International Civil Aviation Organization

EIGHTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION AND SURVEILLANCE SUG-GROUP (CNS SG/18) OF APANPIRG

Asia and Pacific Regional Sub-Office, Beijing, China
(21 – 25 July 2014)

Agenda Item 2.2   Review follow-up to AN Conf/12 recommendations

**FOLLOW-UP TO THE 12ᵀᴴ AIR NAVIGATION
CONFERENCE RECOMMENDATIONS**

(Presented by Secretariat)

SUMMARY

This paper reports on the follow up to AN-Conf/12 recommendations by States, International Organizations and invites APANPIRG sub groups to study the recommendations of the AN-Conf/12, initiate appropriate follow-up actions and submit a report on the outcomes of these actions to APANPIRG/25.

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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 Conference made fifty-six recommendations covering a variety of air navigation subjects. 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. The Council on 1 March 2013 approved the report of the AN- Conf/12, as presented by the Air Navigation Commission.

1.2   APANPIRG/24 on the basis of the analysis of the recommendations of the AN-Conf/12 adopted the following Conclusion and Decision

> ***Conclusion 24/4 — Follow-up to AN-Conf/12 Recommendations by
> States and International Organizations***
>
> *That, the States and International Organizations, on the basis of analysis contained in the Appendix A to Report on Agenda Item 2, takes follow-up action as appropriate on the applicable recommendations of the AN-Conf/12.*
>
> ***Decision 24/5 — Follow-up to AN-Conf/12 Recommendations by APANPIRG***
>
> *That the subgroups of APANPIRG study the recommendations of the AN-Conf/12, initiate appropriate follow-up actions and submit a report on the outcomes of these actions to APANPIRG/25.*

2.   DISCUSSION

2.1   APANPIRG/24 noted that the scope of the follow-up action on the recommendations, in some cases, extends to States, International organizations and other stakeholders. As a first coordination step, APANPIRG/24 also considered to assign the task of developing an implementation plan for the relevant recommendations to the APANPIRG Sub Groups.

2.2   The ICAO Regional Office in letter AN3/3- AP 112/13(AGA) dated 2 August 2013 invited States/Administrations and international organizations to initiate action as appropriate on the applicable AN-Conf/12 Recommendations and submit the action planned by 31 January 2014.

2.3   Australia, Hong Kong China, New Zealand, Singapore, Thailand and USA submitted their action plans which have been compiled in the Attachment A to this working paper.

2.4   The APANPIRG Sub groups are invited to study the recommendations of the AN-Conf/12 and initiate appropriate follow up action and submit a report on the outcomes of these actions to APANPIRG/25.

2.5   The Thirteenth Meeting of Automatic Dependent Surveillance – Broadcast (ADS-B) Study and Implementation Task Force (ADS-B SITF/13) held in Hong Kong, China in April 2014 reviewed   the report of a working group (SWG) established by ADS-B SITF/12 comprising Australia, Hong Kong China and Singapore, tasked to make recommendations for practical ADS-B related initiatives in response to outcomes of the 12th Air Navigation Conference, as directed by *APANPIRG Conclusion 24/4 - Follow-up to AN-Conf/12 and Recommendations by States and International Organizations* and *Decision 24/5- Follow-up to AN-Conf/12 Recommendations by APANPIRG.* This resulted in a proposal to respond to and take action on 16 of the 56 recommendations. Consequently the ADS-B Study and Implementation Task Force formulated the following draft Conclusion:

Draft Conclusion 13/1 - Recommendations in Response to AN-and Conf/12 Recommendations

That, the response to ADS-B related recommendations arising from AN-Conf/12, as provided in **Appendix B** to this report be adopted as guidance for consideration by States.

2.6   The First Meeting of the Aeronautical Communication Services (ACS) Implementation Co-ordination Group (ACSICG/1) of APANPIRG held in Seoul, Republic of Korea, in May 2014 reviewed the APANPIRG Decision 24/5 regarding the follow-up actions to AN Conf/12 Recommendations and discussed the suggested response on the recommendations related to the work of ACSICG. Among 56 Recommendations, 1/6, 3/2, 3/3, 3/4 and 3/5 were identified as relevant to the work of ACSICG. The meeting also considered that recommendations 3/9 and 6/13 are indirectly linked to ACSICG activity. Accordingly, the meeting formulated the following draft Conclusion:

Draft Conclusion 1/1 - Recommendations in Response to AN-and Conf/12 Recommendations

That, the response to Aeronautical Communication Service related Recommendations arising from AN-Conf/12, as provided in **Appendix A** to this report is adopted as guidance for consideration by States.

2.7   Responses proposed by ADS-B SITF/13 and ACSICG/1 meetings are also consolidated into **Attachment A** to this working paper.

3.   ACTION BY THE MEETING

3.1   The meeting is invited to:

     a)   study the recommendations of the AN-Conf/12 and proposed responses/actions;

     b)   endorse a consolidated draft conclusion based on Draft Conclusion 13/1 and 1/1;

     c)   initiate appropriate follow-up actions and submit a report on the outcomes of these actions to APANPIRG/25; and

     d)   discuss any relevant matters as appropriate.

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RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
Recommendation 1/1 – The draft Fourth Edition of the Global Air Navigation Plan (Doc 9750, GANP) That States: 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;	a) Note			a) to g) Noted. Action taken as participant in AN-Conf/12 and 38th Assembly							
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;	b) Note										
That ICAO: c) include the key air navigation policy principles presented in the appendix under "Global Air Navigation Plan" into the Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP);	c) to g): Note										
d) develop financial policies which support efficient acquisition and implementation of global air navigation services infrastructure and aircraft equipage;											
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;											
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											

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
	PIRGS/States/International Organizations (IO)										
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.											
Recommendation 1/2 – Implementation That ICAO: a) through its regional offices, provide guidance and practical assistance to States and regions and subregions when they decide to implement individual blocks or modules of the aviation system block upgrades; b) establish a group and improved mechanism for interregional cooperation to ensure harmonization of air traffic management; and c) assist States and regions in training and capacity-building towards implementation of the relevant modules of the aviation system block upgrades.	a) to c): Note.		APANPIRG has already, and will continue, to provide guidance and practical assistance to States in our region regarding planning and implementation of ASBU modules related to ADS-B OUT and ADS-B IN including B0-SURF, B0-ASUR, B0-OPFL, B0-ASEP and B0-SNET etc. Since 2002, APANPIRG has established the "ADS-B Study & Implementation Task Force" (ADS-B SITF) which has been providing comprehensive guidance materials for ADS-B and numerous	ICAO actions only							

FOLLOW-UP TO AN-CONF/12 RECOMMENDATIONS

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
	PIRGS/States/International Organizations (IO)		seminars and workshops on ADS-B before each meeting. APANPIRG has already proposed early implementation of ADS-B OUT technology and will continue to do so. This has been reflected in the Asia/Pacific Regional Surveillance Strategy document. B0-ASUR on "Initial Capability For Ground Surveillance" and B0-SNET on "Increased Effectiveness of Ground Based Safety Nets", which are dependent on ADS-B OUT technology, are amongst the highest priority ASBU implementation in the Asia Pacific Region.								

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Recommendation 1/3 – Guidance on business cases 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.	Note			ICAO actions only							
Recommendation 1/4 – Architecture That ICAO: 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 b) develop a breakdown of the logical architecture of the ground system to the level needed to best address the global interoperability issues.	a) and b): Note.			ICAO actions only							
Recommendation 1/5 – Time reference accuracy 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.	Note			ICAO actions only							
Recommendation 1/6 – Data communications issues That ICAO: a) organize a multidisciplinary review of air traffic control communication requirements and issues; and b) review the operation, management and	a) and b): Note	APANPIRG is being studying the opportunity and feasibility to deploy a Common Regional network through the CRV Task Force established by an APANPIRG		a) & b) ICAO action c) & d) Noted Australia is developing new generation ATM service platform	(i) Hong Kong, China, China has launched a "global high-speed aviation intranet" service using "Air Traffic Services Message Handling System (AMHS)" since	JCAB has been considering to implement VDL for CPDLC	The New Zealand National Airspace and Air Navigation Plan addresses communications issues.	Singapore is a member of the APANPIRG Common Regional Virtual Private Network (CRV) Task Force and participates actively in the ICAO regional	Acknowledged. Thailand has started to partially implement the Data communications System.	c) FAA will be implementing Data Communications using VDL Mode 0 and 2 for the ground (DCL) and VDL Mode 2 for Enroute Services (airborne) transitioning to B2 in the 2025 timeframe.	

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	PIRGS/States/International Organizations (IO)										
modernization of a regional digital network technical cooperation project and other similar regional experiences with the aim that this efficient practice can be adapted for use in other ICAO regions;

That States:

c) explore multi-modal solutions when appropriate to overcome transition issues; and

d) anticipate and accelerate the migration of air traffic management communication systems towards more efficient technologies to timely service the aviation system block upgrade modules. | c) and d): States to take appropriate action | conclusion in June 2013. Benchmarking was done regarding other regional initiatives such as PENS, MEVA and REDDIG.

It is anticipated in APAC Region that to support B0-FICE, enable B1-SWIM and the sharing of surveillance data and support VoIP communications, a modern and cost effective network needs to be implemented. The Cost Benefit Analysis developed Q1 2014 by the CRV Task Force shows solutions like IP MPLS-based networks would prove to be an efficient technology. Its feasibility in APAC will be confirmed through a Request For Information towards Industry. | | including appropriate communications services. | Dec 2009, which is initially operated with Macao, China for dissemination of aeronautical messages and meteorological information, marking the first city-pair in the APAC region providing a full aeronautical message handling service over Aeronautical Telecommunication Network (ATN). Hong Kong, China has also made early provision in the replacement ATC system project supporting IP-based ATN for exchanging aeronautical information.

(ii) Hong Kong, China has participated as an active member of the Task Force set up under APANPIRG Decision 24/32 to collaborate with States and IOs to | | | meetings. Singapore also supports the establishment of the CRV as a move towards more efficient technologies to timely service the aviation system block upgrade modules. | | RTCA SC-214/EUROCAE-78 is considering "multi-modal" solutions to overcome transition issues in B2 definition, i.e. transition from A623, FANS 1/A, ATN B1 (Link 2000+) to converged B2 and on to B3.

d) Acceleration would come with a convincing cost-benefit leading to investment and commitment to implement based on States, ANSPs and industry consensus. | |

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	PIRGS/States/International Organizations (IO)											
			In 2016 APANPIRG may consider to establish a regional group called OOG (CRV Operations Oversight Group) to coordinate and monitor the transition from legacy communication networks to the CRV network. The safety issues that may be linked to the transition will be studied in the preliminary safety case of CRV project. If confirmed by APANPIRG, the CRV network operations should start late 2016/early 2017. The regional group called OOG will monitor the migration of air traffic management communication data onto CRV.			study the development of a common Regional Virtual Private Network (VPN) for aeronautical information exchange, which provides a backbone infrastructure for future implementation of SWIM. (iii) APANPIRG/24 has endorsed a Conclusion 24/28 on "Timely implementation of ATN/AMHS" urging States to take up implementation of ATN/AMHS connectivity for completion of the regional ATN/AMHS network for APAC region by the end of 2015. Hong Kong, China is in support and compliance of this Conclusion, and will continue to facilitate adjacent Communication						

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	PIRGS/States/International Organizations (IO)										
		No supplementary action needed. States should consider joining the CRV initiative at the earliest to meet Recommendation 1/6.			Centres on early trials of their ATN/AMHS accordingly.						
Recommendation 1/7 – Automatic dependent surveillance — broadcast That States: 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 b) recognize that cooperation between States is key towards improving flight efficiency and enhancing safety involving the use of automatic dependent surveillance — broadcast technology; That ICAO: c) urge States to share automatic dependent surveillance — broadcast (ADS-B) data to enhance safety, increase efficiency and achieve seamless surveillance and to work closely together to harmonize their ADS-B plans to optimize benefits.	a) to b): Note. c) States to share ADS-B data to enhance safety, increase efficiency and achieve seamless surveillance and to work closely together		APANPIRG has already proposed early implementation of ADS-B OUT technology, and will continue to do so. APANPIRG has encouraged ADS-B data sharing among States. Conclusions have been adopted under APANPIRG to urge States to share their ADS-B data and DCPC facilities. ADS-B data sharing is already operational in the region and further deployments are being planned. Besides, APANPIRG has also encouraged	a) & b) noted c) data sharing in place with adjoining FIRs Australia has promoted ADS-B data sharing in the Asia Pacific Region through regional groups and has in operation ADS-B data sharing with Indonesia.	ADS-B ground stations have been installed in eight selected sites within the Hong Kong territories to provide en-route and low-level surveillance to ADS-B equipped aircraft operating within the Hong Kong Flight Information Region (HKFIR). Once the ADS-B data are successfully integrated with the new Air Traffic Management System now being installed, Hong Kong, China will be able to share ADS-B data with neighbouring		ADS-B implementation is addressed in the New Zealand National Airspace and Air Navigation Plan. Airways Corporation will share ADS-B data as part of its implementation programme.	a) a) to b): Singapore has collaborated with Indonesia and Vietnam on ADS-B data sharing. Using the data from neighbouring States, Singapore has commenced ADS-B operations in parts of the Singapore FIR, where there used to have no surveillance coverage. With the extended coverage of VHF, Singapore can provide alternative in coverage area previously served by HF. c) Singapore will continue to support ICAO's effort to	Noted. Thailand has worked closely with other States to share ADS-B data which will be implemented in the near future.	The FAA works cooperatively with international counterparts on ADS-B.	The Seamless ATM Plan PASL Phase 1 (NOV 15) states: Subject to appropriate filtering, ATS surveillance data, particularly from ADS-B, should be shared with neighbouring ATC units within high density FIRs. In Phase 2 (NOV 18): Subject to appropriate filtering, ATS surveillance data, particularly from ADS-B, should be shared with all neighbouring ATC units. Follow-up done through SAORP

FOLLOW-UP TO AN-CONF/12 RECOMMENDATIONS

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	PIRGS/States/International Organizations (IO)										
			harmonized ADS-B implementation among States. Templates for harmonized ADS-B implementation, promulgation of harmonized ADS-B avionics equipage requirements, and guidelines for airworthiness and operational approval, have been developed and published. The dates of ADS-B mandates in many sub-regions were also aligned to take effect from 12 December 2013.

