International Civil Aviation Organization

SEVENTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION/SURVEILLANCE SUB-GROUP (CNS SG/17) OF APANPIRG

Bangkok, Thailand, 13 – 17 May 2013

Agenda Item 4: Aeronautical Fixed Service (AFS)

4.1) review report of the Eighth Meeting of the ATN Implementation Coordination Group (ATNICG/8)

REVIEW REPORT ON THE EIGHTH MEETING OF AERONATUICAL TELECOMMUNICATION NETWORK IMPLEMEMNTATION COORDINATION GROUP (ATNICG/8)

(Presented by the Secretariat)

SUMMARY

Eighth Meeting of Aeronautical Telecommunication Network Implementation Coordination Group (ATNICG/8) was held in Jakarta, Indonesia from 18 to 21 March 2013 in Chiang Mai, Thailand. This paper presents outcome of the meeting for review.

1. Introduction

1.1 Eighth Meeting of the Aeronautical Telecommunication Network Implementation Co-ordination Group (ATNICG/8) of APANPIRG was held in Jakarta, Indonesia from 18 to 21 March, 2013. The Meeting was hosted by the Directorate General of Civil Aviation Office (DGCA), Indonesia.

1.2 All meeting document and full report of the Meeting along with other related documents is available on the ICAO APAC Office website and can be accessed at the following address:
http://www.bangkok.icao.int/cns/meeting.do?method=MeetingDetail&meeting_id=271

2. Discussion

2.1 The meeting was attended by 72 participants from 19 States and 2 Administrations. The meeting considered 19 Information Papers and 19 Working Papers.

2.2 The meeting formulated 1 Decision, 1 draft Decision and 5 Draft Conclusions for consideration by this meeting and APANPIRG/24 meeting.

2.3 The Draft Decision and Draft Conclusions are highlighted below:

Draft Conclusion 8/1 – Timely implementation of ATN/AMHS

That, BBIS and BIS States be urged to resolve bilateral issues on urgent basis paving the way for effective use of the network and thereby ensuring utilization of resources and the investment made by the States.

Draft Conclusion 8/2 – BIS States to implement ATN/AMHS

That, States hosting BIS nodes be urged to aggressively take up implementation of ATN/AMHS connectivity as per the Regional Plan to complete regional ATN/AMHS network in the whole APAC region by the end of 2015.

Draft Conclusion 8/3 - XML Trial over ATN/AMHS

That, ICAO be invited to provide guidance on the requirements for end-user product/message in respect of XML coded NOTAM and OPMET messages.

Draft Conclusion 8/4 – Interface Control Document for ATN IPS (IP v.4)

That, the ICD for ATN IPS (IP v.4) as provided in **Appendix A** to the report be adopted as regional guidance material.

Draft Conclusion 8/5 – BBIS States to implement ATN/AMHS

That, those States which are hosting BBIS hubs and are ready to implement ATN/AMHS be urged to review the feasibility and realize interim ATN connectivity using IDRP prior to complete readiness of all the member States in the Region in 2014/15. This will realize the early operational benefits of network resiliency and AMHS operations, particularly in instances where incompatible versions of AMHS currently preclude AMHS connectivity.

Review and update Subject/Tasks List and Action Item List etc.

2.4 The ATNICG/8 meeting discussed a proposal to amend TOR of the group. Considering the need to follow up recommendations of AN Conf/12 on AFS and SWIM and requirements to provide communication and information management for operational needs, the meeting agreed with the proposed changes and formulated following draft Decision for consideration by APNAPIRG through CNS Sub-group:

Draft Decision 8/7 - Aeronautical Communication Service Implementation Coordination Group – (ACSICG)

That, the revised TOR of ATNICG provided in the **Appendix E** to this report be adopted.

2.5. The meeting also reviewed and updated the list of Subject/Tasks which is provided in the **Appendix G** to this report for review by CNS SG.

MPLS Network

2.6 In order to develop a joint Working Paper on the subject for consideration by APANPIRG through CNS Sub-group, USA was requested to take the lead with participation from Japan Singapore, Thailand, China and Hong Kong China and New Zealand. To request support from Administrations mentioned above for the arrangement of Subject Matter Experts (SME) to actively participate in the work, the meeting formulated following decision:

Decision 8/6 – Common MPLS Network in Asia/Pacific Region

That, Subject Matter Experts from USA, Japan, Singapore, Thailand, China, Hong Kong China and New Zealand provide input and contribution to the joint working paper to be presented at the CNS SG meeting in May 2013 recommending the use of MPLS to create a common regional IP network to meet current and future operational requirements. Regional Office is requested to follow up this action with a letter distributed to States concerned.

2.7 The ATNICG/8 meeting also reviewed and updated the ATN/AMHS Implementation Planner which is provided in **Appendix B** to the Report.

3. Action by the meeting

3.1 The meeting is expected to note the significant outcome of the ATNICG/8 meeting and review the draft Decisions and draft Conclusions developed by the ATNICG and formulate recommendations for consideration by APANPIRG/24.

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INTERNATIONAL CIVIL AVIATION ORGANIZATION

INTERFACE CONTROL DOCUMENT FOR ATN IPS (IPV4) ROUTER

VERSION 1.0

EXECUTIVE SUMMARY

The Aeronautical Telecommunication Network (ATN) is a global telecommunications network being established to provide digital communications between ICAO member States.

