International Civil Aviation Organization

SIXTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND METEOROLOGY SUB-GROUP (CNS/MET SG/16) OF APANPIRG

Bangkok, Thailand, 23 – 27 July 2012

Agenda Item 16: Review and update Performance Framework Objective and Forms

3) Review and update CNS/ATM Implementation Planning Matrix

CNS/ATM IMPLEMENTATION AND PLANNING MATRIX

(Presented by the Secretariat)

SUMMARY

This paper presents the Regional CNS/ATM Implementation and Planning Matrix for review and update by the Meeting.

This paper relates to -

Strategic Objectives
A: Safety - *Enhance global civil aviation safety*
C: Environmental Protection and Sustainable Development of Air Transport - *Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment*

Global Plan Initiatives:
GPI-9 Situational awareness
GPI-17 Data link applications
GPI-21 Navigation systems
GPI-22 Communication infrastructure

1. Introduction

1.1 The CNS/ATM Implementation Matrix lists status of implementation of various major CNS/ATM elements within the Region such as ATN/AMHS, AIDC, CPDLC, NAVIGATION, ADS-C and ADS-B. The matrix provides a good overview of the planning and implementation status of CNS elements. It also serves as a planning tool for monitoring the progress of implementation. States have been encouraged to provide their updates regularly through the Sub-group and Task Force meetings.

2. Discussion

2.1 The CNS/MET SG/15 meeting reviewed the updated CNS/ATM Implementation and Planning matrix. CNS/ATM Implementation Matrix was initially developed in accordance with APANPIRG Conclusion 11/37. The matrix was appended to APANPIRG/22 report (Appendix R) under agenda item 3.4.

3. Action by the Meeting

3.1 The meeting is invited to review and update the CNS/ATM Implementation and Planning Matrix provided in the Attachment.

– – – – – – – – – – – – –

CNS/ATM Implementation Planning Matrix

(Updated in July 2011)

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
AFGHANISTAN									
AUSTRALIA	ATN tests were conducted. BIS Router and Backbone BIS Router and AMHS implemented.	AFTN based AIDC Implemented between Brisbane and Melbourne, Auckland, Nadi and Auckland. AIDC is also in use between Melbourne and Mauritius.	Implemented and integrated with ATM systems to support FANS1/A equipped aircraft.	Implemented	Implemented		A total of 29 UAP and 14 WAM stations are used to provide a 5 Nm separation service and operational. ADS-B mandate applies from 12/2013 at and above FL290. Mandates for additional flight level are considered for 2015 & 2017. WAM operating in Tasmania. Commissioned in 2010. WAM being installed in Sydney to provide 3 Nm separation service and PRM which is expected to be operational 2011. ADS-B data sharing with Indonesia operational since 2/2011.	FANS 1/A ADS-C implemented.	

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
AUSTRALIA (Cont'd)							ASMGCS using multilateration operational in Melbourne & Sydney in 2010. Brisbane and Perth being installed.		
BANGLADESH	BIS Router and AMHS planned for 2011.	AIDC between Dhaka and CTG, Dhaka and Sylhet planned for 2011.		Not yet planned	Not yet planned		Not yet planned	Not yet planned	
BHUTAN	ATN BIS Router and UA service 2011.					Procedures developed for NPA.			
BRUNEI DARUSSALAM	ATN BIS Router planned for 2012 and AMHS planned for 2012.								
CAMBODIA	BIS Router and AMHS planned for 2011.	Planned 2009	Planned 2009			Procedure developed for NPA.			