APANPIRG has developed and published guidance materials on ADS-B data sharing and harmonized ADS-B implementation, and will continue to promote it at each APANPIRG and its contributory bodies' meetings. | | ANSPs and the Regional Monitoring Agency to support ATC operations and enhance safety monitoring. | | | advocate ADS-B data sharing. Singapore also worked together with States such as China, Hong Kong and Vietnam to harmonize ADS-B plans. Singapore is currently sharing ADS-B data with Vietnam and Indonesia to enhance ATM safety and efficiency. We are currently working to expand collaboration with other neighbouring states. Vietnam is providing us the ADS-B data but not taking ours as their FIR is covered by radars. | | | |

FOLLOW-UP TO AN-CONF/12 RECOMMENDATIONS

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated — PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
Recommendation 1/8 – Rationalization of radio systems 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.	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.			Navigation rationisation plan developed with industry and being implemented. Safety has been considered. Australia is implementing GNSS based PBN and decommissioning redundant navigation aids. The remaining navigation aids form the back-up navigation network to provide an alternate means of navigation in the event of GNSS failures. Communications are part of the One Sky Australia ATM, including SATCOM Voice for use as a long range communications system.	APANPIRG/24 has endorsed the Navigation Strategy for the APAC Region which requires States/Administrations to: (i) "Convert from terrestrial-based instrument flight procedures to PBN operations in accordance with the Asia/Pacific Seamless ATM Plan" ; (ii) "rationalize terrestrial navigation aids, retaining a minimum network of terrestrial aids necessary to maintain safety of aircraft operations". Hong Kong, China is in support of this Navigation Strategy for the APAC Region, and has developed and published our roadmap for PBN implementation accordingly. In our strategy for	The decommissioning of NDB has been completed. With the spread of RNAV operation, VOR that reduce the need for using will be halved by 2023.	Navigation aids are addressed in the National Airspace and Air Navigation Plan, and Performance-Based Navigation Plan.	Singapore shall study strategies for the decommissioning of some navigation aids and ground stations subject to our operational requirements. Singapore may decommission some of the navigation aids and ground stations once these have been identified by ICAO.	Noted and will follow up on this recommendation.	The FAA continues to conduct analyses and explore strategies for decommissioning navaids and implementation of new while ensuring safety to the traveling public.	

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	PIRGS/States/International Organizations (IO)										
					implementing CNS systems, efforts will be made to de-commission some of the terrestrial navigation aids and ground stations, rationalise the on-board CNS systems, and retain the essential terrestrial navigation aids in order to mitigate the potential loss of GNSS service for maintaining safety.						
Recommendation 1/9 – Space-based automatic dependent surveillance — broadcast That ICAO: 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; b) develop Standards and Recommended Practices and guidance material to support space-based automatic dependent surveillance — broadcast as appropriate; and c) facilitate needed interactions among stakeholders, if necessary, to support this technology.	a) to c): Note.		APANPIRG noted the development of space-based ADS-B. APANPIRG suggests that the highest cost benefit for this technology will be in the NAT region. The technology may also be cost effective in oceanic regions where installation of ground surveillance equipment/systems are technically infeasible. In this	Noted. This is promising technology however is yet to be operationally validated.						

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
	PIRGS/States/International Organizations (IO)		case, the cost benefit from reduced separation standards competes against FANS ADS-C and with ADS-B IN technology. We also note that the cost to ANSPs and the applicable lateral separations are not yet clear and that the technology is, as yet, unproven. However, APANPIRG sees enormous potential for space-based ADS-B across the oceans of the region. The strategy being adopted by the region is to keep an eye on its development until there is clarity about technical success and about the cost of the services before committing to this technology.								

FOLLOW-UP TO AN-CONF/12 RECOMMENDATIONS

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
			The Asia/Pacific Seamless ATM Plan has identified space-based ADS-B as one of the key areas that should be researched for future development, in order to continue pursuance of seamless ATM beyond ASBU Block 0 implementations and global interoperability.								
Recommendation 1/10 – Automatic dependent surveillance — self-organizing wireless data networks That ICAO consider the use of self-organizing wireless data networks based on VDL Mode-4 technology taking into account: a) possible technical advantages; b) whether it satisfies any unmet operational need; and c) its impact of forward and retro-fit on the global air transport fleet.		a) to c): Note.		Noted. The selection of technology should be undertaken by ANC to satisfy operational requirement.							
Recommendation 1/11 – Automation roadmap That ICAO:			APANPIRG should encourage States to ensure that all newly								

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	PIRGS/States/International Organizations (IO)										
a) develop a global roadmap for the evolution of ground air traffic management automation systems in line with aviation system block upgrade implementation; and b) develop performance-based system requirements for air traffic management automation systems so that: 1) where necessary these systems are interoperable across States and regions; and 2) the function and operation of these systems will result in consistent and predictable air traffic management system performance across States and regions.	a) to b): Note.		deployed air traffic management automation systems should support all applicable ICAO adopted surveillance technologies such as ADS-B / MLAT and Mode S DAPS (Mode S Enhanced Surveillance), and that when appropriate, existing air traffic management automation systems will be upgraded to have such capabilities. Besides, capabilities to allow ADS-B data sharing should be included. Depending on whether there will be operational benefits to States and the region, APANPIRG could consider to promulgate a time line of expected ADS-B / MLAT / Mode S DAPS	ICAO actions only							

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
	PIRGS/States/International Organizations (IO)										
			capabilities in their air traffic management automation systems by say November 2018 (in line with the "Preferred ATM Service Levels" PASL Phase II in Asia/Pacific Seamless ATM Plan). Guidance materials regarding appropriate ADS-B / MLAT / Mode S DAPS functionalities are available in the published guidance documents including guidance on sharing of ADS-B data. However, guidance materials for ADS-B implementation in complex radar airspaces are yet to be developed. ADS-B SITF to consider enhancing guidance								

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	PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1									
			materials for implementation of Mode S DAPS, as well as ADS-B implementation in radar airspace if needed.								
Recommendation 1/12 – Development of the aeronautical frequency spectrum resource That States and stakeholders: 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; b) work together to deliver efficient aeronautical frequency management and "best practices" to demonstrate the effectiveness and relevance of the industry in spectrum management; c) support ICAO activities relating to the aviation spectrum strategy and policy through relevant expert group meetings and regional planning groups; and 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; That ICAO: e) develop and implement a comprehensive aviation frequency spectrum strategy to be referenced to	a) to d): PIRGs, States and IO to take appropriate action e) to i): Note.		With the deployment of ADS-B consideration should be given to the decommissioning of radars to reduce frequency spectrum utilization. The sharing of DCPC facilities to support ADS-B operations could also lead to decommissioning of certain HF stations and thus releasing the associated HF frequencies. High ADS-B fitment rates may lead to the removal of primary radars in some states. The Regional Surveillance	Australia is actively supporting aviation spectrum through aviation specialist engagement in State delegation to ITU and through ICAO ACP WF-F.	(a) & (b) – Recognizing that continued availability of adequate and appropriate radio spectrum is critical for the long term safety and efficiency of civil aviation, Hong Kong, China has organized the Radio Spectrum and Technical Standards Advisory Committee (SSAC) led by the local spectrum regulatory authority (i.e. Office of the Communications Authority (OFCA)) with full participation of the Civil Aviation Department and various industry stakeholders since 1994, to safeguard the interest of civil	Currently frequency spectrum has not been occupied, but we has been considering frequency spectrum for the future. JCAB has been working together to deliver efficient aeronautical frequency management and "best practices" to demonstrate the effectiveness and relevance of the industry in spectrum management with radio administrator.	Aeronautical frequency spectrum matters are addressed by the Aviation Spectrum Group (38th Assembly WP/119 discusses).	Aeronautical Frequency Spectrum Resource management in Singapore involves our national regulator, Infocomm Development Authority of Singapore (IDA) and the military, and we work together at all levels and in close coordination.	Acknowledged. Thai representatives have participated in the WRCs and its relevant meetings continuously.	The FAA is very active in ICAO and International Telecommunications Union (ITU) radio spectrum efforts including: a) acting as Rapporteur of ACP WGF, the ICAO body charged with aeronautical spectrum issues including development of the ICAO World Radiocommunication Conference (WRC) position, and b) participating in United States (US) delegations to Study Groups of the ITU and to the WRC, including taking leadership roles, both within the delegation and in the broader ITU, on aeronautical issues.	

FOLLOW-UP TO AN-CONF/12 RECOMMENDATIONS

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated — PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
the Global Air Navigation Plan (GANP), which includes the following objectives: 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; 2) demonstrate efficient use of the spectrum allocated through efficient frequency management and use of best practises; and 3) clearly state in the strategy the need for aeronautical systems to operate in spectrum allocated to an appropriate aeronautical safety service; f) establish timelines and methodologies to complement the GANP planning objectives with a frequency spectrum strategy; g) continue to allocate adequate resources with a far-sighted approach to its work programmes regarding aviation spectrum challenges; 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 i) consider structuring the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies* (Doc 9718) by using a web-based platform as appropriate, to further support States in their			Strategy has encouraged States to reduce dependence on primary radars for area surveillance.		aviation community in planning for the use of the radio spectrum and formulation of the strategies, policies and procedures in the management of the radio frequency spectrum. (c) & (d) -- In line with ICAO position and through the SSAC, the Civil Aviation Department, in collaboration with OFCA, will continue its full participation in the development of Hong Kong's position for Agenda Items of WRC with full support to the ICAO position. Hong Kong, China has participated actively in the previous WRC-12 including participation in the ICAO's first regional preparatory group (RPG) meeting for WRC-2012 in December 2009 and the 4th APT Conference	JCAB has been supporting ICAO activities relating to the aviation spectrum strategy and policy through relevant expert group meetings and regional planning groups JCAB has expressed our support regarding Assembly Resolution A36-25 and the requirement for WRC meetings with radio administrator					

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implementation of the spectrum strategy.					Preparatory Group Meeting for WRC-12 held in Hong Kong, China in December 2010.						
Recommendation 1/13 – Potential use of fixed satellite service spectrum allocations to support the safe operation of remotely piloted aircraft systems That ICAO support studies in the International Telecommunication Union Radio Communication Sector (ITU-R) to determine what ITU regulatory actions are required to enable use of frequency bands allocated to the fixed satellite service for remotely piloted aircraft system command and control (C2) links to ensure consistency with ICAO technical and regulatory requirements for a safety service.	Note			Note.							

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Recommendation 1/14 – Long-term very small aperture terminal spectrum availability and protection That: a) ICAO and Member States not support additional international mobile telecommunications spectrum allocations in the fixed satellite service C-band spectrum at the expense of the current or future aeronautical very small aperture terminal networks; and b) ICAO and Member States pursue this matter in the International Telecommunication Union Radio Communication Sector (ITU-R) and during the World Radiocommunication Conference (WRC-15), with a coordinated proposal to promote a solution where the international mobile telecommunications spectrum allocation does not compromise the availability of the aeronautical very small aperture terminal networks.	a) and b): States to take appropriate action for a long-term VSAT spectrum availability and protection.			Australian aviation agencies will support the ICAO position on V-Sat spectrum in representation for the development of the State position for the ITU.	Hong Kong, China is in support of the Recommendation and will take appropriate action for a long term VSAT spectrum availability and protection. The Civil Aviation Department will coordinate with the local spectrum regulatory authority (i.e. Office of the Communications Authority (OFCA) to pursue the above matter in the International Telecommunication Union Radio Communication Sector (ITU-R) and during the World Radiocommunication Conference (WRC-15).	JCAB expressed our support regarding the availability and protection of aeronautical VSAT networks in ICAO meeting etc. JCAB expressed our support regarding the availability and protection of aeronautical VSAT networks in ICAO meeting etc.	Aeronautical frequency spectrum matters are addressed by the Aviation Spectrum Group (38th Assembly WP/119 discusses).	VSAT spectrum availability and protection in Singapore involves our national regulator, Infocomm Development Authority of Singapore (IDA), and we work together at all levels and in close coordination. At CAAS level, we are just procuring VSAT service from service provider.	Acknowledged.	Recognizing the safety aspects of the communications carried via VSAT, the FAA has been active within US delegations to support aeronautical use of those systems, and to prevent encroachment by terrestrial mobile broadband systems on the spectrum used by VSAT.	
Recommendation 1/15 – Performance monitoring and measurement of air navigation systems That ICAO: a) establish a set of common air navigation service performance metrics supported by guidance	a) and c): Note.			ICAO Actions only Previously RASMAG was working in this area.							

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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)); 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 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.											
Recommendation 1/16 – Access and equity considerations That States: a) ensure, as part of the aviation system block upgrade implementation, the principles of access and equity are included in all airspace modernization and redesign efforts; and 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.	a) and b): States to ensure the principles 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			Access and equity is included in Australian airspace management. The <u>Office of Airspace Regulation</u> is responsible for regulating airspace and managing airspace change proposals to ensure the safe, orderly and efficient flow of air traffic, cognisant of security, the protection of the	Hong Kong, China will ensure, during the implementation of ASBU modules, that all airspace users have the right of access to ATM resources needed to meet their specific operational requirements, and that the continued shared use of the airspace for different airspace users can be achieved safely. In general, higher service priority are being given to	Japan has established a future ATM plan named CARATS. The principles are ensured in this framework.	Access and equity considerations are included in the Government's National Airspace Policy and Civil Aviation Rules Part 71 (Airspace Design). Aviation Related Concerns, which are handled by the Civil Aviation Authority, provide a mechanism for dealing with concerns.	a) Singapore has in place a framework to systematically engage ATM stakeholders at key stages of the planning process to ensure fair, equitable and efficient to all aviation services.	Acknowledged.	a) The FAA has been keen on providing National Air Space (NAS) users with fair access and providing equity in both benefits and burdens (i.e., delays and route changes). Upon developing new concepts to modernize airspace and systems, the FAA engages in analysis activities to ensure that the principles of access and equity are addressed. b) Some examples of how the FAA ensures fair, equitable,	

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	efficient access to all aviation services including general aviation.			environment, and the equitable use of Australian airspace.	those airspace users ready to receive the ATM resources (i.e. the principle of better equipped, better served has been adopted). The Civil Aviation Department will develop a plan to ensure its service providers are providing fair, equitable, and efficient access to all aviation services including general aviation, through discharging its regulatory/oversight duties including audits and inspections.					and efficient access to the NAS are: provides the performance information to stakeholders in its systems such as Airline Service Quality Performance System (ASQP) and Operations Network (OPSNET), and provides the position for GA representatives at the ATCSCC so that GA reps can monitor the operation of ATCSCC including the traffic flow initiatives.	
Recommendation 2/1 – ICAO aviation system block upgrades relating to airport capacity That the Conference: a) endorse the aviation system block upgrade modules relating to airport capacity included in Block 1 and recommend that ICAO use them as the basis of its standards work programme on the subject; b) agree in principle to the aviation system block				Noted Australia will implement ASBU in accordance with operational needs.	e) Airport capacity at HKIA has been taken into consideration in planning for air traffic management capacity and system performance			e) Airport capacity are amongst the first consideration when planning for ATM capacity & system performance, Regular meetings between Airport operator and ANSP to discuss capacity related	Noted. Thailand realized the importance of the airport's air traffic management capacity and has continued to support airport planning and development.	The FAA's Air Traffic Control System Command Center (ATCSCC) offers the advanced traffic flow management capabilities that meet the ASBU Block 0 NOPS description. ATCSCC addresses the airport capacity and demand	

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upgrade modules relating to airport capacity included in Blocks 2 and 3 as the strategic direction for this subject; c) recommend that the ICAO Council supports the implementation of the APEX in Safety Programme and asks the Secretary General to continue ICAO participation in safety reviews and sharing of relevant safety information, as provided for in the Memorandum of Cooperation between ACI and ICAO; That ICAO: d) include, following further development and editorial review, the aviation system block upgrade modules relating to airport capacity in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); e) States and service providers ensure that airport capacity, including relevant airport planning and operational issues, are addressed and accounted for when planning for air traffic management capacity and system performance; f) work with the Airports Council International (ACI) and other interested parties on guidance material to promote the globally-harmonized implementation of airport collaborative decision-making, including best practices and global technical standards; and That States: g) according to their operational needs, implement the aviation system block upgrade modules relating to airport capacity included in Block 0.	c) Note d) Note e) States and service providers ensure that airport capacity issues are addressed and accounted for when planning for air traffic management capacity and system performance; f) Note g) Note							issues. g) Singapore has implemented a number of ASBU modules relating to airport capacity according to operational needs.		imbalance issues in a collaborative manner including controllers and airport and flight operators. The FAA has installed the airport surveillance systems at major airports to provide more accurate and timely airport data to stakeholders to make better planning and tactic decisions. This capability is described in the ASBU Block 0 SURF.	

