INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

REPORT OF

THE SECOND MEETING OF AERONAUTICAL COMMUNICATIONS SERVICES (ACS) IMPLEMENTATION CO-ORDINATION GROUP OF APANPIRG (ACSICG/2)

Bangkok, Thailand
20 – 22 May 2015

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PART I – HISTORY OF THE MEETING

1.1 Introduction

1.1.1 The Second Meeting of the Aeronautical Communication Services (ACS) Implementation Co-ordination Group (ACSICG/2) of APANPIRG was held at ICAO Regional Office, Bangkok, Thailand, from 20 to 22 May 2015. The meeting was held back to back with the Fourth meeting of the Common Regional VPN (CRV) Task Force which was held from 18 to 19 May 2015.

1.2 Attendance

1.2.1 The Meeting was attended by 56 participants from 20 States/Administrations (Australia, Bangladesh, Cambodia, China, Hong Kong China, Macao China, Fiji Islands, India, Indonesia, Japan, Malaysia, Myanmar, New Caledonia, New Zealand, the Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand and USA) and from the Industry partners including SITA and Comsoft. A list of participants is provided at **Attachment 1**.

1.3 Opening of the Meeting

1.3.1 In his opening remarks, Mr. Hoang Tran, Chairman of the Implementation Coordination Group highlighted objective and tasks of the meeting. Mr. Li Peng, Regional Officer, CNS of ICAO Asia and Pacific Office extended warm welcome to all participants on behalf of Mr. Arun Mishra, ICAO Regional Director. He also introduced the work programme of the meeting.

1.4 Officers and Secretariat

1.4.1 Mr. Hoang Tran from FAA, Chairman of the ACSICG presided over the meeting.

1.4.2 Mr. Li Peng, Regional Officer CNS of ICAO APAC Office was the Secretary of the meeting who was assisted by Mr. Frederic Lecat, Regional Officer CNS from the same office.

1.5 Working Arrangements, Language and Documentation

1.5.1 The ACSICG met as a single body. The working language for the meeting was English inclusive of all documentation and this Report. The meeting considered 13 working papers and 13 information papers and took actions on the report of Fourth meeting of the CRV Task Force. Lists of Working/Information Papers and Presentations are provided at **Attachment 2.**

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Agenda Item 1: Adoption of agenda

The agenda items presented in WP/01 were adopted by meeting.

Agenda Item 2: Review outcome of APANPIRG/25 on Implementation of Aeronautical Communication Facilities and Services

2.1 The meeting reviewed the outcome of APANPIRG/25 (WP/02) on aeronautical communication and works accomplished by the First Meeting of ACSICG of APANPIRG and the Eighteenth Meeting of CNS Sub-group. The meeting pleased to note that most of draft Conclusions formulated by ACSICG/1 meeting and CRVTF were endorsed by CNS SG and adopted by APANPIRG.

2.2 The meeting also reviewed and discussed follow-up actions to APANPIRG/25 meeting taken by States and Secretariat.

2.3 The meeting reviewed the consolidated response to the recommendations of AN Conf/12 and noted those relevant to the ACSICG. The ACSICG was expected to take these recommended actions into account when update its work programme.

Agenda Item 3: Information about APANPIRG Contributory Bodies Review Task Force

APANPIRG Contributory Reconstructive (IP/09)

3.1 The meeting noted updates on the progress being achieved by APANPIRG contributory Bodes Review Task Force (ABSRTF). The first meeting of ABSRTF with the APANPIRG Sub Groups Chairs through a teleconference was held on 8th April 2015. A face-to-face meeting of the ABSRTF with all the Task Force members is scheduled for 24-25 June 2015. The Task Force was established in accordance with APANPIRG/25 Decision 25/50. The meeting noted the ToR of the Task Force and the draft proposal for the new Structure of APANPIRG contributory bodies.

3.2 APANPIRG/25 noted that in light of the performance based approach to air navigation planning and implementation, there was a need to align the work programme of States, Regions and ICAO. APANPIRG also noted that within the ASBU framework, due consideration should be given to planning, implementation, performance measurement, monitoring and reporting aspects and that a project based approach for ASBU's should be applied to APANPIRG Contributory Bodies (Sub Groups, Implementation Coordination Groups, Task Forces) as necessary.

3.3 The meeting recommended using CRV OG (CRV Operation Group to replace OOTF in the recommended structure and considered that the name of ACSICG may be kept as it was just renamed by APANPIRG/24 only in 2013.

3.4 The meeting noted that ACSICG was expected to review its TOR based on the new project approach once the APANPRIG new structure and the project management principle is adopted by APANPIRG. ***ACTION ITEM for all ACSICG Members***

Agenda Item 4: e-ANP: overview and need for specific requirements

Review e-ANP related planning Tables (WP/10)

4.1 The meeting noted the outcome of the e-ANP working group meeting on the recommendations for AFS related tables for e-ANP. The e-ANP working group was established according to Decision 18/23 of CNS Sub-group of APANPIRG for development of CNS part of future e-ANP. The first meeting of this working group held from 8 to 10th April 2015 was attended by 12 participants from Cambodia, China, India, Japan, Malaysia, Papua New Guinea, Singapore, Thailand and USA. Prior to that meeting, two teleconferences on the same subject were organized in early 2015.

4.2 The AFS related planning tables and specific requirements for APAC Region proposed by the e-ANP Working Group were reviewed by the meeting.

4.3 The meeting noted the objective and purpose of the regional ANPs highlighted in the paper. The definition of air navigation deficiency also has very close relation with the regional ANP.

4.4 Regarding whether need to keep some regional specific requirements (APANPIRG Conclusions and Policies agreed in past decades) in the e-ANP Vol. I, the meeting noted the detailed proposal with a table of justification resulted from discussions by the e-ANP Working Group meeting. The initial analysis was conducted and provided by Thailand.

e-ANP Vol. II - Common Templates

4.5 The meeting noted that four new templates for the CNS part in the e-ANP Vol.II were adopted by the Council.

4.6 The meeting reviewed populated **TABLE CNS II-1 - AERONAUTICAL FIXED TELECOMMUNICATIONS NETWORK (AFTN) PLAN** initially input by India based on the latest available information. The meeting reviewed and further updated Table CNS II-1 which is provided in **Appendix A** to this Report. The meeting noted that this table was updated based on the one approved by APANPIRG/25 meeting. This table will be presented to CNS SG/19 Meeting.

4.7 The meeting also reviewed and further updated **TABLE CNS II-2 - REQUIRED ATN INFRASTRUCTURE ROUTING PLAN** initially presented by China with assistance from India at the e-ANP WG meeting. Thailand collected and consolidated the updated information from Participants during the meeting. The updated Table CNS II-2 is provided in **Appendix B** to this meeting Report for further consideration by CNS SG/19 meeting.

4.8 Singapore presented the result of initial review of e-ANP **Table CNS II-3- ATS Direct Speech Circuits Plan** at the e-ANP WG meeting based on existing information and required format. The updated table as result of a survey conducted through a State Letter will be presented to CNS SG/19 for consideration.

4.9 The meeting discussed the requirement for AFS data between Brisbane and Makassar proposed by Australia and Indonesia. The new circuit would support both AIDC and AFTN traffic. The circuit between Brisbane and Jakarta would be decommissioned once the new circuit between Brisbane and Makassar is operational. The meeting had no objection to this proposed change and agreed to include this in the updated draft Table CNS II-1 which will be processed in accordance with the established procedure for the new e-ANP.

e-ANP Vol. II - Regional Specific Requirements

4.10 The meeting noted that the rest of CNS Tables in the Part IV of FASID (Doc 9673 Vol. II) were also reviewed by the e-ANP WG. Among Tables reviewed, the meeting endorsed a proposal from the e-ANP WG to drop the Table CNS 1C - AMHS Routing Plan as the table had not been included in the harmonized templates approved by the Council.

4.11 The meeting noted the recommendation from e-ANP WG that the information contained in the existing Table CNS 1E – AIDC Implementation Plan should be kept as regional specific requirement as AIDC implementation had been identified as one of implementation priorities by APANPIRG. The meeting further noted that this Table was referred to AIDC Task Force (APA TF/1 16-18 June 2015) for refinement in terms of format and the essential planning information contained in the Table.

Agenda Item 5: Review States' ATN/AMHS Implementation Status, Transition and Operational Issues:
(Member States are expected to provide latest implementation status in the attached format)

5.1 Under this agenda item, the meeting reviewed implementation issues and status updates on ATN/AMHS implementation progress achieved and their near plans through information papers presented by the following Administrations:

- Thailand (IP/02)
- India (IP/03)
- Indonesia (IP/11)
- China (IP/06)
- Japan (IP/07 & IP/08)
- Sri Lanka (IP/05)
- Bangladesh (IP/13)
- New Zealand (IP/12)

AFS Implementation updates by New Zealand (IP/12)

5.2 Through the information paper, meeting noted various AFS, AIS and MET related implementation activities in New Zealand. From Q3 2015 AMHS connection between New Zealand and USA would be established and it will be put into operation by the end of 2015. Airways has upgraded its whole network infrastructure to an IP-based MPLS network which enabled the number of X.25-based AFTN connections to be reduced to a minimum and will facilitate connectivity to the planned APAC CRV Network.

5.3 New Zealand has operationally commissioned a new AIM system which interconnects with the Airways Message Switching System using both AMHS and AFTN connections. The use of an AMHS connection will allow the exchange of messages with content other than just a restricted AFTN character set e.g. XML-formatted data and graphical data such as MET charts.

5.4 A Web Service interface is also used to allow external systems to query the AIM system e.g. to obtain pre-Flight Briefings. Rather than developing functionality for accessing Web Services on a number of legacy systems which previously used AFTN in order to query the previous AIS system, an Airway Query Converter (AQC) System has been developed which accepts queries from these systems either via AFTN or FTP. The AQC system then submits Web Service requests to the AIM system and returns a formatted response to the system which submitted the request.

5.5 Airways also provide Pre-flight Briefing (PFB) and Flight Planning functionality to users through an Internet Flight Information Service (IFIS) which has interfaces with the new AIM system via the AQC system. These systems collectively provide greater flexibility for Pre-Flight Briefing, through Web Services and XSL templates.

5.6 VSAT connectivity to a number of Pacific Islands States is planned which will support IP-based AFTN/AMHS connections and voice. Various bodies are funding these connections.

There is an existing VSAT link to Fua'amotu(Tonga).

5.7 The World Bank has issued a tender which will fund the installation of VSAT connections into the following locations:

- Vava'u (Tonga) [In addition to the existing VSAT connection mentioned above]
- Tarawara (Kiribati)
- Kiritimati Island a.k.a. Christmas Island (Kiribati)
- Funifuti (Tuvalu)
- Faleolo (Samoa)
- Vanuatu

5.8 The New Zealand Ministry of Foreign Affairs and Trade (MFAT) are expected to fund similar VSAT connections to:

- Rarotonga (Cook Islands – two links as includes Aitutaki)
- Niue

5.9 Nauru may use a VSAT connection in the future, with separate funding.

5.10 The meeting requested New Zealand to provide point of contact of the World Bank for this VSAT project and the Secretariat was requested to coordinate with the World Bank for detailed information of the project in order to avoid duplicated efforts in improving AFS communication for Pacific Region in the CRV project.

5.11 It was encouraging to note that a number of new operational AMHS had been put into operation in the end of 2014 and beginning of 2015 in the Region. Some more TMC between States/Administration were being discussed and/or signed to progress the implementation of AMHS between States/Administrations and much more planned implementation will take place in 2016. The meeting expressed appreciation to those States/Administrations that made efforts in implementation of AMHS since ACSICG/1 meeting.

Updates on the AMHS Implementation Status and Planner

5.12 Based on the planning and implementation information presented, the meeting reviewed and updated the Regional ATN/AMHS implementation Status Table which is consolidated into **Appendix C** to this report. The meeting also reviewed the AMHS implementation planner updated by India and provided in **Appendix D** to this report.

ICAO Doc7910 and Doc 8585 Update (WP/4)

5.13 USA conveyed the concerns from the European Aeronautical Fixed Services Group (AFSG) regarding the need to timely update ICAO Documents 7910 and 8585.

5.14 With the increased worldwide transition from AFTN to AMHS, a substantial number of messages have been found to contain originator or receipient addresses which are not compliant with ICAO Doc7910 (Location Indicators) and/or 8585 (Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services). These non-compliances typically present themselves in the following manner:

- The address's 4-character location indicator is not present in Document 7910, and/or
- The address's 3-character designator is not present in Document 8585

5.15 The AFSG noted that it is the responsibility of each ICAO member State to ensure that addresses within their responsibility be aligned with ICAO Documents 7910 and 8585. The AFSG also proposed that ICAO ask states to designate national focal points responsible for their respective entries of updates to these ICAO Documents.

5.16 The meeting was informed that the procedure for updating the information in these documents are clearly specified in the forward of each Document.

Revised AMHS Naming Plan (WP/13)

5.17. Thailand and Hong Kong China presented a revised AMHS Naming Plan which provides planning and technical guidance on the naming convention for the transition of ground Aeronautical Fixed Telecommunication Network (AFTN) services to the ATS Message Handling System (AMHS) within the ASIA/PAC Region. Based upon the ATN SARPs as published in ICAO Annex 10 and updated ICAO Doc. 9880, naming and addressing plans are required to be developed by ICAO regions concerned.

5.18 The revised *AMHS Naming* Plan will provide guidance to States/Administrations in the assignment and registration of addresses and names to be used for the Aeronautical Telecommunication Network (ATN) with a view to ensure its consistency with the latest EUROCONTROL AMC documentary and database requirements. The updated sections in the revised document for the naming assignment conventions for allocating Originator/Recipient (O/R) names are highlighted as follows:

a) The references / documents / definitions / abbreviations concerned. (1.3-1.5)

b) AMHS addressing scheme with wildcard (3.2)

c) Defining Organization-name and Organization-unit-name-1 for CAAS (5)

d) Table 1a: PRMD-name values of the AMHS MD in ASIA/PAC region Information from EUROCONTROL AMC Database

e) Table 1b: Suggested PRMD-name values of the AMHS MD in ASIA/PAC region for states/ATSO which have not registered to AMC assuming all States/ATSOs using CAAS

5.19 In view of the foregoing, the meeting formulated the following draft Conclusion for consideration by CNS SG of APANPIRG. In this connection, the meeting appreciated the work done by Thailand and Hong Kong China:

Draft Conclusion 2/1 – Revised AMHS Naming Plan

That, the revised AMHS Naming Plan provided in **Appendix E to** the report be adopted.

Updates on EDS

5.20 A presentation on the development of the European Directory Service (EDS) for AMHS system was provided to the meeting by COMSOFT on behalf of EUROCONTROL. The concept of EDS and its relation, integration and synchronization cycle with AMC was introduced. The operational concept of EDS had included in the EUR AMHS Manual. The EDS located Eurocontrol became operation since April 2015. There are three methods to access the EDS including on-line, indirect and off-line. NATS United Kingdom would use EDS through on-line access and DFS Germany will use indirect method to access EDS. During the discussion, COMSOFT remarked that Eurocontrol had stated that AMHS is core component of SWIM.

Updates on MEVA III Project

5.21 COMSOFT provided updates on MEVA III project in the North America and Caribbean Region. The network was put into operation in the last week of March 2015. The VSAT network uses both PAMA and DAMA technology to meet requirements for both voice and data communication. It was informed that parallel operation for MEVA III and MEVA II were maintained during the transition period at beginning of this year and COMSOFT will provide 5 years operational support for this project from 1 April 2015 according to the contract.

Agenda Item 6: Review outcome of the Common Regional VPN Task Force

Report of CRV TF/4 (WP/09)

6.1 Under this agenda, **t**he meeting reviewed the report of CRVTF/4 meeting and took actions as follows.

6.2 The meeting noted the following decisioins made by the CRV Task Force for providing guidance to the internal furture work process.

Decision 4/1 – Request for Information for the provision of the Common Regional VPN (CRV)

That, the Final Report on the Evaluation of the Request for Information - RFI for the provision of the common Regional VPN (CRV) be adopted.

Note: the Final Report is available on the secure portal as "APAC CRV - RFI Evaluation report - final 30 Mar. 15."

Decision 4/3 - CRV preliminary Safety Analysis

That, the CRV preliminary Safety Analysis v1.0 be adopted and form the basis of the safety requirements for the CRV procurement process.

Decision 4/5 – CRV-OG as an APANPIRG contributory body

That, if the CRV-OG creation is confirmed, the establishment be done under APANPIRG umbrella.

Decision CRV 4/6 - 2 Extension of deadline for payment of CRV stage 1

That, the deadline for payment of the USD 10,000 to ICAO be changed from 22 May 15 to the day before the task 47-i (i) carry out a pre-evaluation and evaluation meeting starts.

6.3 The meeting noted work on updating the CBA based on the second iteration and noted a number recommendations had been developed on the CBA. Based on the report, the meeting endorsed the following draft Conclusion formulated by the CRV Task Force for consideration by CNS SG of APANPIRG (as requested by the meeting, the Document will be further modified by the Chair of CRV TF – removal of vendors specific information as these are sensitive information):

Draft Conclusion 2/2 – Second Iteration of CRV Cost Benefit Analysis (based on RFI)

That the second iteration of the CRV Cost Benefit Analysis provided in **Appendix F** (with password to access) be adopted and distributed to States/Administrations for their reference.

6.4 The meeting also endorsed the following draft Conclusion formulated by the CRV Task Force for consideration by CNS SG of APANPIRG:

Draft Conclusion 2/3 - CRV preliminary Safety Analysis Follow-up

That, CRV Participating States/Administrations be urged to consider the CRV safety requirements specified in the CRV Preliminary Safety Analysis v1.0 as a basis for their local safety case, perform their local safety case, and report to APANPIRG through the appropriate body.

Note: to support the local safety case, a template will be provided, as well as educational material on the safety case.

6.5 The meeting further discussed the cost arrangements between Administrations. In order to facilidate Administrations with negative CBA value to implement CRV project to achieve common benefits, the meeting encourage those Administrations in a position to do so, to work out cost arrangments with their counter parts. In view of the foregoing, the meeting formulated following Draft Conclusion based on the information provided by the CRV Task Force:

Draft Conclusion 2/4 – CRV Cost Arrangement Framework

That, noting that cost arrangements on current telecommunications exist between some States/Administrations and considering the result of the second iteration of the CRV Cost Benefit Analysis,

APAC States/Administrations be advised to:

- make their own local Cost benefit analysis as needed;
- start discussions of possible new or improved cost arrangement frameworks with other ICAO Member State(s)/Administration(s), based on the Request For Information results; and
- endeavor to establish arrangements for mid 2016.

