.
<p><b>Recommendation 1/11 – Automation roadmap</b></p> <p>That ICAO:</p> <p>a) develop a global roadmap for the evolution of ground air traffic management automation systems in line with aviation system block upgrade implementation; and</p> <p>b) develop performance-based system requirements for air traffic management automation systems so that:</p>	a) and b): Noted.	a) and b): Approved and include in the Air Navigation work programme.	a) to b): Note.



RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>1) where necessary these systems are interoperable across States and regions; and</p> <p>2) the function and operation of these systems will result in consistent and predictable air traffic management system performance across States and regions.</p>			
<p><b>Recommendation 1/12 – Development of the aeronautical frequency spectrum resource</b></p> <p>That States and stakeholders:</p> <p>a) recognize that a prerequisite for the deployment of systems and technologies is the availability of adequate and appropriate radio spectrum to support aeronautical safety services;</p> <p>b) work together to deliver efficient aeronautical frequency management and “best practices” to demonstrate the effectiveness and relevance of the industry in spectrum management;</p> <p>c) support ICAO activities relating to the aviation spectrum strategy and policy through relevant expert group meetings and regional planning groups; and</p>	<p>a) to d): Noted.</p>	<p>a) to d): Noted and requested the Secretary General to bring to the attention of States and Stakeholders.</p>	<p>a) to d): PIRGs, States and IO to take appropriate action</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>d) support Assembly Resolution A36-25 and the requirement for sufficient State representation of aviation interests at World Radiocommunication Conferences (WRCs) and relevant International Telecommunication Union WRC preparatory meetings;</p> <p>That ICAO:</p> <p>e) develop and implement a comprehensive aviation frequency spectrum strategy to be referenced to the Global Air Navigation Plan (GANP), which includes the following objectives:</p> <ol style="list-style-type: none"> <li>1) timely availability and appropriate protection of adequate spectrum to create a sustainable environment for growth and technology development to support safety and operational effectiveness for current and future operational systems and allow for the transition between present and next generation technologies;</li> <li>2) demonstrate efficient use of the spectrum allocated through efficient frequency management and use of best practises; and</li> <li>3) clearly state in the strategy the</li> </ol>	<p>e) to i): Noted.</p>	<p>e) to i): Approve and include in the Air Navigation work programme.</p>	<p>e) to i): Note.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>need for aeronautical systems to operate in spectrum allocated to an appropriate aeronautical safety service;</p> <p>f) establish timelines and methodologies to complement the GANP planning objectives with a frequency spectrum strategy;</p> <p>g) continue to allocate adequate resources with a far-sighted approach to its work programmes regarding aviation spectrum challenges;</p> <p>h) consider a methodology to enable ATM stakeholders to effectively share ICAO material on aviation frequency spectrum as a common guidance for securing the aviation position at World Radiocommunication Conferences; and</p> <p>i) consider structuring the <i>Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies</i> (Doc 9718) by using a web-based platform as appropriate, to further support States in their implementation of the spectrum strategy.</p>			
<b>Recommendation 1/15 – Performance monitoring and</b>			

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>measurement of air navigation systems</b></p> <p>That ICAO:</p> <p>a) establish a set of common air navigation service performance metrics supported by guidance material, building on existing ICAO documentation (e.g. Manual on Global Performance of the Air Navigation System (Doc 9883) and the Manual on Air Navigation Services Economics (Doc 9161));</p> <p>b) promote the development and use of “leading safety indicators” to complement existing “lagging safety indicators” as an integral and key component to drive improvement in performance and in the achieved management of risk; and</p> <p>c) encourage the early and close involvement of the regulator and oversight bodies in the development, proving of concepts and implementation of the aviation system block upgrades and regional programmes.</p>	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) and c): Note.
<p><b>Recommendation 1/16 – Access and equity considerations</b></p> <p>That States:</p> <p>a) ensure, as part of the aviation</p>	a) and b): Noted.	a) and b): Noted and requested	a) and b): States to ensure the principles

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>system block upgrade implementation, the principles of access and equity are included in all airspace modernization and redesign efforts; and</p> <p>b) detail how they will monitor the service providers to ensure that they are providing fair, equitable, and efficient access to all aviation services including general aviation.</p>		<p>the Secretary General to take appropriate action and bring to the attention of States and Stakeholders.</p>	<p>of access and equity are included in all airspace modernization and redesign efforts and detail how they will monitor the service providers to ensure that they are providing fair, equitable, and efficient access to all aviation services including general aviation.</p>
<p><b>Recommendation 2/2 – Development of ICAO provisions for remotely operated air traffic services</b></p> <p>That ICAO provide:</p> <p>a) updates on additional guidelines for surveillance and air and ground communications systems;</p> <p>b) requirements for the use of sensors and display technologies to replace visual observation to air traffic in the provision of air traffic services; and</p> <p>c) requirements for air traffic services (ATS) personnel and flight crew training, ATS personnel licensing and related procedures for remotely operated air traffic services.</p>	<p>a) to c): Noted.</p>	<p>a) to c): Approved and include in the Air Navigation work programme.</p>	<p>a) to c): Note</p>
<p><b>Recommendation 2/3 – Security of air navigation systems</b></p>			

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>That ICAO:</p> <p>a) seek the support of States and stakeholders to complete its work in developing a robust, secure aeronautical telecommunication network; and</p> <p>b) establish, as a matter of urgency, an appropriate mechanism including States and industry to evaluate the extent of the cyber security issues and develop a global air traffic management architecture taking care of cyber security issues.</p>	<p>a) and b): Approved and include in the Security work programme.</p>	<p>a) and b): Approved and include in the Air Navigation work programme.</p>	<p>a) to b): Note</p>
<p><b>Recommendation 4/1 –Efficient management of airspace and improved flow performance through collaborative decision-making</b></p> <p>That the Conference:</p> <p>a) endorse the aviation system block upgrade modules relating to network operations included in Block 1 and recommend that ICAO use them as the basis of its work programme on the subject;</p> <p>b) agree in principle with the aviation system block upgrade modules relating to network operations included in Blocks 2 and 3 as the strategic direction for this subject;</p>			

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>That ICAO:</p> <p>c) include, following further development and editorial review, the aviation system block upgrade modules relating to network operations in the draft Fourth Edition of the <i>Global Air Navigation Plan</i> (Doc 9750, GANP);</p> <p>d) include in its work programme the future standardization of all elements to support the collaborative decision-making process underlying the air traffic control (ATC)-air traffic flow management (ATFM) integration as well as of the technical exchanges between ATFM and ATC;</p> <p>e) develop and incorporate into the <i>ICAO Manual on Collaborative Air Traffic Flow Management</i> (Doc 9971) implementation guidance on Airport-CDM and provisions on air traffic flow management data exchange format including trajectory information;</p> <p>f) develop and execute global communications, roll-out and training plan for the <i>ICAO Manual on Collaborative Air Traffic Flow Management</i> (Doc 9971); and</p>	<p>c) to g): Noted.</p>	<p>c) to g): Approved and include in the Air Navigation work programme.</p>	<p>c) to g): Note.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>g) develop further provisions and guidance on flexible use of airspace principles for future use and in preparation for future 4D trajectory-based airspace management.</p> <p>That States:</p> <p>h) accelerate the implementation of collaborative decision-making processes in the provision of services at the regional level, being guided by the principles set forth in the <i>Manual on Collaborative Air Traffic Flow Management</i> (Doc 9971) and the <i>Manual on Flight and Flow – Information for a Collaborative Environment</i> (Doc 9965);</p> <p>i) according to their operational needs, implement the aviation system block upgrade modules relating to network operations included in Block 0.</p>	<p>h) and i): Noted.</p>	<p>h) and i): Noted and requested the Secretary General to bring to the attention of States.</p>	<p>h) States and PIRGs to accelerate the implementation of CDM</p> <p>i) States, according to their operational needs, implement the ASBU modules relating to network operations included in Block 0.</p>
<p><b>Recommendation 4/2 – ICAO aviation system block upgrades relating to ground surveillance using automatic dependent surveillance – broadcast/multilateration, air traffic situational awareness, interval management and airborne separation.</b></p> <p>That the Conference:</p>			



RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>a) endorse the aviation system block upgrade modules relating to interval management included in Block 1 and recommend that ICAO use them as the basis of its work programme on the subject;</p> <p>b) agree in principle to the aviation system block upgrade modules relating to airborne separation included in Block 2 as the strategic direction for this subject;</p> <p>That ICAO:</p> <p>c) include, following further development and editorial review, the aviation system block upgrade modules relating to airborne separation in the Appendices to the draft Fourth Edition of the <i>Global Air Navigation Plan</i> (Doc 9750, GANP);</p> <p>d) agree in principle to review the concepts and terminology of the “airborne separation” concepts involving controllers assigning tasks to flight crews, with controllers able to apply different, risk-based separation minima for properly equipped ADS-B IN aircraft;</p> <p>e) in the development of provisions,</p>	<p>c) to g): Noted.</p>	<p>c) to g): Approved and include in the Air Navigation work programme.</p>	<p>c) to g): Note.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>acknowledge the relationship between airborne separation and airborne collision avoidance system;</p> <p>f) modify aviation system block upgrade (ASBU) Module B2-85 to reflect d) and e), modify ASBU Module B2-101 to reflect f); and</p> <p>g) agree in principle to review the concepts and terminology supporting B2-85 “airborne separation” and amend the module accordingly.</p> <p>That States:</p> <p>h) according to their operational needs, to implement the aviation system block upgrade modules relating to ground surveillance, improved air traffic situational awareness and improved access to optimum flight levels included in Block 0.</p>	<p>h): Noted</p>	<p>h): Noted and requested the Secretary General to bring to the attention of States.</p>	<p>h): States, according to their operational needs, to implement the ASBU modules relating to ground surveillance, improved ATSA and improved access to optimum flight levels included in Block 0.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>Recommendation 4/3 – ICAO aviation system block upgrades relating to airborne collision avoidance systems and ground-based safety nets</b></p> <p>That the Conference:</p> <p>a) endorse the aviation system block upgrade module relating to ground-based safety nets included in Block 1 and recommend that ICAO use it as the basis of its work programme on the subject;</p> <p>b) agree in principle to the aviation system block upgrade module relating to airborne collision avoidance systems included in Block 2, as the basis of the strategic direction for this subject;</p> <p>That ICAO:</p> <p>c) include, following further development and editorial review, the aviation system block upgrade modules relating to airborne collision avoidance systems and ground-based safety nets in the Appendices to the draft Fourth Edition of the <i>Global Air Navigation Plan</i> (Doc 9750, GANP);</p>	<p>c) to h): Noted.</p>	<p>c) to h): Approved and include in the Air Navigation work programme.</p>	<p>c) to h): Note.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>d) adopt a coordinated approach towards reviewing and developing as necessary Standards and Recommended Practices, Procedures for Air Navigation Services and guidance material for ground-based and airborne safety nets, taking into account careful evaluation and validations of the effects on safety and performance of downlinking airborne collision avoidance system (ACAS) Resolution Advisories (RAs) to controllers;</p> <p>e) when considering Standards and Recommended Practices for airborne collision avoidance system (ACAS) downlink, to emphasize the significant amount of training material already existing and the importance of increased pilot and air traffic controller training on the responsibilities and requirements to reacting correctly to ACAS RA events and then communicating;</p> <p>f) develop an ICAO Manual for Ground-based Safety Nets, which includes provision for tools for validation and certification of these;</p> <p>g) incorporate the new generation of airborne collision avoidance system (ACAS X) into its work programme;</p>			

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>h) encourage the Federal Aviation Administration to work with other States with the capacity and capability to do so, in the development of new generation of airborne collision avoidance system (ACAS X);</p> <p>That States:</p> <p>i) according to their operational needs, to implement the aviation system block upgrade modules relating to airborne collision avoidance systems and ground based safety nets included in Block 0.</p>	<p>i): Noted.</p>	<p>i): Noted and requested the Secretary General to bring to the attention of States.</p>	<p>i): States to implement the ASBU modules relating to ACAS and ground based safety nets included in Block 0.</p>
<p><b>Recommendation 4/4 – Positioning and tracking over oceanic and remote areas, and flight data triggered transmission</b></p> <p>That ICAO:</p> <p>a) continue the evaluation of the necessary changes in the field of transmission of flight data, bearing in mind the cost associated with any of these changes as well as the need to improve search and rescue</p>	<p>a) and b): Noted.</p>	<p>a) and b): Approved and include in the Air Navigation work programme.</p>	<p>a) and b): Note.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
operations; and  b) develop suitable proposals for the amendment of ICAO documents, as necessary.			
<p><b>Recommendation 4/5 – Civil/military coordination/cooperation and sharing of airspace</b></p> <p>That States:</p> <p>a) planning and implementation regional groups, and ICAO to analyse the benefits that could be achieved through improved civil/military cooperation and sharing of the airspace serving international traffic flows and express the results of this analysis in terms of:</p> <p>1) capacity increases and reduction in routine delays as measured by traffic volumes on major traffic flows;</p> <p>2) document fuel savings and emission reductions through the use of the fuel savings estimation tools; and</p> <p>3) other additional benefits;</p> <p>b) based on the analysis made by</p>	a) to c): Noted.	a) to c): Noted and request the Secretary General to bring to the attention of States.	<p>a): PIRGs to analyse the benefits that could be achieved through improved civil/military cooperation and sharing of the airspace serving international traffic flows and express the results of this analysis in terms of capacity increase, fuel savings and emissions reductions and other additional benefits.</p> <p>b): States to develop plans to implement</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>States, planning and implementation regional groups, and ICAO, urge States to develop plans to implement improvements for the cooperative use of airspace related to the top areas of opportunity and establish concrete targets using tools already available for this purpose;</p> <p>c) in relation to international traffic flows, for each ICAO region urge the planning and implementation regional groups and their associated States to identify the top areas of opportunity that could benefit the most from improvements in civil/military cooperation and sharing of the airspace and develop concrete targets for improvement;</p> <p>That ICAO:</p> <p>d) develop a set of criteria or metrics to enable objective measurement of progress in civil/military cooperation; and</p> <p>e) continue to develop guidance material for States on the flexible use of their airspace, airspace design, interoperability and integration of humanitarian assistance flights in crisis response scenarios in their airspaces to facilitate integrated use of the airspace.</p>	<p>d) and e): Noted.</p>	<p>d) and e): Approved and include in the Air Navigation work programme.</p>	<p>improvements for the cooperative use of airspace on the basis of analysis made by States /PIRGs and ICAO.</p> <p>c): PIRGs and States to identify the top areas of opportunity that could benefit the most from improvements in civil/military cooperation and sharing of the airspace and develop concrete targets for improvement</p> <p>d) and e): Note.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>Recommendation 4/6 – ICAO aviation system block upgrades relating to integration of remotely piloted aircraft into non-segregated airspace</b></p> <p>That the Conference:</p> <p>a) endorse the aviation system block upgrade module relating to remotely piloted aircraft included in Block 1 and recommend that ICAO use it as the basis of its work programme on the subject;</p> <p>b) agree in principle to the aviation system block upgrade modules relating to remotely piloted aircraft included in Blocks 2 and 3 as the strategic direction for this subject;</p> <p>That ICAO:</p> <p>c) as a matter of urgency, develop the necessary regulatory framework in its entirety to support the integration of remotely piloted aircraft into non-segregated airspace and at aerodromes including and clearly showing the scope of such regulation;</p> <p>d) investigate the need for and scope of oversight of datalinks related to command, control and air traffic</p>	<p>c) to e): Noted.</p>	<p>c) to e): Approved and include in the Air Navigation work programme.</p>	<p>c) to e): Note.</p>



RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>control communications for remotely piloted aircraft systems;</p> <p>e) include, following further development and editorial review, the aviation system block upgrade modules relating to the integration of remotely piloted aircraft into non segregated airspace in the Appendices to the draft Fourth Edition of the <i>Global Air Navigation Plan</i> (Doc 9750, GANP);</p> <p>That States:</p> <p>f) be cognizant of the recent amendments to Annexes 2 — <i>Rules of the Air</i> and 7 — <i>Aircraft Nationality and Registration Marks</i> related to remotely piloted aircraft systems and to support the continuation of this work at ICAO;</p> <p>g) work closely with ICAO and each other to ensure harmonization of provisions if they have an urgent need to accommodate remotely piloted aircraft system operations.</p>	<p>f) and g): Noted.</p>	<p>f) and g): Noted and requested the Secretary General to bring to the attention of States.</p>	<p>f):Note</p> <p>k) States to work closely with ICAO and each other to ensure harmonization of provisions if they have an urgent need to accommodate RPAS operations.</p>
<p><b>Recommendation 4/7 – ICAO aviation system block upgrades relating to meteorological information</b></p>			

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>That the Conference:</p> <p>a) endorse the aviation system block upgrade module relating to meteorological information included in Block 1, including the addition of the provision of information on space weather, and recommend that ICAO uses it as the basis of its work programme on the subject;</p> <p>b) agree in principle the aviation system block upgrade module relating to meteorological information included in Block 3 as the strategic direction for this subject;</p> <p>That ICAO:</p> <p>c) include, following further development and editorial review, the aviation system block upgrade modules relating to meteorological information in the draft Fourth edition of the <i>Global Air Navigation Plan</i> (Doc 9750, GANP);</p> <p>d) undertake the development of the air traffic management meteorological information integration plan and an associated roadmap by a cross-disciplinary group of experts;</p> <p>e) work on defining the meteorological</p>	<p>c) to f): Noted.</p>	<p>c) to f): Approved and include in the Air Navigation work programme.</p>	<p>c) to f): Note.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>information exchange model as an enabler for system-wide information management;</p> <p>f) invite the next Meteorology Divisional Meeting, held in coordination with the World Meteorological Organization, to develop initial provisions in Annex 3 — <i>Meteorological Service for International Air Navigation</i> relating to the aviation system block upgrade modules concerning meteorological information and f) above, and to develop a long-term strategy to support their further development and full implementation;</p> <p>That States:</p> <p>g) according to their operational needs, to implement the aviation system block upgrade module relating to meteorological information included in Block 0, including the addition of the provision of OPMET information;</p> <p>h) work together in the implementation of the aviation system block upgrades relating to meteorological information and to increase investment in education and</p>	<p>g) and h): Noted.</p>	<p>g) and h): Noted and requested the Secretary General to bring to the attention of States.</p>	<p>g): States , according to their operational needs, to implement the ASBU module relating to meteorological information included in Block 0, including the addition of the provision of OPMET information;</p> <p>h) work together in the implementation of the ASBU relating to meteorological information and to increase investment in education and training.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
training.			
<p><b>Recommendation 4/8 – Crisis coordination arrangements and contingency plans</b></p> <p>That ICAO:</p> <p>a) consider how crisis coordination arrangements for potentially disruptive events, similar to that used for volcanic eruptions, could be established on a regional basis; and</p> <p>b) and regional offices continue to support the development, promulgation, maintenance of contingency plans, including the holding of practical exercises, in preparedness for potentially disruptive events, including those events that may adversely impact aviation safety.</p>	a) and b): Noted.	a) and b): Approved and include in the Air Navigation work programme.	a) and b): Note.
<p><b>Recommendation 5/3 – Increased flexibility and efficiency in descent and departure profiles</b></p> <p>That the Conference:</p> <p>a) endorse the aviation system block upgrade module relating to continuous descent operations included in Block 1;</p>			