This Interface Control Document (ICD) the provides Internet Protocol Suite (IPS) router guidelines for the routers that form nodes of the ATN backbone to ensure interoperability between States

CONTENTS

LIST OF FIGURES

FIGURE **PAGE**

1.0 INTRODUCTION

This document provides ATN IPS router ICD guidelines for the routers that form nodes of the network Backbone. This ICD addresses the Network Interface and Internet layers of the ATN IPS router using the TCP/IP model.

1.1 Purpose and Scope

The general requirements for the ATN IPS router cover the lower two layers of the TCP/IP four-layer model. The TCP/IP model defines a four-layer network model as shown in Figure 1-1. Only the lower two layers are covered under this document.

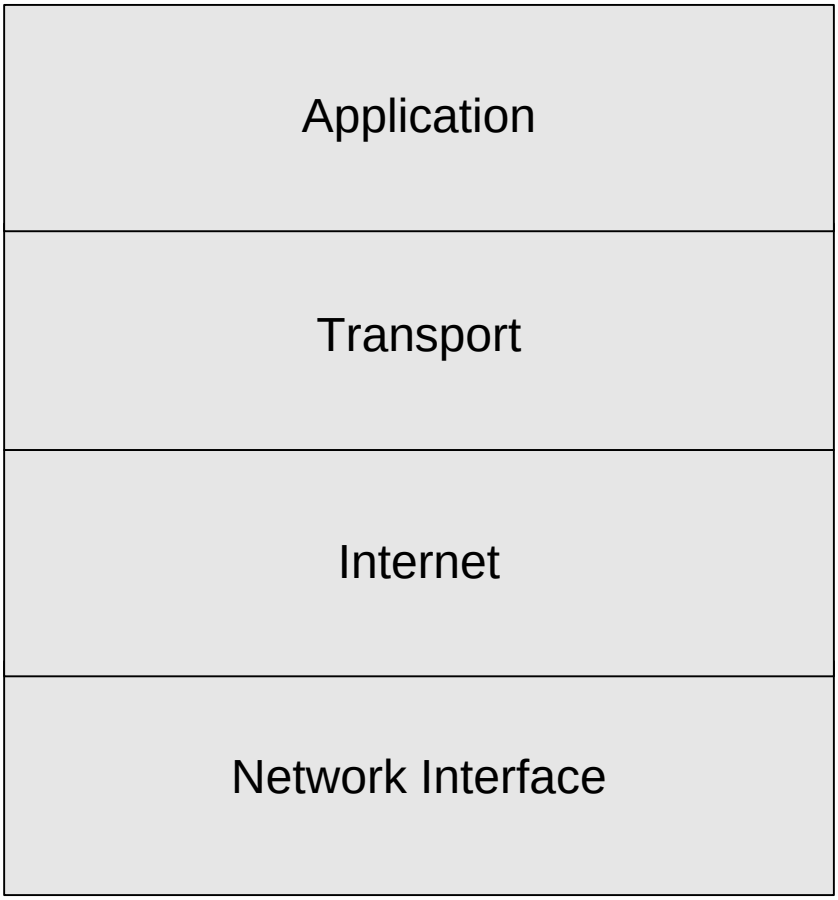

Figure 1-1 TCP/IP Layer Model

1.2 Document Structure

This document is structured as follows:

- Section 1, Introduction, summarizes the contents of this document and reference documents.
- Section 2, Internet Protocol Addressing, specifies the Internet Protocol (IP) address allocation.
- Section 3, Interface Design Characteristics, provides the layer 1 and 2 requirements for interface between ATN IPS routers.

1.3 Applicable Documents

The following documents form a part of this ICD to the extent specified herein. In the event of a conflict between the documents referenced herein and the contents of this ICD, the contents of this ICD shall be the superseding requirements

1.3.1 Internet Standards

RFC 791 Internet Protocol, September 1981
RFC 792 Internet Control Message Protocol, September 1981, as updated by RFCs 950, 4884, and 6633
RFC 793 Transmission Control Protocol, September 1981, as updated by RFC 3168
RFC 796 Address Mappings, September 1981
RFC 826 An Ethernet Address Resolution Protocol, November 1982
RFC 894 Standard for the Transmission of IP Datagrams over Ethernet Networks, April 1984
RFC 2427 Multiprotocol Interconnect over Frame Relay (FR), September 1998
RFC 950 Internet Standard Subnetting Procedure, August 1985
RFC 1812 Requirements for IP Version 4 Routers, June 1995, as updated by RFC 2644 and RFC 6633
RFC 2328 Open Shortest Path First (OSPF) Version 2, April 1998
RFC 2439 BGP Route Flap Damping, November 1998
RFC 2644 Changing the Default for Directed Broadcasts in Routers, August 1999
RFC 3168 The Addition of Explicit Congestion Notification (ECN) to IP, September 2001
RFC 4271 A Border Gateway Protocol 4 (BGP-4), January 2001, as updated by RFC 6286
RFC 4884 Extended ICMP to Support Multi-Part Messages, April 2007
RFC 6286 Autonomous-System-Wide Unique BGP Identifier for BGP-4, June 2011
RFC 6633 Deprecation of ICMP Source Quench Messages, May 2012

1.3.2 ICAO Documents

ATNICG/5-WP/11 11 "Proposed Asia/Pacific IPv4 Address Planning" presented and accepted at The Fifth Meeting of Aeronautical Telecommunication Network (ATN) Implementation Co-ordination Group of APANPIRG (ATNICG/5) in Kuala Lumpur, Malaysia, on 31 May – 4 June 2010

2.0 INTERNET PROTOCOL ADDRESSING

Network addressing should be in accordance with RFC 796 for IPv4 implementations.

