

*International Civil Aviation Organization*



**THE NINTH MEETING OF AUTOMATIC  
DEPENDENT SURVEILLANCE – BROADCAST  
(ADS-B) STUDY AND IMPLEMENTATION TASK  
FORCE (ADS-B SITF/9)**



Jakarta, Indonesia, 18 -19 August 2010

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**Agenda Item 6: Review States' activities and interregional issues on trials and implementation of ADS-B and mulilateration**

**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 – Minimize the adverse effect of global civil aviation on the environment
- D. Efficiency – Enhance the efficiency of aviation operations
- E. Continuity – Maintain the continuity of aviation operations

**Global Plan Initiatives:**

All GPIs

**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 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 Matrix updated by the Thirteenth Meeting of the CNS/MET Sub-group was reviewed by APANPIRG/20. It was noted that the matrix is providing a good overview of the planning and implementation status of CNS elements. The Matrix is also used for monitoring the progress of implementation.

2.2 The CNS/ATM Implementation Planning Matrix was updated by the Fifth ATN Implementation Coordination Group meeting held from 31<sup>st</sup> May to 4<sup>th</sup> June 2010 in Kuala Lumpur, Malaysia. CNS/MET Sub-group meeting held in July 2010 also reviewed and updated the Matrix. The updated Matrix is provided at **Attachment** to this paper for review and further updating.

2.3 ADS-B Study and Implementation Task Force Meeting also regularly update the information in the Matrix in particular on those surveillance related information. The updated Matrix will be presented to APANPIRG/21 for its review.

### **3. Action required by the Meeting**

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

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**CNS/ATM Implementation Planning Matrix**

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AIDC	CPDLC	Navigation*			ADS-B/ Multilateration	ADS-C	Remarks
				En-route	Terminal	Approach			
<b>AFGHANISTAN</b>									
<b>AUSTRALIA</b>	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		<p>16 ADS-B sites are operational. A total of 29 UAP and 14 WAM stations are delivering ADS-B data to serve a 5 Nm separations service. Fully operational.</p> <p>Additional 18 stations have been delivered in 2007 for installation at other sites.</p> <p>ADS-B mandate applies from 12/2013 at and above FL290.</p> <p>WAM operating in Tasmania. Commissioned in 2010.</p> <p>WAM being installed in Sydney to serve 3 Nm separation service and PRM application, expected to be operation 2010.</p>	FANS 1/A ADS-C implemented.	

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Attachment to ADS-B SITF/9-WP/11

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AIDC	CPDLC	Navigation*			ADS-B/ Multilateration	ADS-C	Remarks
				En-route	Terminal	Approach			
<b>AUSTRALIA (Cont'd)</b>							ASMGCS using multilateration operational in Melbourne & Sydney in 2010. Brisbane and Perth being installed.		
<b>BANGLADESH</b>	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	
<b>BHUTAN</b>	ATN BIS Router and UA service 2011.					Procedures developed for NPA.			
<b>BRUNEI DARUSSALAM</b>	ATN BIS Router planned for 2009 and AMHS planned for 2009-2011.								

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State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AIDC	CPDLC	Navigation*			ADS-B/ Multilateration	ADS-C	Remarks
				En-route	Terminal	Approach			
<b>CAMBODIA</b>	BIS Router and AMHS planned for 2011.	Planned 2009	Planned 2009			Procedure developed for NPA.			
<b>CHINA</b>	<p>ATN Router and AMHS deployed in 2008.</p> <p>Tripartite BBIS trial completed with Bangkok and Hong Kong, China in Jan. 2003.</p> <p>ATN trial with Hong Kong using XOT over internet conducted in 2006, Further trials planned in 2009.</p> <p>AMHS/ATN technical tests with Macau completed in 2009.</p> <p>ATN/AMHS tests with ROK, India , Hongkong China planned in 2010.</p>	<p>AIDC between some of ACCs within China has been implemented. AIDC between several other ACCs are being implemented.</p> <p>AIDC between Sanya and Hong Kong put in to operational use in Feb 2007.</p> <p>AIDC between Qingdao and Incheon planned for 2013.</p>	<p>Implemented to ATS Rout.</p> <p>L888 route,</p> <p>Trial on HF data link conducted for use in western China.</p>	<p>Implemented in certain airspace.</p> <p>L888, Y1 and Y2 routes.</p>	<p>RNAV (GNSS) implemented in certain airports.</p> <p>Beijing, Guangzhou, Tianjin.</p>	<p>Ali, Linzhi and Lhasa airports</p>	<p>ADS-B trial has been conducted in 2006. 5 UAT ADS-B sites are operational and used for flight training of CAFUC. Another ADS-B project for ATS route between Chengdu and Jiuzhai using 1090ES conducted since 2008. Will be followed by Chengdu – Lhasa and B215 route.</p>	<p>FANS 1/A based ADS-C implemented.</p> <p>L888 route.</p>	