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
CHINA	ATN Router and AMHS deployed in 2008. Tripartite BBIS trial completed with Bangkok and Hong Kong, China in Jan. 2003. ATN trial with Hong Kong using XOT over internet conducted in 2006, Further trials planned in 2009. AMHS/ATN technical tests with Macau completed in 2009. ATN/AMHS tests with ROK completed in 2010. ATN/AMHS tests with India are on-going. ATN/AMHS tests with Hong Kong, China planned in 2011.	AIDC between some of ACCs within China has been implemented. AIDC between several other ACCs are being implemented. AIDC between Sanya and Hong Kong put in to operational use in Feb 2007. AIDC between Qingdao and Incheon planned for 2013.	Implemented to ATS Rout. L888 route, Trial on HF data link conducted for use in western China.	Implemented in certain airspace. L888, Y1 and Y2 routes.	RNAV (GNSS) implemented in certain airports. Beijing, Guangzhou, Tianjin.	Ali, Linzhi and Lhasa airports	5 UAT ADS-B sites are used for flight training of CAFUC. Chengdu-Jiuzhai project finished in 2008 with 2 ADS-B stations and additional site is planned to enhance the surveillance coverage. Chengdu - Lhasa route surveillance project completed with 5 ADS-B stations using 1090ES since 2010. Trials planned from May 2011. 1 ADS-B site installed in Sanya FIR since 2008. 3 additional ground stations planned, Trial planned for Jun, 2011.	FANS 1/A based ADS-C implemented. L888 route.	

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
HONG KONG, CHINA	ATN and AMHS technical trial with Japan conducted in 2003. 64 Kbps ATN Link with Bangkok put into operational use in June 2004. Preliminary ATN/AMHS technical trials with China (Beijing) using VPN over Internet connection conducted in September 2006. Operational AMHS commissioned in July2009. ATN/AMHS circuit with Macao put into operational use in Dec. 2009. ATN/AMHS interoperability tests with other adjacent communications centres commenced in late 2009, viz Taibei (2009), Beijing (2010), Japan (2012) AMHS trial with Philippines in late 2010. ATN/AMHS into operation in end 2009.	AFTN-based AIDC with Sanya put into operational use in February 2007. AIDC trial with other adjacent ATS authorities for new ATC system to be commissioned by 2013. AIDC technical trial with Taibei conducted in 2010. AIDC technical trial with Philippines to be undertaken by end 2011.	FANS 1/A based CPDLC trials completed in 2002. VDL Mode-2 technical trial conducted in 2002. D-ATIS, D-VOLMET and 1-way PDC implemented in 2001. PDC service upgraded to 2-way data link in June 2008.	Implemented in certain airspace	Implemented in certain airspace	RNAV (GNSS) departure procedures implemented in July 2005. RNP AR APCH procedures for 07L/25R runways implemented in June 2010.	A larger-scale A-SMGCS covering the whole Hong Kong International Airport put into operational use in April 2009. Data collection/ analysis on aircraft ADS-B equipage in Hong Kong airspace conducted on quarterly basis since 2004. ADS-B trial using a dedicated ADS-B system completed in 2007. ADS-B out operations over PBN routes L642 and M771 at or above FL 290 within HK FIR are planned in December 2013 and within HK FIR at or above FL 290 in December 2014 ADS-B trial using ADS-B signal provided	FANS 1A trials for ADS-C completed in 2002.	

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
							by Mainland China to cover southern part of Hong Kong FIR commenced in 2010.		
MACAO, CHINA	ATN/AMHS interoperability test with Beijing commenced in March 2009. ATN/AMHS circuit with Hong Kong put into operational use in end Dec 2009.								ATZ within Hong Kong and Guangzhou FIRs. In ATZ full VHF coverage exist. Radar coverage for monitoring purposes.
COOK ISLANDS									
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	The ATN BIS Router and AMHS to be implemented in 2011.	With neighboring ACCs to be implemented TBD		Implemented in certain ATS routes G711, B467		RNAV (GNSS) Non-precision approach to be implemented in 2011.	ADS-B has been used as back-up surveillance of SSR since 2008.		
FIJI	ATN BIS Router and AMHS implementation by 4th quarter 2010.	AFTN based AIDC implemented between Nadi, Brisbane, Auckland and Oakland.	Implemented and integrated with ATM systems to support FANS1/A equipped aircraft.	Implemented		Implemented	ADS- B /multilateration ground stations installed. Surveillance service will be provided starting from end of 2012	FANS 1/A ADS-C implemented.	