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>b) agree in principle to the aviation system block upgrade module relating to continuous descent operations included in Block 2;</p> <p>That ICAO:</p> <p>c) include, following further development and editorial review, the aviation system block upgrade modules relating to continuous climb operations and continuous descent operations in the draft Fourth Edition of the <i>Global Air Navigation Plan</i> (Doc 9750, GANP);</p> <p>d) incorporate the point merge technique as an interim continuous descent operations measure in Block B0-05;</p> <p>That States:</p> <p>e) as supported by their operational requirements and a positive business case, implement according to their operational needs as a matter of urgency, the aviation system block upgrade modules relating to continuous climb operations and continuous descent operations included in Blocks 0 and 1; and</p>	<p>c) and d): Noted.</p> <p>e) and f): Noted.</p>	<p>c) and d): Approved and include in the Air Navigation work programme.</p> <p>e) and f): Noted and requested the Secretary General to bring to the attention of States</p>	<p>c) and d): Note</p> <p>e):States, as supported by their operational requirements and a positive business case, implement according to their operational needs as a matter of urgency, the ASBU modules relating to CCO and CDO included in Blocks 0 and 1.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
f) as supported by their operational requirements and a positive business case, use point merge technique as an application towards achieving full continuous descent operations, when developing performance-based navigation standard instrument arrivals (STARs).			f) States, as supported by their operational requirements and a positive business case, use point merge technique as an application towards achieving full continuous descent operations, when developing PBN STARs,
<p><b>Recommendation 6/1 – Regional performance framework – planning methodologies and tools</b></p> <p>That States and PIRGs:</p> <p>a) finalize the alignment of regional air navigation plans with the Fourth Edition of the <i>Global Air Navigation Plan</i> (Doc 9750, GANP) by May 2014;</p> <p>b) focus on implementing aviation system block upgrade Block 0 Modules according to their operational needs, recognizing that these modules are ready for deployment;</p> <p>c) use the electronic regional air navigation plans as the primary tool to assist in the implementation of the agreed regional planning framework for air navigation services and facilities;</p> <p>d) involve regulatory and industry</p>	a) to e): Approved.	a) to e): Noted and requested the Secretary General to bring to the attention of States and Stakeholders.	<p>a): States and PIRGs finalize the alignment of regional air navigation plans with the Fourth Edition of the <i>Global Air Navigation Plan</i> (Doc 9750, GANP) by May 2014;</p> <p>b):States and PIRGs focus on implementing ASBU Block 0 Modules according to their operational needs.</p> <p>c): States, PIRGs, IOs, use the electronic regional air navigation plans as the primary tool to assist in the implementation of the agreed regional planning framework for air navigation services and facilities;</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>personnel during all stages of planning and implementation of aviation system block upgrade modules;</p> <p>e) develop action plans to address the identified impediments to air traffic management modernization as part of aviation system block upgrade planning and implementation activities;</p> <p>That ICAO:</p> <p>f) considers how the continuous monitoring approach to safety oversight maps to the evaluation of Member States' safety oversight capabilities concerning aviation system block upgrades</p> <p>g) review the current amendment process to the Regional Air Navigation Plans (ANPs) and recommend improvements to increase efficiencies related to the approval and maintenance of the data in the regional ANPs;</p> <p>h) develop guidance material, on the basis of best practices employed worldwide, for the regional/local deployment of new ATM</p>	<p>f) to l): Noted.</p>	<p>f) to l): Approved with the exception of j), include in the Air Navigation work programme and request the Secretary General take appropriate action.</p>	<p>d) States and PIRGs involve regulatory and industry personnel during all stages of planning and implementation of ASBU modules;</p> <p>e) States and PIRGs develop action plans to address the identified impediments to air traffic management modernization as part of aviation system block upgrade planning and implementation activities;</p> <p>f) to l): Note</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>technologies, required procedures, operational approvals and continue to support States in the implementation of the aviation system block upgrades;</p> <p>i) identify the issues, funding, training and resource requirements necessary to support a safety framework that would lay the foundation for successful implementation the aviation system block upgrades;</p> <p>j) develop, together with industry and stakeholders, an engagement strategy to address the economic and institutional impediments to implementation of the aviation system block upgrades;</p> <p>k) develop a mechanism for sharing of best practices for the aviation system block upgrade implementation; and</p> <p>l) define a methodology to ensure interregional and global harmonization of air navigation services through ANRF reporting in an effective and timely manner, and consider the employment of interregional and multi-regional fora.</p>	<p>j): Approved and requested the Secretary General to address the economic and institutional impediments to GANP implementation.</p>	<p>j): Noted and consider contribution to be included in the Air Navigation work programme.</p>	<p>j): Note</p>



RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>Recommendation 6/2 – Guidelines on service priority</b></p> <p>That:</p> <p>a) ICAO develop an appropriate set of operational and economic incentive principles to allow early benefits of new technologies and procedures, as described in the aviation system block upgrade modules, to support operational improvements, while maximizing safety, capacity and overall system efficiency; and</p> <p>b) States and international organizations contribute to this work.</p>	<p>a) and b): Noted.</p>	<p>a) and b): Approved, consider contribution to be included in the Air Navigation work programme and request the Secretary General to take appropriate action.</p>	<p>a) and b): Note</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>Recommendation 6/3 – Assessment of economic, financial and social implications of air traffic management modernization and aviation system block upgrades deployment</b></p> <p>That ICAO:</p> <p>a) undertake work toward developing a network-wide operational improvement level assessment for global use, which should include the development of standard values and processes for economic evaluations;</p> <p>b) take the relevant conclusions from the AN-Conf/12, regarding economic, financial and social aspects of the aviation system block upgrades, to the Sixth Air Transport Conference with the aim of developing solutions which would support a safe and sustainable air navigation system;</p> <p>That States:</p> <p>c) conduct their economic, financial and social analyses in a closely coordinated manner with relevant ATM stakeholders in view of their diverse position of involvement in the implementation of aeronautical systems.</p>	<p>a) and b): Noted.</p> <p>c): Note and request the Secretary General to bring to the attention of States.</p>	<p>a) and b): Approved, consider contribution to be included in the Air Navigation work programme and request the Secretary General to take appropriate action.</p> <p>c): Noted and the Secretary General to bring to the attention of States.</p>	<p>a) and b): Note</p> <p>c): States conduct their economic, financial and social analyses in a closely coordinated manner with relevant ATM stakeholders in view of their diverse position of involvement in the implementation of aeronautical systems</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>Recommendation 6/4 – Human performance</b></p> <p>That ICAO:</p> <p>a) integrate human performance as an essential element for the implementation of ASBU modules for considerations in the planning and design phase of new systems and technologies, as well as at the implementation phase, as part of a safety management approach. This includes a strategy for change management and the clarification of the roles, responsibilities and accountabilities of the aviation professionals involved;</p> <p>b) develop guidance principles, guidance material and provisions, including SARPs as necessary, on ATM personnel training and licensing including instructors and assessors, and on the use of synthetic training devices, with a view to promoting harmonization, and consider leading this effort with the support of States and industry;</p> <p>c) develop guidance material on using field experience and scientific knowledge in human performance approaches through the identification of human-centred operational and regulatory processes</p>	<p>a) to f): Noted.</p>	<p>a) to f): Approved and include in the Air Navigation work programme.</p>	<p>a) to f): Note.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>to address both current safety priorities and the challenges of future systems and technologies;</p> <p>d) assess the impact of new technologies on competencies of existing aviation personnel, and prioritize and develop competency-based provisions for training and licensing to attain global harmonization;</p> <p>e) establish provisions for fatigue risk management for safety within air traffic services operations;</p> <p>f) develop guidance material on different categories of synthetic training devices and their respective usage;</p> <p>That States:</p> <p>g) provide human performance data, information and examples of operational and regulatory developments to ICAO for the benefit of the global aviation community;</p> <p>h) support all ICAO activities in the human performance field through the contribution of human performance expertise and resources;</p> <p>i) adopt airspace procedures, aircraft</p>	<p>g) to j): Note.</p>	<p>g) to j): Note and request the Secretary General to bring to the attention of States.</p>	<p>g): States provide human performance data, information and examples of operational and regulatory developments to ICAO.</p> <p>h) States support all ICAO activities in the human performance field through the contribution of human performance expertise and resources.</p> <p>i) States adopt airspace procedures,</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>systems, and space-based/ground-based systems that take into account human capabilities and limitations and that identify when human intervention is required to maintain optimum safety and efficiency; and</p> <p>j) investigate methods to encourage adequate numbers of high quality aviation professionals of the future and ensure training programmes are in line with the skills and knowledge necessary to undertake their roles within a changing industry.</p>			<p>aircraft systems, and space-based/ground-based systems that take into account human capabilities and limitations and that identify when human intervention is required</p> <p>j) States investigate methods to encourage adequate numbers of high quality aviation professionals of the future and ensure training programmes are in line with the skills and knowledge necessary.</p>
<p><b>Recommendation 6/5 – ICAO work programme to support global navigation satellite system evolution</b></p> <p>That ICAO undertake a work programme to address:</p> <p>a) interoperability of existing and future global navigation satellite system constellations and augmentation systems, with particular regard to the technical and operational issues associated with the use of multiple constellations;</p>	<p>a) to c): Noted.</p>	<p>a) to c): Approved and include in the Air Navigation work programme.</p>	<p>a) to c): Note</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>b) identification of operational benefits to enable air navigation service providers and aircraft operators to quantify these benefits for their specific operational environment; and</p> <p>c) continued development of Standards and Recommended Practices and guidance material for existing and future global navigation satellite system elements and encouraging the development of industry standards for avionics.</p>			
<p><b>Recommendation 6/6 – Use of multiple constellations</b></p> <p>That States, when defining their air navigation strategic plans and introducing new operations:</p> <p>a) take advantage of the improved robustness and availability made possible by the existence of multiple global navigation satellite system constellations and associated augmentation systems;</p> <p>b) publish information specifying the global navigation satellite system elements that are approved for use in their airspace;</p> <p>c) adopt a performance-based</p>	<p>a) to e): Noted.</p>	<p>a) to e): Noted and requested the Secretary General to bring to the attention of States and Stakeholders.</p>	<p>a): States take advantage of the improved robustness and availability made possible by the existence of multiple GNSS constellations and associated augmentation systems;</p> <p>b) States publish information specifying the GNSS elements that are approved for use in their airspace;</p> <p>c) States adopt a performance-based</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>approach with regard to the use of global navigation satellite system (GNSS), and avoid prohibiting the use of GNSS elements that are compliant with applicable ICAO Standards and Recommended Practices;</p> <p>d) carefully consider and assess if mandates for equipage or use of any particular global navigation satellite system core constellation or augmentation system are necessary or appropriate;</p> <p>That aircraft operators:</p> <p>e) consider equipage with GNSS receivers able to process more than one constellation in order to gain the benefits associated with the support of more demanding operations.</p>			<p>approach with regard to the use of GNSS, and avoid prohibiting the use of GNSS elements that are compliant with applicable ICAO SARPs</p> <p>d) States carefully consider and assess if mandates for equipage or use of any particular global navigation satellite system core constellation or augmentation system are necessary or appropriate;</p> <p>e) IOs consider equipage with GNSS receivers able to process more than one constellation in order to gain the benefits associated with the support of more demanding operations</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>Recommendation 6/7 – Assistance to States in mitigating global navigation satellite system vulnerabilities</b></p> <p>That ICAO:</p> <p>a) continue technical evaluation of known threats to the global navigation satellite system, including space weather issues, and make the information available to States;</p> <p>b) compile and publish more detailed guidance for States to use in the assessment of global navigation satellite system vulnerabilities;</p> <p>c) develop a formal mechanism with the International Telecommunication Union and other appropriate UN bodies to address specific cases of harmful interference to the global navigation satellite system reported by States to ICAO; and</p> <p>d) assess the need for, and feasibility of, an alternative position, navigation and timing system.</p>	<p>a) to d): Noted.</p>	<p>a) to d): Approved and include in the Air Navigation work programme.</p>	<p>a) to d): Note.</p>
<b>Recommendation 6/8 – Planning for</b>			



RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p><b>mitigation of global navigation satellite system vulnerabilities</b></p> <p>That States:</p> <p>a) assess the likelihood and effects of global navigation satellite system vulnerabilities in their airspace and apply, as necessary, recognized and available mitigation methods;</p> <p>b) provide effective spectrum management and protection of global navigation satellite system (GNSS) frequencies to reduce the likelihood of unintentional interference or degradation of GNSS performance;</p> <p>c) report to ICAO cases of harmful interference to global navigation satellite system that may have an impact on international civil aviation operations;</p> <p>d) develop and enforce a strong regulatory framework governing the use of global navigation satellite system repeaters, pseudolites, spoofers and jammers;</p> <p>e) allow for realization of the full advantages of on-board mitigation techniques, particularly inertial navigation systems; and</p>	<p>a) to f): Noted.</p>	<p>a) to f): Approved and requested the Secretary General to bring to the attention of States and Stakeholders.</p>	<p>a) States assess the likelihood and effects of GNSS vulnerabilities in their airspace and apply, as necessary, recognized and available mitigation methods.</p> <p>b) States provide effective spectrum management and protection of GNSS frequencies to reduce the likelihood of unintentional interference or degradation of GNSS performance.</p> <p>c) States report to ICAO cases of harmful interference to global navigation satellite system that may have an impact on international civil aviation operations.</p> <p>d) States develop and enforce a strong regulatory framework governing the use of global navigation satellite system repeaters, pseudolites, spoofers and jammers.</p> <p>e) States allow for realization of the full advantages of on-board mitigation techniques, particularly inertial navigation systems.</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
f) where it is determined that terrestrial aids are needed as part of a mitigation strategy, give priority to retention of distance measuring equipment (DME) in support of inertial navigation system (INS)/DME or DME/DME area navigation, and of instrument landing system at selected runways.			f) States where it is determined that terrestrial aids are needed as part of a mitigation strategy, give priority to retention of DME in support of inertial navigation system (INS)/DME or DME/DME area navigation, and of instrument landing system at selected runways
<p><b>Recommendation 6/9 – Ionosphere and space weather information for future global navigation satellite system implementation</b></p> <p>That ICAO:</p> <p>a) coordinate regional and global activities on ionosphere characterization for global navigation satellite system implementation;</p> <p>b) continue its effort to address the global navigation satellite system (GNSS) vulnerability to space weather to assist States in GNSS implementation taking into account of long-term GNSS evolution as well as projected space weather phenomena;</p> <p>c) study the optimum use of space weather information that is globally applicable from low to high magnetic latitude regions for enhanced global navigation satellite</p>	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note.

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>system performance at a global context;</p> <p>That States:</p> <p>d) consider a collaborative approach to resolve ionospheric issues including ionospheric characterization for cost-effective, harmonized and regionally suitable global navigation satellite system implementation.</p>	<p>d): Noted.</p>	<p>d): Noted and requested the Secretary General to bring to the attention of States.</p>	<p>d): States consider a collaborative approach to resolve ionospheric issues including ionospheric characterization for cost-effective, harmonized and regionally suitable global navigation satellite system implementation</p>
<p><b>Recommendation 6/10 – Rationalization of terrestrial navigation aids</b></p> <p>That, in planning for the implementation of performance-based navigation, States should:</p> <p>a) assess the opportunity for realizing economic benefits by reducing the number of navigation aids through the implementation of performance-based navigation;</p> <p>b) ensure that an adequate terrestrial navigation and air traffic management infrastructure remains available to mitigate the potential loss of global navigation satellite system service in their airspace; and</p> <p>c) align performance-based navigation implementation plans with</p>	<p>a) to c): Noted.</p>	<p>a) to c): Approved and requested the Secretary General to bring to the attention of States and Stakeholders.</p>	<p>a): States assess the opportunity for realizing economic benefits by reducing the number of navigation aids through the implementation of PBN;</p> <p>b) States ensure that an adequate terrestrial navigation and air traffic management infrastructure remains available to mitigate the potential loss of global navigation satellite system service in their airspace; and</p> <p>c) States align performance-based navigation implementation plans with</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
navigation aid replacement cycles, where feasible, to maximize cost savings by avoiding unnecessary infrastructure investment.			navigation aid replacement cycles, where feasible, to maximize cost savings by avoiding unnecessary infrastructure investment.
<p><b>Recommendation 6/11 – Regional performance framework – alignment of air navigation plans and regional supplementary procedures</b></p> <p>That ICAO initiate a formal amendment process in accordance with normal procedures to align the areas of applicability of the air navigation plans and the regional supplementary procedures, observing the following principles:</p> <ol style="list-style-type: none"> <li>1) there will be no change to the current accreditation of the ICAO regional offices to Contracting States;</li> <li>2) there will be no change to the obligation of individual States to provide services in accordance with ICAO Annex 11 — <i>Air Traffic Services</i>, 2.1;</li> <li>3) there will be no change to the governance responsibilities of the ICAO Council, including approval of amendments to air navigation plans and regional supplementary procedures;</li> <li>4) there will be no change to the</li> </ol>	Approved and requested the Secretary General to bring to the attention of States and Stakeholders.	Noted.	Note