Inter-regional Connection issues (WP/05)

6.6 USA presented a working paper highlighted the need to replace existing International Private Line (IPL) between Air Navigation Service Providers (ANSPs) with common network using standard Internet Protocol (IP) interface. The meeting was informed that a common IP network provider, Pan-European Network Service (PENS), has been used in the European region, and FAA Telecommunication Infrastructure (FTI) has also been in extensive operation in Canada and USA.

6.7 The Asia/Pacific region was making efforts to implement a common IP network service i.e. Common Regional Virtual Private Network (CRV) in the region which is planned for contract award by 2016.

6.8 However, it was pointed out that replace existing IPLs between ICAO regions. The equipment to support IPL service is obsolete and has been difficult to maintain as spare part inventory is depleting and many parts are no longer manufactured.

6.9 ANSPs in the Asia/Pacific region who have IPLs with other ICAO regions should consider the following options to replace their existing IPLs:

1) Invite counterparts in other ICAO regions to join CRV or
2) Join the respective ICAO regional IP network (e.g. PENS) or
3) Establish a bi-lateral agreement for a single telecommunication network vendor

6.10 It is expected that data communication, the entry points between ANSPs is still governed by Air Traffic Service Message Handling System (AMHS) routing policy.

6.11 The meeting invited States with inter-regional entry/exit points including Australia, China, India, Japan, Singapore and Thailand to provide addresses and contact points of their counter parts in the other Regions so the potential service providers may be requested to provide quotation on the options for including those circuits in the CRV project proposal.

Agenda Item 7: System Wide Information Management (SWIM)

7.1 Japan made a presentation on their informaiton managment in CARATS project associated with SWIM concept. JCAB intended to convey the importance to increase common awarenes among concerned members through active discussions.

Utilizing exisiting Infrastructure to Support SWIM (IP/01)

7.2 In following up one of the action items agreed the first meting of the ACSICG, USA presented an information paper (IP/01) on the Federal Aviation Administration operational and implementation analysis to support SWIM environment between Air Navigation Service Providers (ANSPs) utilizing existing infrastructure. The existing internal infrastructure of each ANSP is different from one another. Thus, it's impossible to recommend a common SWIM access point or gateway.

7.3 The Air Traffic Services Message Handling System (AMHS) has been standardized and could allow a common access to both existing interface and to SWIM with each individual ANSP's specific SWIM gateway. The FAA is investigating development of a FAA SWIM gateway that could interface to AMHS, AFTN or both to support interface with other ANSPs or organizations. The SWIM Gateway is planned to provide conversion between AMHS based messages to other FAA applications/systems seamlessly. Several issues and comments regarding requirements, architecture, governance and management were consolidated in a table attached to the paper which is kept for information only. It was recommended to consider such information to support SWIM transition. Some issues would also be required to be discussed at the proposed SWIM workshop in 2016.

7.4 The members of ACSICG were requested to provide feedback to the paper and USA will present the feedback to CNS SG/19 meeting in July 2015.

SWIM Seminar/Workshop in 2016 (WP/03)

7.5 In order to follow up APANPIRG Conclusion 25/43 - Promote understanding of SWIM in APAC Region with focus on both technical and operational aspects for SWIM development, Secretariat proposed to organize a seminar/workshop during April-June 2016. The meeting briefly discussed the topics, audience, partnerships, expertise and demonstrations possibilities for the event.

7.6 States/Administrations were invited to support the event by providing SME. In particular from those Administrations participated in the Mini Global Demonstration on SWIM during APANPIRG/25 meeting. USA, China, Japan expressed their willingness to support the event. Australia, Republic of Korea, Singapore and Thailand will confirm their support later after the meeting.

7.7 USA recommended to organize a workshop rather than a seminar so some issues may be discussed with experts. Australia recommended conducting the workshop in conjunction with other associated meeting like the SWIM seminar conducted in Chiangmai back to back with an ATNICG meeting so approval of travel for participants from States would be justified.

7.8 The meeting was informed that ICAO Europe Office had a plan to organize a Seminar/Workshop on IWXXM in 2016 and the second Mini Global Demonstration on SWIM was also scheduled for 2016.

Proposed joint action by the ATFM/SG (WP/08)

7.9 The Secretariat presented outcomes of the Asia/Pacific Air Traffic Flow Management Steering Group (ATFM/SG), related to the development of an interface control document (ICD) for the proposed regional ATFM network.

7.10 ATFM/SG/5 held in Bangkok from 30 March to 3 April 2015 produced the final draft version of the *Asia/Pacific Region Framework for Collaborative Air Traffic Flow Management,* which will be presented to APANPIRG/26 through the ATM Sub-Group of APANPIRG this year.

7.11 ATFM/SG/5 discussed the need for development of an operational requirements document for the exchange of ATFM information, and an ICD for technical ATFM communications solutions. The ATFM/SG/5 meeting made the following decision:

Decision ATFM/SG/5-1 – ATFM Information Requirements Small Working Group (ATFM/IR/SWG)

That, recognizing the need for the development of operational and technical requirements for the exchange of ATFM information in the cross-border, multi-nodal ATFM network, a small working group comprised of China, Hong Kong China, India, Indonesia, Japan, Singapore, Thailand and ICAO, be established to draft:

1. *An Operational Requirements document for the exchange of and interaction with ATFM information; and*

2. *A technical interface control document (ICD)in accordance with the terms of reference at* ***Attachment B****.*

7.12 The meeting was informed that the composition of the SWG is currently being finalized. It was envisaged that its initial work, commencing in the near future, will include inter-alia the drafting of a skeletal ICD based on templates used for Asia/Pacific Region ICDs.

7.13 The meeting also noted the TOR of ATFM/IR/SWG attached to WP/08. As result of discussions, the meeting agreed to the following:

a) Member States/Administrations for the ATFM/IR/SWG be encouraged to nominate additional telecommunication subject experts (nominated for ACSICG) in addition to the ATFM expert for joint development of the ICD;

b) Agreed to provide the current ICD for all applications using IP to ATFM/IR/SWG for their reference in developing the ICD for ATFM;

c) ATFM/IR/SWG or ATFM SG is requested to provide the draft ATFM ICD to the ACSICG for review and comments once it is ready.

Agenda Item 8: Pan Regional AIDC ICD

Status of PAN Inter-regional ICD for AIDC (IP/10)

8.1 The meeting noted that the PAN regional ICD for AIDC developed by the inter-regional AIDC Task Force had been adopted by APANPIRG/25 meeting and NAT IMG in November 2015. The ICD now is avaialble on ICAO APAC website and States/Administration were notified about its availability. The meeting was also informed that the first meeting of APAC AIDC Task Force established by APANPIRG/25 is scheduled for 16-18 June 2015.

AIDC Implementationrelated issues (WP/07)

8.2 The meeting noted the status of AIDC implementation in India and with adjacent ATSUs in the Sub-region. India also highlighted the major issues involved in the implementaiton of AIDC. The meeting congradulated India for the successful implementaiton of AIDC between major ATSUs in India and a number of successful trials conducted with neighbouring States. The meeting encouraged States concernd to sign bilaterial agreements either LoA or MoU in an expeditious manner and recommended India to present the identified issues resulted from the trials to the first meeting of AIDC Task Force scheduled for June 2015 in Bangkok.

Agenda Item 9: Review and update Subject/Tasks List and Action Items List.

Update the work programme for ACSICG

9.1 The meeting reviewed and updated the work programme presented by Chairman of the group based on the one resulted from ACSICG/1 meeting. The updated work programme for ACSICG is provided in **Appendix G** to this Report.

Agenda Item 10: Any Other Business

VHF Data Link System Implementation in ROK

10.1 Republic of Korea updated the meeting on the implementation status of VHF DATA LINK System. From Oct. 2014 through Dec. 2015, Republic of Korea is planning to move to VDL Mode 2 operation, expecting the future traffic growth and meeting ICAO standards and recommended practices (SARPs). VHF Digital Link Mode 2(VDLM2) is implemented with a bit-oriented, air/ground and ground/ground data link technology that delivers information at 31.5 kbps - over 10 times the rate used by ACARS. VDLM2 is currently considered by ROK the only technology that is compliant with ICAO ATN requirements. VDLM2's expanded bandwidth would offer a whole range of flight information, aeronautical operational control, and air traffic control applications and services.

10.2 Three phases will make sure that VDL M2 is more reliable. The first phase is simulator test for system commissioning which is intended to ensure communication performance such as message format/flow compatibility between new VDL M2 Key system and Simulator. The second phase is designed to make best performance of interface among Key system, Simulator and aircraft via VDL ground station. This test will verify and confirm DATIS and PDC message format and message flow between Simulator and VDL active aircraft. The final phase is designed to optimize Key system in operation regarding interface among Key system, Simulator and aircraft at all (8 sites) VDL ground station activated while broadcasting "VDLM2 Available message" from ACARS transceiver. The trial operation is going to transit from ACARS to VDLM2, for adopting future traffic growth and expanding various DFIS applications in Republic of Korea. The operation use of VDLM2 is expected in 2016 onwards.

Next meeting of the Group

10.3 The ACSICG/3 meeting is scheduled for early May 2016 for a period of 3 or 4 days starting 17/18-20 May 2016 at ICAO Regional Office, Bangkok, Thailand. The exact dates of the meeting would be confirmed by APANPIRG/26 meeting in September 2015.

10.4 The meeting reviewed proposed work programme of CRV Task Force and noted the heavy tasks required to be dealt with by the pioneer Administrations. The meeting identified the need to organize a side by side meeting for the CRV Pioneer Administrations during CNS SG/19 meeting. In this connection, a letter of invitation from ICAO Regional Office is required as soon as possible for this side meeting. The next face and face meeting of Pioneers States was scheduled for March and May 2016 for interim and final evaluation of response to the tender.

10.5 The meeting thanked the participants for the useful information and updates shared with the meeting. The meeting also appreciated the achievements and progress made by the CRV Task Force.

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TABLE CNS II-1 AERONAUTICAL FIXED TELECOMMUNICATIONS NETWORK (AFTN) PLAN

EXPLANATION OF THE TABLE

Column

1 The AFTN Centres/Stations of each State are listed alphabetically. Each circuit appears twice in the table. The categories of these facilities are as follows:

M - Main AFTN COM Centre
T - Tributary AFTN COM Centre
S - AFTN Station

2 Category of circuit:

M - Main trunk circuit connecting Main AFTN communication centres.
T - Tributary circuit connecting Main AFTN communication centre and Tributary AFTN Communications Centre.
S - AFTN circuit connecting an AFTN Station to an AFTN Communication Centre.

3 Type of circuit provided:

LTT/a	-	Landline teletypewriter, analogue (e.g. cable, microwave)
LTT/d	-	Landline teletypewriter, digital (e.g. cable, microwave)
LDD/a	-	Landline data circuit, analogue (e.g. cable, microwave)
LDD/d	-	Landline data circuit, digital (e.g. cable, microwave)
SAT/a/d	-	Satellite link, with /a for analogue or /d for digital

4 Circuit signalling speed in bits/s.

5 Circuit protocols

6 Data transfer code (syntax):

ITA-2	-	International Telegraph Alphabet No. 2 (5-unit Baudot code).
IA-5	-	International Alphabet No. 5 (ICAO 7-unit code).
CBI	-	Code and Byte Independency (ATN compliant).

7 Remarks

TABLE CNS II – 1 AERONAUTICAL FIXED TELECOMMUNICATIONS NETWORK (AFTN) PLAN

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
AFGHANISTAN						
Kabul/OAKB						
Karachi/OPKC	S	SAT/d	2400 bps	None	IA-5	
Tehran/OIII	S	LDD/d	2400 bps	None	IA-5	
AMERICAN SAMOA						
Pago Pago/NSTU						
Salt Lake City/KSLC	S	LDD/d	2400 bps	IP	IA-5	
AUSTRALIA						
Brisbane/YBBB						
Christchurch/NZCH	T	LDD/d	9600 bps	X.25	IA-5	MPLS VPN AMHS-IPS 2017
Honiara/AGGG	S	LDD/d	N/A	HTTP	IA-5	INTERNET
Jakarta/WIII	S	SAT/d	64 Kbps	AMHS/IPS	IA-5	IP VPN
Makassar/WAAA	S				IA-5	IP VPN for AIDC

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Nadi/NFFN	M	LDD/d	64 Kbps	AMHS/OSI	IA-5	INTERNET
Nauru/ANAU	S	LDD/d	N/A	HTTP	IA-5	
Port Moresby/AYPM	S	LDD/d	128 Kbps	IP	IA-5	INTERNET
Port Vila/NVVV	S	LDD/d	N/A	HTTP	IA-5	INTERNET
Dili/WPDL	S	LDD/d	N/A	HTTP	IA-5	INTERNET
Singapore/WSSS	M	LDD/d	64 Kbps	X.25	IA-5	AMHS/OSI 2015
United States/KSLC	M	LDD/d	64 Kbps	X.25	IA-5	MPLS/VPN AMHS/IPS 2017
Johannesburg/FAOR	M	LDD/d	64 Kbps	X.25	IA-5	IP VPN
BANGLADESH						
Dhaka/VGHS						
Bangkok/VTBB	S	SAT/d	32 Kbps	None	IA-5	
Kolkata/VECC	S	LDD/d	64 Kbps	X.25	IA-5	
BHUTAN						
Paro/VQPR						
Mumbai/VABB	S	SAT/a	300 baud	None	IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
BRUNEI DARUSSALAM						
Brunei/WBSB						
Singapore/WSSS	S	LDD/d	64 Kbps	X.25	IA-5	
Kuala Lumpur/WMKK	S	LDD/d	9600 bps	X.25	IA-5	
CAMBODIA						
Phnom Penh/VDPP						
Bangkok/VTBB	S	SAT/d	64 Kbps	None	IA-5	
CHINA						
Beijing/ZBBB						
Bangkok/VTBB	M	SAT/da	2400 bps	X.25	IA-5	
Guangzhou/ZGGG	M	LDD/d	64 Kbps	X.25	IA-5	
Karachi/OPKC	M	LDD/d	2400 bps	X.25	IA-5	
Kathmandu/VNKT	S	SAT/d	300 bps	None	IA-5	
Russian Federation/UHHH	M	LDD/d	64 Kbps	X.25	IA-5	
Pyongyang/ZKKK	S	SAT/d	9600 bps	X.25	IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Seoul/RKSS	S	SAT/d	9600 bps	X.25	IA-5	
Fukuoka/RJJJ	S	LDD/d	64 Kbps	X.25	IA-5	
Ulaan Baatar/ZMUB	S	LDD/d	64 Kbps	X.25	IA-5	
Yangon/VYYY	S	SAT/d	4800 bps	X.25	IA-5	
Guangzhou/ZGGG						
Beijing/VTBB	M	LDD/d	64 Kbps	X.25	IA-5	
Hanoi/VVNB	S	SAT/d	300 bps	None	IA-5	
Hong Kong/VHHH	M	LDD/d	2400 bps	None	IA-5	
Macau/VMMC	S	LDD/d	2400 bps	None	IA-5	
Haikou/ZJHK	S	LDD/d	9600 bps	None	IA-5	
Haikou/ZJHK						
Guangzhou/ZGGG	S	LDD/d	9600 bps	None	IA-5	
Hong Kong/VHHH	S	LDD/d	2400 bps	None	IA-5	
Taibei/RCTP						

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Hong Kong/VHH	S	LDD/d	4800 bps	X.25	IA-5	
Manila/RPLL	S	LDD/d	300 bps	None	ITA-2	
Fukuoka/RJJJ	S	LDD/d	64 Kbps	X.25	IA-5	
Hong Kong China/VHHH						
Bangkok/VTBB	M	LDD/d	64 Kbps	X.25	IA-5	
Guangzhou/ZGGG	M	LDD/d	2400 bps	None	IA-5	
Ho Chi Minh/VVTS	S	LDD/d	2400 bps	None	IA-5	
Macau/VMMC	S	LDD/d	64 Kbps	X.25	IA-5	
Manila/RPLL	S	LDD/d	9600 bps	X.25	IA-5	
Haikou/ZJHK	S	LDD/d	2400 bps	None	IA-5	
Taibei/RCTP	S	LDD/d	4800 bps	X.25	IA-5	
Fukuoka/RJJJ	M	LDD/d	64 Kbps	X.25	IA-5	
MACAU CHINA						
Macau/VMMC						
Hong Kong/VHHH	S	LDD/d	64 Kbps	X.25	IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Guangzhou/ZGGG	S	LDD/d	2400 bps	None	IA-5	
COOK ISLANDS						
Rarotonga/NCRG						
Christchurch/NZCH	S	LDD/d	2400 bps	X.25	IA-5	
DPR KOREA						
Pyongyang/ZKKK						
Beijing/ZBBB	S	LDD/d	2400 bps	X.25	IA-5	
FIJI						
Nadi/NFFN						
Brisbane/YBBB	M	LDD/d	64 Kbps	AMHS/OSI	IA-5	
Funafuti/NGFU	S	SAT/d	Internet	IP	IA-5	VPN over Internet
Noumea/NWWW	S	SAT/d	9600 bps	Asynch.	IA-5	
Tarawa/NGTT	S	SAT/d	Internet	IP	IA-5	VPN over Internet
United States/KSLC	M	LDD/d	9600 bps	X.25	IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Wallis Is./NLWW	S	SAT/d	9600 bps	Asynch.	IA-5	Via Noumea
FRENCH POLYNESIA (France)						
Papeetee (NTAA)						
Christchurch/NZCH	S	LDD/d	64 Kbps	X.25	IA-5	
INDIA						
Mumbai/VABB						
Bangkok/VTBB	M	LDD/d	64 Kbps	X.25	IA-5	
Kolkata/VECC	S	LDD/d	64 Kbps	X.25	IA-5	
Colombo/VCCC	S	LDD/d	64 Kbps	X.25	IA-5	
Karachi/OPKC	M	SAT/d	2400 bps	None	IA-5	
Kathmandu/VNKT	S	SAT/a	50 bauds	None	ITA-2	
Muscat/OOMS	M	SAT/a	300 bauds	None	ITA-2	
Nairobi/HKNA	M	SAT/a	50 bauds	None	ITA-2	
Paro/VQPR	S	SAT/a	300 bauds	None	ITA-2	
Singapore/WSSS	M	LDD/d	64 Kbps	X.25	IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Kolkata/VECC						
Dhaka/VGZR	S	LDD/d	64 Kbps	None	IA-5	
Mumbai	S	LDD/d	64 Kbps	X.25	IA-5	
Delhi/VIDP						
Tashkent/UTTT	S	SAT/a	50 bauds	None	ITA-2	
Chennai/VOMM						
Kuala Lumpur/WMKK	S	LDD/d	64 Kbps	None	IA-5	
INDONESIA						
Jakarta/WIII						
Brisbane/YBBB	S	SAT/d	64 Kbps	AMHS/IPS	IA-5	IP VPN
Singapore/WSSS	S	LDD/d	128 Kbps	X.25	IA-5	
Makassar/WAAA						
Brisbane/YBBB	S					IP VPN for AIDC