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				En-route	Terminal	Approach			
<b>HONG KONG, CHINA</b>	<p>ATN and AMHS technical trial with Japan conducted in 2003. 64 Kbps ATN Link with Bangkok put into operational use in June 2004.</p> <p>Preliminary ATN/AMHS technical trials with China (Beijing) using VPN over Internet connection conducted in September 2006.</p> <p>Operational AMHS commissioned in July 2009.</p> <p>ATN/AMHS circuit with Macao put into operational use in Dec. 2009.</p> <p>ATN/AMHS interoperability tests with other</p>	<p>AFTN-based AIDC with Sanya put into operational use in February 2007.</p> <p>AIDC trial with other adjacent ATS authorities planned for end 2009/2010.</p> <p>AIDC technical trial with Taipei to be undertaken in 2010.</p> <p>AIDC technical trial with Philippines to be undertaken by end 2010.</p>	<p>FANS 1/A based CPDLC trials completed in 2002.</p> <p>VDL Mode-2 technical trial conducted in 2002.</p> <p>D-ATIS, D-VOLMET and 1-way PDC implemented in 2001.</p> <p>PDC service upgraded to 2-way data link in June 2008.</p>	Implemented in certain airspace	Implemented in certain airspace	<p>RNAV (GNSS) departure procedures implemented in July 2005.</p> <p>RNP AR APCH procedures for 07L/25R runways implemented in June 2010.</p>	<p>A larger-scale A-SMGCS covering the whole Hong Kong International Airport put into operational use in April 2009.</p> <p>Data collection/analysis on aircraft ADS-B equipage in Hong Kong airspace conducted on quarterly basis since 2004.</p> <p>ADS-B trial using a dedicated ADS-B system was conducted in April 2007. Further ADS-B trial planned for 2010.</p>	FANS 1A trials for ADS-C completed in 2002.	

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				En-route	Terminal	Approach			
	adjacent communications centres commenced in late 2009, viz Taipei (2009), Beijing (2010), Japan (2012) AMHS trial with Philippines in late 2010. ATN/AMHS into operation in end 2009.								
<b>MACAO, CHINA</b>	ATN/AMHS interoperability test with Beijing commenced in Mar 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.
<b>COOK ISLANDS</b>									
<b>DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA</b>	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.		

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State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AIDC	CPDLC	Navigation*			ADS-B/ Multilateration	ADS-C	Remarks
				En-route	Terminal	Approach			
<b>FIJI</b>	ATN BIS Router and AMHS implementation by 4 <sup>th</sup> 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 implementation in 2009/2010.	FANS 1/A ADS-C implemented.	
<b>FRANCE</b> <i>(French Polynesia Tahiti)</i>		Implementation of limited message sets with adjacent centres under discussion.	FANS-1. Implemented since 1996.					FANS 1/A ADS-C implemented since March 1999.	
<b>INDIA</b>	ATN BBIS router and AMHS Physical installation over. SAT in May 2008, Operational trials being conducted with Singapore with live traffic exchange. Coordinating with China, Thailand, Pakistan and Oman for conduct of test.	AFTN Based AIDC Coordinating with Bangladesh and Pakistan and, we are ready.	FANS-1 implemented at Kolkata, Chennai, Mumbai and Delhi.	SBAS Technical development in 2007.  Implementation planned for 2009.			Trial planned for 2006.  ASMGCS Implemented at IGI Airport New Delhi.	FANS 1/A ADS-C implemented at Kolkata, Chennai, Delhi and Mumbai.	