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
FRANCE ***(French Polynesia Tahiti)***		Implementation of limited message sets with adjacent centres under discussion.	FANS-1. Implemented since 1996.					FANS 1/A ADS-C implemented since March 1999.	
INDIA	MUMBAI – SINGAPORE – BBIS – Circuit Implemented MUMBAI – PAKISTAN – BIS – Operational Trial Completed MUMBAI – CHINA – BBIS – Under operational trials MUMBAI – OMAN – BIS -Presently AFTN over TCP/IP MUMBAI – THAILAND – BBIS -Awaiting readiness from Thailand MUMBAI AMHS – Commissioned in APRIL 2011	AIDC with Dhaka /Muscat – TBD Mumbai/Karachi under trial operations	FANS-1 implemented at Kolkata, Chennai, Mumbai and Delhi.	SBAS (GAGAN project) likely to operational in the year 2013	PBN based SIDs & STARS implemented at Delhi, Mumbai, Chennai, Ahmadabad, Hyderabad and Kolkata		ASMGCS with MLAT commissioned at Delhi, Hyderabad and Bangalore Mumbai and Chennai ASMGCS installed	FANS 1/A ADS-C implemented at Kolkata, Chennai, Delhi and Mumbai.	

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
INDONESIA	ATN BIS Router and AMHS planned for trial in 2009. Trial with Singapore planned. ATNBIS Router and AMHS are still on going trial with Singapore planned to complete by 2012. (Part D: AMHS Commission)	Brisbane and Makassar in planned in June 2009. Makasar and Brisbane is still on going trial AIDC, planned operational in 2011	FANS-1/A. CPDLC in Ujung Pandang FIRs already trial start from 2008 and will be implemented in 2009. FANS-1/A CPDLC in Ujung Pandang FIRs is completely trial operational and will be full operational for designated route on September 2010.				30 Ground Station successfully installed. Since 2009, ATC Automation in MATSC has capabilities to support ADS-B application. ADS-B Task Force team established to develop planning and action concerning ADS-B Implementation within Indonesia FIR	FANS-1/A ADS-C trial planned at Jakarta and Ujung Pandang ACC in 2007. FANS-1/A ADS-C in Ujung Pandang FIRs is completely trial operational and will be full operational in September 2010.	
JAPAN	ATN BBIS router and AMHS installed at 2000. Connection tests with USA 2000 - 2004 and put into operational use in 2005. Connection test with Taibei 2008 - 2009. Connection tests with Australia, China, Hong Kong, Singapore, Republic of Korea, Europe and Russian Federation is TBD	AFTN based AIDC implemented with Oakland, Anchorage and Incheon. Planned between Fukoka ATMC and Taibei ACC for 2012.	FANS1/A system Implemented in Fukuoka FIR.	SBAS implemented RNAV5 implemented.	RNAV1 implemented	RNP Approach implemented	Two Multilateration Systems have been implemented at Narita and Haneda airports.	FANS 1/A. ADS-C implemented in Fukuoka FIR.	

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
KIRIBATI									
LAO PDR	ATN BIS Router and AMHS completed planned for implementation with Bangkok in 2010.	AIDC with Bangkok planned for 2010.		Implemented. Planned for 2011.					
MALAYSIA	ATN BIS Router completed 2007. AMHS planned in 2012.	AFTN AIDC planned with Bangkok ACC - TBD	On trial since July 2008. On 7 oceanic ATS routes i.e. P628, L510, L645, L627, N571, B466 and P574 within the Kuala Lumpur FIR.	Implemented for Oceanic Routes.	Basic RNAV implemented		Malaysia planned to start mandate ADS-B requirement in KL FIR in 2018 and ADS-B implementation on 2020. Implementation of ADS-B proposed in 2010 - 2015.	FANS 1/A ADS-C already implemented for Bay of Bengal area. Implemented since July 2008 on 7 oceanic ATS routes within KL FIR.	
MALDIVES	Implementation planned for 2012.	Planned for 2012.	FANS1/A installed, system on trial.	Planned for 2012	PBN based SIDS and STARS implemented.	RNP approach implemented at Male' International Airport.	Planned for 2013.	Implemented since 2008.	
MARSHALL ISLANDS						NPA implemented at Majuro Atoll.			
MICRONESIA (EDERATED STATES OF)									
Chuuk				Implemented					