3.0 INTERFACE DESIGN CHARACTERISTICS

This section provides the general functional and physical design characteristics for the interfacing communication devices.

3.1 General Characteristics

The ATN IPS routers are Commercial off the Shelf (COTS) routers that can be easily procured and implemented. The use of these routers will tremendously decrease the time of deployment and final implementation of the ATN.

3.2 Functional Design Characteristics

This section describes the functional requirements of this interface.

3.2.1 Network Interface Layer

The network interface layer handles the hardware details or the physical interfacing to the transmission medium (e.g., cable, radio link). It provides the mechanical, electrical, functional, and procedural methods necessary to activate, maintain, and deactivate physical connections for data links.

The following standards are allowable physical interface implementations.

3.2.1.1 TIA/EIA-232-E/F

The TIA/EIA-232-E/F should be implemented according to TIA/EIA-232-E/F documents.

3.2.1.2 TIA/EIA-530-A

The TIA/EIA-530-A should be implemented according to TIA/EIA-530-A document.

3.2.1.3 V.35

The V.35 should be implemented according to ITU-T V.35 document.

3.2.1.4 Ethernet

Transmission of IPv4 datagrams over Ethernet networks should be in accordance with RFC 894.

3.2.1.5 Frame Relay (FR)

Transmission of IPv4 datagrams over Frame Relay should be done in accordance with RFC 2427.

3.2.2 Internet Layer

The Internet layer specifies the protocols that provide services corresponding to the internet layer. The protocol used in this layer shall be Internet Protocol (IP). IP is designed for use in interconnected packet-switched computer communication networks and provides addressing and fragmentation services.

3.2.2.1 Internet Protocol

IPv4 implementations shall be in accordance with RFC 791.

3.2.3 Routing

The Border Gateway Protocol 4 (BGP-4) shall be used to build and maintain routing tables in the ATN IPS routers, in accordance with RFC 4271. BGP route flap damping shall be used in accordance with RFC 2439.

3.2.4 Monitoring

ATN IPS routers shall support monitoring, to include, at a minimum, properly responding to an ICMP (RFC 792) Echo Request (ping).

APPENDIX A - ACRONYMS

A.0 Acronyms

This appendix defines the acronyms used in this document.

A/G	AIR-GROUND
AAC	Aeronautical Administrative Control
ABM	Asynchronous Balanced Mode
AIDC	ATS Interfacility Data Communications
AMHS	ATS Message Handling System
AOC	Aeronautical Operational Control
APC	Aeronautical Passenger Communication
APRLs	ATN Protocol Requirement Lists
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Service
ATSC	Air Traffic Service Control
BGP	Border Gateway Protocol
CLNP	Connectionless Network Protocol
CLNS	Connection-Less Network Service
CPDLC	Controller Pilot Data Link Communications
DCE	Data Circuit-terminating Equipment
DM	Disconnected Mode
DTE	Data Terminal Equipment
E/R	Error Report
ECN	Explicit Congestion Notification
EIA	Electrical Industry Association
ERD	End Routing Domain
ES	End System
FIB	Forwarding Information Base
FR	Frame Relay
FSM	Finite State Machine
G-G(G/G)	Ground-Ground
GRE	Generic Routing Encapsulation
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
ICMP	Internet Control Message Protocol

IDRP	Inter Domain Routing Protocol
IEC	International Electrotechnical Commission
IPS	Internet Protocol Suite
ISO	International Standardization Organization
IP	Internet Protocol
ITU	International Telecommunications Union
ITU-T	ITU Telecommunications Sector
LAPB	Link Access Procedure Balanced
NET	Network Entity Title
NPDU	Network Protocol Data Unit
NSAP	Network Service Access Point
OSI	Open Systems Interconnection
PDU	Protocol Data Unit
PIB	Policy Information Base
PICS	Protocol Implementation Compliance Statement
PSDN	Public Switched Data Network
PSN	Packet Switched Network
PVC	Permanent Virtual Circuit
QOS	Quality of Service
RD	Routing Domain
RDC	Routing Domain Confederation
RIB	Routing Information Base
SARPs	Standards and Recommended Practices
SNDCF	Sub Network Dependent Convergence Functions
SNPA	Sub Network Point of Attachment
SVC	Switched Virtual Circuit
TBD	to be Determined
TBR	to be Reviewed
TCP	Transmission Control Protocol

DRAFT REVISED TERMS OF REFERENCE

Title and Terms of Reference

Title: **Aeronautical Communication Services Implementation Co-ordination Group (ACSICG)**

Terms of Reference (TORs)

Complete implementation of Asia and Pacific (APAC) Aeronautical Communication Network (ATN) and ensure the underlying communications backbone continues to support the evolving ICAO operational requirements for the exchange and management of aeronautical information and data.

Composition

The Group will be composed of experts nominated by ~~all~~ ICAO member states in the Asia and Pacific Regions.

Reporting

The Group will present its report to APANPIRG through the CNS~~/MET~~ Sub-group.