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
JAPAN						
Fukuoka-M/RJJJ						
Beijing/ZBBB	M	LDD/d	64 Kbps	X.25	IA-5	
Hong Kong/VHHH	M	LDD/d	9600 bps	X.25	IA-5	
Russian Federation/UUUU	M	LTT	64 Kbps	X.25	IA-5	
Seoul/RKSS	S	LDD/d	9600 bps	X.25	IA-5	
Singapore/WSSS	M	LDD/d	9600 bps	X.25	IA-5	
United States/KSLC	M	LDD/d	64 Kbps	X.25	-	
Taibei/RCTP	S	LDD/d	64 Kbps	X.25	IA-5	
KIRIBATI						
Tarawa-S/NGTT						
Nadi/NFFN	S	SAT/d	Internet	IP	IA-5	VPN over Internet
LAO PDR						
Vientiane-S/VLVT						

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Bangkok/VTBB	S	SAT/d	32 kbps	None	IA-5	
Hanoi/VVNB	S	SAT/d	2400 bps	None	IA-5	
MALASIA						
Kuala Lumpur-S/WMKK						
Bangkok/VTBB	S	SAT/d	64 Kbps	None	IA-5	
Brunei/WBSB	S	LDD/d	9600 bps	X.25	IA-5	
Chennai/VOMM	S	LDD/d	9600 bps	X.25	IA-5	
Singapore/WSSS	S	SAT/d	64 Kbps	X.25	IA-5	
MALDIVES						
Male-S/VRMM						
United States/KSLC	S	SAT/d	9600 bps	X.25	IA-5	
MARSHALL ISLAND						
Majuro-S/PKMJ						
United States/KSLC	S	Internet	64 Kbps	IP	IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
MICRONESIA						
FEDERATED STATES OF						
Chuuk-S/PTKK						
United States/KSLC	S	Internet	64 Kbps	IP	IA-5	
Kosrae-S/PTSA						
United States/KSLC	S	Internet	64 Kbps	IP	IA-5	
Ponapei-S/PTPN						
United States/KSLC	S	Internet	64 Kbps	IP	IA-5	
YAP-S/PTYA						
YAP-S/PTYA						
United States/KSLC	S	Internet	64 Kbps	IP	IA-5	
MONGOLIA						

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Ulaanbaatar-S/ZMUB						
Beijing/ZBBB	S	LDD/d	64 Kbps	X.25	IA-5	
Russian Federation/UIII	S	LDD/d	9600 bps	X.25	IA-5	
MYANMAR						
Yangon-S/VYYY						
Bangkok/VTBB	S	SAT/d	48 Kbps	None	IA-5	
Beijing/ZBBB	S	SAT/d	4800 bps	X.25	IA-5	
NAURU						
Nauru-S/ANAU						
Brisbane/YBBB	S	LDD/d	N/A	HTTP	IA-5	Internet
NEPAL						
Katmandu-S/VNKT						
Beijing/ZBBB	S	SAT/d	300 baud	None	IA-5	
Mumbai/VABB	S	SAT/a	50 baud	None	ITA-2	

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
NEW CALEDONIA						
(FRANCE)						
Noumea-S/NWWW						
Nadi/NFFN	S	SAT/d	9600 bps	Asynch.	IA-5	
NEW ZEALAND						
Christchurch-T/NTCH						
Faleolo/NSFA	S	LDD/d	2400 bps	X.25	IA-5	
Brisbane/YBBB	T	LDD/d	2400 bps	X.25	IA-5	MPLS VPN AMHS-IPS 2017
Niue/NIUE	S	E-mail				
Papeetee/NTAA	S	SAT/d	bps	IP	IA-5	
Rarotonga/NCRG	S	LDD/d	2400 bps	X.25	IA-5	
Tongatapu/NFTF	S	LDD/d	2400 bps	X.25	IA-5	
USA/KSLC	M	LDD/d	9600 bps	X.25	IA-5	
NIUE IS						

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Niue-S/NIUE						
Christchurch/NZCH	S					
PAKISTAN						
Karachi-M/OPKC						
Beijing/ZBBB	M	LDD/d	2400 bps	None	IA-5	
Mumbai/VABB	M	SAT/d	2400 bps	None	IA-5	
Kabul/OAKB	S	SAT/d	2400 bps	None	IA-5	
Kuwait/OKBK	M	LDD/d	2400 bps	None	IA-5	
PALAU						
Koror-S/PTRO						
United States/KSLC	S	Internet	64 Kbps	IP	IA-5	
PAPUA NEW GUINEA						
Port Moresby-S/AYPM						
Brisbane/YBBB	S	LDD/d	128 Kbps	IP	IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
PHILIPPINES						
Manila-S/RPLL						
Hong Kong/VHHH	S	LDD/d	9600 bps	X.25	IA-5	
Singapore/WSSS	S	LDD/d	64 Kbps	X.25	IA-5	
Taibei/RCTP	S	LDD/d	300 baud	None	ITA-2	
REPUBLIC OF KOREA						
Seoul-S/RKSS						
Beijing/ZBBB	S	SAT/d	9600 bps	X.25	IA-5	
Fukuoka/RJJJ	S	LDD/d	9600 bps	X.25	IA-5	
SAMOA						
Faleolo-S/NSFA						
Christchurch/NZCH	S	LDD/d	2400 bps	X.25	IA-5	
SINGAPORE						
Singapore-M/WSSS						

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Bahrain/OBBI	M	LTT/d	64 Kbps	X.25	IA-5	
Bangkok/VTBB	M	LDD/d	64 Kbps	X.25	IA-5	
Brisbane/YBBB	M	LDD/d	64 Kbps	X.25	IA-5	AMHS/OSI 2015
Brunei/WBSB	S	LDD/d	64 Kbps	X.25	IA-5	
Colombo/VCCC	S	LDD/d	64 Kbps	X.25	IA-5	
Ho-Chi-Minh/VVTS	S	LDD/d	128 Kbps	X.25	IA-5	
Jakarta/WIII	S	LDD/d	128 Kbps	X.25	IA-5	
Kuala Lumpur/WMKK	S	SAT/d	64 Kbps	X.25	IA-5	
Mumbai/VABB	M	LDD/d	64 Kbps	X.25	IA-5	
London/EGGG	M	LDD/d	128 Kbps	None	IA-5	
Manila/RPLL	S	LDD/d	64 Kbps	X.25	IA-5	
Fukuoka/RJJJ	M	LDD/d	9600 bps	X.25	IA-5	
SOLOMON IS.						
Honiara-S/AGGG						
Brisbane/YBBBB	S	LDD/d	N/A	HTTP	IA-5	Internet

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
SRI LANKA						
Colombo-M/VCCC						
Mumbai/VABB						
Male/VRMM						
Singapore/WSSS						
THAILAND						
Bangkok-M/VTBB						
Beijing/ZBBB	M	SAT/d	2400 bps	X.25	IA-5	
Mumbai/VABB	M	LDD/d	64 Kbps	X.25	IA-5	
Dhaka/VGHS	S	SAT/d	32 Kbps	None	IA-5	
Ho Chi Minh/VVTS	S	SAT/d	2400 bps	X.25	IA-5	
Hong Kong/VHHH	M	LDD/d	64 Kbps	X.25	IA-5	
Kuala Lumpur/WMKK	S	SAT/d	64 Kbps	None	IA-5	
Phnom Penh/VDPP	S	SAT/d	64 Kbps	None	IA-5	
ROME/LIII	M	LDD/d	64 Kbps	X.25	IA-5	
Singapore/WSSS	M	LDD/d	64 Kbps	X.25	IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
Vientiane/VLVT	S	SAT/d	32 Kbps	None	IA-5	
Yangon/VYYY	S	SAT/d	48 Kbps	None	IA-5	
TIMOR LESTE						
Dili/WPDL						
Brisbane/YABB	S	LDD/d	N/A	HTTP	IA-5	Internet
TONGA						
Tongatapu-S/NFTF						
Christchurch/NZCH	S	LDD/d	2400 bps	X.25	IA-5	
TUVALU						
Funafuti-S/NGFU						
Nadi/NFFN	S	SAT/d	Internet	IP	IA-5	VPN over Internet
United States/KSLC	M	LDD/d	64 Kbps	X.25	IA-5	MPLS/VPN AMHS/IPS 2017
UNITED STATES						

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
USA-M/KSLC						
Brisbane/YBBB	M	LDD/d	64 Kbps	X.25	IA-5	MPLS/VPN AMHS/IPS 2017
Christchurch/NZCH	S	LDD/d	9600 bps	X.25	IA-5	
Chuuk/PTKK	S	Internet	64 Kbps	IP	IA-5	
Koror/PTRO	S	Internet	64 Kbps	IP	IA-5	
Kosrae/PTSA	S	Internet	64 Kbps	IP	IA-5	
MajuroPKMJ	S	Internet	64 Kbps	IP	IA-5	
Nadi/NFFN	M	LDD/d	9.6 Kpbs	X.25	IA-5	
Pago Pago/NSTU	S	SAT/d	2400 bps	IP	IA-5	
Ponapei/PTPN	S	Internet	64 Kbps	IP	IA-5	
Fukuoka/RJJJ	M	LDD/d	64 Kbps	X.25		
YapPTYA	S	Internet	64 Kbps	IP	IA-5	
VANUATU						
Port Vila-S/NVVV						
Brisbane/YBBB	S	LDD/d	N/A	HTTP	IA-5	Internet

State/Station	Category	Requirement				Remarks
		Type	Signaling Speed	Protocol	Code	
1	2	3	4	5	6	7
VIET NAM						
Hanoi-S/VVNB						
Vientiane/VLVT	S	SAT/d	2400 bps	None	IA-5	
Ho Chi Minh/VVTS	S	SAT/d	9600 bps	None	IA-5	
Guangzhou/ZGGG	S	SAT/d	300 bps	None	IA-5	
Ho Chi Minh-S/VVTS						
Bangkok/VTBB	S	SAT/d	2400 bps	None	IA-5	
Hanoi/VVNB		SAT/d	9600 bps	None	IA-5	
Hong Kong/VHHH	S	LDD/d	2400 bps	None	IA-5	
Singapore/WSSS	S	LDD/d	128 Kbps	X.25	IA-5	
WALLIS IS/ (FRANCE)						
Wallis-S/NLWW						
Nadi/NFFN	S	SAT/d	9600 bps	IP	IA-5	Via Noumea

TABLE CNS II-2 - REQUIRED ATN INFRASTRUCTURE ROUTING PLAN

EXPLANATION OF THE TABLE

Column

1 Name of the Administration and Location of the ATN Router

2 Type of Router (in end systems (ES) of the Administration shown in column 1)

3 Type of Interconnection:

Inter-Regional: Connection between different Regions/ domains
Intra-Regional: Connection within a Region/ domain.

4 Connected Router: List of the Administration and location of the ATN routers to be connected with the router shown in column 1)

5 Bandwidth: Link Speed expressed in bits per second (bps)

6 Network Protocol: If Internet Protocol Suite is used, indicate version of IP (IPv4 or IPv6)

7 Via: The media used to implement the interconnection of the routers. (in case of IP service bought from a service provider, indicate VPN)

DDN (public telecomm leased line)
VSAT
VPN

8 Remarks

Table CNS II-2 - Required ATN Infrastructure Routing Plan

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remark
1	2	3	4	5	6	7	8
Afghanistan Kabul	BIS	Intra-Regional	Pakistan	64000bps	IPS		Intra-domain
	BIS	Inter-Regional	Iran	9600 bps	IPS		
American Samoa Pago Pago			United States				Intra-domain
Australia Brisbane	BBIS	Intra-Regional	Fiji	64000 bps	CLNP/IP-SNDCF (IPv4)	DDN	Implemented
	BIS	Intra-Regional	Indonesia	64000 bps	IPS		Not implemented
	BBIS	Intra-Regional	Japan	64000 bps	IPS/IP-SNDCF	VPN	Not implemented
	BIS	Intra-Regional	New Zealand	64000 bps	IPS	VPN	Not implemented
	BBIS	Intra-Regional	Singapore	64000 bps	CLNP/IP-SNDCF		ATN/AMHS trial planned to completed by end 2015
	BBIS	Inter-Regional	South Africa	64000 bps	TBD		Not implemented
	BBIS	Inter-Regional	United States	64000 bps	DDN lease line/IPS		
Bangladesh Dhaka	BIS	Intra-Regional	India	64000 bps	IPS		Implemented
	BIS	Intra-Regional	Thailand	32000 bps	IPv4	VSAT	Implemented
Bhutan Paro	BIS	Intra-Regional	India	64000 bps	IPS		TBD. Presently using AFTN via VPN through public internet
Brunei Darussalam Brunei	BIS	Intra-Regional	Malaysia	64000 bps	IPS		
	BIS	Intra-Regional	Singapore	9600 bps	IPS		ATN/AMHS trial commence on 2017

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remark
1	2	3	4	5	6	7	8
Cambodia Phnom Penh	BIS	Intra-Regional	Thailand	64000 bps	IPv4	VSAT	Implemented
China Beijing	BIS	Intra-Regional	DPR Korea	9600 bps	X.25		Router Implemented
	BBIS	Intra-Regional	Hong Kong, China	64000 bps	X.25	DDN	Router Implemented
	BBIS	Intra-Regional	India	64000 bps	X.25/IPS	DDN	IOT/POT completed. - Migrate to IPS
	BBIS	Intra-Regional	Japan	64000 bps	IPS/SNDCF	VPN	Implement from 2016 onwards
	BBIS	Inter-Regional	Kuwait	64000 bps	X.25		Router Implemented
	BIS	Intra-Regional	Macau, China	64000 bps	X.25		Implemented
	BIS	Intra-Regional	Mongolia	9600 bps	X.25		Router Implemented
	BIS	Intra-Regional	Myanmar	64000 bps	IPS		Implementation on going/Plan Q4/15
	BIS	Intra-Regional	Nepal	9600 bps	X.25		Router Implemented
	BIS	Intra-Regional	Pakistan	64000 bps	X.25		Router Implemented
	BIS	Intra-Regional	Republic of Korea	64000 bps	X.25		Implemented
	BBIS	Inter-Regional	Russian Federation	64000 bps	X.25		Router Implemented
	BBIS	Intra-Regional	Thailand	64000 bps	CLNP/X.25	DDN	
	BIS	Intra-Regional	Vietnam	9600 bps	X.25		
Taibei	BIS	Intra-Regional	Hong Kong, China	64000 bps	X.25	DDN	TBD
	BIS	Intra-Regional	Japan	64000 bps	IPS	VPN	Implement from 2016 onwards Scheduled after CRV
Hong Kong, China	BBIS	Intra-Regional	China	64000 bps	X.25	DDN	Router Implemented
	BIS	Intra-Regional	Macau, China	64000 bps	X.25	DDN	Implemented

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remark
1	2	3	4	5	6	7	8
	BBIS	Intra-Regional	Japan	64000 bps	X.25/SNDCF	VPN	Scheduled for Q4/2017
	BIS	Intra-Regional	Philippines	64000 bps	X.25/IPS	DDN	Scheduled for Q4/2016
	BBIS	Intra-Regional	Taibei	64000 bps	X.25	DDN	TBD
	BBIS	Intra-Regional	Thailand	64000 bps	CLNP/X.25	DDN	Implemented
	BIS	Intra-Regional	Viet Nam	64000 bps	X.25	DDN	TBD
Macau, China	BIS	Intra-Regional	China	64000 bps	X.25		Implemented
	BIS	Intra-Regional	Hong Kong, China	64000 bps	X.25	DDN	Implemented
Cook Islands Rarotonga			New Zealand	796 kbps	IPS		Intra-domain
DPR Korea Pyongyang	BIS	Intra-Regional	China	9600 bps	X.25		
Fiji Nadi	BBIS	Intra-Regional	Australia	64000 bps	CLNP/IP-SNDCF (IPv4)	DDN	Implemented
	BIS	Intra-Regional	Kiribati	Internet	IPv4	VPN	Intra-domain (User Agent) - Implementation Q3 2015
	BIS	Intra-Regional	New Caledonia	64000 bps	IPS (IPv4)	DDN	Intra-domain - Implementation 2016 Connect with Wallis
	BIS	Intra-Regional	Tuvalu	Internet	IPv4	VPN	Intra-domain (User Agent) - Implementation Q3 2015
	BBIS	Inter-Regional	United States	9600 bps	CLNP/X.25-SNDCF	DDN	The protocol will upgrade to IPS/SNDCF in 2016
	BIS	Intra-Regional	Wallis Islands	Internet	IPv4	VPN	Connect with New Caledonia - Implemente in 2016
French Polynesia Papeete			New Zealand	64000 bps	IPS		Intra-domain

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remark
1	2	3	4	5	6	7	8
India Mumbai	BIS	Intra-Regional	Bangladesh	64000 bps	DDN leased line/IPS		Implemented
	BIS	Intra-Regional	Bhutan	64000 bps	IPS		TBD. Presently using AFTN via VPN through public internet
	BBIS	Intra-Regional	China	64000 bps	X. 25/IPS	DDN	IOT/POT completed. - Migrate to IPS
	BIS	Inter-Regional	Kenya	64000 bps	TBD	TBD	Presently using AFTN via VPN via public internet
	BIS	Intra-Regional	Nepal	64000 bps	IPS		Implemented
	BIS	Inter-Regional	Oman	64000 bps	IPS		IOT completed. POT planned. TMC to be signed
	BIS	Intra-Regional	Pakistan	64000 bps	IPS		IOT/POT completed. TMC to be signed
	BBIS	Intra-Regional	Singapore	64000 bps	X.25	DDN	Implementation Plan Q4/15
	BIS	Intra-Regional	Sri Lanka	64000 bps	IPS	DDN	IOT/POT Ccompleted.
	BBIS	Intra-Regional	Thailand	64000 bps	X. 25	DDN	Implemented
	BBIS	Intra-Regional	Nairobi	64000 bps	IPS		
Indonesia Jakarta	BIS	Intra-Regional	Australia	64000bps	IPS		Not Implemented
	BIS	Intra-Regional	Singapore	64000 bps	IPS		ATN/AMHS trial to be completed by end 2015. Implementation Plan Q1/16
Japan Tokyo	BBIS	Intra-Regional	Australia	64000 bps	IPS/IP-SNDCF	VPN	Schedule after CRV
	BBIS	Intra-Regional	China	64000 bps	IPS/IP-SNDCF	VPN	Implement from 2016 onwards Schedule after CRV
	BBIS	Intra-Regional	Hong Kong, China	64000 bps	X.25/SNDCF	VPN	Scheduled for Q4/2017
	BBIS	Inter-Regional	Europe	64000 bps	IP-SNDCF	DDN/ VPN	TBD