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State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AIDC	CPDLC	Navigation*			ADS-B/ Multilateration	ADS-C	Remarks
				En-route	Terminal	Approach			
<b>INDONESIA</b>	<p>ATN BIS Router and AMHS planned for trial in 2009.</p> <p>Trial with Singapore planned.</p> <p>ATNBIS Router and AMHS are still on going trial with Singapore to be finished in 2010 (Part D: AMHS Commission)</p>	<p>Brisbane and Makassar in planned in June 2009.</p> <p>Makasar and Brisbane is still on going trial AIDC, planned operational in 2011</p>	<p>FANS-1/A. CPDLC in Ujung Pandang FIRs already trial start from 2008 and will be implemented in 2009.</p> <p>FANS-1/A CPDLC in Ujung Pandang FIRs is completely trial operational and will be full operational for designated route on September 2010.</p>				<p>22 ADS-B ground stations have been installed in 2009. Upgrading ATC automation at Makasar for ADS-B application capabilities in 2009.</p>	<p>FANS-1/A ADS-C trial planned at Jakarta and Ujung Pandang ACC in 2007.</p> <p>FANS-1/A ADS-C in Ujung Pandang FIRs is completely trial operational and will be full operational in September 2010.</p>	<p>MATSC new version with capability for ADS-B and Mode-S will be operated in 2009.</p>
<b>JAPAN</b>	<p>ATN BBIS router and AMHS installed at 2000. Connection tests with USA 2000 - 2004 and put into operational use in 2005.</p> <p>Connection test with Taibei 2008 - ongoing.</p> <p>Connection tests with Australia, China, Hong Kong, Singapore, Republic of Korea, Europe and</p>	<p>AFTN based AIDC implemented with Oakland, Anchorage and Incheon.</p> <p>Planned between Fukoka ATMC and Taibei ACC for 2012.</p>	<p>FANS1/A system Implemented in Fukuoka FIR.</p>	<p>SBAS implemented RNAV5 implemented.</p>	<p>RNAV1 implemented</p>	<p>RNP Approach implemented</p>	<p>Two (2) Multilateration will be implemented in January 2010.</p>	<p>FANS 1/A. ADS-C implemented in Fukuoka FIR.</p>	

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				En-route	Terminal	Approach			
	Russian Federation is TBD								
<b>KIRIBATI</b>									
<b>LAO PDR</b>	ATN BIS Router and AMHS completed planned for implementation with Bangkok in 2010.	AIDC with Bangkok planned for 2010.		Implemented. Planned for 2011.					
<b>MALAYSIA</b>	ATN BIS Router completed 2007. AMHS planned in 2011	AFTN AIDC planned with Bangkok ACC in 2011.	Implemented for Bay of Bengal in July 2008.	Implemented for Oceanic Routes.	Basic RNAV implemented	NPA at KLIA implemented	Implementation of ADS-B proposed in 2010 - 2015.	FANS 1/A ADS-C implemented for Bay of Bengal on July 2008	
<b>MALDIVES</b>	ATN BIS Router/AMHS planned for implementation in the 2011.	Planned for 2011.	FANS1/A installed Trials planned in last quarter of 2007.	Trials planed for 2005-2008. Implementation in later 2008.			Trials planned for 2007-2008. Implementation in late 2008.		

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				En-route	Terminal	Approach			
<b>MARSHALL ISLANDS</b>						NPA implemented at Majuro Atoll.			
<b>MICRONESIA (EDERATED STATES OF)</b>									
Chuuk				Implemented					
Kosrae				Implemented					
Pohnpei				Implemented					
Yap				Implemented					
<b>MONGOLIA</b>	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.	
<b>MYANMAR</b>	Implementation of AMHS to be completed by the end of 2010.	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.	
<b>NAURU</b>									
<b>NEPAL</b>	BIS Router and AMHS planned for 2011.	AFTN/AMHS based AIDC between KTM-CAL, KTM-BAN,			GPS departure and approach has been developed for 8 airports and		ADS-B feasibility study planned for 2007.		