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
Kosrae				Implemented					
Pohnpei				Implemented					
Yap				Implemented					
MONGOLIA	ATN BIS Router and AMHS planned for 2005 and 2006. Trial with Bangkok conducted.		Function available. Regular trials are conducted.		GPS procedures are being developed and implemented at 10 airports.		ADS-B trial in progress implementation planned for 2006.	FANS 1/A ADS-C implemented since August 1998.	
MYANMAR	Implementation of AMHS to be completed by the end of 2011.	The capability of ATM Automation system to support AIDC by 2011	Implemented since August 1998.				A plan to implement ADS-B by 2011	Implemented since August 1998.	
NAURU									
NEPAL	BIS Router and AMHS planned for 2011.	AFTN/AMHS based AIDC between KTM-CAL, KTM-BAN, KTM-LHASA planned for 2011.			GPS departure and approach has been developed for 8 airports and planned for implementation in 2008.		ADS-B feasibility study planned for 2007.		

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
NEW CALEDONIA							Three ADS-B ground stations commissioned in 2010 to cover international traffic at La tontouta airport serving Tontouta ACC & APP. It is used for Situation awareness and SAR.		
NEW ZEALAND	AMHS implementation planned for 2012 using IPS links.	AFTN based AIDC implemented between New Zealand, Australia, Fiji, Tahiti, Chile and USA.	FANS-1/A. Implemented	Will be implemented as required.	RNAV procedures being implemented as developed.	RNP AR APCH implemented at Queenstown (NZQN).	MLAT being used in Queenstown (NZQN) and Aukland (airport surface movements).	FANS 1/A Implemented	
PAKISTAN	ATN/AMHS considered as Phase II implemented since 2010.	Implemented between Karachi and Lahore ACCs Plan to implement AIDC with Mumbai and Muscat for December 2010	Implementation planned from 2005-2010.	Planned for 2005-2010.	RNAV arrival and departure procedure being developed.	NPA (RNP) procedure are being developed and under flight inspection.	Feasibility study for using ADS-B is in hand. One station was installed at ACC Karachi and evaluation is in progress.	Planned for 2005-2010.	Existing Radar system being upgraded.

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
PAPUA NEW GUINEA	Plans to create a newly duplicated digital communications line connecting with existing and new sites and replacing AFTN switch with a AMHS before 2015	Implemented with Australia in April 2011	Plans for new ATM system supporting CPDLC by 2015	Implemented	GNSS based RNAV procedures have been developed by for five airports.	GNSS NPA approach implemented at 22 aerodromes.	Legislation mandating ADS-B and guidelines for aircraft equipage and operational approval to be issued by 31/12/2011 with target mandatory date by mid-2015 and plans to provide ADS-B service above FL245 within Port Moresby FIR and also in specific higher traffic areas domestically.	Plans for new ATM system with ADS-C within UTA airspace by 2015	
PHILIPPINES	ATN G/G BIS Router/AMHS implemented in 2006. AMHS trials with Singapore by end 2012 and Hong Kong planned in 2012.	Planned for 2013.	CPDLC Planned for 2011. Trials on-going.	New ACC on test.	RNAV routes of MLA. MACTAN for FLT validation.		Two ground stations scheduled for implementation in 2013.	FANS 1/A ADS-C planned for 2013.	