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remark
1	2	3	4	5	6	7	8
	BIS	Intra-Regional	Republic of Korea	64000 bps	IPS(IPv4)	VPN	Implement from 2016 onwards Scheduled after CRV
	BBIS	Inter-Regional	Russia Federation	64000 bps	IP-SNDCF	DDN/ VPN	TBD
	BBIS	Intra-Regional	Singapore	64000 bps	IPS/IP-SNDCF	VPN	Scheduled for Q1/2018
	BIS	Intra-Regional	Taibei	64000 bps	IPS	VPN	Implement from 2016 onwards Scheduled after CRV
	BBIS	Inter-Regional	United States	64000 bps	X.25-SNDCF	DDN/ VPN	Implemented
Kiribati Tarawa	BIS	Intra-Regional	Fiji	Internet	IPv4	VPN	Intra-domain (User Agent) - Implementation Q3 2015
Lao PDR Vientiane	BIS	Intra-Regional	Thailand	32000 bps	IPv4	VSAT	Implemented
	BIS	Intra-Regional	Viet Nam	9600 bps	X.25		
Malaysia Kuala Lumpur	BIS	Intra-Regional	Brunei	64000 bps	IPS		
	BIS	Intra-Regional	Singapore	64000 bps	IPS		Scheduled for Q1/2018
	BIS	Intra-Regional	Thailand	64000 bps	IPv4	VSAT	Implemented
Maldives Male	BIS	Intra-Regional	Sri Lanka	64000 bps	X.25		
Marshall Islands Majuro	BIS	Inter-Regional	United States	64000 bps	IP		VPN over Internet Intro-domain
Micronesia Federated State of Chuuk	BIS	Inter-Regional	United States	64000 bps	IP	VPN	VPN over Internet Intra-domain
Kosrae		Inter-Regional	United States	64000 bps	IP	VPN	VPN over Internet/Intra-domain
Ponapei		Inter-Regional	United States	64000 bps	IP	VPN	VPN over Internet/Intra-domain

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remark
1	2	3	4	5	6	7	8
Yap		Inter-Regional	United States	64000 bps	IP	VPN	VPN over Internet/Intra-domain
Mongolia Ulanbaatar	BIS	Intra-Regional	China	9600 bps	X.25		Router Implemented
Myanmar Yangon	BIS	Intra-Regional	China	64000 bps	IPS		
	BIS	Intra-Regional	Thailand	32000 bps	IPv4	VSAT	Implemented
Nepal Kathmandu	BIS	Intra-Regional	China	9600bps	X.25		Router Implemented
	BIS	Intra-Regional	India	64000 bps	IPS		Implemented
New Caledonia Noumea			Fiji	64000 bps	IPS (IPv4)	DDN	Intra-domain - Implementation 2016 Connect with Wallis
New Zealand Christchurch	BIS	Intra-Regional	Australia	64000 bps	IPS	VPN	Not Implemented
			Cook Is.	796 kbps	IPS		Intra-domain
			French Polynesia	64000 bps	IPS		Intra-domain
			Samoa	1.1 Mb	IPS		Intra-domain
			Tonga	85000 bps	IPS		Intra-domain
	BIS	Inter-Regional	USA	64000 bps	IPS		
Pakistan Karachi	BIS	Intra-Regional	Afghanistan	64000 bps	IPS		
	BIS	Intra-Regional	China	64000 bps	X.25		
	BIS	Intra-Regional	India	64000 bps	IPS		IOT/POT completed. TMC to be signed
	BIS	Inter-Regional	Oman	64000 bps	-		

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remark
1	2	3	4	5	6	7	8
	BIS	Inter-Regional	Iran	64000 bps	-		
	BIS	Inter-Regional	Kuwait	64000 bps	-		
Philippines	BIS	Intra-Regional	Hong Kong, China	64000 bps	X.25/IPS	DDN	Scheduled for Q4/2016
	BIS	Intra-Regional	Singapore	64000 bps	IPS		2016
		Intra-Regional	United States	64000 bps	IPS		to be implementated in 2016
Republic of Korea Seoul	BIS	Intra-Regional	China	64000 bps	X.25		Implemented
	BIS	Intra-Regional	Japan	64000 bps	IPS(IPv4)	VPN	Implementation from 2016 onwards scheduled after CRV
Samoa Faleolo			New Zealand	1.1 Mb	IPS		Intra-domain
Singapore Singapore	BBIS	Intra-Regional	Australia	64000 bps	CLNP/IP-SNDCF		ATN/AMHS trial planned to completed by end 2015
	BBIS	Inter-Regional	Bahrain	64000 bps	IPS		
	BIS	Intra-Regional	Brunei	9600 bps	IPS		ATN/AMHS trial commence on 2017
	BBIS	Intra-Regional	India	64000 bps	X.25	DDN	Implemented
	BIS	Intra-Regional	Indonesia	64000bps	IPS	DDN	ATN/AMHS trial to be completed by end 2015. Implementation Plan Q1/16
	BBIS	Intra-Regional	Japan	64000 bps	IPS/IP-SNDCF	VPN	ATN/AMHS trial commence on 2017 Scheduled for Q1/2018
	BIS	Intra-Regional	Malaysia	64000 bps	IPS		Scheduled for Q1/2018
	BIS	Intra-Regional	Philippines	64000 bps	IPS		2016
	BIS	Intra-Regional	Sri Lanka	64000 bps	IPS		Implementation Plan Q1/16
	BBIS	Intra-Regional	Thailand	64000 bps	X.25	DDN	Implemented

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remark
1	2	3	4	5	6	7	8
	BBIS	Inter-Regional	United Kingdom	64000 bps	IPS		Implemented
	BIS	Intra-Regional	Viet Nam	9600 bps	X.25		ATN/AMHS trial planned to completed by end 2015
Sri Lanka Colombo	BIS	Intra-Regional	India	64000 bps	IPS	DDN	Implementation Plan Q4/15
	BIS	Intra-Regional	Maldives	64000 bps	X.25		TBD
	BIS	Intra-Regional	Singapore	64000 bps	IPS	DDN	Implementation Plan Q1/16
Thailand Bangkok	BIS	Intra-Regional	Bangladesh	32000 bps	IPv4	VSAT	Implemented
	BIS	Intra-Regional	Cambodia	64000 bps	IPv4	VSAT	Implemented
	BBIS	Intra-Regional	China	64000 bps	CLNP/X.25	DDN	
	BBIS	Intra-Regional	Hong Kong, China	64000 bps	CLNP/X.25	DDN	Implemented
	BBIS	Intra-Regional	India	64000 bps	X.25	DDN	Implemented
	BBIS	Inter-Regional	Italy	64000 bps	IPv4	DDN	
	BIS	Intra-Regional	Lao PDR.	32000 bps	IPv4	VSAT	Implemented
	BIS	Intra-Regional	Malaysia	64000 bps	IPv4	VSAT	Implemented
	BIS	Intra-Regional	Myanmar	32000 bps	IPv4	VSAT	Implemented
	BBIS	Intra-Regional	Singapore	64000 bps	CLNP/X.25	DDN	Implemented
	BIS	Intra-Regional	Viet Nam	64000 bps	IPv4	VSAT	
Tonga Tongatapu	BIS	Intra-Regional	New Zealand	85000 bps	IPS		Intra-domain
Tuvalu Faleolo	BIS	Intra-Regional	Fiji	Internet	IPv4	VPN	Intra-domain (User Agent) - Implementation Q3 2015

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remark
1	2	3	4	5	6	7	8
United States Salt Lake City	BBIS	Inter-Regional	Australia	64000 bps	IPS		
			American Samoa				Intra-domain
	BBIS	Inter-Regional	Fiji	9600 bps	CLNP/X.25-SNDCF	DDN	The protocol will upgrade to IPS/SNDCF in 2016
	BBIS	Inter-Regional	Japan	64000 bps	X.25-SNDCF	DDN/ VPN	Implemented
		Intra-Regional	Marshall Islands	64000 bps	IP		Intra-domain/Internet
		Intra-Regional	Micronesia, Federated State of	64000 bps	IP		Intra-domain
	BIS	Inter-Regional	New Zealand	64000 bps	IPS		Implemented
		Intra-Regional	Philippines	64000 bps	IP		to be implementated in 2016
Viet Nam Ho Chi Minh/Hanoi	BIS	Intra-Regional	China	9600 bps	X.25		
	BIS	Intra-Regional	Hong Kong, China	64000 bps	X.25	DDN	TBD
	BIS	Intra-Regional	Lao PDR.	9600 bps	X.25		
	BIS	Intra-Regional	Singapore	9600 bps	X.25		ATN/AMHS trial planned to completed by end 2015
	BIS	Intra-Regional	Thailand	64000 bps	IPv4	VSAT	
Wallis Islands	BIS	Intra-Regional	Fiji	Internet	IPv4	VPN	Connect with New Caledonia - Implemente in 2016

Updated: JUN 2015

ATN/AMHS/AIDC Implementation Status in the APAC Region

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
AFGHANISTAN					
AUSTRALIA	ATN tests were conducted. BIS Router and Backbone BIS Router and AMHS implemented. 64 kbps IPLC established with Fiji. Basic AMHS circuit will be commissioned in September 2014; Another basic AMHS circuit planned for operational in Feb. 2015. The connectivity will be provided by CAAS's VPN.	COMSOFT	AFTN based AIDC Implemented between Brisbane and Melbourne, Oakland, Nadi and Auckland; Implemented between Melbourne and Johannesburg; AIDC is also in use between Melbourne and Mauritius; Operational trial between Brisbane and Ujung Pandang since May 2013.		

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
BANGLADESH	Bangladesh installed ATN/AMHS at Dhaka (with User Agents at Chittagong (VGEG) and Sylhet (VGSY). BIS Router and AMHS installed in Q1/2013 at Dhaka (VGHS). System Commissioning & SAT completed in March 2013.	COMSOFT	Tentative date of implementation of AIDC is Q1 of 2018 with Kolkata and Myanmar.		AMHS connectivity between Dhaka & Chittagong and Dhaka & Sylhet are already established. Dhaka-Mumbai AMHS connectivity is commissioned on 23 March 2015 and the circuit is operational. Dhaka-BKK AMHS connectivity is expected to be commissioned by the end of May2015 and TMC will be signed accordingly. ATC Center up-gradation of Dhaka is expected to be completed by December 2017. As soon as the ATC up-gradation is completed hopefully Bangladesh will be able to implement AIDC with Kolkata and Myanmar (Q1/2018)

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
BHUTAN	ATN BIS Router and UA service planned for 2011.				
BRUNEI DARUSSALAM	ATN BIS Router planned for 2012 and AMHS planned for 2012				
CAMBODIA	BIS Router and AMHS installed. Cambodia (CATS) AMHS connected with Bangkok via VSAT IP link on 10 December 2013	AVITECH	AIDC function and capability made available. Ready for testing with neighbors ATS Facilities starting from 2015-2016.		
CHINA	ATN Router and AMHS including NCC deployed in 2008 which is being upgraded to support ATN/IPS with target date of completion in December 2013. 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 conducted in 2009. Plan for ATN/AMHS implementation with Hong Kong, China (2016).	IN-HOUSE (Aero-Info Technologies Co., Ltd)	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 since 8 Feb 2007. AIDC between Qingdao and Incheon planned for 2013;		

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
	AMHS/ATN technical tests with Macau completed in 2009. Plan for ATN/AMHS implementation with Macau, China (2016). ATN/AMHS circuit with ROK put into operational use since June 2011. ATN/AMHS tests with India started from March 2011 using 64 Kbps landline. ATN and AMHS technical trial with Mongolia is TBD. Connection tests with Thailand is TBD Connection tests with Nepal is TBD		Implemented between: Guangzhou with Nanning/Zhanjiang/Zhuhai; Nanning and Kunming/Guiyang/Zhanjiang in 2011; Zhanjiang/Haikou; Chengdu and Chongqing/Guiyang in 2011; Guiyang and Chongqing/Kunming in 2011; Started negotiation for implementation between Dalian and Incheon and Shanghai/Fukuoka.		

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
HONG KONG, CHINA	Preliminary ATN/AMHS technical trials with China (Beijing) using VPN over Internet connection in 2006. Operational AMHS and BIS router accepted in July2009. ATN/AMHS circuit with Macao put into operation use in Dec. 2009. ATN/AMHS circuit with Bangkok put into operation use in Sept. 2014 ATN/AMHS interoperability tests with other adjacent communications centres commenced in late 2009, viz Taibei (2009), Japan (Planned Q4/2017), Philippines (Planned Q2/2016) and Viet Nam (Planned 2016) Plan for ATN/AMHS implementation with China (Beijing) (2016).	COMSOFT	AFTN-based AIDC with Sanya put into operational use in Feb 2007. AIDC trial with other adjacent ATS authorities for new ATC system to be commissioned by mid 2016. AIDC technical trial with Taibei conducted in 2010 and completed in 2012 and put into operational use in Nov. 2012	Raytheon ATM system Support AIDC ICD Version 3 from mid 2016	
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.	COMSOFT	(Not applicable for using AIDC, looking into the possible application (some way) between TWR and ACC/APP).		

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
COOK ISLANDS					
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	The ATN BIS Router and AMHS planned for in 2011.		With neighboring ACCs to be implemented TBD		
FIJI ISLANDS	ATN BIS Router and AMHS implemented	COMSOFT	AFTN based AIDC implemented between Nadi/ Brisbane, Auckland and Oakland.	- Support and implemented AIDC messaging: ABI, EST, CPL, CDN, ACP, TOC, AOC with all three centers - AIDC ICD version 2.0 implemented with Auckland and Oakland. - AIDC ICD Version 1.0 implemented with Brisbane	
FRANCE ***(French Polynesia Tahiti)***			Implementation of AIDC (based on Version 3) with adjacent centres (Oakland and Auckland) since 2009		

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
INDIA	Dual stack ATN/lp router and AMHS implemented at Mumbai in 2011	COMSOFT	AIDC planned with Bangladesh, Myanmar, Thailand, Pakistan, Nepal, Seychelles, Malaysia, Indonesia, Sri Lanka, Kenya, Oman and Maldives Mauritius and Somalia. Successful AIDC trials done between Chennai-Kuala Lumpur, Chennai-Male, Ahmedabad-Karachi, Delhi-Karachi (One way towards Delhi)	1) Raytheon at New Delhi, Mumbai and Chennai 2) Selex at Hyderabad and Bengaluru. 3) INDRA at 39 locations	1) Major Indian airports and ATC centres have integrated ATS Automation Systems having AIDC capability. Successful AIDC trials have been carried out amongst major ATSUs within India. 2) AIDC implemented between Chennai and Mumbai. 3) AMHS implemented and working between A. BBIS: Mumbai-Singapore, Bangkok B: BIS: Mumbai, Kathmandu, Dhaka
INDONESIA	ATN BIS Router and AMHS planned for trial in 2009. Trial with Singapore planned. ATNBIS Router and AMHS are still ongoing trial with Singapore planned to complete by 2012. (Part D: AMHS Commission)	ELSA	Makasar and Brisbane has been l ongoing trial AIDC since 2013.		

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
JAPAN	ATN BBIS router and AMHS installed at 2000. Connection tests with USA 2000 - 2004 and put into operational use in 2005. ATN BBIS router (to apply to Dual Stack) and AMHS (to upgrade in 2015. The connection test with each country which is not currently connecting is started after update.	NEC	AIDC implemented between Fukuoka ATMC and Oakland ARTCC in 1998. AIDC implemented between Fukuoka ATMC and Anchorage ARTCC in 2005. AIDC implemented between Tokyo ACC/Fukuoka ACC and Incheon ACC in 2010. Implemented between Fukuoka and Incheon since June 2009. AIDC implemented between Fukuoka ACC/Naha ACC and Taibei ACC in 2012. AIDC between Fukuoka ACC and Shanghai ACC under negotiation (2014)		
KIRIBATI					
LAO PDR	ATN BIS Router and AMHS completed planned for implementation with Bangkok in 2010.	THALES	AIDC with Bangkok planned for 2015-2016. Testing with Ho Chi Minh 1Q 2015		

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
MALAYSIA	ATN BIS Router completed 2007. AMHS planned in 2012.	FREQUENTIS	AFTN AIDC planned with Bangkok ACC – Middle 2015. AIDC between Kuching and KK FIR already implemented. via TCP/IP. Planning for using AFTN from Nov. 2014. Between Kuala Lumpur and Chennai trial successful. Plan for trial with Singapore from Mid. November 2014. Plan for trial with Ho Chi Minh from 1Q 2015.		
MALDIVES	Planned for 2015 as existing AFTN was upgraded recently to make it compatible with protocols of interconnected AMHS systems and the flight plan format 12.		System is AIDC ready. Trials with neighbouring ACC's 1st half 2015.		
MARSHALL ISLANDS					
MICRONESIA (EDERATED STATES OF)					

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
Chuuk					
Kosrae					
Pohnpei					
Yap					
MONGOLIA	AMHS/AFTN gateway is implemented in first quarter of 2012. ATNBIS router will be implemented in 2013. Coordinating with China on ATN/AMHS connection technical trial target date TBD.		ATM automation system supports both AIDC and OLDI. Coordinating with Russia on OLDI connection in target date TBD. Coordinating with China on AIDC connection technical trial target date TBD.		
MYANMAR	AMHS including ATFTN/AMHS gateway implemented in Nov. 2011	THALES	ATM automation system capable to support AIDC in end of 2015. Plan for trial with Bangkok in 2015 with target for implementation in 2016.		
NAURU					
NEPAL	BIS Router and AMHS commissioned with Kathmandu Mumbai circuit on 2 June 2014.	COMSOFT	AIDC between Kathmandu and Beijing and KTM-BBN and KTM-CCU planned for		

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
			2015		
NEW CALEDONIA	New router and AMHS planned at the end of 2013 with Nadi				
NEW ZEALAND	Some external AMHS connections 2014.	COMSOFT	AIDC implemented between New Zealand, Australia, Fiji, Tahiti, Chile and USA.		
PAKISTAN	ATN/AMHS considered as Phase II implemented since 2010.	COMSOFT	Implemented between Karachi and Lahore ACCs Plan to implement AIDC with Mumbai and Muscat for 2015		Existing Radar system being upgraded.
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		To be implemented with Australia in early 2016		
PHILIPPINES	ATN G/G BIS Router/AMHS installed in 2006. Pending AMHS Interoperability tests moved to Q3/2015 both for Singapore and Hong Kong. AMHS trials with Singapore by end 2012 and	COMSOFT	AFTN based AIDC system (version 2) test plan for Dec. 2014. Plan for trial with Taipei and Singapore for 2015. Plan for trials with other ACCs TBD.		