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>current requirements for services and facilities and or to the current supplementary procedures for a given airspace as listed in current air navigation plans and regional supplementary procedures;</p> <p>5) there will be no change to the principle that a planning and implementation regional group is composed of the Contracting States providing air navigation service in the air navigation region and that other Contracting States can participate in the activities with observer status;</p> <p>6) there will be no change to ICAO's assistance to planning and implementation regional groups from the regional offices;</p> <p>7) the responsibilities of the performance framework management for an air navigation region will now be integrated and will rest with the planning and implementation regional group established for the region; and</p> <p>8) to the extent possible, the main traffic flows will be accommodated within homogeneous airspaces in order to minimize changes between different air navigation systems and different operational procedures</p>			

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
during flight.			
<p><b>Recommendation 6/12 – Prioritization and categorization of block upgrade modules</b></p> <p>That States and PIRGs:</p> <p>a) continue to take a coordinated approach among air traffic management stakeholders to encourage effective investment into airborne equipment and ground facilities;</p> <p>b) take a considerate approach when mandating avionics equipage in its own jurisdiction of air navigation service provision, taking into account of burdens on operators including foreign registry and the need for consequential regional/global harmonization;</p> <p>That ICAO:</p> <p>c) continue to work on guidance material for the categorization of block upgrade modules for implementation priority and provide guidance as necessary to planning and implementation regional groups and States;</p> <p>d) modify the block upgrade module naming and numbering system using, as a basis, the intuitive</p>	<p>a) and b): Noted.</p> <p>c): Noted.</p> <p>d):Noted.</p>	<p>a) and b): Noted.</p> <p>c): Approved and include in the Air Navigation work programme.</p> <p>d): Approved and requested the Secretary General to take appropriate action.</p>	<p>a): States, PIRGS and IOs continue to take a coordinated approach among air traffic management stakeholders to encourage effective investment into airborne equipment and ground facilities</p> <p>b) States , PIRGs and IOs, take a considerate approach when mandating avionics equipage in its own jurisdiction of air navigation service provision, taking into account of burdens on operators including foreign registry and the need for consequential regional/global harmonization</p> <p>c): Note</p> <p>d): Note</p>

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
<p>samples agreed by the Conference; and</p> <p>e) identify modules in Block 1 considered to be essential for implementation at a global level in terms of the minimum path to global interoperability and safety with due regard to regional diversity for further consideration by States.</p>	e):Noted.	e): Approved and include in the Air Navigation work programme.	e): Note

— END —



International Civil Aviation Organization

ADS-B SITF/12-WP/10  
Attachment 2

# ADS-B SITF/12 MEETING 15-18 April, Kolkata

## Outcomes of the 12<sup>th</sup> Air Navigation Conference



# ICAO 12<sup>th</sup> Air Navigation Conference



- Montréal, 19-30 November 2012
- Opportunity to formalize future of infrastructure & equipage
- Strategies for longer-term requirements
- Agreement of first series of block upgrades
- Revised GANP
  - Operational capabilities to manage ATM system requirements
- The report was reviewed by ANC on 28 January and approved by the ICAO Council on 1 March 2013
- 