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Recommendation 2/2 – Development of ICAO provisions for remotely operated air traffic services That ICAO provide: a) updates on additional guidelines for surveillance and air and ground communications systems; 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 c) requirements for air traffic services (ATS) personnel and flight crew training, ATS personnel licensing and related procedures for remotely operated air traffic services.	a) to c): Note		Due to the high Mode-S and ADS-B fitment and usage in the APAC region, trials of remotely operated ATS may be practical within the region earlier than other regions. APAC states should be encouraged to support these activities.	Noted Australia is investigating remote towers services.							
Recommendation 2/3 – Security of air navigation systems That ICAO: a) seek the support of States and stakeholders to complete its work in developing a robust, secure aeronautical telecommunication network; and 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.	a) to b): Note			ICAO Actions only.			Airport capacity issues are addressed in the Government's National Airspace Policy, the national security programme, through the Civil Aviation Authority's regular programme of airspace reviews, and through Airport Master Plans.				
Recommendation 2/4 – Optimized management of wake turbulence That ICAO: a) accelerate the implementation of new ICAO wake turbulence categorization systems and to pursue	a) to c): Note			ICAO Actions only. Australia is implementing GNSS based PBN and has a PBN				a) Singapore has published the State PBN implementation plan and it is progressing well.			

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development of dynamic wake turbulence separation provisions with supporting implementation guidance; b) support the continuation of the cooperative work on-going addressing the static pair wise separation, with a view to having revised global provisions in place in advance of Block 1 timescales; and c) develop the wake vortex flight safety system (WVSS) concept description along with a proposed system architecture with the possibility for WVSS to be included in the aviation system block upgrade Modules B1-70, B2-70, B1-85 and B2-85.				Implementation Plan but needs airspace concepts to fully implement PBN in terminal areas.				b) Efficient operations approval procedures and support the mutual recognition of other States' operational approvals are in place c) Singapore will continue to share PBN implementation experiences with other states at various forums. d) Singapore has in place procedures to determine operational requirements for PBN implementation. e) PBN implementation in Singapore involves ATC, the military and other aircraft operators, and we work together at all levels and in close coordination			

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								g) Singapore has in place a framework to regularly consult ATM stakeholders, including the airport operator, when planning for PBN implementation.			
Recommendation 2/5 – Performance-based navigation for terminal and approach operations implementation That States and stakeholders: a) urgently implement, where appropriate, performance-based navigation (NAS) for terminal and approach operations in accordance with Assembly Resolution A37-11; b) urgently adopt efficient operations approval procedures and support the mutual recognition of other States' operational approvals; c) share their best practices including required navigation performance authorization required implementation initiatives as well as relevant flight operational safety assessment documentation with other States;	a) States and IOs urgently implement, where appropriate, PBN for terminal and approach operations in accordance with Assembly Resolution A37-11; b) States and IOs urgently adopt efficient operations approval procedures and support the mutual recognition of other States' operational approvals; c) States and IOs share their best practices			Australia is implementing PBN for terminal and approach operations. Australia is participating in ICAO and other fora to share best practice information. Australia is implementing GNSS based PBN and has a PBN Implementation Plan but needs airspace concepts to fully implement PBN in terminal areas.	a) Basic-RNP 1 SID and STAR procedures have been implemented at HKIA since Jan 2013. In addition, since Dec 2013, RNP AR APCH procedures have been implemented for all runway ends at HKIA. b) Hong Kong, China has also developed Job Aid for the process of application from Foreign Operator for operating RNP AR APCH in HKIA c) Hong Kong, China supports the recommendation.	JCAB has assessed the benefits of RNP for each airport and determined prioritization of airport for implemenation. Japan adopted operational approval procedures based on ICAO PBN manual and adopted the mutual recgnition of other States' operational approvals. JCAB shared the FOSA FOSA process in last	Addressed by the National Airspace and Air Navigation Plan, the PBN Implementation Plan, and Airways Corporation's PBN implementation programme.	a) Singapore has published the State PBN implementation plan and it is progressing well. b) Efficient operations approval procedures and support the mutual recognition of other States' operational approvals are in place c) Singapore will continue to share PBN implementation experiences with other states at various forums.	Acknowledged.	The FAA is supporting the use of Performance Based Navigation (PBN) to provide greater flexibility in the National Airspace System (NAS) and to facilitate more dynamic management of air traffic. PBN is valuable as it provides a framework for defining performance requirements in navigation specifications that contain detailed aircraft and operator/pilot requirements. It further provides a basis for the design and implementation of air traffic routes	Establishment of APVs is part of the Seamless ATM Plan. Follow-up through SAORP

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d) determine operational requirements in support of their airspace concept in accordance with the processes described in the *Performance-based Navigation (PBN) Manual* in order to select the appropriate PBN specification;	d) States and IOs determine operational requirements in support of their airspace concept in accordance with the processes described in the *PBN Manual*				d) Hong Kong, China determines the operational requirements to support our airspace concept (Approach, terminal and enroute) in accordance with the processes described in the Performance-based Navigation (PBN) Manual.	issued WP at 2012. JCAB has determined operational requirements by establishing appropriate criteria in accordance with the processes described in the PBN Manual.		d) Singapore has in place procedures to determine operational requirements for PBN implementation.		and instrument procedures and also can support airspace design requirements. The FAA is conducting key activities to support the use of PBN and has implemented PBN for many of its terminal and approach operations.	
e) including regulators, airport authorities, air navigation service providers, commercial operators, General Aviation and the military, work together at all levels and in close coordination to ensure successful performance-based navigation implementation;	e) States and IOs work together at all levels and in close coordination to ensure successful PBN implementation;				e) Since 2008, Hong Kong, China has formed the PBN Planning and Implementation Team (PIT) which consists of representatives from regulators, ANSP, IATA and major operators. The PIT plays a key role in steering the implementation of PBN in HK.	We work together at all levels and in close coodination through the working group of CARATS with the participants from industrygovernment-academia. JCAB has done through environmental Regional Development Division as necessary.		e) PBN implementation in Singapore involves ATC, the military and other aircraft operators, and we work together at all levels and in close coordination			
f) international organizations and industry continue to provide resources to support ICAO with the development of provisions, guidance and training material in support of performance-based navigation implementation; and	f) IOs provide resources to support ICAO with the development of provisions, guidance and training material in support of PBN implementation							g) Singapore has in place a framework to regularly consult ATM stakeholders, including the airport operator, when planning for PBN implementation.			
g) States, when considering performance-based navigation routes arriving at and departing from airports, should ensure that air navigation service providers and aircraft operators involve airport operators from the outset so that they may consult fully with local communities in order to avoid adverse noise impact on those communities.	g) States, when considering PBN routes arriving at and departing from				g) In Hong Kong, China, flight procedure designers work closely with ANSP when considering						

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	PIRGS/States/International Organizations (IO)										
	airports, should ensure that air navigation service providers and aircraft operators involve airport operators from the outset so that they may consult fully with local communities in order to avoid adverse noise impact on those communities				PBN routes. They would also participate in District Council meetings and other relevant fora, as required to address concerns of the local communities on the possible noise impact of new procedures.						
Recommendation 2/6 – Development of ICAO provisions for performance-based navigation for en route terminal and approach operations That ICAO study and make appropriate additions where required to the ICAO provisions, including: a) required navigation performance authorization-required departure navigation specification; b) the application of performance-based navigation standard terminal arrival routes for en route independent simultaneous approaches; c) assessment of the need for ICAO provisions on the use of ground-based augmentation system to append standard instrument arrival and standard instrument departure procedures to approach and landing trajectory;	a) to g): Note.			ICAO Actions only. Australia has RNP AR Departures. The development of broader applications for GBAS in terminal operations is supported.							

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	PIRGS/States/International Organizations (IO)										
d) development of separation minima to support all performance-based navigation specifications and which will also allow for operations where mixed performance requirements are in effect; e) advanced use of performance-based navigation to support aviation system block upgrade modules; f) continued development of provisions, guidance and training material in support of performance-based navigation implementation; and g) develop and make available the minimum qualification requirements for personnel to attend performance-based navigation procedure design training.											
Recommendation 3/1 – ICAO aviation system block upgrades relating to performance improvement through the application of system-wide information management That the Conference: a) endorse the aviation system block upgrade module relating to performance improvement through the application of system-wide information management included in Block 1, and recommend that ICAO use it as the basis of its work programme on the subject; b) agree in principle with the aviation system block upgrade module relating to performance improvement through the application of system-wide information management included in Block 2, as the strategic direction for this subject; That ICAO:				ICAO Actions only.							

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	PIRGS/States/International Organizations (IO)										
c) include, following further development and editorial review, the aviation system block upgrade modules relating to performance improvement through the application of system-wide information management for inclusion in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP).	c) Note										
Recommendation 3/2 – Development of a global system-wide information management concept That ICAO: a) undertake further work to develop a global system-wide information management concept for air traffic management operations and related ICAO provisions that may be necessary; b) at the appropriate time coordinate information management principles and performance-based information management; c) perform additional work on the global implementation of those principles and framework for all air traffic management information through the development of appropriate information management/system-wide information management concepts to be ready in 2014 for subsequent system development work in Block 1 and to include in its work programme, specific activities tailored at coordinating system-wide information management deployment at a local, regional and global level; d) update the information management/system-wide information management (IM/SWIM) working arrangements; That States and stakeholders:	a) to d): Note.	APANPIRG to review the SWIM CONOPS. APANPIRG through ATNICG has initially studied and A cost-benefit analysis for CRV was developed. A cost-benefit analysis for SWIM at regional level is planned to be developed (Conclusion **C 23/21**). **Action proposed: identify and implement a project "Develop SWIM APAC implementation framework".** While this task can initially report to APANPIRG through ACSICG and CNS/SG, the integrated nature		Australia is evaluating SWIM to support ATM evolution.	Recognizing the global system-wide information management (SWIM) concept is under the ICAO ASBU Block 1 initiatives with further development work being undertaken by ICAO in conjunction with the industry stakeholders, Hong Kong, China is in support of working together with States and IOs to demonstrate how SWIM capabilities and functions will meet the needs of the future ATM. Hong Kong, China has participated as an active member of the Task Force set up	e) By participation to Mini Global Demonstration which is promoted by the United States, JCAB is planning to demonstrate the effectiveness of SWIM toward future environment.	Addressed by the National Airspace and Air Navigation Plan, and the Aeronautical Information Service to Aeronautical Information Management (AIS-AIM) Plan.	e) Singapore will be taking part in the FAA's Mini-Global demonstration to be held in September, together with other States in the region.	Noted.	In 2007, the FAA established the System Wide Information Management (SWIM) Program to implement a set of Information Technology (IT) principles in the NAS and provide users with relevant and commonly understandable information. Since then, the FAA has been actively involved in the work of the ICAO ATM Requirements and Procedures Panel (ATMRPP) to develop the ICAOs SWIM Concept of Operations. In addition, the FAA will conduct a mini-global demonstration in later 2014 which includes demonstration of SWIM to international community.	

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	PIRGS/States/International Organizations (IO)										
e) work together to demonstrate how system-wide information management capabilities and functions will meet the needs of the future air traffic management system.	e) States and IOs work together to demonstrate how SWIM capabilities and functions will meet the needs of the future ATM	of SWIM may need to identify dependencies with ATM and MET SGs. **Action proposed: plan the Cost Benefit Analysis to support SWIM using existing underlying ATN or using webservices under the project "Develop SWIM APAC implementation framework".**			under APANPIRG Decision 24/32 to collaborate with States and IOs to study the development of a common Regional Virtual Private Network (VPN) for aeronautical information exchange, which provides a backbone infrastructure for future implementation of SWIM, and demonstrates how SWIM capabilities and functions can support the future ATM. Hong Kong, China has participated actively in the development of ICAO Meteorological Information Exchange Model (IWXXM) by ICAO and World Meteorological Organization (WMO).						

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Recommendation 3/3 – Development of ICAO provisions relating to system-wide information management That: a) under the leadership of ICAO, develop detailed technical specifications for system-wide information management in close collaboration with the aviation community; b) detailed technical specifications for system-wide information management should be open and rely on generic international standards to the extent possible; and c) ICAO undertake work to identify the security standards and bandwidth requirements for system-wide information management.	a) to c): Note.	The Task "Generate User Requirements" of CRV project is expected to address security standards and bandwidth requirements for all data conveyed, including SWIM data. Yet this will be early requirements as not all the provisions and guidance about SWIM will be available in 2014-2015. **Action proposed: to include identification of security standards for SWIM in the Action proposed: Develop Information Security framework including updating regional information Security Guidelines.**		Noted.							

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	PIRGS/States/International Organizations (IO)										
		Action proposed: Include bandwidth requirements in a task called "Develop SWIM guidance and requirements (performance, functional, safety, security).									
Recommendation 3/4 – State and industry and industry support of system-wide information management a) industry support the transition towards system-wide information management by providing appropriate systems supporting automation and the exchange of all relevant air traffic management data in a globally standardized manner; and b) States and all relevant stakeholders contribute to further development and harmonization of performance-based information management.	a) States and IOs support the transition towards SWIM b) States and IOs contribute to further development and harmonization of performance-based information management	**Action proposed: include performance-based information management for SWIM in the Statement of Work of the Task "Develop SWIM APAC implementation framework".**		Australia supports the transition to SWIM and is working in ICAO and other fora to develop SWIM.	Hong Kong, China is in support of SWIM under the ICAO ASBU Block 1 initiatives, and will contribute to further development and harmonization of performance-based information management. In response to this Recommendation: (i) Hong Kong, China has procured a new Aeronautical Information Management System supporting exchange of air traffic management data	a) JCAB and Industry are supporting toward standardizing the air traffic management data by the research and development in CARATS. b) A research will be conducted for the performance-based information management.	Addressed by the National Airspace and Air Navigation Plan, and the Aeronautical Information Service to Aeronautical Information Management (AIS-AIM) Plan.	a) Singapore supports the transition towards SWIM. b) Singapore will participate in appropriate forums and contribute to further development and harmonization of performance-based information management.	Noted.	As noted above, the FAA is working with ICAO and other international organizations to support international transition to SWIM.	