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
	Hong Kong planned in 2012.				
REPUBLIC OF KOREA	ATN/AMHS circuit with China put into operational use in June 2011. ATN/AMHS test with Japan to be conducted	SAMSUNG	AFTN based AIDC implemented between ACC and Fukuoka ATMC. AIDC between Incheon and Dalian under negotiation (2014)		
SINGAPORE	AMHS implemented. ATN/AMHS circuit with India put into operational use in March 2011. ATN/AMHS circuit with UK put into operational use in March 2012. ATN/AMHS circuit with Thailand put into operational use in December 2014. On-going ATN/AMHS trial with Indonesia and Malaysia. Coordinating with Australia and Viet Nam to start ATN/AMHS trial in Q3 2015.	COMSOFT	Operational with Ho Chi Minh implemented July 2014. Technical trials with Malaysia (Kota Kinabalu, Kuching and Kuala Lumpur ATCCs) on going since Dec. 2014. Planned operational implementation from Dec. 2015. Technical trials with Manila ACC ongoing since Dec. 2014. Planned operational implementation in Nov. 2015. Planned technical trial with Indonesia plan from Dec. 2015.	LORADS III - AIDC Full set	

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
SRI LANKA	ATN BIS Router Planned for 2013. AMHS (Domestic) and AMHS/AFTN Gateway implemented by Oct. 2011. - Mumbai testing during Q3/Q4 2014 operational in Nov. 2014; - Singapore testing in Q4 214 operational in Dec. 2014; - Male testing in Q2 2015 operational date TBD.	IDS	Trials with Male' planned for in 2015. Plan for trial with Chennai and Melbourne for November 2014.		
THAILAND	BBIS/BIS Routers already implemented. AMHS has been implemented in July 2011. Trial with other BBIS States; Singapore, India, Hong Kong China and Italy are ongoing. Pre-operational test (POT) with India and Singapore in 2013, with Hong Kong China in May 2014, with Italy in August 2014, with Laos PDR and Malaysia over VSAT IP link conducted in 2014. Inter-Operability Test (IOT) with Bangladesh in May 2014, with Beijing China planned for 2014 and with Vietnam and Myanmar planned for 2015. Connected with Cambodia (CATS) AMHS on 10 December 2013 over VSAT IP link; Established new CLNP 64 Kbps link with AAI In June 2013 following successful IOT; Established CLNP 64 Kbps link with CAAS in July 2013 following successful IOT. Operational the AMHS service with target date within Q4 2014; Established CLNP 64Kbps with Hong Kong China CAD in May 2014, POT is scheduled for Q2 2014.	AEROTHAI's AMHS system / Ubitech System	Plan for trials with neighboring ACCs from 2015 to 2016.	ATM system Thales is being implemented with planned completion in November 2015. AIDC feature is based on APAC AFTN AIDC ICD v.3 and can support ABI, EST, ACP, TOC, AOC messages.	

State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
TONGA	AMHS planned for 2008. The provider is linked to the New Zealand AFTN				CPDLC and ADS-C is not considered for lower airspace
UNITED STATES	AMHS implemented. (Salt Lake City & Atlanta)	IN-HOUSE	AFTN based AIDC implemented.		
VANUATU					
VIET NAM	BIS Routers planned for 2009. ATN/AMHS trial in 2010 and operation in 2012. ATN BIS Router AMHS in 2013	IN-HOUSE	AFTN based AIDC implemented in 2009. Operational with Singapore in April 2014. Plan for trials with Lao. PDR. Cambodia, Malaysia 1Q 2015.		

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)				
Australia (Brisbane)	A					Completed	TBD After CRV	Q3/15		Q2/13		A			
	B					Q3/12	TBD After CRV	Q3/15		Q2/13		B	Australia		
	C					Q2/13	TBD After CRV	Q3/15		Q3/13		C	(Brisbane)		
	D					Q3/14 Completed	TBD After CRV	Q4/15		Q3/17(After CRV)		D			
China (Beijing)	A			Q3/10	Q1/11		From 2016 onward After CRV Q3/16		Q4/15			A			
	B			Q3/10	Q2/11		From 2016 onward After CRV Q4/16		Q4/15			B	China		
	C			On-going	pre-operational trials completed July/13 & Aug 14		From 2016 onward After CRV Q1/17		Q1-Q2/16			C	(Beijing)		
	D			Q3/16	Q3/15		From 2016 onward After CRV Q2/17		Q3/16			D			
Hong Kong, China (Hong Kong)	A		Q3/10				Q4/17 After CRV		Q1/13		Q2/15	A			
	B		Q3/10				Q4/17 After CRV		Q4/12		Q2/16	B	Hong Kong, China		
	C		On-going				Q4/17 After CRV		Q2/14		Q3/16	C	(Hong Kong)		
	D		Q3/16				Q4/17 After CRV		completed		Q4/16	D			
India (Mumbai)	A		Q1/11					Q3/09	Q2/13			A			
	B		Q2/11					Q4/09	Q2/12			B	India		
	C		pre-operational trials completed July/13 & Aug/14					Q4/09	Q3/13			C	(Mumbai)		
	D		Q3/15					Completed	Q3/14 Completed			D			
Fiji (Nadi)	A	Completed								Completed		A			
	B	Q3/12								Completed		B	Fiji		
	C	Q2/13								Completed		C	(Nadi)		
	D	Q3/14 Completed								Completed		D			
Japan (Fukuoka)	A	TBD After CRV	From 2016 onward After CRV	Q4/17 After CRV				Q4/17		Q3/00 Renewal AMHS Q2/15		A			
	B	TBD After CRV	From 2016 onward After CRV	Q4/17 After CRV				Q4/17		Q4/04 Renewal AMHS Q2/15		B	Japan		
	C	TBD After CRV	From 2016 onward After CRV	Q4/17 After CRV				Q4/17		Q4/04 Renewal AMHS Q2/15		C	(Fukuoka)		

	D	TBD After CRV	From 2016 onward After CRV	Q4/17 After CRV				Q1/18		Completed Renewal AMHS Q3/15		D		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.
Singapore	A	Q3/15			Q3/09		Q1/18 After CRV		Q2/13		Q1/15	A		
	B	Q3/15			Q4/09		Q1/18 After CRV		Q2/13		Q2/15	B	Singapore	
	C	Q3/15			Q4/09		Q1/18 After CRV		Q3/13		Q2/15	C	(Singapore)	
	D	Q1/16			Completed		Q1/18 After CRV		completed		Q4/15	D		
Thailand (Bangkok)	A		Q2/14	Q1/13	Q2/13			Q2/13				A		
	B		Beijing to Cfm	Q4/12	Q2/12			Q4/13				B	Thailand	
	C		Beijing to Cfm	Q2/14	Q3/13			Q4/13				C	(Bangkok)	
	D		Beijing to Cfm	completed	Q3/14 Completed			Completed				D		
USA (Salt Lake City / Atlanta)	A	Q2/13				Completed	Completed Renewal AMHS Q2/15				Q4/16	A		
	B	Q2/13				Completed	Completed Renewal AMHS Q2/15				Q4/16	B	USA	
	C	Q3/13				Completed	Completed Renewal AMHS Q2/15				Q4/16	C	(Salt Lake City / Atlanta)	
	D	Q3/17(After CRV)				completed	Completed Renewal AMHS Q3/15				Q4/16	D		
Phillipines	A			Q2/15				Q3/16		Q4/16			Phillipines	
	B			Q2/16				Q3/16		Q4/16				
	C			Q3/16				Q3/16		Q4/16				
	D			Q4/16				Q4/16		Q4/16				
	A							Q3/13				A		
Bahrain	A							Q3/13				A	Bahrain	
	B							N/A				B		
	C							Completed				C		
	D							Q2/16				D		
Europe	A						TBD					A	Europe	
	B						TBD					B		
	C						TBD					C		
	D						TBD					D		
Italy	A								waiting for new system TBD			A	Italy	
	B								TBD			B		
	C								TBD			C		
	D								TBD			D		
Kuwait	A		TBD									A	Kuwait	
	B		TBD									B		
	C		TBD									C		
	D		TBD									D		
Russian Federation	A		TBD				TBD					A	Russian Federation	
	B		TBD				TBD					B		
	C		TBD				TBD					C		
	D		TBD				TBD					D		
South Africa	A	TBD After CRV										A	South Africa	
	B	TBD After CRV										B		
	C	TBD After CRV										C		
	D	TBD After CRV										D		
	A							Q4/11				A		
United	B							N/A				B	United	
Kingdom	C							Q1/12				C	Kingdom	
	D							Completed				D		
Indonesia (Jakarta)	A	Q1/14						2009				A		
	B	Q2/14						Completed				B	Indonesia	
	C	Q3/14						Completed				C	(Jakarta)	
	D	Q1/16						Q4/15				D		
New Zealand (Christchurch)	A	Q3/17(After CRV)								Completed Q1/14		A		
	B	Q3/17(After CRV)								N/A		B	New Zealand	
	C	Q3/17(After CRV)								Q3/15		C	(Christchurch)	

	D	Q3/17(After CRV)								Q4/15		D			
Timor Leste (Dili)	A	UA										A			
	B	UA										B	Timor Leste		
	C	UA										C	(Dili)		
	D	Completed										D			
Nauru (Nauru)	A	UA										A			
	B	UA										B	Nauru		
	C	UA										C	(Nauru)		
	D	Completed										D			
Papau New Guinea (Port Moresby)	A	TBD After CRV										A			
	B	TBD After CRV										B	Papau New Guinea		
	C	TBD After CRV										C	(Port Moresby)		
	D	TBD After CRV										D			
Solomon Islands (Honiara)	A	UA										A			
	B	UA										B	Solomon Islands		
	C	UA										C	(Honiara)		
	D	Completed										D			
Vanuatu (Port Vila)	A	UA										A			
	B	UA										B	Vanuatu		
	C	UA										C	(Port Vila)		
	D	Completed										D			
DPR Korea (Pyongyang)	A		TBD									A			
	B		TBD									B	DPR Korea		
	C		TBD									C	(Pyongyang)		
	D		TBD									D			
Macao, China (Macao)	A		Q1/09	Q3/09								A			
	B		Q1 - Q2/09	Q3 - Q4/09								B	Macao, China		
	C		Q1 - Q2/09	Q3 - Q4/09								C	(Macao)		
	D		Q3/16	Completed								D			
Mongolia (Ulaanbaatar)	A		TBD									A			
	B		TBD									B	Mongolia		
	C		TBD									C	(Ulaanbaatar)		
	D		TBD									D			
Myanmar (Yangoon)	A		Q4/15						Completed at Q1/15			A			
	B		Q4/15						Completed at Q1/15			B	Myanmar		
	C		Q1/16						Q3/15			C	(Yangoon)		
	D		Q2/16						Q4/15			D			
Nepal (Kathmandu)	A		Q2/12* No physical connection yet, testing through VSAT		Q4/12							A			
	B		TBD		Q2/13							B	Nepal		
	C		TBD		Q1/14							C	(Kathmandu)		
	D		TBD		Q2/14 Completed							D			
Pakistan (Karachi)	A		TBD		Q3/10							A			
	B		TBD		N/A							B	Pakistan		
	C		TBD		Q3/10							C	(Karachi)		
	D		TBD		Q2/15							D			
Republic of Korea (Seoul)	A		Q2/10				From 2016 onward After CRV					A			
	B		Q3/10				From 2016 onward After CRV					B	Republic of Korea		
	C		Q3-Q4/10				From 2016 onward After CRV					C	(Seoul)		
	D		Completed				From 2016 onward After CRV					D			
	A			Q4/14				Q3/15	Q1/15			A			
	B			Q4/14				Q3/15	Q2/15			B	Vietnam		

Vietnam (Ho Chi Minh / Hanoi)	C			Q4/14				Q3/15	Q2/15			C	(Ho Chi Minh / Hanoi)		
	D			Q1/15				Q4/15	Q2/15			D			
Taipei	A			TBD			From 2016 onward After CRV					A	Taibei		
	B			TBD			From 2016 onward After CRV					B			
	C			TBD			From 2016 onward After CRV					C			
	D			TBD			From 2016 onward After CRV					D			
Bangladesh (Dhaka)	A				Q2/13				Q2/14			A			
	B				Q2/13				Q2/14			B	Bangladesh		
	C				Q3/14				Q2/14			C	(Dhaka)		
	D				Q1/15 Completed				Q3/15			D			
Bhutan (Paro)	A				Plans not received							A			
	B				Plans not recieved							B	Bhutan		
	C				Plans not recieved							C	(Paro)		
	D				Plans not recieved							D			
Kenya (Nairobi)	A				Q3/13							A	Kenya		
	B				Q4/13							B			
	C				Awaiting firm plans from Nairobi Q3/15							C			
	D				Awaiting firm plans from Nairobi Q4/15							D			
Oman (Muscat)	A				Q1/10							A			
	B				N/A							B	Oman		
	C				Q2/15							C	(Muscat)		
	D				Q3/15							D			
Sri Lanka (Colombo)	A				Q4/14			Q2/16				A			
	B				N/A			Q3/16				B	Sri Lanka		
	C				Q1/15			Q3/16				C	(Colombo)		
	D				Q3/15			Q4/16				D			
Kiribati (Tarawa)	A					UA						A			
	B					UA						B	Kiribati		
	C					UA						C	(Tarawa)		
	D					Q3/15						D			
New Caledonia (Noumea)	A					Q4/14						A			
	B					NA						B	New Caledonia		
	C					Q2/15						C	(Noumea)		
	D					Q3/15						D			
Tuvalu (Funafuti)	A					UA						A			
	B					UA						B	Tuvalu		
	C					UA						C	(Funafuti)		
	D					Q3/15						D			
Wallis Island (Wallis)	A					UA						A			
	B					UA						B	Wallis Island		
	C					UA						C	(Wallis)		
	D					Q3/15						D			
Brunei Darussalam (Brunei)	A							2017				A			
	B							2017				B	Brunei Darussalam		
	C							2017				C	(Brunei)		
	D							2017				D			
Malaysia (Kuala Lumpur)	A							Q4/15	Q2/13			A			
	B							N.A.	NA			B	Malaysia		
	C							Completed	Q2/14			C	(Kuala Lumpur)		
	D							Q1/16	Q4/15			D	(Kuala Lumpur)		
Cambodia (Phnom Penh)	A								Q2/13			A	(Kuala Lumpur)		
	B								Q3/13			B	Cambodia		
	C								Q3/13			C	(Phnom Penh)		
	D								completed			D			
Lao PDR (Vientiane)	A								Q1/13			A			
	B								Q2/13			B	Lao PDR		
	C								Q2/14			C	(Vientiane)		
	D								Q4/15			D			
American Samoa (Pago Pago)	A									UA		A			
	B									UA		B	American Samoa		
	C									UA		C	(Pago Pago)		
	D									UA		D			
Marshall Islands	A									UA		A	Marshall Islands		
	B									UA		B			

Marshall Islands	C									UA		C	Marshall Islands		
	D									UA		D			
Micronesia, Federated (State of Chuuk)	A									UA		A			
	B									UA		B	Micronesia, Federated		
	C									UA		C	State of Chuuk		
	D									UA		D			
Micronesia, Federated (State of Kosrae)	A									UA		A			
	B									UA		B	Micronesia, Federated		
	C									UA		C	State of Kosrae		
	D									UA		D			
Micronesia, Federated (State of Ponapei)	A									UA		A			
	B									UA		B	Micronesia, Federated		
	C									UA		C	State of Ponapei		
	D									UA		D			
Micronesia, Federated (State of Yap)	A									UA		A			
	B									UA		B	Micronesia, Federated		
	C									UA		C	State of Yap		
	D									UA		D			
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								
						Green	Cicuit completed								
						Yellow colour in Cells	Requires latest update								
Note : Japan has plans to install a new AMHS system from 2016 and start testing the sytem initially with FAA and then schedule installation of other circuits with BBIS a nd Bis countries.															

INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

ASIA/PACIFIC ATS MESSAGE HANDLING SYSTEM (AMHS) NAMING PLAN

FOURTH EDITION - MAY 2015

Table of Content

Abstract

This document is the planning and technical guidance on the naming convention for the transition of ground Aeronautical Fixed Telecommunication Network (AFTN) services to the ATS Message Handling System (AMHS) within the ASIA/PAC Region. Based upon the ATN SARPs as published in ICAO Annex 10 and ICAO Doc. 9880, naming and addressing plans are required to be developed by ICAO regions concerned.

This revised AMHS Naming Plan will provide guidance to States in the assignment and registration of addresses and names to be used for the Aeronautical Telecommunication Network (ATN) with a view to ensure its consistency with the latest EUROCONTROL AMC documentary and database requirements.

Executive Summary

This document provides planning and technical guidance on the naming convention for the transition of ground Aeronautical Fixed Telecommunication Network (AFTN) services to the ATS Message Handling System (AMHS) within the ASIA/PAC Region.

Based upon the ATN SARPs as published in ICAO Annex 10 and ICAO Doc 9880, naming and addressing plans are required to be developed by ICAO regions concerned. These Regional Plans will provide guidance to States in the assignment and registration of addresses and names to be used for the Aeronautical Telecommunication Network (ATN).

The ASIA/PAC ATN AMHS Naming Plan aligns itself with the global AMHS naming scheme. To maintain compatibility within the region, the Common AMHS Addressing Scheme (CAAS) Address format should be adopted where States are about to start their AMHS implementation programmes. This will ensure compatibility with the proposed global AMHS naming scheme.

A formal registration authority is established within ICAO, which will maintain a register for registering all Private Management Domains (PRMDs).

This document was adopted by 12th Meeting of APANPIRG held in 2001 for distribution to States in the ASIA/PAC and adjacent regions. It was further updated in April 2005 to include a comprehensive elaboration on the Common AMHS Addressing Scheme (CAAS), in particular the Private Management Domain Name value for States in the ASIA/PAC region.

As follow-up action of the 1st Meeting of ACSICG, an updated version was accepted by the 2nd Meeting of ACSICG with an aim to ensure compliance of ASIA/PAC of AMHS Naming Plan to latest EUROCONTROL AMC documentary and database requirement.

1. Introduction

This document presents the naming assignment conventions for allocating Originator/Recipient (O/R) names to be used for the ATS Message Handling System (AMHS) in the ASIA/PAC Region.

The information contained in this document was firstly adopted by 12th Meeting of APANPIRG held in 2001 for distribution to States in the ASIA/PAC and adjacent regions. It was further updated in April 2005 to include a comprehensive elaboration on the Common AMHS Addressing Scheme (CAAS), in particular the Private Management Domain Name value for States in the ASIA/PAC region. As follow-up action of the 1st Meeting of ACSICG, an updated version was accepted by the 2nd Meeting of ACSICG with an aim to ensure compliance of ASIA/PAC of AMHS Naming Plan to latest EUROCONTROL AMC documentary and database requirement.