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No.	PERFORMANCE OBJECTIVE	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/8 Update
1	ATN Implementation Coordination	(1) Review of implementation problems and develop co-ordinated solutions (2) Coordinate / compile the regional implementation schedule (3) Monitor Implementation	Expedite implementation activities, ensure system compatibility through out the region	(1) Co-ordination Report (2) Waterfall schedule (3) Monitor AMHS Implementation Planner	(1)On-going /Semi-annually (2) Schedule 03/2013 (3) On- going	Kapoor (India) Hong Kong, China	All members	(1)Updated the information on the ATN Router and AMHS planning tables and the implementation status (2) Completed, maintain the AMHS implementation Planner.
2	ATN Operational Procedures	(1) Development of Interim Database for Directory Services	Make available real time and quality assurance addresses for ATN message delivery	(1) Interim Database - (2)Global AMC service are used	(1) (2013)	Robert Hallman (USA)	Thailand, Hong Kong China, Japan	Completed. The database was demonstrated. Aerothai will maintain the database on behalf of the regional ICAO Office. Aerothai will serve as POC for AMC coordination between ASIA/PAC States and Eurocontrol. ATN Operational Procedures is completed and adopted.
		(2) Develop the operational database management procedures		(2) Operational Procedures	(2) (2007)			Completed.

No.	PERFORMANCE OBJECTIVE	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/8 Update
3	ATN Certification & Validation Process	(1) Develop conformance procedures and checklist for AMHS and ATN routers	Expedite implementation activities, ensure global system compatibility	(1) Checklist	(1) (2007)	Sin Hie Sng (Singapore)	China, Hong Kong China, Indonesia,ROK, USA,	Completed
		(2) Develop validation process document		(2) Conformance Document	(2) 2007			Completed and adopted by APANPIRG
				(3) Update to Conformance Document	(3) Ongoing until 2010			Completed
4	(1) ATN Documentation (2) Review all documents adopted by ATNICG and ATNTTF	(1) Study DIR objects / attributes proposed in ACP and follow development within other groups (2) Update document tree / establish tracking table for suspended dates (3) Standardized Report form and Guidance Material	Expedite implementation activities, ensure global system compatibility	(1) Directory Report (2) Tracking table/Updated documentation tree (3) AMC report (4)Report Form and Report Guidance	(1) Annually (2) Periodically (3) 2012	Jittima (Thailand)	USA	Update the database. AMC mandated by ICAO. Training completed. Directory Service will be implemented in coordination with ACP and phases will be developed.

No.	PERFORMANCE OBJECTIVE	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/8 Update
		(2) Development AIDC documentation (including ICD) and follow development within other groups		(2) AFTN AIDC / ATN Gateway Specification ATN AIDC ICD	(2) 2014 (IRAIDTF-dependent)	(Thailand)	Thailand	Remark: Removal of provision from Doc 9880 was noted. IR AIDC ICD has been taken over by Inter-reginal Task Force. Monitoring progress and provides input
		(3) Update of AMHS ICD to comply with SARPs 3rd Edition		(1) Report differences between existing ICD and requirements for Edition 3 of Doc 9705 (2) Updated AMHS ICD	(1) Sept 2011 (2) (2013)	USA	Japan	Ad-hoc group formed and consolidated APAC Technical Specificaiton replacing AMHS ICD developed. Further verification of funciton are assigned to members of ATNICG WG.
		Managing PDR	Update ICAO Documents (9880 /9896)	PDR filing and tracking	On-going	USA	All the Member States	Additional Task proposed in ATNICG/5. PDR filing procedure already circulated.
5	ATN Performance	(1) Develop/establish/adapt/monitor/identify/analyse performance indicators	Assure QOS, service continuity, timely delivery of services	(1) AMHS performance report	(1) Annually until (2010)	Japan	Republic of Korea, India	Will resisit when regional IP-VPN be considered.

No.	PERFORMANCE OBJECTIVE	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/8 Update
6	ATN Service Enhancements	(1) Review the impact of the implementation of Directory Services in the Region	Enhancing the service	(1) Report on directory	(1) Annually	Fiji	USA, Thailand New Zealand Japan Australia	AMC directory temporarily being used.Directory service will be considerd when regional IP-VPN becoming availabel.
		(2) Directory Service - Implementation Strategy	Enhancing the operation	Requirement Analysis Report & Implementation Strategy	(2) 2012	Thailand		Closed in view of the implementation of AMC
7	IPM Implementation	ATN/IPS Implementation Plan	Inter-regional and intra regional network compatibility	(1) ATN/IPS router ICD (2) IPS addressing plan (3) ATN/OSI - ATN/IPS Transition Plan (4) ATN/IPS routing policy (5) Update FASIS Tables to accommodate IPS (6) IDRP over IP subnet - ICD	(1) 2011 (2) 2011 (3) 2011 (4) 2012 (5) 2011 (6) 2011	USA	Australia, China, India, Fiji, Hong Kong, China, Japan, and USA	Proposed an additional task 1) ongoing 2) IPv4 addressing plan has been adopted