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	PIRGS/States/International Organizations (IO)				based on AIXM 4.5 standards. The system is planned to be put into operational use towards end 2014. (ii) Hong Kong, China has developed a roadmap for AIS-AIM transition harmonized with the ICAO roadmap on AIS-AIM transition to provide foundation for future implementation of SWIM. (iii) Hong Kong, China has participated actively in the development of IWXXM by ICAO and World Meteorological Organization. To prepare for the transition to SWIM, the Hong Kong Observatory (HKO), the local MET authority, is arranging trial offline exchange						

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	PIRGS/States/International Organizations (IO)				of OPMET data in XML code form with other MET authorities. (iv) Hong Kong, China has participated actively in the Expert Team on Meteorological Services to ATM and Meteorological Information Exchange (ET-M&M) of WMO. Hong Kong, China hosts the website on behalf of the Commission for Aeronautical Meteorology (CAeM) of WMO showcasing demonstration projects to facilitate further development and harmonization of performance-based information management.						

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	PIRGS/States/International Organizations (IO)										
Recommendation 3/5 – Operational performance through flight and flow – information for a collaborative environment That the Conference: a) endorse the aviation system block upgrade module relating to flight and flow – information for a collaborative environment included in Block 1, and recommend that ICAO use it as the basis of its work programme on the subject; b) agree in principle with the aviation system block upgrade module relating to flight and flow – information for a collaborative environment included in Blocks 2 and 3, as the strategic direction for this subject; That ICAO: c) include, following further development and editorial review, the aviation system block upgrade modules relating to flight and flow – information for a collaborative environment for inclusion in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); d) investigate, as part of the post-implementation review of the FPL2012, proposals for the implementation of all performance-based navigation codes and other capabilities into the flight plan, having regard to an impact assessment including cost benefit analysis and other factors; e) convene a symposium, as soon as possible, where interested partners would develop an end-to-end advanced system demonstrations of new air traffic management concepts to support a common	c) and d): Note e) : Noted. .	**Action proposed:** **APANPIRG to include the refinement of a regional CONOPS for FICE in the Statement of Work of the Task "Develop SWIM APAC implementation framework"** **Action proposed:** **Include FIXM in the scope of the task "Develop SWIM CONOPS refinement for APAC (FIXM. WXXM, AIXM, NOTAM) - models/infrastructure"** **Action proposed:** **Launch the task Support AIDC implementation at the earliest** **Action proposed:** **States to implement AIDC**		Australia in active in ICAO and other fora supporting FF-ICE and FIXM.	Hong Kong, China will work through ICAO to mature the FF-ICE for a collaborative environment concept, and support the development of a flight information exchange model. Hong Kong, China has developed an Implementation Plan (IP) for 18 nos. of ASBU Block 0 modules in consultation with industry stakeholders. B0-FICE (Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration) is one of the Block 0 modules that will be implemented by Hong Kong, China in accordance with the IP based on our operational needs.	f) JCAB, Airline, AOC, Industry and Military will carry out the implementation of FF-ICE by the collaboration in CARATS while contributing to ICAO. g) JCAB is participating to the development of FIXM as research and development in CARATS. h) While cooperating between stakeholder in CARATS, JCAB will consider about the ASBU modules to improve operational performance through FF-ICE.	Will be addressed in the implementation review of the National Airspace and Air Navigation Plan in three years.	f) Singapore will work with ICAO and stakeholders to mature FF-ICE. g) Singapore supports the development of FIXM. h) Singapore has plans to implement FF-ICE to improve operational performance.	Thailand has started to establish AIDC (ATS Inter-facility Data Communication) in order to support ATFM/CDM implementation.	f) FAA co-chairs the ATMRPP. Through the ATMRPP, member States and IOs have been working collaboratively to address issues/concerns and make progress to mature the FF-ICE both in concept and implementation process. The ATMRPP hosts international meetings approximately twice per year to continue progress. g) The international Flight Information Exchange Model (FIXM) development team, under the supervision of ATMRPP, has been formed in 2011. FAA is the co-chair of the FIXM international team. The team has released FIXM version 1.0 in 2012, version 2 in 2013 including all ATS and AIDC message components, and plans to release version 3 in 2014.	

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understanding of concepts such as SWIM, FF-ICE trajectory-based operations and collaborative decision-making; That States: f) and industry work through ICAO to mature the flight and flow – information for a collaborative environment concept; g) support the development of a flight information exchange model; h) according to their operational needs, implement the aviation system block upgrade modules relating to improved operational performance through flight and flow – information for a collaborative environment included in Block 0.	f) States and IOs work through ICAO to mature the FF-ICE for a collaborative environment concept; g) States and IOs support the development of a flight information exchange model; h) States according to their operational needs, implement the ASBU modules relating to improved operational performance through FF-ICE	**at the earliest and report through the regional Seamless ATM reporting process (item 220 – B0-FICE)**								h) The FAA has been successfully implementing the Block 0 FICE capabilities including the implementation of AIDC, and ATN router and TIC/IP router structure. MEVA II has been implemented and the FAA plan to transition to MEVA III IP network in 2015. Implementation plans for the Asia/Pacific Common Regional Virtual Regional Network and North Atlantic Regional VPN are established. The FAA has implemented AMHS with adjacent FIRs including as Japan, Fiji, UK, and Dominican Republic. The FAA plans to implement AMHS with more FIRS in the future.	
Recommendation 3/6 – ICAO aviation system block upgrades relating to service improvement through aeronautical information management as well as digital air traffic management information That the Conference:				Australia is implementing digital AIM.	c) Aeronautical Information Management (AIM) is targeted to be implemented in phases and in line with the ICAO	c) JCAB has implemented ASBU Block 0 Modules according to the operational needs.	Addressed by the AIS-AIM Plan, and will also be addressed in the implementation review of the National Airspace	c) The implementation of digital AIM is in the pipeline as part of the overall ATM master plan for Singapore.	Noted.	Through FAA participation within the ICAO AIS-AIM Study Group FAA has successfully begun implementing BLOCK 0 of ICAO	

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a) endorse the aviation system block upgrade module relating to service improvement through the integration of digital air traffic management information included in Block 1 and recommend that ICAO use it as the basis of its work programme on the subject; That ICAO: b) include, following further development and editorial review, the aviation system block upgrade modules relating to service improvement through digital aeronautical information management as well as integration of digital air traffic management information in the draft in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); That States: c) according to their operational needs, implement the aviation system block upgrade module relating to service improvement through digital aeronautical information management included in Block 0.	b) Note c) States, according to their operational needs, implement the ASBU module relating to service improvement through digital AIM				roadmap. To facilitate the progressive implementation of AIM, Hong Kong, China will commission the new Aeronautical Information Management System (AIMS) by Q4 2014. The implementation of the digital air traffic management information is being studied by Hong Kong, China, China.		and Air Navigation Plan in three years.			ASBUs.	
Recommendation 3/7 – ICAO provisions relating to service improvement through aeronautical information management as well as digital air traffic management information That ICAO: a) expedite the development of relevant Standards facilitating the transition of aeronautical information service to aeronautical information management and the implementation of system-wide information management taking into account the work accomplished in State programmes; and b) as a matter of urgency, to translate and make	a)and b) :Note			ICAO Actions only.							

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
	PIRGS/States/International Organizations (IO)										
available the necessary Standards and guidance material to facilitate the global transition from aeronautical information service to aeronautical information management.											
Recommendation 3/8 – State actions relating to service improvement through aeronautical information management as well as digital air traffic management information That States: a) accelerate transition from aeronautical information service to aeronautical information management by implementing a fully automated digital aeronautical data chain; b) implement necessary processes to ensure the quality of aeronautical data and information from the origin to the end users; c) engage in intraregional and interregional cooperation for an expeditious transition from aeronautical information service (AIS) to aeronautical information management (AIM) in a harmonized manner and to using digital data exchange and consider regional or subregional AIS databases as an enabler for the transition from AIS to AIM; and d) review their NOTAM publication procedures, provide appropriate guidance to NOTAM originators and ensure adequate oversight of the NOTAM publication process is conducted.	a) States accelerate transition from AIS to AIM by implementing a fully automated digital aeronautical data chain; b) States implement necessary processes to ensure the quality of aeronautical data and information from the origin to the end users; c) States /PIRGS engage in intraregional and interregional cooperation for an expeditious transition from AIS to aeronautical information management AIM in a harmonized manner and to using digital data exchange and consider regional			Australia is implementing the transition from AIS to AIM and is active in ICAO and other fora supporting transition.	a) Aeronautical information management is targeted to be achieved by Q4 2014 through the implementation of the new Aeronautical Information Management System (AIMS) which incorporated a fully automated digital aeronautical data chain. b) Aeronautical Information Service provided by Hong Kong, China, China has been ISO 9001 – 2008 accredited for the quality assurance. c) Hong Kong, China actively participates in the ICAO AIS-AIM Task Force Meeting for the intraregional (Asia-Pacific Region)	a) A research will be conducted for the digital aeronautical data chain. b) A process is already established by distributing the document outlining the procedure for the issuance of aeronautical information to originators and having them comply with it. c) This is one of the discussions in ICAO task force (AAITF). d) A process is already established by distributing the document outlining the procedure for the issuance of aeronautical information to originators and	Addressed by the AIS-AIM Plan, the Aeronautical Services contract, Civil Aviation Rules Part 175, and the AIM Information web site provided by Airways Corporation.	a) Singapore is transitioning from AIS to AIM in line with the regional roadmap. b) The necessary processes are already in place and AIS in Singapore are certified ISO 9001 c) Singapore participates actively in intraregional and interregional meetings/forums for an expeditious transition from AIS to aeronautical information management AIM in a harmonized manner d) The necessary processes are already in place and AIS in Singapore are certified ISO 9001	Thailand is now developing a plan to transition from AIS to AIM.	a) & d) FAA has proactively led advancements in methods to transition from a product-centric aeronautical information environment to data-centric services. We have implemented dissemination of Digital NOTAMS and began dissemination of aeronautical data into the international exchange model for aeronautical information. The FAA has also revised the order governing NOTAM publication procedures to better ensure compliance with ICAO standards. b) FAA has implemented the necessary processes to ensure the quality of aeronautical data and information from time of origin to dissemination through the use of policies, procedures,	

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	or subregional AIS databases as an enabler for the transition from AIS to AIM; and d) States review their NOTAM publication procedures, provide appropriate guidance to NOTAM originators and ensure adequate oversight of the NOTAM publication process				cooperation and will consider digital data exchange with other data providers in future d) The Hong Kong Aeronautical Information Service (AIS) is responsible for the NOTAM publication process. The AIS has been certified to meet ISO 9001 standards since 2007.	having them comply with it				FAA Orders, and Advisory Circulars in addition to ISO Quality Management certification within the AIM organization. c) FAA participates and presents on AIS-AIM advancements within various ICAO Regional Meetings. In addition, collaboration with intra-regional states has begun to discuss the exchange of digital aeronautical data.	
Recommendation 3/9 – Review of NOTAM system and development of options for replacement That ICAO initiate a review of the current NOTAM system, building further on the digital NOTAM activities, including the development of options for a replacement system that would enable web-based applications and compliant with the system-wide information management principles that are being developed for the air traffic management system.	Note.	This recommendation has an indirect impact. NOTAM may be conveyed upon SWIM in the future. **NOTAM needs to be considered as the Task "Develop SWIM APAC implementation framework".**		ICAO Actions only.							

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FOLLOW-UP TO AN-CONF/12 RECOMMENDATIONS

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
Recommendation 4/1 – Efficient management of airspace and improved flow performance through collaborative decision-making That the Conference: 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; 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; That ICAO: 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 *Global Air Navigation Plan* (Doc 9750, GANP); 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; e) develop and incorporate into the ICAO *Manual on Collaborative Air Traffic Flow Management* (Doc 9971) implementation guidance on Airport-CDM and provisions on air traffic flow management data exchange format including trajectory information; f) develop and execute global communications, roll-out and training plan for the ICAO *Manual on*	c) to g): Note.		CDM in some environments may be improved by separate organisations having a common view of the traffic. ADS-B data sharing between organisations may support better CDM.	Australia is implementing CDM at major ports and is working with APANPIRG and other fora on the implementation of CDM on major traffic flows.	h) & i) Hong Kong, China has been collaborating with Singapore and Thailand on a tripartite CDM/ATFM project since 2012. In the Pearl River Delta (PRD) area, a CDM initiative to facilitate integrated release of departures from the 5 PRD airports is being pursued. Both initiatives will form a fundamental part of the ASBU modules relating to network operations included in Block 0.	h) Japan implements the related OIs and ENs in a phased manner since 2012 according to our future ATM plan named CARATS. Additionally, through the collavorative work with ICAO APAC and states concerned,we support to accelerate the realization of ATM seamless plan at the regional level. i) Japan planned OI and EN in CARATS according to our need, related to NOPS in the ASBUs. Additionally, we has already implemented ATFM function for the domestic airspace and	Airways Corporation has implemented COM at Auckland and other main trunk route aerodromes	h) Singapore is implementing A-CDM. i) Singapore, in collaboration with like-minded States/ANSPs, has developed a Multi-Nodal Regional ATFM based on CDM Concept of Operations. Operational trial is targeted to commence in mid-2015	Noted.	The FAA Air Traffic Control System Command Center (ATCSCC) has actively been involved in promoting CDM philosophy with aviation stakeholders. This is accomplished through formal exchanges, meetings in both the operationally and non-operational domains. This collaborative core value has led to improved tactical decision making, ATFM tool development and common situational awareness in the areas of safety, efficiency and security. The FAA National Airspace System (NAS) is comprised of a proven airspace system that can accommodate the key characteristics of the ICAO ASBU model and meets the needs of system customers.	