This document has been updated as follow:

a. The references / documents / definitions / abbreviations concerned. (1.3-1.5)
b. AMHS addressing scheme with wildcard (3.2)
c. Defining Organization-name and Organization-unit-name-1 for CAAS (5)
d. Table 1a: PRMD-name values of the AMHS MD in ASIA/PAC region Information from EUROCONTROL AMC Database
e. Table 1b: Suggested PRMD-name values of the AMHS MD in ASIA/PAC region for states/ATSO which have not registered to AMC assuming all States/ATSOs using CAAS

1.1 Objectives

The objective of the document is to provide guidance in the naming convention to be used for the AMHS in the ASIA/PAC Region (Included the present AMHS Address information from EUROCONTROL AMC Database)

1.2 Scope

The scope of the document includes:

- Describing the attributes of the AMHS address format, and
- Recommending the values for the relevant attributes those are to be used in the AMHS address.

The ASIA/PAC Regional ATN/AMHS naming convention presented here will comply with the relevant formats as specified in ICAO Doc 9880.

The ASIA/PAC Regional ATN/AMHS Naming Plan defines the method for assigning values to each of the relevant attributes of the AMHS address. States may choose to assign their AMHS addresses based upon the recommendations made here.

1.3 References

Reference 1	Manual of Technical Provisions for the ATN (Doc 9880-AN/466) First Edition
Reference 2	ICAO Location Indicators – Document 7910
Reference 3	The State Letter T8/2.11, T8/2.13&T8/10.10: AP150/14 (CNS) dated 9 October 2014
Reference 4	The Third Edition of the ASIA/PAC ATN Network Service Access point (NSAP) Addressing Plan
Reference 5	ATNICG 5-WP20: ASIA/PACIFIC ATN NSAP Addressing Plan

Reference 6	The revised EUROCONTROL Convention 27 June 1997
Reference 7	AMC User Manual Edition 10.0 Adopted version (AFSG/18) (10/04/2014)
Reference 8	Appendix E1 AMC Network Inventory Form
Reference 9	Appendix E2 Major Change Form of AMC
Reference 10	Working Paper 9 (WP/9) The sage of Wildcard (**) in AMHS CAAS Address / ATNICG/7

1.4 Definitions

AMC Database	An off-line network management services in support of the ground ATS Messaging network of Air Navigation Service Providers (ANSPs) in Europe. This network integrates the Aeronautical Fixed Telecommunications Network (AFTN), the Common ICAO Data Interchange Network (CIDIN) and the ATS Message Handling System (AMHS) to transparently deliver operational ATS Messages such as flight plans, between users and hosts in ANSPs, airlines, etc. on a global basis.
CAAS-Address (Common AMHS Address Scheme)	A MF-Address of which the organization-name attribute identifying the user within an AMHS Management Domain is selected by the Management Domain itself and shall be supplied to ICAO for publication.
MF-Address (MHS-form address)	The Originator/Recipient name of an AMHS user.
NSAP Address (Network Service Access Point)	A hierarchically organized global address, supporting international, geographical and telephony-oriented formats by way of an address format identifier located within the protocol header. Although the top level of the NSAP address hierarchy is internationally administered by ISO, subordinate address domains are administered by appropriate local organizations.
NSAP Address Prefix	A portion of the NSAP Address used to identify groups of systems that reside in a given routing domain or confederation. An NSAP prefix may have a length that is either smaller than or the same size as the base NSAP Address.
Routing Domain (RD)	A set of End Systems and Intermediate Systems that operate the same routing policy and that are wholly contained within a single administrative domain.
XF-Address (Translated-form address)	A particular MF-Address of which all attributes identifying the user within an AMHS Management Domain may be converted by an algorithmic method to and from an AFTN form address.

1.5 Abbreviations

The following abbreviations are used in this document:

ADMD	Administration Management Domain
AFTN	Aeronautical Fixed Telecommunication Network
AMHS	ATS Message Handling System
AMC	ATS Messaging Management Centre
ATSMHS	ATS Message Handling Service
APANPIRG	Asia Pacific Air Navigation Planning and Implementation Regional Group
ATN	Aeronautical Telecommunication Network
ATNTTF	APANPIRG ATN Transition Task Force
ATS	Air Traffic Service
ATSO	Air Traffic Service Organizations
CAAS	Common AMHS Addressing Scheme
CCITT	Consultative Committee for International Telephony and Telegraphy
ICAO	International Civil Aviation Organization
ITU-T	International Telecommunication Union Telecommunication Standardization Sector
MHS	Message Handling Service
MF	MHS Form
MTA	Message Transfer Agent
O/R	Originator/Recipient
PRMD	Private Management Domain
NSAP	ASIA/PACIFIC ATN Network Service Access Point
SARP	Standards and Recommended Practices
XF	Translated Form

2. AMHS Naming Convention

The ASIA/PAC AMHS naming convention is based on a number of factors that have arisen from the third meeting of the ATN Panel held in Montreal during the 7th to 18th of February 2000 and the results from other AMHS planning activities developed by other regions.

To ensure continuity and compatibility with other AMHS naming conventions, the AMHS naming convention for the ASIA/PAC Region was developed based upon the outcome of the European SPACE[1] Project.

[1] SPACE (Study and Planning of AMHS Communications in Europe) is a project supported by the European Commission and is the combined efforts of the participating countries and organizations from EUROCONTROL, France, Germany, Spain and the United Kingdom.

The attributes of the AMHS address format should be:

- Simplicity
- No prefix
- Not an abbreviation words

2.1 MHS Addressing Scheme

There are 4 types of address form in CCITT X.400 Message Handling System. The addressing scheme of AMHS adopts the mnemonic form address and the attributes contain in this form are described in the table below:

Table 2-1 Mnemonic form address attributes of MHS

Attribute	Notation	Maximum Length	Comment
Country-name	C	3	
ADMD	A	16	
PRMD	P	16	
Organization-name	O	64	
Organizational Unit name	OUn	4 x 32	n = 1 – 4
Common name	CN		
Personal name	S G I GQ	40 16 5 3	Surname Given name Initials Generation Qualifier
Domain-defined-attributes	DDA	Varies	(DDA type) = (DDA Value), up to 4 attributes

2.2 MF-Addressing Scheme in AMHS

Each AMHS user within an AMHS Management Domain is assigned an Originator/Recipient (O/R) name, which is referred to as a MF-address (MHS-form address).

Two types of MF-address in AMHS are defined in Doc9880, namely Common AMHS Addressing Scheme (CAAS) and XF (Translated-form) Addressing Scheme. They differ in the number of attributes being selected from mnemonic form of MHS addressing scheme,

The MF-address of an AMHS user (no matter CAAS or XF) shall comprise:

a) a set of attributes identifying the AMHS Management Domain of which the AMHS user, either direct or indirect, is a service-user; and
b) a set of attributes identifying unique AMHS user within the AMHS Management Domain.

2.3 Naming Convention for CAAS Format

It is recommended that:

a) ICAO register with the ITU-T the ADMD name "ICAO" as an international ADMD under the "XX" country code.
b) ICAO establishes and maintains a register of PRMDs allocated by air traffic service providers according to the "XX" + "ICAO" address structure.

The management of this register would be established and maintained in the same way as the Location Indicators (Doc7910) and Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services (Doc8585).

The Air Navigation Commission on the 1st of June 2000 approved these recommendations. On the basis of these recommendations, the ASIA/PAC Region accepted the format for the allocation of the first two attributes used in the O/R name. It was proposed that a common naming convention be used worldwide to help stream line the addressing scheme and to ensure compatibility and consistency with other neighboring regions. This scheme would be based on the work that has been ongoing in Europe. It was also stressed that if States have not already started their implementation programmed for AMHS that when planning to do so they should adopt the CAAS-Address format and not the XF-Address format.

The ASIA/PAC Region will adopt the proposed worldwide CAAS-Address format, which uses the following attributes to define the O/R name during the transition phase from AFTN to AMHS:

1. Country-name;
2. ADMD;
3. PRMD;
4. Organization-name;
5. Organizational-unit-name 1; and
6. Common Name.

2.3.1 Country Name

The country name is a mandatory requirement and shall consist of the two alphanumeric ISO 3166 Country Code "XX" encoded as a Printable String. The country code "XX" has been adopted, as this is a special code registered by the ITU-T for the purpose of allocation to international organizations, which do not reside within any particular country.

2.3.2 ADMD

The administrative domain is a mandatory requirement and shall consist of the Printable String "ICAO". ICAO has registered "ICAO" as the ADMD with the ITU-T. By providing the "ICAO" ADMD will allow the addressing schemes to be independent of any constraints that may be imposed by management domains in the global MHS or national regulations that may vary from region to region.

2.3.3 PRMD

The private management domain is an optional requirement as documented in the relevant ITU-T Standards. However, this attribute is mandatory for implementation of AMHS by States in the ASIA/PAC Region as part of the worldwide CAAS-Address format scheme.

The contents of this field can include the ICAO Location Indicator specified in ICAO Doc7910 or the name of the Air Traffic Service Organization (ATSO) that has been registered with ICAO. Where an ATSO has not yet assigned their PRMD then a default value will be allocated, which will use either one or two letters of the ICAO Country Indicator specified in ICAO Doc7910. This has been chosen for its simplistic and non-ambiguous format, which is already managed by ICAO. Hence providing an easier management role for ICAO who will be responsible for maintaining the register of all PRMDs allocated under the ADMD of "ICAO".

2.3.4 Organization Name

The organization name is used to define the local or national geographical routing information. This information is to be assigned by the ATSO (for example can be based on the ICAO location indicator as specified in ICAO Doc7910 or some other value determined by an ATSO and published by ICAO). Figure 2 - 1 provides a pictorial view of how the organization name can be used in relation with the lower attribute structure.

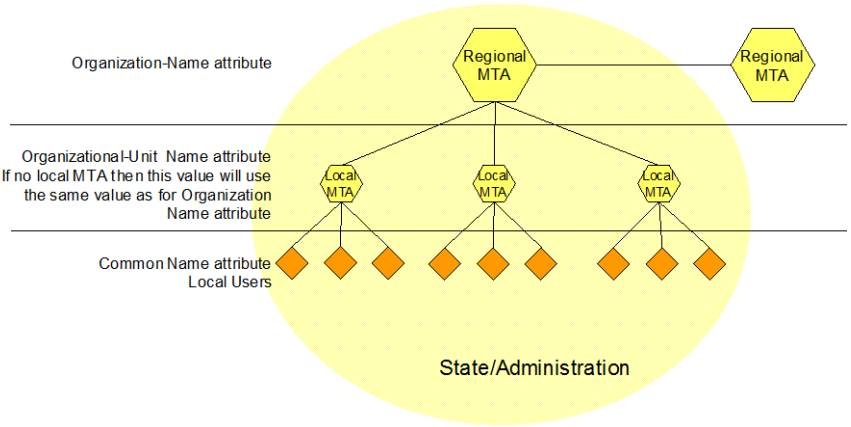


Figure 2 -1 Lower Attribute Structure

2.3.5 Organizational Unit Name OU1

Each State or organization is allocated a unique ATS message organizational name. As all States are familiar with the ICAO four character location indicators defined in ICAO doc7910, it is proposed that the organization unit name 1 use the location indicator to identify the Message Transfer Agent (MTA) site, encoded as a Printable String. Including the reference to the WP/9 - The sage of Wildcard (**) in AMHS CAAS Address / ATNICG/7, wildcard should be used for the purposes of reducing the amount of data in EUROCONTROL AMC Database.

Note: The MTA site may be the MTA name of the server. However there are security issues that need to be addressed to ensure that this arrangement does not cause any unnecessary concerns with service providers that allow the MTA name to be broadcast in this fashion.

2.3.6 Common Name

It is proposed that during the AFTN transition to AMHS that the common name attribute be used to contain the 8-character alphabetical value of the AFTN address indicator of the user, encoded as a Printable String. This shall apply for AFTN users only. Possible example of an O/R address is shown in Table 2-2

Table 2- 2 Example of a CAAS-Address AMHS Naming Convention

Attribute	Assigned By	Value	Comment
Country-name (C)	ITU-T	XX	International Organization
ADMD (A)	ICAO	ICAO	ICAO Responsibility to register
PRMD (P)	ATSO	e.g. THAILAND	ATSO registered private domain with ICAO.
Organization name (O)	ATSO	e.g. VTBB	Local/national geographical information, which can be based on ICAO Location Indicators (Doc7910)
Organizational-Unit name (OU1)	ATSO	e.g. VTBB, VT**	ICAO Location Indicator (Doc7910) Wild card can be used (*)
Common Name (CN)	ATSO	e.g. VTBBYFYX	AFTN address

Note: It is proposed that for a direct AMHS user that an ATSO should be able to assign a suitable name to that user without being restricted to an AFTN address indicator.

2.4 Naming Convention for XF-Address Format

The attributes to be used for the XF-Address format are as described in ICAO Document 9880 and presented below as follows:

Country-name;
ADMD;
PRMD;
Organization-name; and
Organizational-unit-name 1.

2.4.1 Country Name

As proposed in Section 2.3.1

2.4.2 ADMD

As proposed in Section 2.3.2

2.4.3 PRMD

As proposed in Section 2.3.3

2.4.4 Organization Name

This field has already been defined by ICAO Document 9880. The value of this field contains the encoded printable string “AFTN”.

2.5 General Use of X.400 O/R Addresses

The address format of X.400 O/R address attributes for sending general non-operational AMHS traffic is a local matter for States/Administrations to implement if they wish to do so and no further advice is provided in this plan.

3. PRMD-name values and Address Scheme Registration

As it is important to have the proper address developed well before the AMHS implementation in the Region, a comprehensive draft of PRMD value and AMHS Addressing Scheme for each State/ATSO in the ASIA/PAC region are developed in table 1a and table 1b. Examples and tables given would assist State/ATSO to understand XF and CAAS address scheme. States/ATSOs are recommended to follow the proposal and register to deploy CAAS as early as possible.

3.1 XF Addressing Scheme

XF is only intended for transitional arrangement when both AFTN and AMHS systems co-exist during the initial implementation of AMHS. States/ATSOs declare the use of XF could still maintain an AFTN system for routing of messages to and from local and international AFTN users before the sunset date (to be decided by ICAO), whereas messages to and from the ATN are routed through the AFTN/AMHS gateway for format conversion.

The XF Addressing Scheme is simple to implement because the *organization-name* always takes the fixed value "AFTN" and the *organization-unit-name-1* is used to store the AFTN address. Hence, only the *PRMD-name* is required for AFTN to XF address translation and there are not more than 200 of such entries. The ATN SARPs Edition 2 provided the XF addressing requirements. However, the XF scheme does not support the addressing of multiple MTAs within a MD for more operational choice by States/ATSO. For example, having two MTAs as entry/exit points, a MD can serve the purpose of load balancing as well as providing a hot-backup site to enhance the performance and availability of the AMHS service. The drawback on the use of XF is that, unlike the CAAS that allows multiple *organization-name* values, XF supports only one value. Hence an AMHS initially using XF addressing will need to be changed back to CAAS addressing at a later time (when the system will be in operation delivering live traffic). With this in conjunction with the limited value (i.e. for simplicity) of XF addressing, the ATN SARPs Edition 3 encourages the direct use of CAAS addressing right in the beginning of AMHS implementation.

3.2 Common AMHS Addressing Scheme with wildcard

CAAS supports both transitional (AFTN plus AMHS) and pure AMHS environment. In a pure AMHS environment, only CAAS addresses are used and the routing decision rests on the router and/or MTA depending on the MTA routing policy. No address conversion is needed and hence XF address does not play any role here.

The CAAS offers greater flexibility in assigning values to the *organization-unit-name-1 (OU1)* and *common-name (CN)* attributes. It opens up the possibility for the MD to select any desirable values on *OU1* and *CN* after the sunset date and hence give rise to a user-friendly address and more importantly, higher scalable service even down to personal level.

To facilitate smooth migration, *OU1* attribute is initially used to store 4-letter location indicator(s) categorized under *organization* attribute whereas *CN* is deployed to keep the existing AFTN address during the transition period. After the transition period, the values of *OU1* and *CN* could be changed or re-assigned by the respective MDs in accordance with the guidelines to be developed by ICAO.

The CAAS requires each AMHS MD to maintain and update the latest *organization-name* and additional *organization-unit-name-1* values declared by all AMHS MDs. The complexity of maintenance and updating of these values will grow with the size of AMHSs in use globally. To ease the problem on address resolution in CAAS, Directory Service (DIR), which is an Extended AMHS function, should be used. For information, DIR had been included as one of the optional elements in the ATN SARPs.

In this connection, in the AFSG/14 meeting in June 2010, the AFSG Operations Group at EUR proposed in WP/02 "The use of wildcard (*) characters to reduce the number of entry in the CAAS table. The working paper recommended that wild card (*) characters can be used for AMHS Address on the "Organization-unit-name-1" (OU1) attribute, be restricted to the 2nd, 3rd, and 4th position, and be used as trailing characters only. The recommendation has been also proposed in The ATNICG/7-WP/09, The AMC has just announced the use of wild card (*) characters for AMHS ASIA/PAC Addresses on the "Organization-unit-name-1" (OU1) attribute and proposed all AMC users to consider changing their AMHS registry entries to include wild card (*) character.

For example: VTBB used by VT** / VHHH used by VH**

4. PRMD-name value

Values of the *PRMD-name* may take any one of the following three forms: -

(a) Value declared by AMHS MD which is their country name, e.g.

- Hong Kong, China declared the value "HONGKONG" as *PRMD-name.*
- Thailand declared the value "THAILAND" as *PRMD-name.*

(b) Value declared by AMHS MD but follows the Nationality Letter as specified in Doc7910, e.g.

- New Zealand declared the value "NZ" as *PRMD-name.*

(c) Value from the default Nationality Letter assigned by ICAO when the AMHS MD does not respond to the ICAO State Letter, e.g. value "RP" is assigned to Philippine as *PRMD-name* by ICAO.

4.1 PRMD-name value for XF

In the XF Addressing Scheme, the *organization-name* value is fixed as "AFTN" and there is no *common-name* attribute. Therefore, only the *PRMD-name* is required by AMHS MD for AFTN/XF address translation. To streamline the choice of *PRMD-name* value and to simplify the conversion, it would be more convenient and logical to make use of the Nationality Letters in AFTN location indicator as the *PRMD-name* value.

4.2 PRMD-name value for CAAS

In CAAS, the *organization-name* value is not fixed. To minimize the influence of the legacy AFTN address structure on CAAS and to present explicitly the name of the States/ATSOs administering the AMHS MD, it would be advisable to use full name of the States/ATSOs as the *PRMD-name* value.

Table 1a presents the data extracted from EUROCONTROL AMC Database shows the registered PRMD-name values of the AMHS MD in ASIA/PAC region. For States/ATSOs not yet registered at AMC, Table 1b gives suggested *PRMD-name* values of the AMHS MD assuming CAAS addressing scheme is used.