No.	PERFORMANCE OBJECTIVE	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/8 Update
		Providing support for emerging requirements of OPMET, AIS/AIM, AIDC etc.	Enhancing the service	Task Report on XML based messages over AMHS platform	2011	USA	Hong Kong China,	Additional Task proposed in ATNICG/5
		(5) Study for transition of AFTN-based AIDC as an alternative to ATN based AIDC to ATN environment	Improving the service and lowering the operating cost	(5) Report on the impact of transition of AFTN-AIDC to ATN-AIDC AFTN AIDC/ATN Gateway Specification	(5) (2008)	Thailand	India, Indonesia, New Zealand, USA,	A Draft specification of AFTN AIDC/ATN Gateway was presented. Completed. Task closed in view of removal of provision from Doc 9880
8	Address Prefix	Analyze Common Address Prefix Proposal	Improving the service and routing efficiency	Report on common prefix based analysis conduced	End of 2010	Mark Brown (Japan)	Australia, Fiji, Hong Kong China, New Zealand and USA	Closed. Action Items developed at ATNICG/2 for follow-up at WG meetings.
9	Security	(1) Develop ATN System Security policy	Safe and Secure Inter and Intra Regional Communication and service infrastructure	(1) Policy Document	(1) Annually until (2010)	Vidyut Patel (USA)	Australia, Hong Kong China	Completed and Adopted by APANPIRG/19

No.	PERFORMANCE OBJECTIVE	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/8 Update
		(2) Develop ATN System Security Guidance		**(2) Guidance Document**	**(2) (2011)**			**reviewed and updated - closed**
		(3) Develop ATN System Security Solution for Initial and Enhanced Services		**(3) Security, Technical, Management and Operational Control**	**(3) (2008)**			**Completed**
		(4) Co-ordinate and monitor ACP working group and other regions including Directory Service, PDRs		**(4) Report**	**(4) Semi-Annually**		**Thailand**	**On-Going review and update**
		(5) Develop IPS Security Policy and update the relevant guidance documents		**Policy and updated guidance documents**	**2011**			**Proposed additional task to facilitate ATN/IPS**
		(6) Develop ATN System Security Check List based on Security Control and Regional Incident Response Plan and Contingency Plan		**(5) Check List, Regional Incident Response Plan and Contingency Plan**	**(5) (2009)**			**Forward to CNS/MET SG and APANPIRG for review and adoption**

No.	PERFORMANCE OBJECTIVE	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/8 Update
10	ATN Service Enhancements (supporting amended ICAO Flight Plan and ATS Message Formats)	(1) Review the impact of the implementation of Amendment 1 to 15th Edition of Doc 4444 effective 15 Nov. 2012 (PANS ATM Chapter 4 and Appendix 3 relating to the ICAO Flight Plan and associated ATS Message formats to the AFS	Enhancing the service	(1) Report on capability of existing and planned AFS systems to the revised ICAO Flight Plan and ATS Message Format	(1) Annually until 2012	USA	Fiji, India Hong Kong, China New Zealand Singapore USA	Completed. Post Monitor the performance.
		(2) Identify the new requirements for AMHS/AFTN to support new message format	Enhancing the operation	(2) Report on impact of New ATS message format in AMHS	(2) 2010	Thailand	Fiji, India Hong Kong, China New Zealand Singapore USA	Completed
			Enhancing the operation	Develop Voice over IP point-to-point ICD	2012	USA, Japan, India		Task created in ATNICG/6

No.	PERFORMANCE OBJECTIVE	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/8 Update
			(3) Identify the link control procedure using the AMHS to support the revised ATS message format to the ATC automation system	**Enhancing the service**	**(3) Report whether special link control procedure is required**	**(3) 2010**	**Thailand**	**Completed Fiji, India Hong Kong New Zealand Singapore USA**
		Develop Regional Strategy for the implementation of SWIM/IMS	To meet the requirements of ASBU as recommended in AN Conf/12	Regional SWIM/IMS Implementation Strategy	2014	USA		Draft Strategy will be presented to the ATNICG WG/12 meeting for consideration by CNS SG in 2014
		Common Communication Service Provider for the region.	Will facilitate implementation of circuits/connections within the region. Will also facilitate harmonization of regional network	Joint Working Paper for the consideration of CNS SG of the APANPIRG	May, 2013	USA	Japan, Singapore, Thailand, China, Hong Kong China and New Zealand	USA, Japan, Singapore, Thailand, China, Hong Kong China & New Zealand assigned the task of preparing common Working Paper
11	Update regional ATN/AMHS implementation strategy	Update regional ATN/AMHS Implementation Strategy to include recent developments	Regional Strategy will be aligned to the changing requirements	Updated Strategy	Apr. 2014	ATNICG WG Members		Draft Strategy to be reviewed by ATNICG/13

No.	PERFORMANCE OBJECTIVE	Tasks/Strategy	Benefits	Deliverables	Target Date	Leader	Supporting Members	ATNICG/8 Update
	The ATN PERFORMANCE OBJECTIVE Workprogramme of ATNICG relates to ICAO Strategic Objective: Sustainability and GPS22, 19 and 17. The APAC ATN ground-to-ground infrastructure will be fully operational 80 percent at 23 locations by December 2013. **(GPI-22) COMMUNICATION NETWORK INFRASTRUCTURE** **Related ATM objectives:** AMSS; HF data; VHF data; SSR Mode S; ATN **Scope:** To evolve the aeronautical mobile and fixed communication infrastructure, supporting both voice and data communications, accommodating new functions as well as providing the adequate capacity and quality of service to support ATM requirements. **(GPI-19) METEOROLOGICAL SYSTEMS** **Objective:** To improve the availability of meteorological information in support of a seamless global ATM system. **(GPI-17) IMPLEMENTATION OF DATA LINK APPLICATIONS** **Scope:** Increase the use of data link applications **Related ATM objectives:** Application of data link; Functional integration of ground systems; with airborne systems; ATS inter-facility data communication (AIDC)							