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	PIRGS/States/International Organizations (IO)										
Collaborative Air Traffic Flow Management (Doc 9971); and 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. That States: 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 *Manual on Collaborative Air Traffic Flow Management* (Doc 9971) and the *Manual on Flight and Flow – Information for a Collaborative Environment* (Doc 9965); i) according to their operational needs, implement the aviation system block upgrade modules relating to network operations included in Block 0.	h) States and PIRGs to accelerate the implementation of CDM i) States, according to their operational needs, implement the ASBU modules relating to network operations included in Block 0.					engaged international ATFM procedures with some adjacent ANSPs. As for the civil/militaly collaborative work, The Fukuoka ATMC has a CDM function that optimizes airspace management accoding to civil/military needs among the ATMC and Japan Air Self Defence Foreces (JASDF).					
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. That the Conference: a) endorse the aviation system block upgrade modules relating to interval management included in Block 1 and recommend that ICAO use them as			APANPIRG supports and prioritizes deployment of ASBU B0-ASUR (Initial Capability for Ground Surveillance) using ADS-B OUT technology. Initially, this serves the needs of	Australia is employing ADS-B and multilat to support surface operations. ADS-B has been implemented for FL290+ to provide access to optimum	h) Hong Kong FIR is fully covered by radar surveillance and operational needs are satisfied, additional ground surveillance using ADS-B / multilateration are being progressively	h) Japan introduced RWSL utilized by MLAT operation at four airports (including two trial operations). Additionally, we are reviewing Ois and ENs	Addressed in the Airways Corporation ATM Plan.	h) Singapore has implemented advance surface surveillance (A-SMGCS: MLAT & SMR) to enhance safety and efficiency at Changi airport.	Acknowledged.	The FAA has implemented Block 0 modules including those relating to ground surveillance, improved ATSA and access to optimum flight levels.	The Seamless ATM Plan recognises that B0-ASUR is a priority 1 element. Followp-up through SAORP

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	PIRGS/States/International Organizations (IO)										
the basis of its work programme on the subject; 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; That ICAO: 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 *Global Air Navigation Plan* (Doc 9750, GANP); 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; e) in the development of provisions, acknowledge the relationship between airborne separation and airborne collision avoidance system; f) modify aviation system block upgrade (ASBU) Module B2-85 to reflect d) and e), modify ASBU Module B2-101 to reflect f); and g) agree in principle to review the concepts and terminology supporting B2-85 "airborne separation" and amend the module accordingly. That States: h) according to their operational needs, to implement the aviation system block upgrade modules relating to ground surveillance, improved air traffic	c) to g): Note. h): States, according to their		ground surveillance but will place the region in a good position for ADS-B IN applications listed in Block 0, 1 and 2. ==States could consider the cost effectiveness of using forward fit mandates (requiring new airframes to be equipped) when planning the transition to ADS-B.== APANPIRG could consider to enhance safety & efficiency in the region by supporting further deployment of ADS-B IN capabilities available in Block 0, including : - B0-ASEP Air Traffic Situational Awareness (ATSA)	flight levels. ADS-B mandate for upper airspace effective December 2013. There is an ADS-B mandate in place requiring all IFR aircraft to be ADS-B equipped by Feb 2017.	implemented to supplement and provide contingency backup to radar coverage.	regarding ATSA according to CARATS.					

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	PIRGS/States/International Organizations (IO)										
situational awareness and improved access to optimum flight levels included in Block 0.	operational needs, to implement the ASBU modules relating to ground surveillance, improved ATSA and improved access to optimum flight levels included in Block 0.		- B0-OPFL Improved Access to Optimum Flight Levels Through Climb/Descent Procedures Using ADS-B (ITP)								
Recommendation 4/3 – ICAO aviation system block upgrades relating to airborne collision avoidance systems and ground-based safety nets That the Conference: 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; 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; That ICAO: 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 *Global Air Navigation Plan* (Doc 9750, GANP); d) adopt a coordinated approach towards reviewing	c) to h): Note.		Depending on whether there will be operational benefits for States and the region, APANPIRG could further improve safety in the region by encouraging States in the region to implement: - B0-SNET Increased Effectiveness of Ground Based Safety Nets. States in the region could agree, based on ALARP principles, to replace / upgrade their ATC	Australia has implemented a range of ground based safety nets. ACAS II (TCAS Ver 7.1) is required in all aircraft with MCTOW >5700 kg and >19 passengers.	Hong Kong, China has developed an Implementation Plan (IP) for 18 nos. of ASBU Block 0 modules in consultation with industry stakeholders. B0-ACAS (Airborne Collision Avoidance Systems Improvements) and B0-SNET (Increased Effectiveness for Ground-based Safety Nets) are Block 0 modules that will be implemented by Hong Kong, China in accordance with the IP based on our operational	i) Japan has already implemented the ground based safety nets.	ACAS is included in Civil Aviation Rules Part 121/125. Airways Corporation has implemented Minimum Safe Altitude Warning in its systems.	i) The carriage of ACASII is mandated in Singapore FIR. Similarly, ground based safety nets such as Short Term Conflict Alert are already in place in the ATM system.	Acknowledged.	The FAA has implemented Block 0 modules including those relating to ground surveillance, improved ATSA and access to optimum flight levels	The Seamless ATM recognises B0-SNET as a priority 2 element and also B0-ACAS as a priority 2 element, noting the requirement for forward fit from 01 January 2014 and retrofit by 01 January 2017 of aircraft ACAS installations with an upgraded collision avoidance logic known as TCAS V7.1 Followp-up through SAORP

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	PIRGS/States/International Organizations (IO)										
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; 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; f) develop an ICAO Manual for Ground-based Safety Nets, which includes provision for tools for validation and certification of these; g) incorporate the new generation of airborne collision avoidance system (ACAS X) into its work programme; 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); That States: 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.	i): States to implement the ASBU modules relating to ACAS and ground based safety		systems to include: - Short-term conflict alert (STCA) using data from available surveillance sensors such as Radar, WAM and ADS-B - Area proximity warning (APW) - Minimum safe altitude warning (MSAW) - Route adherence monitoring (RAM) - Cleared level adherence monitoring (CLAM) - Selected level mismatch (using Mode C, Mode S and ADS-B data). The Asia/Pacific Seamless ATM Plan has set target date for implementation of the ground-based safety nets by PASL Phase II		needs.						

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	PIRGS/States/International Organizations (IO)										
	nets included in Block 0.		(expected implementation by November 2018).\n\nThis could be done at the same time as upgrading the ATC system to support ADS-B.\n\nThis recommendation supports ACAS-X which uses ADS-B to improve ACAS performance. An ADS-B fitment mandate across the APAC region would improve the effectiveness of these ACAS-X capabilities.								
Recommendation 4/4 – Positioning and tracking over oceanic and remote areas, and flight data triggered transmission\n\nThat ICAO:\n\na) 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 operations; and\n\nb) develop suitable proposals for the amendment of ICAO documents, as necessary.	a) and b): Note.			ICAO Actions only.							

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated — PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
Recommendation 4/5 – Civil/military coordination / cooperation and sharing of airspace That States: 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: 1) capacity increases and reduction in routine delays as measured by traffic volumes on major traffic flows; 2) document fuel savings and emission reductions through the use of the fuel savings estimation tools; and 3) other additional benefits; b) based on the analysis made by 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; 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;	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. b): States to develop plans to implement improvements for the cooperative use of airspace on the basis of analysis made by States /PIRGs and ICAO. c): PIRGs and States to identify the top areas of		APAC could consider encouraging the sharing of ADS-B data between civilian and military authorities, including those from neighbouring States, to support a common view of the airspace. Engagement of the military in ADS-B could lead to improved co-ordination and increased airspace sharing. Use of ADS-B data provided by the civilian authority could fill surveillance gaps in the military system (at least as far as civilian traffic is concerned). Guidance materials on advice to military authorities	In Australia the cooperation between civil and military is optimising utilisation of airspace. The OneSky Australia project is a collaborative between the Australian Department of Defence and Airservices Australia.	b & c) A direct communication mechanism has been established between Hong Kong ATC and the relevant military unit to facilitate civil/military coordination on the use of Hong Kong airspace at tactical level.	b) Temporary airspace resrvation for joint use both US Force and Japan Self Defense Force is under consideration among relevant authority to meet civil/military requirement. Operational trial will be implemented by the end of 2014. c) Training airspace user deconflict their schedule by using scheduling tool in some location. Based on it, JCAB operates Conditional Routes (CDR) when airspace not used. JCAB has prioritized to establish CDR at most	Addressed in the National Airspace Policy, and handled under Civil Aviation Rules Part 71.	b) Regular meetings and close cooperation between civil and military ATC are carried out at various levels to allow both to operate efficiently. c) Singapore supports APANPIRG's efforts to achieve the region's targets to improve civil/military cooperation c) Singapore will support the APANPIRG's work-plan to achieve the appropriate targets to improve civil/military cooperation	Acknowledged. Thai civil and military units have worked closely in order to improve the cooperation and share the airspace to optimize the use of it.	The United States routinely analyses and optimizes the use of airspace for military and civil purposes. The mechanisms the FAA and the Department of Defense have in place to ensure cooperative sharing of airspace enable ready identification of areas for improvement. Furthermore, FAA Air Route Traffic Control Centers work closely with the military and their FAA Service Centers to resolve military airspace requirements for operational exercises, tests, and training with least impact on civil air traffic flows. This ANC 12 recommendation is directed at States that do not have civil/military cooperation mechanisms in place that ensure optimum sharing of airspace.	

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That ICAO: d) develop a set of criteria or metrics to enable objective measurement of progress in civil/military cooperation; and 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.	opportunity that could benefit the most from improvements in civil/military cooperation and sharing of the airspace and develop concrete targets for improvement d) and e): Note.		regarding ADS-B data sharing has been developed and published.			beneficail route so that the number of aircraft is increasing so far.				However, if ICAO PIRGs identify any areas for improvement of civil/military cooperation in US controlled airspace, FAA AJR-2 will facilitate coordination with the military to ensure the issues are addressed by the appropriate FAA facilities and military units.	
Recommendation 4/6 – ICAO aviation system block upgrades relating to integration of remotely piloted aircraft into non-segregated airspace That the Conference: 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; 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; That ICAO: 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;	c) to e): Note.		According to ICAO Annex 2 – Rules of the Air, "remotely piloted aircraft" is defined as "an unmanned aircraft which is piloted from a remote pilot station". When operated above 400ft, beyond visual line of sight, "remotely piloted aircraft" should be operated under the IFR and be equipped with the appropriate surveillance	Australia is actively participating with ICAO and other fora.	g) At the moment, there is no urgent need to integrate RPAS operation into non-segregated airspace in the Hong Kong FIR. Hong Kong, China will keep in view the development of relevant ICAO provisions and work closely with other States/Administration to ensure harmonization of provisions should such need arises.	g) We work with ICAO and other States through the participation in Unmanned Aircraft System Study Group of ICAO.	New Zealand participates in the ICAO Unmanned Aircraft Systems Study Group.	Singapore is an active member of the ICAO UAS Study Group, and is committed to continue working with States and ICAO to develop a harmonised regime to facilitate RPAS operations	Acknowledged. Thailand is under the consideration process of issuing rules and regulations regarding the Remotely Pilot Aircraft System.	The FAA supports this initiative by participating in the ICAO Unmanned Aerial Systems Study Group (UASSG).	

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d) investigate the need for and scope of oversight of datalinks related to command, control and air traffic control communications for remotely piloted aircraft systems; 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 *Global Air Navigation Plan* (Doc 9750, GANP); That States: f) be cognizant of the recent amendments to Annexes 2 — *Rules of the Air* and 7 — *Aircraft Nationality and Registration Marks* related to remotely piloted aircraft systems and to support the continuation of this work at ICAO; 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.	f):Note g) States to work closely with ICAO and each other to ensure harmonization of provisions if they have an urgent need to accommodate RPAS operations.		technology for the class of airspace. The APANPIRG publication of such a rule could avoid the costs of an expensive retrofit in the future. The time is right for ADS-B SITF to deliberate such a strategic move.								
Recommendation 4/7 – ICAO aviation system block upgrades relating to meteorological information That the Conference: 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				Australia will implement meteorological related ASBU based on operational needs. Australia is active	g) Hong Kong, China has implemented ASBU B0-AMET. h) A Plan is being developed to implement ASBU	g) Already impremented. h) CARATS are supporting toward the implementation of the ASBUs relating to	Addressed in the National Airspace and Air Navigation Plan. New Zealand participates widely in international aviation	g & h) Singapore has implemented B0-AMET and is working closely with the MET Services Singapore to enhance ATM	Noted.	g) The FAA supports the ASBU and is leading the development of Roadmaps for volcanic ash and the World Area Forecast System and supports	

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ICAO uses it as the basis of its work programme on the subject; 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; That ICAO: 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 *Global Air Navigation Plan* (Doc 9750, GANP); d) undertake the development of the air traffic management meteorological information integration plan and an associated roadmap by a cross-disciplinary group of experts; e) work on defining the meteorological information exchange model as an enabler for system-wide information management; f) invite the next Meteorology Divisional Meeting, held in coordination with the World Meteorological Organization, to develop initial provisions in Annex 3 — *Meteorological Service for International Air Navigation* 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; That States: g) according to their operational needs, to implement the aviation system block upgrade module relating to meteorological information included in Block 0,	c) to f): Note. g): States , according to their operational needs, to implement the			in ICAO and other fora developing SARPs and promoting implementation.	Block 1 and 3 relating to meteorological information. Education and training investment will be enhanced as necessary.	meteorological information.	meteorology working groups.	operations		the provision of OPMET data via the World Area Forecast System File Service (WIFS) h) The FAA in cooperation with the NWS supports computer based training that is accessible to all aviation weather meteorologist to further improve their skills and is ensuring that the meteorological services provided by the United States as defined in the ASBU are in harmony as practicable with U.S. National practices.	

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including the addition of the provision of OPMET information;	ASBU module relating to meteorological information included in Block 0, including the addition of the provision of OPMET information;										
h) work together in the implementation of the aviation system block upgrades relating to meteorological information and to increase investment in education and training.	h) work together in the implementation of the ASBU relating to meteorological l information and to increase investment in education and training.										
Recommendation 4/8 – Crisis coordination arrangements and contingency plans That ICAO: 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 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.	a) and b): Note.			ICAO Actions only.							