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
REPUBLIC OF KOREA	ATN/AMHS circuit with China put into operational use in June 2011. ATN/AMHS test with Japan to be conducted	AFTN based AIDC implemented between ACC and Fukuoka ATMC. AIDC between Incheon and Qingdao to be implemented.	PDC & D-ATIS implemented 2003.	Two RNAV5 routes were implemented in 2011. More RNAV5/2 routes will be implemented gradually.	RNAV1 SID/STAR were partially implemented at GIMPO and INCHEON airports. More SIDs/STARs will be implemented gradually	RNP approaches with Baro were implemented at GIMPO airport in 2011. More RNP approaches with Baro will be implemented gradually	ADS-B implemented 2008 for SMC in Incheon International Airport.	FANS 1/A based ADS-C implemented since 2003 for contingency purpose.	
SINGAPORE	AMHS implemented. ATN Router trial with Malaysia completed in 2007 On-going ATN/AMHS trial with Indonesia and planned to complete by 2012. ATN/AMHS circuit with India put into operational use in Mar 2011. Coordinating with Thailand on ATN/AMHS trial in Q3-Q4 2011. Coordinating with UK on ATN/AMHS trial using VPN over internet in Q4 2011.	AFTN based AIDC to be implemented	Implemented since 1997. Integrated in the ATC system in 1999.		RNAV SIDS and STARS implemented in 2006.	NPA Procedure implemented in 2005.	The airport M-lat system was installed in 2007 and "far-range" ADS-B sensor was installed in 2009.	FANS 1/A ADS-C implemented since 1997. Integrated with ATC system in 1999.	

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
SRI LANKA	ATN BIS Router Planned for 2013. AMHS (Domestic) and AMHS/AFTN Gateway to be implemented by Oct. 2011.	Trials with Male' planned in 2013.	Implemented (FANS 1/A based)	14RNAV10 routes already established. 05 RNAV5 routes to be established in 2013. Upgrade airspace above FL225 to RNAV10 and introduce RNP4 routes in a phased manner within 2013-2016.	GNSS based RNAV-1 SIDS and STARS trials being conducted. To be implemented in a phased manner within 2013-2016.	Introduction of RNP APCH (with Baro-VNAV) in a phased manner with 2013-2016. GNSS based Precision Approaches planned beyond 2016.	ADS-B Trials planned for 2012 and implementation in 2013.	Implemented (FANS 1/A based) .	Information pertaining to Navigation are based on the PBN Implementation plan of Sri Lanka .
THAILAND	BBIS/BIS Routers already implemented. Target date for AMHS in Q2-2012. Coordinating with Singapore on ATN/AMHS trial in Q3-Q4 2011.	AFTN based AIDC planned for TBD. (as a part of new ATM system)	FANS-1/A Implemented.	Under implementation	Implemented at Phuket Airport	Implemented at Phuket	Multilateration implemented in 2006 at Suvarnbhumi Int'l. Airport. ADS-B is planned to be part of future surveillance infrastructure.	FANS 1/A ADS-C Implemented.	
TONGA	AMHS planned for 2008.					NPA planned for 2007.	Trial planned for 2012		CPDLC and ADS-C is not considered for lower airspace
UNITED STATES	AMHS implemented. (Salt Lake City & Atlanta)	AFTN based AIDC implemented.	FANS-1/A based CPDLC implemented.	Implemented	Implemented		Status as of March 31, 2011 81 Radio Stations under construction or in Final Design	Implemented	

				Navigation*					
State/Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**En-route**	**Terminal**	**Approach**	**ADS-B/ Multilateration**	**ADS-C**	**Remarks**
							(77 in CONUS; 4 in AK) 342 Radio Stations constructed (313 in CONUS; 29 in Alaska) 326 Radio Stations Reporting on the SBS Network (297 in CONUS; 29 in AK) 275 Operational Radio Stations WAM implemented in areas of Colorado for 5nm separation services and coming to Juneau in 2011		
VANUATU									
VIET NAM	BIS Routers planned for 2009. ATN/AMHS trial in 2010 and operation in 2012.	AFTN based AIDC implemented in 2009. Trial for ATN based AIDC planned in 2010.	CPDLC operational trial conducted in early 2007.	For en-route TBD.	RNAV		TBD	FANS 1/A ADS-C operational trial conducted for oceanic area of Ho Chi Minh FIR since March 2002.	

* Navigation – Navigation including Performance Based Navigation (PBN), APV and precision approach