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Phillipines (Manila)	Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia (Brisbane)	China (Beijing)	Hong Kong, China (Hong Kong)	India (Mumbai)	Fiji (Nadi)	Japan (Fukuoka)	Singapore (Singapore)	Thailand (Bangkok)	USA (Salt Lake City / Atlanta)					
	A					Completed	Q3/17	Q3/13		Q2/13		A			
Australia	B					Q3/12	Q4/17	Q3/13		Q2/13		B	Australia		
(Brisbane)	C					Q2/13	Q1/18	Q4/13		Q3/13		C	(Brisbane)		
	D					Q2/13	Q2/18	Q4/13		Q4/13		D			
	A			Q3/10	Q1/11		Q3/16		Q1/14			A			
China	B			Q3/10	Q2/11		Q4/16		Q4/13			B	China		
(Beijing)	C			On-going	On-going - pre-operational trials to begin march/13		Q1/17		Q4/13			C	(Beijing)		
	D			Q4/13	Q2/13		Q2/17		Q1/14			D			
	A		Q3/10				Q2/16		Q1/13		Q1/15	A			
Hong Kong, China	B		Q3/10				Q3/16		Q4/12		Q2/15	B	Hong Kong, China		
(Hong Kong)	C		On-going				Q3/16		Q4/12		Q2/15	C	(Hong Kong)		
	D		Q4/13				Q4/16		Q2/13		Q4/15	D			
	A		Q1/11					Q3/09	Q2/13			A			
India	B		Q2/11					Q4/09	Q2/12			B	India		
(Mumbai)	C		On-going - pre-operational trials to begin march/13					Q4/09	Q2/13			C	(Mumbai)		
	D		Q3/13					Completed	Q4/13			D			
	A	Completed								Completed		A			

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Phillipines (Manila)	Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia (Brisbane)	China (Beijing)	Hong Kong, China (Hong Kong)	India (Mumbai)	Fiji (Nadi)	Japan (Fukuoka)	Singapore (Singapore)	Thailand (Bangkok)	USA (Salt Lake City / Atlanta)					
Fiji	B	Completed								Completed		B	Fiji		
(Nadi)	C	Q3/13								Completed		C	(Nadi)		
	D	Q4/13								completed		D			
	A	Q2/17	Q2/16	Q2/16				Q2/16		Q3/00 Renewal AMHS Q2/15		A			
Japan	B	Q3/17	Q3/16	Q3/16				Q3/16		Q4/04 Renewal AMHS Q3/15		B	Japan		
(Fukuoka)	C	Q3/17	Q3/16	Q3/16				Q3/16		Q4/04 Renewal		C	(Fukuoka)		
	D	Q4/17	Q4/16	Q4/16				Q4/16		Completed Renewal AMHS Q4/15		D			
	A	Q3/13			Q3/09		Q2/16		Q2/13		Q1/15	A			
Singapore	B	Q3/13			Q4/09		Q3/16		completed		Q2/15	B	Singapore		
(Singapore)	C	Q4/13			Q4/09		Q3/16		ongoing		Q2/15	C	(Singapore)		
	D	Q4/13			Completed		Q4/16		Q2/13		Q4/15	D			
	A		TBD * Discussions underway to implement the circuit in 2013-14	Q4/12	Q2/13			Q2/13				A			
Thailand	B		TBD	Q3/12	Q2/12			completed				B	Thailand		
(Bangkok)	C		TBD	Q3/12	Q3/13			ongoing				C	(Bangkok)		
	D		TBD	Q4/12	Q4/13			Q3/13				D			
	A	Q2/13				Completed	Completed Renewal AMHS Q2/15					A			

Note : Japan has plans to install a new AMHS system in 2015 and start testing the sytem initially with FAA and then schedule connectivity with other BBIS a nd Bis countries.

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Phillipines (Manila)	Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia	China	Hong Kong, China	India	Fiji	Japan	Singapore	Thailand	USA					
		(Brisbane)	(Beijing)	(Hong Kong)	(Mumbai)	(Nadi)	(Fukuoka)	(Singapore)	(Bangkok)	(Salt Lake City / Atlanta)					
USA	B	Q2/13				Completed	Completed Renewal AMHS Q3/15					B	USA		
(Salt Lake City / Atlanta)	C	Q3/13				Completed	Completed Renewal AMHS Q3/15					C	(Salt Lake City / Atlanta)		
	D	Q4/13				completed	Completed Renewal AMHS Q4/15					D			
Phillipines	A			Q1/15				Q1/15					Phillipines		
	B			Q2/15				Q2/15							
	C			Q2/15				Q2/15							
	D			Q4/15				Q4/15							
Bahrain	A							Q3/13				A	Bahrain		
	B							N/A				B			
	C							Completed				C			
	D							Q4/13				D			
Europe	A						TBD					A	Europe		
	B						TBD					B			
	C						TBD					C			
	D						TBD					D			
Italy	A								Q1/14			A	Italy		
	B								q4/13			B			
	C								q4/13			C			
	D								Q2/14			D			
Kuwait	A		TBD									A	Kuwait		
	B		TBD									B			
	C		TBD									C			
	D		TBD									D			
	A		TBD				Q3/17					A			