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RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated — PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
Recommendation 5/1 – Improved operations through enhanced airspace organization and routing Considering that performance-based navigation (PBN) is one of ICAO's highest air navigation priorities and the potential benefits achievable through creation of additional capacity with PBN: That States: a) implement performance-based navigation in the en-route environment; b) fully assess the operational, safety, performance and cost implications of a harmonization of transition altitude and, if the benefits are proven to be appropriate, undertake further action on a national and (sub) regional basis a first step towards a globally harmonized transition altitude; c) take advantage of improved models for inter-regional coordination and collaboration to achieve seamless air traffic management and more optimum routes through the airspace; d) through the planning and implementation regional groups improve their methods of coordination to increase implementation of en-route performance-based navigation in order to achieve more optimum routes through the airspace; That ICAO: e) encourage the planning and implementation regional groups to support the early deployment of performance-based navigation in accordance with	a): States implement PBN in the enroute environment b) : States fully assess the operational, safety, performance and cost implications of a harmonization of transition altitude and, if the benefits are proven to be appropriate, undertake further action on a national and (sub) regional basis a first step towards a globally harmonized transition altitude; c): States and PIRGs take advantage of improved models for inter-regional coordination and collaboration to			PBN operations to enhance the flexibility of airspace taking to account safety, performance and economics. Australia with partners in ASIOACG have recently implement User Preferred Routes in the Indian Ocean. PBN is being implemented but airspace implementation and optimisation will become effective from 2016. Regional coordination for PBN implementation and harmonisation needs to be improved.	a) Hong Kong, China has implemented six RNP10 / RNAV5 routes. In addition, Hong Kong, China has issued an AIC in 2012 announcing the mandatory requirement for all aircraft operating at or above FL290 in the Hong Kong FIR to be approved for RNP 4 with effect from December 2014. b) Only one single transition altitude is in use across the whole Hong Kong FIR. c) Hong Kong, China will closely monitor the progress of development of the models for inter-regional coordination and collaboration. d) Hong Kong, China actively participates in the coordination fora	a) Implementation PBN in the enroute environment is under consideration. b) A globally harmnized transition altitude might be useful, but the implementation of it needs futher assessment and is under considertation. c) JCAB has tried to take advantage of improved models in order to achieve seamless ATM. d) JCAB has participated in APANPIRG and has been cooperating for improving their methods of	Addressed in the National Airspace and Air Navigation Plan, and by Airways Corporation's PBN implementation.	a) Singapore has been progressing well with enroute PBN and working closely with our neighbours to achieve harmonization b) The determination of transition altitude is contingent on the environmental factors unique to geographical locations. Given the diversity of aerodrome elevation in various location, global harmonization of transition altitude might not be practicable and might not yield significant benefits in operations, safety, performance and cost. c) Singapore is an active participant of APANPIRG and contributed to the	Thailand has harmonized the transition altitude and continued to support the implementation of PBN, including participation in regional and sub-regional coordination and collaboration; particularly in ASEAN to achieve seamless air traffic management.	The FAA has implemented PBN in the enroute environment. c) & d) Gulf of Mexico Route Restructure 10 January 2013 Gulf of Mexico route restructure successfully implemented. The new routes are spaced 50NM apart, which supports reduced lateral separation from 100NM to 50NM in the GoMex. The Project was coordinated by the En Route and Oceanic Services Group over a 3-year period with industry, ICAO Mexico City and ICAO Caribbean Working Groups.	e/ and f/ The Asia/Pacific Seamless ATM Plan contains extensive expectations to implement PBN based and performance-based airspace within the Asia/Pacific (incorporating the Asia/Pacific Regional PBN Plan). The Asia/Pacific Regional Sub-Office is actively studying proposals to implement improved ATS structures using PBN as a key enabler. Follow-up through SAORP

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Assembly Resolution 37-11; f) support, through development of a framework that capitalizes, builds on, and promotes demonstration activities which confirm the benefits of performance-based navigation as an enabler of more efficient operations in the en-route phase of flight; and g) that avionics incorporate fixed radius transition functionality to support closer spacing of performance-based navigation routes and improve airspace capacity.	achieve seamless air traffic management and more optimum routes through the airspace; d): States and PIRGs improve their methods of coordination to increase implementation of en-route performance-based navigation in order to achieve more optimum routes through the airspace; e) and f): Note. g): Note				organized by ICAO RO to facilitate the regional implementation of en-route performance-based navigation.	coordination.		development of the APAC Seamless ATM Plan. d) Aside from regular ICAO ATM coordination forums, Singapore also actively participates in informal multilateral ATM coordination meetings to achieve more optimum routes through the airspace			
Recommendation 5/2 – ICAO aviation system block upgrades relating to trajectory based operations That the Conference: a) endorse the aviation system block upgrade module relating to trajectory-based operations included in Block 1 and ICAO use it as the basis of its work programme on the subject; b) agree in principle with the aviation system block upgrade module relating to 4D trajectory-based				Australia supports ICAO in the development of SARPs including those associated with TBO. TBO are limited pending ICAO completing the development of the Time of Arrival	d) Hong Kong, China supports the development by ICAO of SARPS and guidance material related to TBO. e) As the Hong Kong FIR is fully covered by radar surveillance and	d) For development of TBO in the ASBUs, Japan has supported the improvement of ICAO SARPs and the guidance materials such as GOLD,	Airways Corporation will implement as required.	d) Singapore supports the development by ICAO of SARPS and guidance material related to TBO. e) Singapore has implemented the related ASBU module relating to	Thailand has a plan to implement trajectory-based operations in the near future.	User Preferred Route (UPR) Implementation: 15 March 2013 PACOTS Track C and E were merged which resulted in development of overall more efficient westbound PACOTS tracks between North America and Japan	e/ The Asia/Pacific Seamless ATM Plan has recognised B0-TBO as a priority 1 element for implementation, so the Preferred ATM Service Levels (PASL) has an expectation that within Category R airspace, ADS-C

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	PIRGS/States/International Organizations (IO)										
operations included in Block 3 as the strategic direction for this subject; That ICAO: c) include, following further development and editorial review, the aviation system block upgrade module relating to 4D trajectory-based operations in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); That States: d) support development by ICAO of Standards and Recommended Practices and guidance material related to trajectory-based operations; and e) implement, according to their operational needs, the aviation system block upgrade module relating to trajectory-based operations included in Block 0.	c): Note. d): support development by ICAO of SARPs and guidance material related to TBO e): States implement, according to their operational needs, the ASBU module relating to TBO included in Block 0.			Control section in the PBN Manual.	the operational needs are satisfied, the ASBU module relating to TBO included in Block 0 (i.e. ADS-C, CPDLC) is not applicable.	as a member of ICAO OPLINKP. We are reflecting our operational experience of ADS-C, CPDLC over the Oceanic Airspace in the Fukuoka FIR to the panel activities. e) Japan has implemented ADS-C, CPDLC over the Pacific Ocean in cooperation with ANSP and the stakeholders concerned. According to the CARATS program, we will expand the current CPDLC operation to continental airspace in 2021.		Datalink. ADS-C and CPDLC based on FANS 1/A is in operation within Singapore FIR.		(average fuel burn savings of 509kg (1120lbs) per flight) 25 July 2013 UPRs associated with Pacific Organized Track System (PACOTS) Tracks F (Japan to US) in the Oakland Oceanic FIR (summer savings 880 kg fuel burn and winter savings 299 kg fuel burn) Enhanced Automation Capabilities to provide automation support to oceanic air traffic control that will enable airspace users to fly closer to their preferred 4D trajectories. ATOP Surveillance Airspace Capability; SWIM Interfaces capability; User Trajectory Planning in the pre-oceanic phase that enables interactive flight plan collaboration between the airspace users and the FAA in which the airspace user informs the FAA of his intended 4D	surveillance and CPDLC should be enabled to support PBN-based separations, as well as UPR and DARP, target 12 November 2015. Follow-up through SAORP

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										oceanic trajectory and receives feedback prior to the flight's entry into oceanic airspace (whether pre-departure or in-flight) about the likelihood of achieving that trajectory based on other oceanic flights' intended trajectories.	
Recommendation 5/3 – Increased flexibility and efficiency in descent and departure profiles That the Conference: a) endorse the aviation system block upgrade module relating to continuous descent operations included in Block 1; b) agree in principle to the aviation system block upgrade module relating to continuous descent operations included in Block 2; That ICAO: 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 *Global Air Navigation Plan* (Doc 9750, GANP); d) incorporate the point merge technique as an interim continuous descent operations measure in Block B0-05;	c) and d): Note e):States, as supported by their operational requirements and a positive business case, implement according to their			Australia is evaluating CCO, CDO and terminal area procedures and will implement procedures based on evaluation. CCO and CDO need to be included in the terminal area Airspace Concept.	e) CDO profiles have been incorporated into most RNP AR APCH procedures in Hong Kong, China and will be further introduced gradually in certain applicable STARs in Hong Kong FIR. Hong Kong, China will consider applying the CCO profiles for departures where appropriate, subject to satisfying safety and traffic capacity considerations. f) Hong Kong, China will keep in	e) JCAB had been implemented CDO procedure in KANSAI AP and started operational trial at NAHA AP. (Both night operation only) We concluded to implement CDO at New-Chitose, Narita, Haneda, and Chubu airports since 2021 according to CARATS. In the future implementation, Continentail CDPLC will be utilized.	Addressed by Airways Corporation's PBN implementation.	e) Singapore has implemented CDO procedures for arrivals into change since 2012. Subsequent reviews of SIDs and STARs will take into consideration the design principals to incorporated CCO/CDO profiles f) Singapore is actively exploring concepts and techniques towards achieving full CDO.	Thailand has already implemented Continuous Descent Operations (CDO) at Chiang Mai and Hat Yai International Airport. Furthermore, we are developing plan to provide service in line with ASBUs Strategy including Continuous Climb Operations (CCO) and Point Merge will be implemented in the near future.	Tailored Arrival Implementation. TAs adapted at San Francisco (KSFO), Los Angeles (KLAX) and Miami (KMIA) will be transitioned from an operational evaluation to an implementation. The implementation of TA is a first step toward 4D trajectory operations in the arrival domain. Future enablers of the TA Project will include new and advanced ground automation assistance.	

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That States: 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 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).	operational needs as a matter of urgency, the ASBU modules relating to CCO and CDO included in Blocks 0 and 1. 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,				view the latest development and review the STARs where appropriate.	f) Point merge technique is under consideration.					
Recommendation 6/1 – Regional performance framework – planning methodologies and tools That States and PIRGs: a) finalize the alignment of regional air navigation plans with the Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP) by May 2014; b) focus on implementing aviation system block upgrade Block 0 Modules according to their operational needs, recognizing that these modules are ready for deployment;	a): States and PIRGs finalize the alignment of regional air navigation plans with the Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP) by May 2014;		APANPIRG should focus on implementing ASBU Block 0 Modules according to States' operational needs. ADS-B related ASBU Block 0 modules are ready	Australia participates in APANPIRG and through this groups is contributing to objectives a) to e)	(a) APANPIRG/24 invited the Chairpersons of ATM, CNS, MET and RASMAG sub groups to establish regional priorities and targets for the APAC Region in alignment with the GANP and APAC Seamless ATM Plan for submission	a) JCAB participate APANPIRG in which address the finalize the alingment of regional air navigation plans. b) JCAB has implemented	Addressed in the National Airspace and Air Navigation Plan.	a) Singapore will review its national plan to align with the regional air navigation plan. b) Singapore has implemented the relevant ASBU Block 0 modules in accordance with our ATM Masterplan and the	We are developing a plan to provide service in line with ASBUs Strategy and will continue our support to APANPIRG and ICAO.	a) The FAA publishes the NextGen Implementation Plan every year. NextGen Implementation Plan is the future air navigation plan. The FAA has been the major contributor to create GANP and its NextGen Implementation Plan	The WP on Seamless ATM Reporting and Monitoring, and WP regarding the eANP detail the regional expectations of monitoring, and integration with the e-ANP being developed. The monitoring provides a mechanism for

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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; d) involve regulatory and industry personnel during all stages of planning and implementation of aviation system block upgrade modules; 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; That ICAO: 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 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; h) develop guidance material, on the basis of best practices employed worldwide, for the regional/local deployment of new ATM technologies, required procedures, operational approvals and continue to support States in the implementation of the aviation system block upgrades; i) identify the issues, funding, training and resource requirements necessary to support a safety framework that would lay the foundation for	b): States and PIRGs focus on implementing ASBU Block 0 Modules according to their operational needs. 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; d) States and PIRGs involve regulatory and industry personnel during all stages of planning and implementation of ASBU modules; e) States and PIRGs develop action plans to		for deployment including : - B0-ASUR (Initial capability for ground surveillance) using ADS-B/MLAT - B0-SNET Increased Effectiveness of Ground Based Safety Nets - B0-ASEP Air Traffic Situational Awareness (ATSA) - B0-OPFL Improved Access to Optimum Flight Levels Through Climb/Descent Procedures Using ADS-B (ITP) The Asia/Pacific Seamless ATM Plan has set the priorities and timeline in implementing the above modules.		to ICAO by May 2014. Hong Kong, China has been actively involved in the relevant discussions on establishing the regional priorities and targets. (b), (d) and (e) Hong Kong, China has established the ASBU Planning and Implementation Committee since February 2013 with participation from various aviation stakeholders. The Committee meets regularly to keep the aviation stakeholders abreast of the latest development in the ICAO ASBU framework and solicit their full support to its implementation. Two industry briefings were arranged in May 2013 to facilitate different groups of aviation stakeholders to	ASBU Block 0 Modules according to the operational Needs c) The electornic regional air navigation plans are not yet in operation in Asia/Pacific region, so we have not yet used it. d) CARATS has been progressed with the participants from industry-governmentacademia. e) Such case hasn't occurred now.		APAC Seamless ATM Plan. c) Singapore will support the use of an electronic regional air navigation plan implemented by APANPIRG. d) Singapore has in place a systematic framework of engaging relevant stakeholders during all stages of our ATM masterplaning process. e) The Singapore ATM Masterplan addresses Singapore's long term ATM modernisation needs. It is also aligned with the APAC Seamless ATM Plan which addresses the ATM modernisation needs of the region.		is fully aligned with the GANP. b) The FAA's operational needs require the implementation of all or some portion of 18 ASBU Block 0 modules. It has implemented a significant portion of ASBU Block 0 modules by December 2013. c) The FAA fully intends to follow the ICAO-provided electronic regional air navigation plans when available. d) The FAA has been and will continue to involve regulatory and industry personnel during all stages of planning and implementation of ASBU modules. e) The FAA plans to develop action plans to address the identified impediments to air traffic management	identifying implementation issues and improvements. ANRF are being developed for all key ASBU elements, plus Search and Rescue, which is not currently an ASBU element

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
	PIRGS/States/International Organizations (IO)										
successful implementation the aviation system block upgrades; 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; k) develop a mechanism for sharing of best practices for the aviation system block upgrade implementation; and 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.	address the identified impediments to air traffic management modernization as part of aviation system block upgrade planning and implementation activities; f) to l): Note j): Note				better understand the ASBU modules. An Implementation Plan (IP) on ASBU Block 0 modules in accordance with the operational needs of Hong Kong, China has been endorsed by the Committee during its 2nd meeting held in Aug 2013. Action plans to support the IP have been developed and will be regularly reviewed during the Committee Meetings. (c) Hong Kong, China supports use of the electronic regional ANPs as the primary tool to assist in the implementation of the agreed regional planning framework for air navigation services and facilities, once the tool becomes ready.					modernization as part of aviation system block upgrade planning and implementation activities.	