5. Defining *Organization-name* and *Organization-unit-name-1* for CAAS

On top of *PRMD-name*, *organization-name* is also required for AFTN to CAAS address resolution. It may take a value that represents a geographical unit or identifies an organization. The syntax and values are to be defined by the States/ATSOs. States/ATSOs selecting CAAS are required to provide at the same time a group of 4-letter location indicators associated to the selected *organization-name* value. These location indicators constitute the *organization-unit-name-1* values to facilitate address conversion and therefore shall also be provided to ICAO for publication. Examples on CAAS deployment in the ASIA/PAC Region are given below:

Example 1 : CAAS with *organization-name* to identify an organization

State/ATSO: A

PRMD-name	*A*
Organization-name	*x*
Organization-unit-name-1	*[XXXX] / [XX**]*

A= *name of State/ATSO in alphanumeric characters*
x = *name of the organization in alphanumeric characters. The syntax and value are to be defined by the considered State/ATSO.*
[XXXX] = *4-letter AFTN location indicator(s) that is associated with the organization*
*[XX**] =* *4-letter AFTN location indicator(s) that is associated with the organization with wild card (*) characters*

Wildcard (*) characters may be used to reduce the number of entries in Organsiation-unit-name-1 attribute.

e.g. COUNTRYABCD

PRMD-name	*COUNTRYABCD*
Organization-name	*CAA NAME*
Organization-unit-name-1	*VKKK VKKA VKSA VKSP / VK**

Example 2 : CAAS with *organization-name* to represent a geographical unit

State/ATSO: A

PRMD-name	*A*
Organization-name	*[PPPP]*
Organization-unit-name-1	*[XX**]*

[PPPP] = 4-letter AFTN location indicator representing a geographical unit
[XX**] = 4-letter AFTN location indicator(s) that is associated with the organization with wild card (*) characters

e.g. COUNTRYMNPQ

PRMD-name	*COUNTRYMNPQ*
Organization-name	*VZSS*
Organization-unit-name-1	*VZ**

The above examples involve one single MTA. However, it is possible to deploy multiple MTAs within the AMHS MD when the area of the States/ATSOs or the size of the organizations is big enough for consideration of segregation. In this case, more than one *organization-name* value, each associated with a number of location indicators shall be defined and provided to ICAO for publication.

Example 3 : CAAS with *organization-name* to represent a geographical unit and more than one MTA within the MD

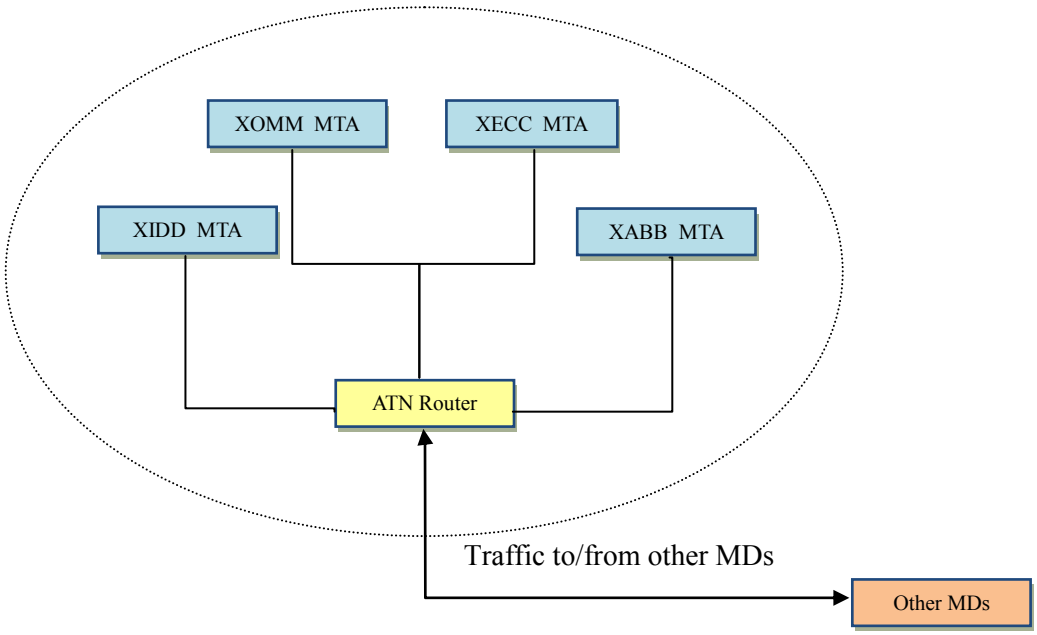
State/ATSO: B

PRMD-name	*B*
Organization-name	*m[PPPP]*
Organization-unit-name-1	*n[XXXX] / n[XX**] per [PPPP] / [PP**]*

m[PPPP] = m number of 4-letter location indicator each representing different geographical unit
n[XXXX] = n number of 4-letter location indicator(s) that are associated with a particular geographical unit
*n[XX**] = 4-letter AFTN location indicator(s) that is associated with the organization with wild card (*) characters*

e.g. COUNTRYXYZ

PRMD-name	COUNTRYXYZ			
Organization-name	XECC	XABB	XOMM	XIDD
Organization-unit-name-1	XE**	XA**	XO**	XI**



AMHS MD with multiple MTAs requires CAAS addressing

Note: 1. Each MTA, as an end system, should have its own NSAP address.
2. Traffic between MTAs within the domain is a local matter.

As an example, the registered OU value of Hong Kong in the CAAS table of EUROCONTROL AMC Database shows that wildcard is used.

HONGKONG - XX - ICAO - HONGKONG

AMHS MD Register

MD Common Name	Country-Name	Addressing Scheme	ATN Directory Naming-Context
HONGKONG	XX	(•) CAAS ( ) XF ( ) Other	c=HK

PRMD-Name	ADMD-Name	Administrative Status	Operational Status
		EXTERNAL	OP
		Relation to Doc 7910	ATN ICAO Designator
		Consistent	
HONGKONG	ICAO		

State(s)/ Organization(s)

State(s)/ Organization(s)	Nationality Letters or Designator	Doc 7910 Status
Hong Kong, China	VH	Official

COM Centres

COM Centres	Location	Organization Name
VHHH	HONG KONG/INTERNATIONAL	

HONGKONG - XX - ICAO - HONGKONG

Intra MD Addressing

CAAS Table

Org. (O)	Org. Unit (OU)	7910 Status	Offic. Register Status
HKGCAD	VH**	Official	Registered

User Address Table

User Short Name	AFTN Addr Indicator	O/R Address

****

Table 1a

PRMD-name values of the AMHS MD in ASIA/PAC region
Information from EUROCONTROL AMC Database

	Contracting State	MD Common Name	MTA Name	Addressing Scheme	Country-name	Administration-domain-name	Private-domain-name	Organization name	Organization unit-name-1	COM Centre	Location of COM Centre	Operational Status
				(CAAS/XF)	(C)	(A)	(P)	(O)	(OU1)			
1	**AFGHANISTAN**	OA		XF	XX	ICAO	OA	AFTN	OAKB	OAKB	KABUL	NON OP
2	**AUSTRALIA**	AUSTRALIA		CAAS	XX	ICAO	AUSTRALIA	YBBN	Y***	YBBB	BRISBANE	OP
3	**BANGLADESH**	VG	VGEG-MTA	CAAS	XX	ICAO	BANGLADESH	VGHS	VG**	VGHS	DHAKA	OP
4	**BHUTAN**	VQ		XF	XX	ICAO	VQ	AFTN	VQPR	VQPR	PARO INTL	NON OP
5	**BRUNEI DARUSSALAM**	WBSB		XF	XX	ICAO	WBSB	AFTN	WBSB	WBSB	BRUNEI INTL AP	NON OP
				XF	XX	ICAO	WBSB	AFTN	WBAK	WBAK	BRUNEI INTL AP	NON OP
6	**CAMBODIA**	CAMBODIA	MTA-VDPP-1	CAAS	XX	ICAO	CAMBODIA	VDPP	VD**	VDPP	PHNOM PENH	OP

	Contracting State	MD Common Name	MTA Name	Addressing Scheme	Country-name	Administration-domain-name	Private-domain-name	Organization name	Organization unit-name-1	COM Centre	Location of COM Centre	Operational Status
				(CAAS/XF)	(C)	(A)	(P)	(O)	(OU1)			
7	**CHINA**	CHINA	CHNMTA	CAAS	XX	ICAO	CHINA	CS	ZG**	ZBBB	BEIJING CITY	OP
				CAAS	XX	ICAO	CHINA	CS	ZH**			
				CAAS	XX	ICAO	CHINA	CS	ZJ**			
				CAAS	XX	ICAO	CHINA	EC	ZS**			
				CAAS	XX	ICAO	CHINA	HQ	ZBBB			
				CAAS	XX	ICAO	CHINA	NC	ZB**			
				CAAS	XX	ICAO	CHINA	NE	ZY**			
				CAAS	XX	ICAO	CHINA	NW	ZL**			
				CAAS	XX	ICAO	CHINA	SW	ZP**			
				CAAS	XX	ICAO	CHINA	SW	ZU**			
				CAAS	XX	ICAO	CHINA	XJ	ZW**			
		RC		XF	XX	ICAO	RC	AFTN	RCTP	RCTP	TAIBEI CITY	NON OP
8	**HONG KONG, CHINA**	HONGKONG	HKAMHS	CAAS	XX	ICAO	HONGKONG	HKGCAD	VH**	VHHH	HONGKONG INTL AP	OP
9	**MACAO, CHINA**	MACAO	MCUMTA	CAAS	XX	ICAO	MACAO	VM	VM**	VMMC	MACAO INTL AP	OP

	Contracting State	MD Common Name	MTA Name	Addressing Scheme	Country-name	Administration-domain-name	Private-domain-name	Organization name	Organization unit-name-1	COM Centre	Location of COM Centre	Operational Status
				(CAAS/XF)	(C)	(A)	(P)	(O)	(OU1)			
10	**COOK ISLANDS**	NC		XF	XX	ICAO	NC	AFTN	NCRG	NCRG	RAROTONGA INTL.	NON OP
11	**DPR OF KOREA**	ZK		XF	XX	ICAO	ZK	AFTN	ZKKK	ZKKK	PYONGYANG (CITY)	NON OP
12	**FIJI**	FIJI	NFMTA	CAAS	XX	ICAO	FIJI	NFFN	NF**	NFFN	NADI INTL	OP
13	**FRENCH POLYNESIA**	NT		XF	XX	ICAO	NT	AFTN	NTAA	NTAA	TAHITI FAAA	NON OP
14	**INDIA**	INDIA	BBAMHS	CAAS	XX	ICAO	INDIA	VABB	VA**	VABB	MUMBAI	OP
				CAAS	XX	ICAO	INDIA	VECC	VE**	VECC	KOLKATA	
				CAAS	XX	ICAO	INDIA	VIDD	VI**	VIDD	SAFDARJUNG (DELHI)	
				CAAS	XX	ICAO	INDIA	VOMM	VO**	VOMM	CHENNAI	
15	**INDONESIA**	INDONESIA		CAAS	XX	ICAO	INDONESIA	WIII	WI**	WIII	JAKARTAINTL / SOEKARNO-HATTA	NON OP
				CAAS	XX	ICAO	INDONESIA	WAAA	WA**			
				CAAS	XX	ICAO	INDONESIA	WRRR	WR**			
16	**JAPAN**	RJ	JPAMHS	XF	XX	ICAO	RJ	AFTN	RJJJ	RJJJ	FUKUOKA/JCAB	OP
				XF	XX	ICAO	RO					
17	**KIRIBATI**	NG		XF	XX	ICAO	NG	AFTN	NGTT	NGTT	TARAWA/BETIO	NON OP

	Contracting State	MD Common Name	MTA Name	Addressing Scheme	Country-name	Administration-domain-name	Private-domain-name	Organization name	Organization unit-name-1	COM Centre	Location of COM Centre	Operational Status
				(CAAS/XF)	(C)	(A)	(P)	(O)	(OU1)			
18	**LAO PDR**	LAO	MTA-VLVT-1	CAAS	XX	ICAO	LAO	VLVT	VL**	VLVT	VIENTIANE(WATTAY)	NON OP
19	**MALAYSIA**	MALAYSIA		CAAS	XX	ICAO	WM	WMKK	WM**	WMKK	SEPANG/KL INTL AP	NON OP
				CAAS	XX	ICAO	WB	WBKK	WB**	WBKK	KOTA KINABALU	NON OP
20	**MALDIVES**	VR		XF	XX	ICAO	VR	AFTN	VRMM	VRMM	IBRAHIM NASIR INTL AP	NON OP
21	**MONGOLIA**	ZM		XF	XX	ICAO	ZM	AFTN	ZMUB	ZMUB	ULAANBAATAR	NON OP
22	**MYANMAR**	VY		XF	XX	ICAO	VY	AFTN	VYYY	VYYY	YANGON	NON OP
23	**NAURU**	AN		XF	XX	ICAO	AU	AFTN	ANAU	ANAU	NAURU FIR	NON OP
24	**NEPAL**	VN		XF	XX	ICAO	VN	AFTN	VNKT	VNKT	KATHMANDU	NON OP
25	**NEW CALEDONIA**	NW		XF	XX	ICAO	NW	AFTN	NWWW	NWWW	NOUMEA LA TONTOUTA	NON OP
26	**NEW ZEALAND**	NZ		CAAS	XX	ICAO	NZ	NZCH	NZ**	NZCH	CHRISTCHURCH INTL	NON OP
27	**PAKISTAN**	OP		XF	XX	ICAO	OP	AFTN	OPKC	OPKC	KARACHI	NON OP
28	**PAPUA NEW GUINEA**	AY		XF	XX	ICAO	AY	AFTN	AYPM	AYPM	PORT MORESBY	NON OP
29	**PHILIPPINES**	RP		XF	XX	ICAO	RP	AFTN	RPLL	RPLL	MANILA	NON OP
30	**REPUBLIC OF KOREA**	RK	RKMTA	CAAS	XX	ICAO	RK	RKSS	RK**	RKSS	GIMPO	OP

	Contracting State	MD Common Name	MTA Name	Addressing Scheme	Country-name	Administration-domain-name	Private-domain-name	Organization name	Organization unit-name-1	COM Centre	Location of COM Centre	Operational Status
				(CAAS/ XF)	(C)	(A)	(P)	(O)	(OU1)			
31	**SINGAPORE**	SINGAPORE	SGAMHS	CAAS	XX	ICAO	SINGAPORE	CAASG	WS**	WSSS	SINGAPORE/CHANGI	OP
32	**SOLOMON ISLANDS**	AG		XF	XX	ICAO	AG	AFTN	AGGG	AGGG	HONIARA (FIC)	NON OP
33	**SRI LANKA**	SRILANKA		XF	XX	ICAO	VC	AFTN	VCCC	VCCC	RATMALANA/COLOMBO	NON OP
34	**THAILAND**	THAILAND	MTA-VTBB-1	CAAS	XX	ICAO	THAILAND	VTBB	VT**	VTBB	BANGKOK	OP
35	**TIMOR LESTE**	WP		XF	XX	ICAO	WP	AFTN	WPDL	WPDL	DILI	NON OP
36	**TONGA**	NFT		XF	XX	ICAO	NFT	AFTN	NFTF	NFTF	TONGATAPU	NON OP
37	**TUVALU**	NGF		XF	XX	ICAO	NGF	AFTN	NGFF	NGFF	FUNAFUTI	NON OP
38	**UNITED STATES**	K	KATLMTA	XF	XX	ICAO	K	AFTN	KATL	KATL	HARTSFIELD-JACKSON ATLANTA INTL GA.	OP
			KSLCMTA	XF	XX	ICAO	K	AFTN	KSLC	KSLC	SALT LAKE CITY	OP
39	**VANUATU**	NV		XF	XX	ICAO	NV	AFTN	NVVV	NVVV	PORT VILA/BAUERFIELD	NON OP
40	**VIET NAM**	VV		XF	XX	ICAO	VV	AFTN	VV	VVVV	HANOI	NON OP
41	**WALLIS AND FUTUNA ISLANDS**	NL		XF	XX	ICAO	NL	AFTN	NLWW	NLWW	WALLIS HIHIFO	NON OP

Note: Information from 1. EUR AFTN/CIDIN/AMHS Address Management Implemented On : 30/04/2015 10:15 UTC Created by AMC at EUROCONTROL
2. AMC Operational Data / Network Inventory: AMHS Capabilities OPER 144 Released on 30/04/2015 11:00 UTC
3. Bangladesh Information is the last information received from him (MAR 2015)

Table 1b

Suggested *PRMD-name* values of the AMHS MD in ASIA/PAC region
For states/ATSO which have not registered to AMC
assuming all States/ATSOs using CAAS

	Contracting State	Nationality Letters	Addressing Scheme	Country-name	Administration-domain-name	Private-domain-name (using Nationality Letters)	Private-domain-name (using Name of Country)	Organization name	Organization unit-name-1 (using wildcard)
			(CAAS)	(C)	(A)	(P)	(P)	(O)	(OU1)
1	**AFGHANISTAN**	OA	CAAS	XX	ICAO	OA	AFGHANISTAN	OAKB	OA**
2	**BHUTAN**	VQ	CAAS	XX	ICAO	VQ	BHUTAN	VQPR	VQ**
3	**BRUNEI DARUSSALAM**	WBSB	CAAS	XX	ICAO	WBSB	BRUNEI DARUSSALAM	WBSB	WBS*
4	**COOK ISLANDS**	NC	CAAS	XX	ICAO	NC	RAROTONGA INTL.	NCRG	NC**
5	**DPR OF KOREA**	ZK	CAAS	XX	ICAO	ZK	DPR OF KOREA	ZKKK	ZK**
6	**FRENCH POLYNESIA**	NT	CAAS	XX	ICAO	NT	FRENCH POLYNESIA	NTAA	NT**
7	**KIRIBATI**	NG	CAAS	XX	ICAO	NG	KIRIBATI	NGTT	NG**
8	**MALDIVES**	VR	CAAS	XX	ICAO	VR	MALDIVES	VRMM	VR**
9	**MONGOLIA**	ZM	CAAS	XX	ICAO	ZM	MONGOLIA	ZMUB	ZM**
10	**MYANMAR**	VY	CAAS	XX	ICAO	VY	MYANMAR	VYYY	VY**

	Contracting State	Nationality Letters	Addressing Scheme	Country-name	Administration-domain-name	Private-domain-name (using Nationality Letters)	Private-domain-name (using Name of Country)	Organization name	Organization unit-name-1 (using wildcard)
			(CAAS)	(C)	(A)	(P)	(P)	(O)	(OU1)
11	**NAURU**	AU	CAAS	XX	ICAO	AU	NAURU	AUUU	AU**
12	**NEPAL**	VN	CAAS	XX	ICAO	VN	NEPAL	VNKT	VN**
13	**NEW CALEDONIA**	NW	CAAS	XX	ICAO	NW	NEW CALEDONIA	NWWW	NW**
14	**PAKISTAN**	OP	CAAS	XX	ICAO	OP	KARACHI	OPKC	OP**
15	**PAPUA NEW GUINEA**	AY	CAAS	XX	ICAO	AY	PAPUA NEW GUINEA	AYPM	AY**
16	**PHILIPPINES**	RP	CAAS	XX	ICAO	RP	PHILIPPINES	RPLL	RP**
17	**SOLOMON ISLANDS**	AG	CAAS	XX	ICAO	AG	SOLOMON ISLANDS	AGGG	AG**
18	**SRI LANKA**	VC	CAAS	XX	ICAO	VC	SRI LANKA	VCCC	VC**
19	**TIMOR LESTE**	WP	CAAS	XX	ICAO	WP	TIMOR LESTE	WPDL	WP**
20	**TONGA**	NFT	CAAS	XX	ICAO	NFT	TONGA	NFTF	NFT*
21	**TUVALU**	NGF	CAAS	XX	ICAO	NGF	TUVALU	NGFF	NGF*
22	**VANAUTU**	NV	CAAS	XX	ICAO	NV	VANAUTU	NVVV	NV**
23	**VIET NAM**	VV	CAAS	XX	ICAO	VV	VIET NAM	VVVV	VV**
24	**WALLIS AND FUTUNA ISLANDS**	NL	CAAS	XX	ICAO	NL	WALLIS	NLWW	NL**

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Common Regional Virtual Private Network (CRV)Of Asia/Pacific

Air Navigation Planning and implementation Regional Group

(APANPIRG)

Cost Benefit Analysis (Second iteration, based on Request for Information, Jan.15)

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA-PACIFIC OFFICE

Document Change Record

Version Number	Date	Reason for Change	Sections Affected
1	29 April 2014	Creation of draft CBA for CRV TF/2 and ACSICG/1 meetings	
2	03 March 2015	Update based on the Request for Information data collected from the market from August 2014 to January 2015	Part II is added
3	28 April 2015	Review by CRV Task Force Chair and ICAO Secretariat	

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I. First iteration (April 2014)

1. Introduction

The First Meeting of the CRV (Common Regional Virtual Private Network) Task Force elaborated a work plan for carrying out the study mandated by the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) under Decision 24/32 Common Regional Virtual Private Network (VPN) Task Force.