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Phillipines (Manila)	Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia (Brisbane)	China (Beijing)	Hong Kong, China (Hong Kong)	India (Mumbai)	Fiji (Nadi)	Japan (Fukuoka)	Singapore (Singapore)	Thailand (Bangkok)	USA (Salt Lake City / Atlanta)					
Russian Federation	B		TBD				Q4/17					B	Russian Federation		
	C		TBD				Q1/18					C			
	D		TBD				Q2/18					D			
South Africa	A	TBD										A	South Africa		
	B	TBD										B			
	C	TBD										C			
	D	TBD										D			
	A							Q4/11				A			
United	B							N/A				B	United		
Kingdom	C							Q1/12				C	Kingdom		
	D							Completed				D			
	A	Q1/14						2009				A			
Indonesia	B	Q2/14						Completed				B	Indonesia		
(Jakarta-Singapore/Makkasar-Australia)	C	Q3/14						Completed				C	(Jakarta)		
	D	Q4/14						Q3/13				D			
	A	Q1/14								Q1/14		A			
New Zealand	B	N/A								N/A		B	New Zealand		
(Christchurch)	C	Q2/14								Q2/14		C	(Christchurch)		
	D	Q3/14								Q1/15		D			
	A	UA/TBD										A			
Timor Leste	B	UA/TBD										B	Timor Leste		
(Dili)	C	UA/TBD										C	(Dili)		
	D	UA/TBD										D			
	A	UA/TBD										A			
Nauru	B	UA/TBD										B	Nauru		
(Nauru)	C	UA/TBD										C	(Nauru)		
	D	UA/TBD										D			
	A	TBD										A			

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Phillipines (Manila)	Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia	China	Hong Kong, China	India	Fiji	Japan	Singapore	Thailand	USA					
		(Brisbane)	(Beijing)	(Hong Kong)	(Mumbai)	(Nadi)	(Fukuoka)	(Singapore)	(Bangkok)	(Salt Lake City / Atlanta)					
Papau New Guinea	B	TBD										B	Papau New Guinea		
(Port Moresby)	C	TBD										C	(Port Moresby)		
	D	TBD										D			
	A	UA/TBD										A			
Solomon Islands	B	UA/TBD										B	Solomon Islands		
(Honiara)	C	UA/TBD										C	(Honiara)		
	D	UA/TBD										D			
	A	UA/TBD										A			
Vanuatu	B	UA/TBD										B	Vanuatu		
(Port Vila)	C	UA/TBD										C	(Port Vila)		
	D	UA/TBD										D			
	A		TBD									A			
DPR Korea	B		TBD									B	DPR Korea		
(Pyongyang)	C		TBD									C	(Pyongyang)		
	D		TBD									D			
	A		Q1/09	Q3/09								A			
Macao, China	B		Q1 - Q2/09	Q3 - Q4/09								B	Macao, China		
(Macao)	C		Q1 - Q2/09	Q3 - Q4/09								C	(Macao)		
	D		Q4/13	Completed								D			
	A		TBD									A			
Mongolia	B		TBD									B	Mongolia		
(Ulaanbaatar)	C		TBD									C	(Ulaanbaatar)		
	D		TBD									D			
	A		TBD						Q1/14			A			
Myanmar	B		TBD						Q2/14			B	Myanmar		
(Yangoon)	C		TBD						Q3/14			C	(Yangoon)		
	D		TBD						Q4/14			D			

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Phillipines (Manila)	Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia (Brisbane)	China (Beijing)	Hong Kong, China (Hong Kong)	India (Mumbai)	Fiji (Nadi)	Japan (Fukuoka)	Singapore (Singapore)	Thailand (Bangkok)	USA (Salt Lake City / Atlanta)					
	A		Q2/12* No physical connection yet, testing through VSAT		Q4/12							A			
Nepal	B		Q3/12		Q2/13							B	Nepal		
(Kathmandu)	C		Q4/12		Q2/13							C	(Kathmandu)		
	D		Q2/13		Q2/13							D			
	A		TBD		Q3/10							A			
Pakistan	B		TBD		N/A							B	Pakistan		
(Karachi)	C		TBD		Q3/10							C	(Karachi)		
	D		TBD		Q2/13 India ready, waiting for Pakistan updation of AMC table							D			
	A		Q2/10				Q3/16					A			
Republic of Korea	B		Q3/10				Q4/16					B	Republic of Korea		
(Seoul)	C		Q3-Q4/10				Q1/17					C	(Seoul)		
	D		Completed				Q2/17					D			
	A			Q4/14				Q3/14	Q3/14			A			
Vietnam	B			Q4/14				Q3/14	Q3/14			B	Vietnam		
(Ho Chi Minh)	C			Q4/14				Q3/14	Q3/14			C	(Ho Chi Minh / Hanoi)		
	D			Q1/15				Q4/14	Q4/14			D			
Taipei	A			TBD			Q3/17					A	Taibei		
	B			TBD			Q4/17					B			
	C			TBD			Q1/18					C			
	D			TBD			Q2/18					D			
	A				Q2/13				Q2/13			A			
Bangladesh	B				Q2/13				Q2/13			B	Bangladesh		