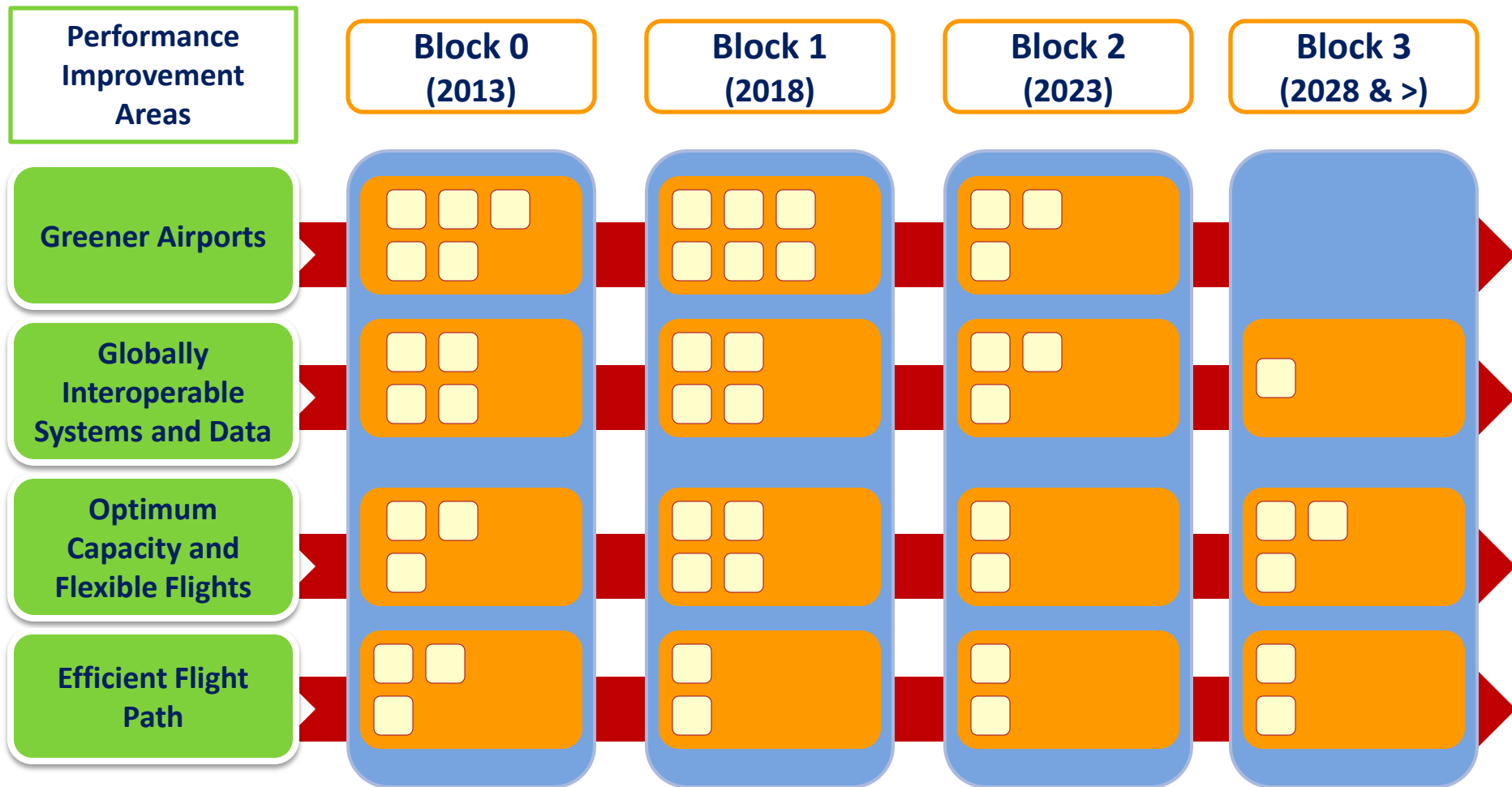


# ICAO 12<sup>th</sup> Air Navigation Conference

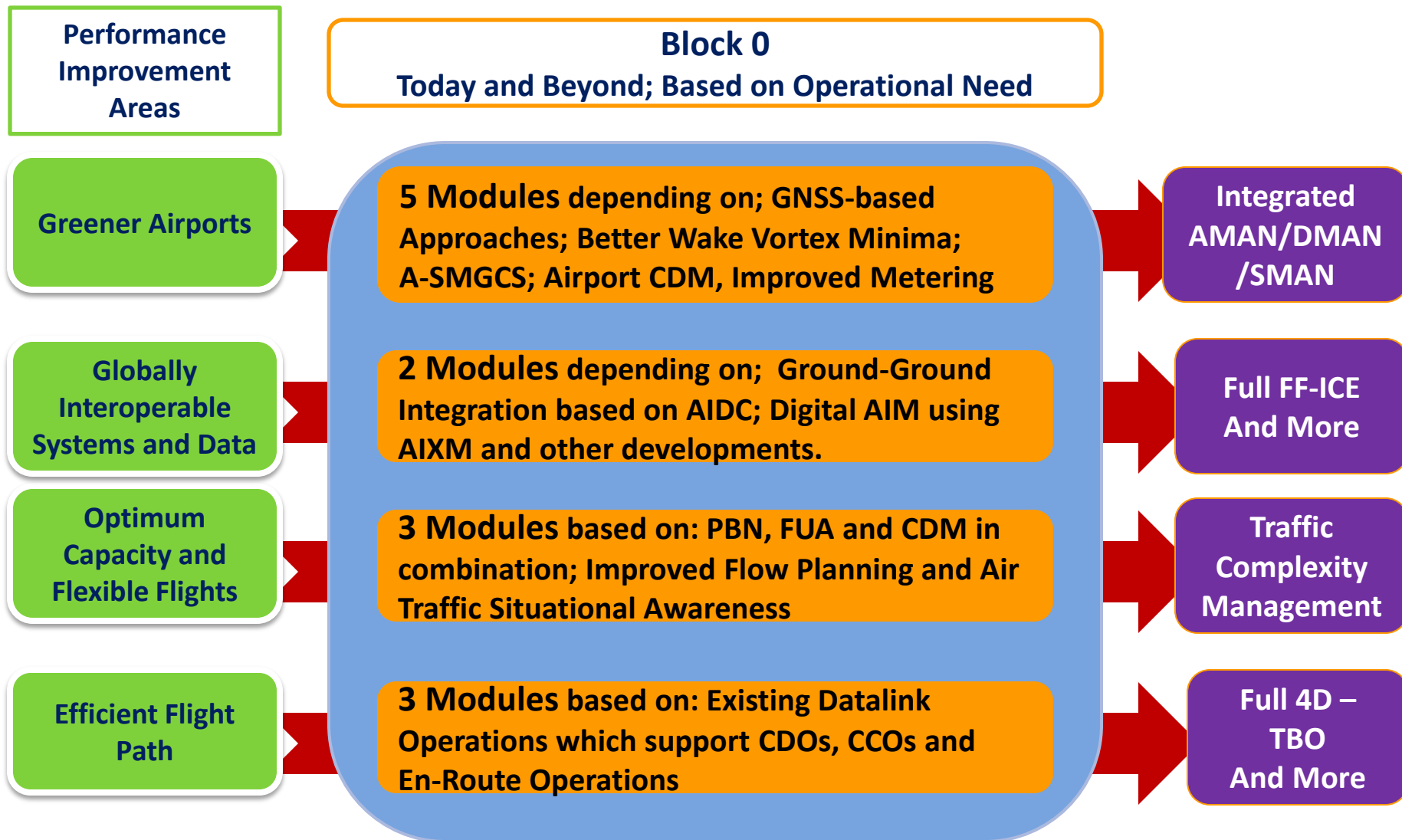


- A globally harmonized and time-wise synchronized set of ATM improvements to direct the work of States, ANSPs, AOs, airports, ICAO and other international and standard making organizations;
- A globally agreed ATM baseline through commitment to implement Block 0;
- A systematic approach to ATM improvements, a packaged solution that includes standards/guidance, technology, procedures, regulatory framework, business case, performance measurements etc.

# Improvement Areas, Blocks & Modules



# Block 0 - Contents



# MODULE: Readiness Checklist

Global Readiness Checklist		Status (ready or date)
	Standards Readiness	√
	Avionics Availability	√
	Infrastructure Availability	√
	Ground Automation Availability	√
	Procedures Available	√
	Operations Approvals	√