FOLLOW-UP TO AN-CONF/12 RECOMMENDATIONS

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated — PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
Recommendation 6/2 – Guidelines on service priority That: 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 b) States and international organizations contribute to this work.	a) and b): Note		APANPIRG could obtain some quick wins by promulgating a view that aircraft equipped with ADS-B have service priority over those that don't (i.e. better equipped, better served). This will increase the business case for equipage. The above has already been reflected in the ADS-B mandate published by States (e.g. non-ADS-B equipped aircraft is required to fly outside the ADS-B airspace)	Noted. "Best equipped, best served" needs to become reality.						The FAA continues to conduct analyses in coordination with relevant ATM stakeholders for the implementation of aeronautical systems.	
Recommendation 6/3 – Assessment of economic, financial and social implications of air traffic management modernization and aviation system block upgrades deployment That ICAO: a) undertake work toward developing a network-wide operational improvement level assessment for global use, which should include the development	a) and b): Note			Australia undertakes appropriate economic, financial and social analyses including wide consultation in changes to the aeronautical	c) Hong Kong, China has committed to an air traffic management modernization programme, with the new Air Traffic Management System targeted	c) Promoting in a coordinated mannner with airlines.	Addressed in Civil Aviation Rules Parts 171 and 172.	Singapore has in place a framework to systematically engage ATM stakeholders at key stages of the planning process to implement aeronautical systems - from	Noted.		

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	PIRGS/States/International Organizations (IO)										
of standard values and processes for economic evaluations; 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; That States: 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.	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			navigation system.	to be commissioned in 2014/15. Hong Kong, China will deploy relevant ASBU modules to gain operational benefits, in line with the ICAO ASBU roadmap.			inception to operationalisation.			
Recommendation 6/4 – Human performance That ICAO: 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;	a) to f): Note.			Australia considers human performance in the design, implementation and operation of new systems.	g) Pending specific guidelines provided by ICAO RO on this issue. h) Support in principle. i) Hong Kong, China adopts the ICAO Annex 19 SMS principles and ensures all essential	i)Japan conducts necessary consideration.	New Zealand will respond to requests for information from ICAO. Human factors and training requirements will be considered during the implementation of the various elements of the	g) Singapore will provide human performance data, information and examples of operational regulatory developments, as required, to ICAO where possible. h) Singapore supports ICAO	Acknowledged and will continue to support all ICAO activities.	g) Recent developments involving human performance include two reports • Recommendations of the Flight Deck Automation Working Group that address, for current and projected operational use, the safety and	

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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; 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 to address both current safety priorities and the challenges of future systems and technologies; 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; e) establish provisions for fatigue risk management for safety within air traffic services operations; f) develop guidance material on different categories of synthetic training devices and their respective usage; That States: g) provide human performance data, information and examples of operational and regulatory developments to ICAO for the benefit of the global aviation community; h) support all ICAO activities in the human performance field through the contribution of	g): States provide human performance data, information and examples of operational and regulatory				elements including human capabilities and limitations are accounted for when introducing new components (airspace procedures and ATC systems) into the operation system. In this regard, controller consultation, rigorous assessment and testing are conducted prior to implementation. For ATM/CNS systems, Hong Kong, China has taken into account human factors including human capabilities and limitations in the design and implementation of the ATM/CNS systems, and has identified requirement for human intervention to maintain optimum safety and efficiency.		National Airspace and Air Navigation Plan.	activities in the human performance field where possible. i) Singapore takes into consideration human performance when implementing ATM initiatives, so as to achieve a balance approached to enhancing efficiency j) Singapore has in place a comprehensive programme to train and upgrade the skills and knowledge of aviation professionals.		efficiency of modern flight deck systems for flight path management. The report was published September 5, 2013 and is available at the following web page: http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/parc/parc_reco/media/2013/130908_PARC_FltDAWG_Final_Report_Recommendations.pdf • Guidance in the design and evaluation of avionics displays and controls reported in a single source document for human factors regulatory and guidance material for flight deck displays and controls. The report was published November, 2013 and is available at the following web page: http://ntl.bts.gov/lib/50000/50700/50760/General_Guidance_Document_Nov_2013_v	

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	PIRGS/States/International Organizations (IO)										
human performance expertise and resources; i) adopt airspace procedures, aircraft 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 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.	developments to ICAO. h) States support all ICAO activities in the human performance field through the contribution of human performance expertise and resources. i) States adopt airspace procedures, aircraft systems, and space-based/ground-based systems that take into account human capabilities and limitations and that identify when human intervention is required j) States investigate methods to encourage adequate numbers of high				j) Hong Kong CAD puts in great efforts to strengthen our training hardware as well as software for aviation professional training. To enhance training in the aviation professionals in order to sustain long-term development of the aviation industry, Hong Kong, China has commenced a feasibility study on the proposed establishment of a Civil Aviation Training Institute (CATI) with the objective of providing systematic aviation training for young generation and professionals both locally and in the region, and to strengthen the aviation professional workforce.					1.pdf • The FAA published 14 CFR 25.1302 titled "Installed Systems and Equipment for Use by the Flightcrew" in order to provide guidance for the design and methods of compliance for installed equipment on transport airplanes intended for use by the flightcrew. The document was published on May 5, 2013 and is available at the following web page: http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_25.1302-1.pdf • The FAA published changes to 14 CFR Part 121 14 CFR Part 121 Qualification, Service and Use of Crewmembers and Aircraft Dispatchers: Final rule. h) The FAA supports ICAO in addressing	

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	PIRGS/States/International Organizations (IO)										
	quality aviation professionals of the future and ensure training programmes are in line with the skills and knowledge necessary.				The Training Unit of Hong Kong ATC also adopted the Quality Management System (ISO9001) to ensure the quality of our aviation training programmes meet the highest standard requirements.					human performance challenges including pilot fatigue and color vision. Regarding pilot fatigue, following the Colgan Air, Flight 3407 accident near Buffalo, New York on February 12, 2009, the FAA has readdressed and approached the pilot fatigue topic with the focus to successfully resolve and implement new regulations. The new Flightcrew Member Duty and Rest Requirements; Final Rule was released to the industry with an effective date of January 4, 2014. The new rule recognizes factors that lead to fatigue in most individuals are the same for all people and regulates these factors to ensure that flightcrew members in passenger operations do not accumulate dangerous amounts of fatigue. Beyond	

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	PIRGS/States/International Organizations (IO)									how ICAO has implemented their Fatigue Risk Management System (FRMS) Standards and Recommended Practices (SARP), the U.S. 14 CFR Part 117 offers the provision for an optional FRMS to safely conduct specific flight operations not available within regulatory limits. Regarding pilot color vision, the FAA Civil Aerospace Medical Institute (CAMI) developed and recommended acceptance of three new precision color vision screening tests for use at the Regional Flight Surgeons offices and/or at national test sites. i) The FAA released several documents that address human capabilities and limitations. For air traffic control systems this includes the following two	

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	PIRGS/States/International Organizations (IO)										
										documents:	
										• The FAA Human Factors Design Standard consolidates human factors knowledge, practice, and prior experience for application to new systems and equipment. It is used by the FAA in the acquisition of systems, equipment, and software. It can be tailored to accommodate different types of acquisitions. It can also be tailored to accommodate domestic norms, for example, in the United States the color red has a unique meaning for warning necessitating immediate attention. It is available on the internet at: http://www.hf.faa.gov/hfds.htm.	
										• The FAA Human Factors Acquisition Job Aid explains processes supporting	

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	PIRGS/States/International Organizations (IO)										
										the integration of human factors across the acquisition life cycle. It is available on the internet at: http://www.hf.faa.gov/docs/508/docs/jobaid.pdf. Accounting for human capabilities and limitations for flight deck displays and controls, as described above in item g, is a report available on the internet at: http://ntl.bts.gov/lib/50000/50700/50760/General_Guidance_Document_Nov_2013_v1.pdf. j) The FAA encourages development of the future aviation workforce in different ways including supporting academic centers of excellence and schools participating in the Collegiate Training Initiative that provides basic understanding and skills in air traffic	

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	PIRGS/States/International Organizations (IO)									control. The FAA continues to investigate methods to ensure air traffic control specialist training programs provide the necessary skills and knowledge for the future. Strategic analyses for mid-term (2018) implementation of NextGen determined the impact of NextGen on the job of air traffic control specialists. The Strategic Job Analysis for en route, terminal radar approach, and tower controllers showed NextGen primarily changes how the job is done but not what is done. That is, there is no change in job responsibilities in the mid-term. NextGen involves many new technologies, automation, and procedures so implementing NextGen will require a significant training effort. The Strategic Training Needs Analysis (STNA) assessed training	

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										plans for controller job tasks including required knowledge and skill. The STNA specified training requirements for a set of NextGen "drivers" to account for technology, automation, and procedures. The STNA also estimated the resources such as the number of labor hours needed to develop and implement NextGen related training.	
Recommendation 6/5 – ICAO work programme to support global navigation satellite system evolution That ICAO undertake a work programme to address: 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; b) identification of operational benefits to enable air navigation service providers and aircraft operators to quantify these benefits for their specific operational environment; and 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.	a) to c): Note			ICAO Actions only. Australia participates in the Navigation Systems Panel and actively supports multi-constellation system development.							

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	PIRGS/States/International Organizations (IO)										
Recommendation 6/6 – Use of multiple constellations That States, when defining their air navigation strategic plans and introducing new operations: 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; b) publish information specifying the global navigation satellite system elements that are approved for use in their airspace; c) adopt a performance-based 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; 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; That aircraft operators: 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.	a): States take advantage of the improved robustness and availability made possible by the existence of multiple GNSS constellations and associated augmentation systems; b) States publish information specifying the GNSS elements that are approved for use in their airspace; c) States adopt a performance-based approach with regard to the use of GNSS, and avoid prohibiting the use of GNSS elements that are compliant with		ADS-B robustness would be improved if multiple constellations could be used. APANPIRG could consider to request states to ensure that future ADS-B and GNSS mandates do not rely on a single constellation. ==When aviation standard multi constellation GNSS equipment/systems become available, ADS-B SITF could then develop guidance materials for use of multiple constellations to support ADS-B in APAC region==	Australia adopts a performance based approach. Australian regulations refer to the generic GNSS with no requirements to use any particular constellation. As systems are developed and compliance is demonstrated, authorisation for use will be issued. The need for equipment technical standards for use in the multi-constellation environment are needed.	Hong Kong, China takes note of the potential improvement in robustness and availability by use of multiple global navigation satellite systems constellations and associated augmentation systems. Subject to availability of Standards and Recommended Practices, Procedures and guidance materials from ICAO to address the emerging technical and operational issues related to interoperability among multiple global navigation satellite systems constellations and associated augmentation systems, Hong Kong, China will consider to	a) JCAB will consider to use multi GNSS b) Japan has specified the GNSS elements that for use in our airspace in operational approval standards based on ICAO PBN manual and Operational standards and requirements for the use of GPS. And Japan has published these standards. c) Japan has adopted operational approval procedures based on ICAO PBN manual. If the additional use of GNSS elements is	Addressed in the National Airspace and Air Navigation Plan and PBN Implementation Plan.	a) The Singapore ATM Masterplan takes into account current and future availability of multiple GNSS constellations and associated augmentation systems. b, c & d) Singapore adopts a performance based approach to GNSS implementation by requiring performance compliance with applicable ICAO SARPs. We are looking at the new MEOSAR as well as SATCOM voice which make use of multiple constellations.	Noted.	The United States will continue to provide GPS and its augmentations free of direct charges to all users for the foreseeable future and other States have made similar commitments. This provision is very important for improving the safety and efficiency of States that have limited air navigation infrastructure. Developing States may also achieve benefits from the improved capabilities provided by use of multi-GNSS services for essential business and infrastructure applications including aviation.	

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	applicable ICAO SARPs 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; 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				incorporate use of multiple global navigation satellite systems constellations and associated augmentation systems in our planning for implementation of satellite-based CNS technologies.	nessasary, Japan will assess whether the signal in space will satisfy ICAO SARPs and will consider the approval of the additional use of GNSS elements. d) Japan will carefully consider and assesss if mandates for equipage or use of any particular global navigation satellite system core constellation or augmentation system are necessary or appropriate.					
Recommendation 6/7 – Assistance to States in mitigating global navigation satellite system vulnerabilities That ICAO: a) continue technical evaluation of known threats to the global navigation satellite system, including space weather issues, and make the information available to States;	a) to d): Note.			ICAO Actions only. Australian radio regulations limit the risk of interference to GNSS to the minimum				a) Singapore is assessing the vulnerabilities of GNSS systems in the equatorial region. CAAS is looking at Implementation of RAIM.	Noted.		

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
b) compile and publish more detailed guidance for States to use in the assessment of global navigation satellite system vulnerabilities; 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 d) assess the need for, and feasibility of, an alternative position, navigation and timing system.				practicable and is enforced.				d) IDA is the authority regulating these equipment and they have a fairly strong regulatory framework. e) All our operators' aircraft are equipped with FMS (MMR) with ABAS (AAIM and RAIM FDE). Operation procedure stipulates satisfactory on-board RAIM check prior to commencing RNP approaches and for RNP AR operations pre-departure RAIM prediction is mandatory f) Singapore's policy is to retain the necessary ground navigation aids as part of our CNS mitigation strategies. Singapore also takes note of this scenario in granting operational approval.			