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				En-route	Terminal	Approach			
		KTM-LHASA planned for 2011.			planned for implementation in 2008.				
<b>NEW CALEDONIA</b>							Tontouta ACC 2009  Tontouta APP 2009.		
<b>NEW ZEALAND</b>	BIS Router and AMHS implementation planned for 2010.	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 (ZQN).	Domestic trial was conducted in 2005. Use will be re- evaluated in 2008. Trial of Area MLAT conducted in 2006. ADS-B planned as an element of MLAT at specific sites for domestic use.*	FANS 1/A Implemented	*MLAT being implemented in Auckland (Surface Movement) and Queenstown.
<b>PAKISTAN</b>	Implementation of ATN considered for Phase II (2005- 2010).	Implemented between Karachi and Lahore ACCs	Implementation planned from 2005-2010.	Planned for 2005-2010.	RNAV arrival and departure procedure being developed.	NPA procedure are being developed.	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.
<b>PAPUA NEW GUINEA</b>				Implemented		Implemented at certain aerodromes.			

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				En-route	Terminal	Approach			
<b>PHILIPPINES</b>	ATN G/G BIS Router/AMHS implemented in 2006.  AMHS trials with Singapore by end 2008 and Hong Kong planned in 2009.	Planned for 2011.	CPDLC Planned for 2011.				Included in CNS/ATM Project and scheduled for implementation in 2011.	FANS 1/A ADS-C planned for 2011.	
<b>REPUBLIC OF KOREA</b>	ATN BIS Router/AMHS planned for 2011.	AFTN based AIDC planned for 2009 between Incheon ACC and Fukuoka ATMC.  AIDC between Incheon and Qingdao planned for 2013.	PDC & D-ATIS implemented 2003.			NPA procedure developed at Incheon International Airport in 2008.	ADS-B trials planned for 2008-2009 at Incheon International Airport.	FANS 1/A based ADS-C implemented since 2003 for contingency purpose.	
<b>SINGAPORE</b>	AMHS implemented. ATN BIS Router trial with Malaysia commenced in 2007 and with Indonesia in 2009.  ATN/AMHS interoperability trial with India completed in Oct 2009. Commenced pre-ops trial in	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.		FANS 1/A ADS-C implemented since 1997. Integrated with ATC system in 1999.	

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				En-route	Terminal	Approach			
	Dec 2009.  Co-ordinating with UK and Australia on ATN/AMHS trial in Q4 2010.								
<b>SRI LANKA</b>	ATN BIS Router Planned for 2009. AMHS planned along with BIS in 2009.		PDLC in trial operation since November 2000.				ADS-B Trials planned for 2010 and implementation in 2011.	FANS 1 /A ADS-C trial since November 2000.	GPS based domestic route structure being developed.
<b>THAILAND</b>	BBIS/BIS Routers already implemented. Target date for AMHS in 2008.	AFTN based AIDC planned for 2010.	FANS-1/A Implemented.	Under implementation	Implemented at Phuket Airport	Implemented at Phuket	Multilateration implemented in 2006 at Suvarnabhumi Int'l. Airport. 22 ADS-B ground stations will be implemented in 2008.	FANS 1/A ADS-C Implemented.	
<b>TONGA</b>	AMHS planned for 2008.					NPA planned for 2007.	Trial planned for 2010		CPDLC and ADS-C is not considered for lower airspace

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				En-route	Terminal	Approach			
<b>UNITED STATES</b>	AMHS implemented.  AMHS Atlanta Sept 2009 to serve CAR/SAM,/ North Atlantic/Europe	AFTN based AIDC implemented.	FANS-1/A based CPDLC implemented.	Implemented	Implemented		Implemented	Implemented	
<b>VANUATU</b>									
<b>VIET NAM</b>	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