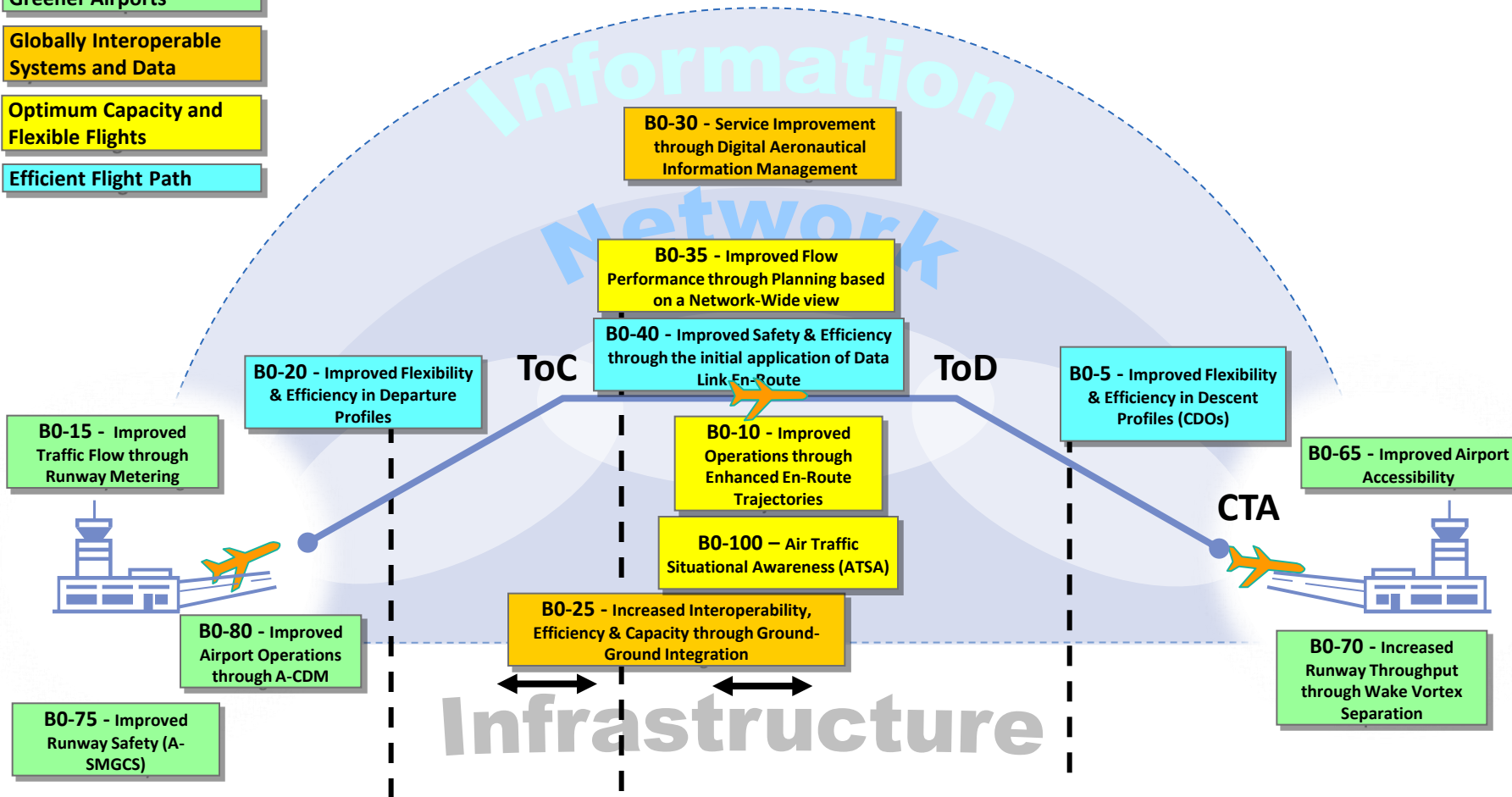
- Each Module is evaluated for its readiness
- If any component is not found to be ready it moves to a future Block for implementation
- Those Modules that are not specifically ready at a Block release are noted as “dates of readiness”

***All Block 0 Modules Have Met the Readiness Criteria***

# Block 0 in Perspective

## Performance Improvement Areas

- Greener Airports
- Globally Interoperable Systems and Data
- Optimum Capacity and Flexible Flights
- Efficient Flight Path



# Strategic issues

- **1/1- the draft 4<sup>th</sup> Edition of the GANP**
- States, agree in principle that high-level policy principles and other improvements be included in the GANP, final comments be considered at the Assembly in 2013:
- ICAO, include the key policy principles in the GANP, develop financial policies, SARPS development plan, define a stable and efficient process to update the GANP
- **1 /2 - Implementation**
- ICAO through Regional Offices provide guidance and assistance on ASBUs implementation, establish a group and mechanism for inter-regional cooperation.

# Optimum capacity and efficiency

- B0-10, B1-10 and B3-10 – Enhanced en-route trajectories;
- B0-35, B1-35 and B2-35 – Improved flow performance through network wide planning;
- **B0-84 – Ground-based surveillance;**
- **B0-85, B1-85, B2-85 and B3-85 – Air traffic situational awareness and airborne separation applications;**
- B0-86 – Improved access to optimum flight levels;
- B1-90, B2-90 and B3-90 – Remotely piloted aircraft;
- **B0-101 and B2-101 – Airborne collision avoidance system (ACAS) improvements;**
- B0-102 and B1-102 – Ground-based safety nets; and
- B0-105, B1-105 and B3-105 – Meteorology in support of air traffic management improvements.



# Optimum capacity and efficie

- **Recommendation 4/2 – ICAO aviation system block upgrades relating to ground surveillance using automatic dependent surveillance – broadcast/multilateration, air traffic situational awareness, interval management and airborne separation**
- Conference endorse Block 1 modules and agreed in principle to Block 2 modules as the strategic direction. ICAO update its work programme and the GANP, review the concepts and terminology of the “airborne separation” to enable to apply different risk-based separations to ADS-B In aircraft, acknowledge the relationship between airborne separation and ACAS, and modify appropriate modules. States implement Block 0

# Optimum capacity and efficie

- **Recommendation 4/3 – ICAO aviation system block upgrades relating to airborne collision avoidance systems and ground-based safety nets**
- Conference endorse Block 1 and agree in principle to Block 2 as the strategic direction. States implement Block 0. ICAO update its work programme and the GANP, adopt a coordinated approach to develop SARPs, PANS and guidance material for ground and airborne base safety nets, develop a Manual for ground based safety nets, incorporate the new generation ACAS X into its work programme.
- **Recommendation 4/4 – Positioning and tracking over oceanic and remote areas, and flight data triggered transmission**
- ICAO evaluate the necessary changes and develop suitable proposals for amendment of ICAO documents
- **Recommendation 4/5 – Civil/military coordination/cooperation and sharing of airspace**
- States, ICAO and PIRGs analyse the benefits and express in terms of capacity increases and reduction of delays, fuel savings, emission reductions etc and based on the analysis identify top areas of opportunity and develop concrete targets. ICAO develop a set of criteria or metrics to enable objective measurements of progress, continue to develop guidance material of FUA in crisis response scenarios.

# Future direction

- **Recommendation 6/1 – Regional performance framework – planning methodologies and tools**
- States and PIRGs align the regional ANPs with the GANP by May 2014, focus on Block 0 implementation, use regional ANPs as the primary tool, involve regulatory and industry at all stages, develop action plans to address the identified impediments. ICAO consider using CMA to evaluate States oversight of block upgrades, review the current regional ANPs amendment process and propose improvements, develop guidance material for the regional deployment of block upgrades, identify the issues and requirements for successful implementation, develop an engagement strategy, develop a mechanism, for sharing of best practices, define a methodology to ensure inter-regional harmonization.
- **Recommendation 6/2 – Guidelines on service priority**
- ICAO develop a set of incentive principles to allow early benefits new technologies/procedures

# Future direction

- **Recommendation 6/4 – Human performance**
- ICAO integrate human performance as an essential element of ASBUs implementation, develop guiding principles, guidance material and provisions on ATM personnel, licensing and on the use of synthetic training devices,, provisions for fatigue risk management.
- **Recommendation 6/5 – ICAO work programme to support global navigation satellite system evolution**
- ICAO work programme to address interoperability and continued development of SARPs and guidance material for existing and future GNSS components

# Future direction

- **Recommendation 6/12 – Prioritization and categorization of block upgrade modules**
- States and PIRGs continue a coordinated approach to encourage effective investment into ground and airborne equipage, in particular when considering mandates. ICAO guidance material on prioritization and provide guidance on implementation, identify Block 1 modules considered to be essential