RECOMMENDATIONS ADOPTED BY AN-CONF/12	Follow-up action to be initiated PIRGS/States/International Organizations (IO)	Proposed Response/Actions By ACSICG/1	Proposed Response/Actions By ADS-B SITF	AUSTRALIA	HONG KONG CHINA	JAPAN	NEW ZEALAND	SINGAPORE	THAILAND	USA	REMARK (SECRETARIAT)
Recommendation 6/8 – Planning for mitigation of global navigation satellite system vulnerabilities That States: a) assess the likelihood and effects of global navigation satellite system vulnerabilities in their airspace and apply, as necessary, recognized and available mitigation methods; 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; c) report to ICAO cases of harmful interference to global navigation satellite system that may have an impact on international civil aviation operations; d) develop and enforce a strong regulatory framework governing the use of global navigation satellite system repeaters, pseudolites, spoofers and jammers; e) allow for realization of the full advantages of on-board mitigation techniques, particularly inertial navigation systems; and 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.	a) States assess the likelihood and effects of GNSS vulnerabilities in their airspace and apply, as necessary, recognized and available mitigation methods. b) States provide effective spectrum management and protection of GNSS frequencies to reduce the likelihood of unintentional interference or degradation of GNSS performance. c) States report to ICAO cases of harmful interference to global navigation			Australia has in place regulations to protect GNSS services from interference and a reporting requirement for instances of interference. Instances of reported interference to GNSS are few and generally related to on-aircraft issues. DME-DME is not considered a viable solution due to the topography of Australia. Further, many modern aircraft are not equipped with DME. For most smaller aircraft using integrated GNSS/COM/NAV systems, the most practicable alternate means of navigation are	(a) Hong Kong, China is in support of conducting risk assessment on global navigation satellite system vulnerabilities in our airspace and will apply recognized and available mitigation methods as necessary. (b) & (d) The Civil Aviation Department will continue to collaborate with our local spectrum regulatory authority (i.e. Office of the Communications Authority (OFCA)) in developing technical and regulatory arrangements to ensure effective spectrum management and protection of global navigation satellite system	a) JCAB will consider mitigation methods for GNSS vulnerabilities b) JCAB has been studying the implementation of GNSS interference monitoring system. c) Reporting process will be developed by ICAO NSP. e) It is is allowed to use inertial navigation systems for RNAV operation in accordance with ICAO PBN manual in case of GNSS failure. f) DME for RNAV and ILS are retained.	Addressed in the National Airspace and Air Navigation Plan and PBN rules.	a) Singapore is assessing the vulnerabilities of GNSS systems in the equatorial region. CAAS is looking at Implementation of RAIM. d) IDA is the authority regulating these equipment and they have a fairly strong regulatory framework. e) All our operators' aircraft are equipped with FMS (MMR) with ABAS (AAIM and RAIM FDE). Operation procedure stipulates satisfactory on-board RAIM check prior to commencing RNP approaches and for RNP AR operations pre-departure RAIM prediction is	Noted.	The FAA participates in many government/non-government fora regarding protection of GNSS services, and has created a dedicated team to study GNNS interference impacts to the National Airspace System as well as current and potential mitigations. The FAA has worked with, and will continue to collaborate with, International air navigation service provider partners on reporting to ICAO incidents of GNSS interference. U.S. agencies are presently coordinating activities to improve the current regulatory framework to better protect GNSS and to dissuade illicit use of GPS jammer-type devices. The FAA is heavily engaged to	

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	PIRGS/States/International Organizations (IO)										
	satellite system that may have an impact on international civil aviation operations. d) States develop and enforce a strong regulatory framework governing the use of global navigation satellite system repeaters, pseudolites, spoofers and jammers. e) States allow for realization of the full advantages of on-board mitigation techniques, particularly inertial navigation systems. f) States where it is determined that terrestrial aids are needed as part of a mitigation strategy, give			VOR and ILS. Larger aircraft will retain these systems but are also likely to be equipped with inertial systems. In decreasing numbers, NDB/ADF systems also provide an alternate means of navigation.	frequencies to reduce the likelihood of unintentional interference or degradation of GNSS performance. GNSS repeaters, pseudolites, spoofers and jammer device is not a licensable apparatus and is not allowed to be used in Hong Kong, China. Under the Telecommunications Ordinance (Cap.106), no person shall possess, use or deal in the course of trade any apparatus for radiocommunications unless a licence is granted by the local spectrum regulatory authority (i.e. OFCA). (c) Hong Kong, China will report to ICAO should			mandatory f) Singapore's policy is to retain the necessary ground navigation aids as part of our CNS mitigation strategies. Singapore also takes note of this scenario in granting operational approval.		increase the regulatory and enforcement actions of appropriate U.S. officials, with a focus on addressing GNSS jamming. Future activities will consider other modes of impact to GNSS. The FAA is actively exploring on-board aircraft systems, as well as external systems, to address identified issues. The FAA intends to retain DME systems and encourages inertial systems equipage if affordable. The FAA is exploring future Alternative position, navigation, timing (PNT) systems and plans to retain a VOR minimum operational network for the indefinite future.	

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	PIRGS/States/International Organizations (IO)										
	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				cases of harmful interference to global navigation satellite system that may have an impact on international civil aviation operations be found within its jurisdiction. (e) Hong Kong, China is in support of using on-board mitigation techniques to mitigate risks in the potential loss of GNSS service in our airspace. According to Article 14 of the Air Navigation (Hong Kong, China) Ordinance Cap448C, aircraft are required to install with: (i) automatic direction finding equipment; (ii) distance measuring equipment; and (iii) VHF omni-range equipment.						

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	PIRGS/States/International Organizations (IO)										
					For determination of aircraft position. (f) In our strategy for implementation of CNS systems, all the existing DMEs will be retained to ensure adequate terrestrial navigation aids to mitigate the potential loss of GNSS service for maintaining safety.						
Recommendation 6/9 – Ionosphere and space weather information for future global navigation satellite system implementation That ICAO: a) coordinate regional and global activities on ionosphere characterization for global navigation satellite system implementation; 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; 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 system performance at a global context;	a) to c): Note.			Australia participates in the Regional Ionosphere study group and the ionospheric work of the Navigations Systems Panel.	Hong Kong, China has participated actively in the Ionospheric Studies Task Force (ISTF) since its first establishment under APANPIRG in Feb 2012 to collaborate with States to resolve ionospheric issues including ionospheric characterization for cost-effective, harmonized and regionally suitable global navigation satellite system	d) JCAB considered a collaborative approach to resolve ionospheric issues with the Research Instutute, and a study of ionospheric effect and space weather are carried out in coordination with relevant organizations by the Research Instutute	New Zealand notes that this issue is being addressed by the International Airways Volcano Watch group, in which New Zealand is a participant.		Noted.	The FAA will further mature the ICAO draft ConOps on Space Weather Information and support the proposed implementation of global space weather centers to provide this information to operators and ANSP.	ISTF addresses these points

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That States: d) consider a collaborative approach to resolve ionospheric issues including ionospheric characterization for cost-effective, harmonized and regionally suitable global navigation satellite system implementation.	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				implementation.						
Recommendation 6/10 – Rationalization of terrestrial navigation aids That, in planning for the implementation of performance-based navigation, States should: a) assess the opportunity for realizing economic benefits by reducing the number of navigation aids through the implementation of performance-based navigation; 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 c) align performance-based navigation implementation plans with navigation aid replacement cycles, where feasible, to maximize	a): States assess the opportunity for realizing economic benefits by reducing the number of navigation aids through the implementation of PBN; b) States ensure that an adequate		APANPIRG could consider to: a) publish a list of the approvals available to operators in different States. Eg: GNSS NPA approvals without requiring a conventional alternate. This could encourage other states to increase the useability of GNSS systems	Australia is implementing PBN. In consultation with industry. Australia is rationalising conventional navaids and retaining a back-up network.	APANPIRG/24 has endorsed the Navigation Strategy for the APAC Region which requires States/Administrations to: (i) "Convert from terrestrial-based instrument flight procedures to PBN operations in accordance with the Asia/Pacific Seamless ATM Plan" ; (ii) "rationalize terrestrial	a) The upkeep of navigation aids costs reduction is calculated based on the number of the decommissioning of navigation aids and reflected in budget cuts. b) Japan maintained necessary terrestrial navigation and air traffic management	Addressed in the National Airspace and Air Navigation Plan and PBN Implementation Plan.	a, b & c) In Singapore's implementation of PBN, we have in place a system of assessing the cost and benefit of CNS infrastructure in support of our operational needs.	Noted.	a) The FAA plans to disestablish NDBs, reduce the number of VORs to a minimum operating network and optimize the number of Cat I ILS. Through the implementation of WAAS a total benefits of $177 million (ref. 2009 WAAS Program Baseline) for VOR reductions are planned by WAAS enabling reduction or avoidance of maintenance costs associated with excess ground based navigation aids.	The Asia/Pacific Seamless ATM Plan contains reference (paragraph 5.42) to matters that States need to take into account when planning to migrate from terrestrial to space-based navigation aids.

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	PIRGS/States/International Organizations (IO)										
cost savings by avoiding unnecessary infrastructure investment.	terrestrial navigation and air traffic management infrastructure remains available to mitigate the potential loss of global navigation satellite system service in their airspace; and c) States align performance-based navigation implementation plans with navigation aid replacement cycles, where feasible, to maximize cost savings by avoiding unnecessary infrastructure investment.		b) APANPIRG could promote the synergy between ADS-B and GNSS equipage. ADS-B requires a high performance GNSS system. The business case of ADS-B and GNSS combined is better than for either alone. ADS-B SITF considered to develop guidance materials on this subject.		navigation aids, retaining a minimum network of terrestrial aids necessary to maintain safety of aircraft operations". Hong Kong, China is in support of this Navigation Strategy for the APAC Region, and has developed and published our roadmap for PBN implementation accordingly. In our strategy for implementing CNS systems, efforts will be made to de-commission some of the terrestrial aids and ground stations, rationalise the on-board CNS systems, and retain the essential terrestrial navigation aids in order to mitigate the potential loss of GNSS service	infrastructure c) Japan arranges both plan if needed.				Reductions in the number of ground based navigation aids and the associated cost savings began in 2010. In 2016, the FAA plans to make a decision on the optimum number and placement of Category I instrument landing systems (ILS) to be sustained indefinitely. It is anticipated that the total number of ILSs will be reduced. The size of this reduction will be the subject of studies to support the pending 2016 decision. b) The FAA currently plans to retain DME capability for the foreseeable future. The FAA is pursuing (Alternate Position Navigation and Timing) (APNT) capability that unlike NDB and VOR can continue to provide a Precision Based Navigation (PBN) capability in the event of a GNSS outage. The FAA has also	

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	PIRGS/States/International Organizations (IO)										
					for maintaining safety.					developed a formal plan for the reduction and potential disestablishment of VORs while understanding the need to retain a minimum operating network (MON). c) The FAA has an aging ground-based navaid infrastructure. Where possible reductions/elimination of ground-based navaids are achieved through attrition. Cost avoidance in sustaining the full complement of existing ground-based navaids is expected to help offset the cost of potential new APNT that can support PBN.	
Recommendation 6/11 – Regional performance framework – alignment of air navigation plans and regional supplementary procedures 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: 1) there will be no change to the current accreditation of the ICAO regional offices to Contracting States;	Note			ICAO Actions only.							

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2) there will be no change to the obligation of individual States to provide services in accordance with ICAO Annex 11 — *Air Traffic Services*, 2.1;											
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;											
4) there will be no change to the 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;											
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;											
6) there will be no change to ICAO's assistance to planning and implementation regional groups from the regional offices;											
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											
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 during flight.											

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Recommendation 6/12 – Prioritization and categorization of block upgrade modules That States and PIRGs: a) continue to take a coordinated approach among air traffic management stakeholders to encourage effective investment into airborne equipment and ground facilities; 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; That ICAO: 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; d) modify the block upgrade module naming and numbering system using, as a basis, the intuitive samples agreed by the Conference; and 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.	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 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		APAC States could agree to give higher service priority to ADS-B equipped aircraft than those that do not equip (i.e. better service, better served). States are encouraged to take a coordinated approach to implement ADS-B/WAM to bridge the existing surveillance gaps so as to apply end to end radar liked separation along major air routes. This can improve the business case for operators to equip. The above has already been reflected in the ADS-B mandate published by States (e.g. non-ADS-B equipped aircraft is required to fly outside the	Australia is working cooperatively with stakeholders to guide the evolution of air navigation.	Hong Kong, China has taken a coordinated approach among stakeholders to implement ASBU modules which include airborne equipment and ground facilities, according to our operational needs and the regional priorities. Hong Kong, China had established an ASBU Planning and Implementation Committee since February 2013 with participation from various aviation stakeholders. The Committee has formulated an Implementation Plan (IP) for 18 nos. of ASBU Block 0 modules in consultation with industry stakeholders. The Committee meets regularly to keep the aviation stakeholders abreast of the latest	a) Japan has established a future ATM plan named CARATS. Collaborative dicision making is conducted in this framework. b) Japan recognizes the inportance of considerate approach.		a) Singapore will continue to take a coordinated approach to engage stakeholders to encourage effective investment into airborne equipment and ground facilities b) Singapore is mindful of the need to adopt a harmonized approach taking into consideration aircraft operators' ability to equip themselves or attain the necessary operational approval. An example would be the implementation of ADS-B exclusive airspace.	Acknowledged and will conform to this recommendation.	a) The FAA will continue to take a coordinated approach among air traffic management stakeholders to encourage effective investment into airborne equipment and ground facilities. One of the examples of the approach is described in section b) below. b) The FAA has mandated ADS-B Out compliance, which enables aircraft to transmit flight information, by January 1, 2020. This mandate requires the investment by airspace users, thus FAA placed the preparation period of 10 years and established the NextGen GA Fund to support General Aviation.	

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	c): Note d): Note e): Note		ADS-B airspace)		development in the ICAO ASBU framework, and solicit full support from the stakeholders to the implementation of ASBU modules in Hong Kong, China. Hong Kong, China has taken a considerate approach when mandating avionics equipage taking into account of burdens on operators including foreign registry and the need for consequential regional/global harmonization. Mandate of avionics equipage for ADS-B and PBN in the Hong Kong Flight Information Region (HKFIR) has gone through the process in industry consultation including local operators and IATA with sufficient advance notice provided to the						

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	PIRGS/States/International Organizations (IO)										
					operators, and has been harmonized with the implementation plans of the regions.						
Recommendation 6/13 – Development of Standards and Recommended Practices, procedures and guidance material That ICAO: a) improve its project management and coordination of contributing ICAO panels, study groups and other expert groups, including task forces and other specialized teams tasked with the development of ICAO provisions and related work, through: 1) consistent application of the *Directives for Panels of the Air Navigation Commission* (Doc 7984); 2) receiving regular reports from the expert groups against agreed terms of reference and work programmes; 3) mandating strong coordination between all expert groups developing ICAO provisions to ensure efficient management of issues and avoidance of duplication; 4) application of the principles of accountability, geographical representation, focus, efficiency, consistency, transparency and integrated planning to the operation of all the expert groups; 5) developing documented procedures for other	a) to d): Note	APANPIRG has already structured its CRV project based on tasks and progresses its work mainly through use of portal and webconferences. **Action proposed: ACSICG to use virtual meetings as the main vector for progressing its work programme, projects and tasks.** APANPIRG has developed an ANRF for B0-FICE in which regional implementation and challenges are captured. **Action proposed: APANPIRG to**		ICAO Actions only. The ICAO Panel restructuring programme needs to be expedited and finalised to ensure timely coordinated work is carried out by the appropriate technical experts.						

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expert groups, including task forces and other specialized teams as well; and 6) better use of today's communication media and internet to facilitate virtual meetings, thereby increasing participation and reducing costs to States and ICAO; b) continue to coordinate with the other recognized standards-making organizations (Assembly Resolution A37-15 refers) in order to make the best use of the capabilities of these other recognized standards-making organizations and to make reference to their material, where appropriate; c) initiate studies to improve the verification and validation process required within ICAO before material developed by recognized standards-making organizations can be referenced in ICAO documentation; and d) consider a methodology by which ICAO can capture the regional implementation and challenges, and to reflect them in a standardized process to effectively support the aviation system block upgrade deployment.		**include the development of B1-SWIM ANRF in the Statement of Work of the Task "Develop SWIM APAC implementation framework**									
Recommendation 6/14 – Guidelines for conducting aeronautical studies to assess permissible penetration of obstacle limitation surfaces That ICAO develop comprehensive guidelines for States in the uniform application in conducting aeronautical studies to assess the permissible penetration of obstacle limitation surfaces (OLS).	Note			ICAO Actions only. Noted.							