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Phillipines (Manila)	Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia (Brisbane)	China (Beijing)	Hong Kong, China (Hong Kong)	India (Mumbai)	Fiji (Nadi)	Japan (Fukuoka)	Singapore (Singapore)	Thailand (Bangkok)	USA (Salt Lake City / Atlanta)					
(Dhaka)	C				Q2/13				Q3/13			C	(Dhaka)		
	D				Q2/13				Q3/13			D			
	A				Reply received from Bhutan. Govt. approval for funds will be sought by them N/A							A			
Bhutan	B				N/A							B	Bhutan		
(Paro)	C				N/A							C	(Paro)		
	D				N/A							D			
Kenya	A				Q3/13							A	Kenya		
	B				Q4/13							B			
	C				Q4/13							C			
	D				Q4/13							D			
	A				Q1/10							A			
Oman	B				N/A							B	Oman		
(Muscat)	C				Awaiting firm plans from Muscat Q3/12							C	(Muscat)		
	D				Q4/13							D			
	A				Awaiting firm information from Sri Lanka Q2/13			TBD				A			
Sri Lanka	B				N/A			TBD				B	Sri Lanka		
(Colombo)	C				Q2/13			TBD				C	(Colombo)		

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Phillipines (Manila)	Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia (Brisbane)	China (Beijing)	Hong Kong, China (Hong Kong)	India (Mumbai)	Fiji (Nadi)	Japan (Fukuoka)	Singapore (Singapore)	Thailand (Bangkok)	USA (Salt Lake City / Atlanta)					
	D				Q3/13			TBD				D			
	A					UA						A			
Kiribati	B					UA						B	Kiribati		
(Tarawa)	C					UA						C	(Tarawa)		
	D					UA						D			
	A					Q4/12						A			
New Caledonia	B					NA						B	New Caledonia		
(Noumea)	C					Q4/12						C	(Noumea)		
	D					Q4/12						D			
	A					UA						A			
Tuvalu	B					UA						B	Tuvalu		
(Funafuti)	C					UA						C	(Funafuti)		
	D					UA						D			
	A					UA						A			
Wallis Island	B					UA						B	Wallis Island		
(Wallis)	C					UA						C	(Wallis)		
	D					UA						D			
	A							2013				A			
Brunei Darussalam	B							2013				B	Brunei Darussalam		
(Brunei)	C							2013				C	(Brunei)		
	D							2013				D			
	A							2007	Q2/13			A			
Malaysia	B							N.A.	Q3/13			B	Malaysia		
(Kuala Lumpur)	C							Completed	Q4/13			C	(Kuala Lumpur)		
	D							Q4/13	Q4/13			D			
	A								Q2/13			A			
Cambodia	B								Q3/13			B	Cambodia		
(Phnom Penh)	C								Q3/13			C	(Phnom Penh)		
	D								Q3/13			D			

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia (Brisbane)	China (Beijing)	Hong Kong, China (Hong Kong)	India (Mumbai)	Fiji (Nadi)	Japan (Fukuoka)	Singapore (Singapore)	Thailand (Bangkok)	USA (Salt Lake City / Atlanta)	Phillipines (Manila)				
	A								Q1/13			A			
Lao PDR	B								Q2/13			B	Lao PDR		
(Vientiane)	C								Q3/13			C	(Vientiane)		
	D								Q4/13			D			
	A									UA		A			
American Samoa	B									UA		B	American Samoa		
(Pago Pago)	C									UA		C	(Pago Pago)		
	D									UA		D			
Marshall Islands	A									UA		A	Marshall Islands		
	B									UA		B			
	C									UA		C			
	D									UA		D			
	A									UA		A			
Micronesia, Federated	B									UA		B	Micronesia, Federated		
State of Chuuk	C									UA		C	State of Chuuk		
	D									UA		D			
	A									UA		A			
Micronesia, Federated	B									UA		B	Micronesia, Federated		
State of Kosrae	C									UA		C	State of Kosrae		
	D									UA		D			
	A									UA		A			
Micronesia, Federated	B									UA		B	Micronesia, Federated		
State of Ponapei	C									UA		C	State of Ponapei		
	D									UA		D			
	A									UA		A			
Micronesia, Federated	B									UA		B	Micronesia, Federated		
State of Yap	C									UA		C	State of Yap		
	D									UA		D			

Interconnection, Connected to router of: *Administration (Location of Router)*	Stage	BBIS									Phillipines (Manila)	Stage	Interconnection, Connected to router of: *Administration (Location of Router)*	Remarks	
		Australia (Brisbane)	China (Beijing)	Hong Kong, China (Hong Kong)	India (Mumbai)	Fiji (Nadi)	Japan (Fukuoka)	Singapore (Singapore)	Thailand (Bangkok)	USA (Salt Lake City / Atlanta)					
Palau	A									UA		A	Palau		
	B									UA		B			
	C									UA		C			
	D									UA		D			
					Note:										
					A	Physical Connections									
					B	Router Connection Tests									
					C	MTA Interoperability Tests									
					D	AMHS Commission									
					Q1/09	e.g. 1st Quarter in 2009									
					UA	User Agent									
Note : Japan has plans to install a new AMHS system in 2015 and start testing the sytem initially with FAA and then schedule installation of other circuits with BBIS a nd Bis countries.															