It was recognized that such a service could be considered as a multinational service, as per ICAO Document ASIA/PAC BASIC ANP Doc 9673, and that such approach would require a cost benefit analysis to make sure that the project was cost efficient and beneficial for both developing and advanced States. The task was initiated to collect data from various member states as per Appendix 1 template in order to better define the recurring costs and problems associated with the current configurations. Every State or Administration of the Asia/Pacific Region was invited to reply to this Survey to ICAO Asia and Pacific Office (ICAO APAC Survey).

Fifteen organizations including one ANSP and fourteen States, have positively contributed through the ICAO APAC Survey, as per Appendix 2. This Cost Benefit Analysis (CBA) document analyzes the reports based on the Survey of these States and evaluates options that will help APANPIRG and the member states to take a decision for joining the CRV network and plan their budget accordingly.

1.1. Current Status

Currently, Aeronautical Fixed Telecommunication Network (AFTN) and AMHS services in the Asia/Pacific Region are operated over point-to-point international private lines (IPL). This network configuration exhibits a number of limitations, including (but not limited to):

- Half circuit arrangement between States is increasingly difficult to order and time consuming;
- Circuit upgrades between states is also impacted due to variable pricing and bandwidth availability of the half circuit at each State;
- Dynamic routing is not supported due to limited bandwidth and no central administration of the network;
- Incompatible network protocol do not support Extended Service as specified in ‘Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols (ICAO Doc9880)’;

- New features enhancement as recommended by ICAO 12th Air Navigation Conference such as System Wide Information Management (SWIM) is not supported;
- Network security measures cannot be implemented which leads many States to implement their own security measures and policy adding to overall costs; and
- Different budget cycles and priorities between States make the synchronization of upgrades difficult and in turn limit the seamless distribution of Aeronautical Fixed Service (AFS) data.

1.2. Brief introduction to CRV

In an attempt to resolve these issues, the CRV Task Force was formally established in accordance with APANPIRG Decision (24/32), (Bangkok, Thailand, 24-26 June 2013).

It was decided that a dedicated, common network operated by a Communication service provider is a viable approach to be studied to replace the current configuration. Common networks have successfully been deployed in other ICAO regions (e.g. PENS in the EUR Region and MEVA in the CAR Region). Therefore, the Meeting adopted the following decision:

Decision 24/32 - Common Regional Virtual Private Network (VPN) Task Force

> *That, a Task Force with Subject Matter Experts (SME) be established to study the virtual private network and develop a detailed proposal by 2016. The Task Force reports the outcome of its study to APANPIRG through ACSICG and CNS SG.*

2. Scenario Analysis

The CBA document has studied two scenarios: introducing and not introducing a common aeronautical regional network in the Asia/Pacific region. Cost and benefit analysis was performed for the two scenarios.

2.1. Scenario 1 – Do Nothing

This chapter considers the case of not introducing the CRV.

2.1.1. Benefit Analysis

2.1.1.1. Summarized cost of current link infrastructure from ICAO APAC Survey

From ICAO APAC Survey and analyses on the data provides following

Type of circuits in use:

There are three types of circuits currently used by states, 'Voice only', 'Data only' and 'Multiplexed Data + Voice'. Summarizing all usage types, the total number of circuits are 181. Distribution of usage is 'Data only': 43%, 'Voice only': 43% and 'Multiplexed Data+ Voice': 14%. Usage of Multiplexed 'Voice' and 'Data' remains quite low at 14%, indicating that separate circuits are provided for data and voice in most cases.

Bandwidth in use:

Currently circuits with 64 Kbps bandwidth accounts for the highest number of circuits in use and amount to 39% of all the circuits in use in Asia/Pacific region. 9.6kbps accounts for 12%. Furthermore the slowest bandwidth used is 2.4kbps and highest bandwidth is 2Mbps. There are 8 lines of 2Mbps.

Ratio of Landline to Satellite circuits:

Regarding the use of connection between various states, the ratio of Land Line is 85%, and the ratio of Satellite is quite low at 15%.

In accordance with the result from ICAO APAC Survey, the cost of the communication infrastructure that is currently connected is summarized in the table below:

Figure 1: *Result of ICAO APAC Survey*

	For all Communications	For voice only	For data only	For multiplexed data + voice
Total monthly cost of communications for all States (in US$)	415,647	185,009	162,498	68,140
Total annual cost of communications for all States (in US$)	4,987,764	2,220,110	1,949,976	817,678
Average annual cost by State (in US$)	332,518	148,007	129,998	54,512
Average kbps cost (in US$)	98.7			

Caveats:

- Number of States/Administrations in the Survey is 15 organizations (States/ANSPs).
- All currencies have been converted into US$ based on the March 14 rate
- Costs are a minimal estimate since costs as per use are not included

It may be noted that the 15 organizations (States/ANSPs) that were reported by ICAO APAC Survey are spending a total US$ 5 million per year for international aeronautical ground-to-ground communications (voice and data).

2.1.1.2. Negative impact from doing nothing (can be considered as cost)

Negative impact of non-introduction of the CRV by states based on available data is as follows:

2.1.1.2.1. Inability to support GANP technology roadmap

SWIM is an integral part of the Global Air Navigation Plan (GANP) and relates to a number of Aviation System Block Upgrades (ASBUs) modules. It will offer SWIM technical services based as much as possible on mainstream information technologies (IT) technologies. It will preferably be based on commercial off-the-shelf (COTS) products and services. Typically dedicated, secured IP networks will be applied to the underlying basic ground/ground connectivity. Also a dedicated IP network is an explicit requirement of the technology roadmap to enable SWIM and Voice over IP for inter‑centre voice ATM communications. In Asia/Pacific region, IP network that connects between each States is not currently implemented. The CRV if not implemented will be a major stumbling block in realizing the future plan of ICAO.

2.1.1.2.2. Difficult to expand / manage ground-ground communications (lack of scalability and manageability)

The management - and specifically the upgrade - of the present IPL which are based on half circuit agreements between states is becoming increasingly difficult. Setting up and maintaining the circuits require regular coordination between telecommunication service providers and are difficult to manage. The actual implementation of the circuit requires a long lead time as each State has a different contract procedure and is required to pay for its own half circuit thus making it increasingly difficult to order the circuits in several States. Also, there is no common point for management of faults thus requiring each state to individually research into the cause of a circuit failure and thus it takes a lot of time to isolate the fault. Furthermore, whenever an upgrade of circuit is required due to increased bandwidth requirements, the service provider is not able to upgrade and mostly a new circuit is required to be established to cater for higher bandwidth.

2.1.1.2.3. No common interface – different interfaces due to different technologies used such as X.25, VSAT, etc.

The existing regional network has been built up with large number of IPLs between individual States. These circuits use various underlying protocols and physical interfaces such as X.25, X25/IP conversion, or voice/data MUX, making it increasingly difficult to manage for the technical teams. In addition, many interfaces, which were designed to support point-to-point or application-to-application exchanges, have limited flexibility to accommodate new users, additional systems, new content or changed formats use.

2.1.1.2.4. Obsolescence

According to the ICAO APAC Survey, the maintenance of low-speed IPL by the telecommunication service provider is becoming increasingly difficult. The legacy technologies like X.25 or PES/TES VSAT etc. are almost obsolete, requiring lot of effort and increasing costs to maintain and sustain the network. The service providers are therefore reluctant to maintain the legacy technologies. X.25 technology has been taken over by IP based/ MPLS networks which are more efficient and provide higher bandwidths at lower costs. Also, the Voice/Data Multiplexer has become difficult to maintain as the industry has moved to Voice over Internet Protocol (VoIP) standard. In some cases, spare parts can no longer be obtained from industry.

2.1.2. Cost Analysis

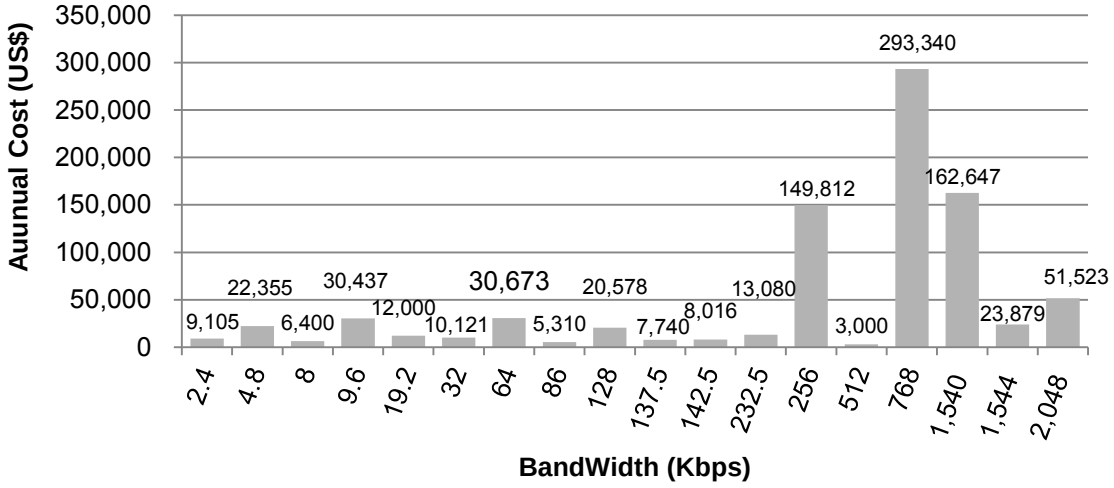
2.1.2.1. Current predictable cost

Currently, the contract method of IPLs is based on half circuit arrangement: the cost is shared by two States for establishing one circuit. In view of difficulty in analyzing each line approach of total cost and average connecting cost in the Asia/Pacific region has been adopted accordance with the purpose.

The analysis of the data based on annual cost per circuit for each bandwidth connection reveals that 64Kbps accounts for 39% of the total circuits and the protocol mainly used is X.25 protocol, and the average cost per circuit is US$ 30,673.

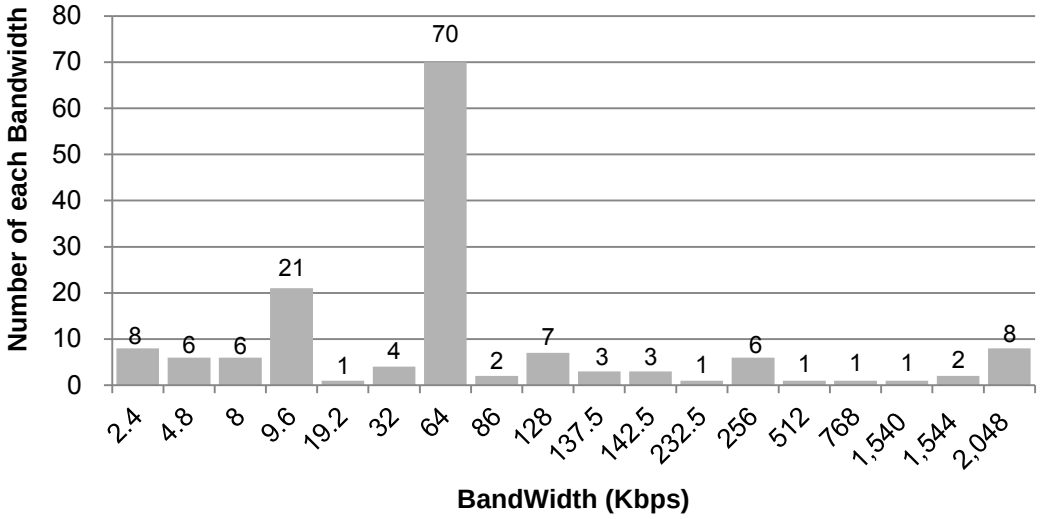
The reason of usage of 64Kbps being so widespread is the use of underlying X.25 protocol which supports 64Kbps as a maximum bandwidth. The cost worked out is per circuit, so total cost for each State depends on the number of connections.

Figure 2: *Annual Cost per Line of each Bandwidth*



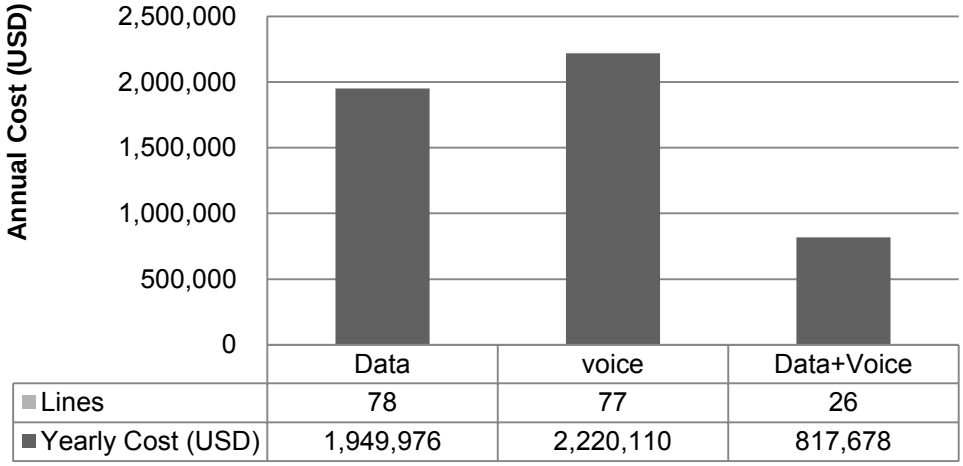
In the future, the need for internet protocol suite (IPS) would increase, requiring faster line speeds. As per the plans AMHS will be used to exchange weather information (WXXM) defined by the XML format, and thus the lines for AMHS will be expected to use IPS for accommodating increased flow of data through XML format.

Figure 3: *The Number of lines per bandwidth*



Furthermore, it may be seen that bandwidth requirements/ new circuits will increase in the short-term to cater for the exchange for AIDC messages with adjacent States.

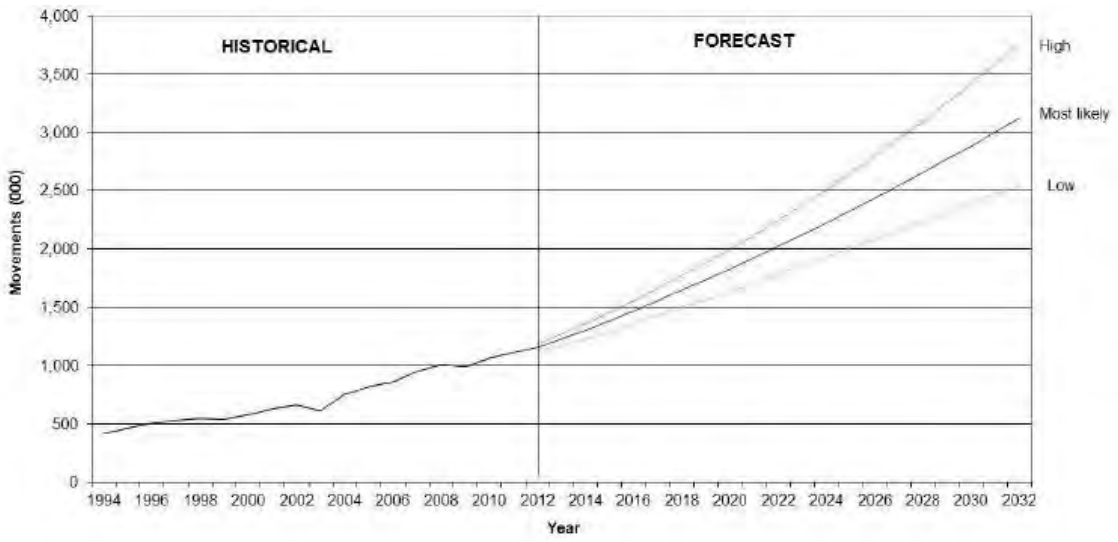
Figure 4: *Annual Cost of Type*



Also as per ICAO APAC Survey, MUX for Voice and Data cannot be maintained by telecommunication service providers in near future, so it is imperative to look for alternative method or install individual circuits for different services.

In the medium to long term perspective, strong growth of demand is expected toward 2032. The demand for aircraft movement of the Intra-Asia/Pacific is shown in the figure 5 below. To cater to these demands, States will need to achieve the ASBUs in GANP (e.g. SWIM). Therefore, the wider bandwidths supported by a secure IP/ MPLS network will be required by existing and new international aeronautical communication services.

Figure 5: *Intra-Asia/Pacific Aircraft Movement Forecast*



Forecasts of Transpacific and Intra-Asia/Pacific Traffic to the Year 2032

(REPORT OF THE ASIA/PACIFIC AREA TRAFFIC FORECASTING GROUP (APA TFG) SIXTEENTH MEETING MONTREAL, 19 – 21 SEPTEMBER 2012)

Consequently, it may be seen that the present method of constructing the network by IPLs to meet the existing requirements as listed above, the cost to maintain the circuits will continue to upwards from annual US$ 5 million presently being used by 15 States in ICAO APAC Survey.

2.2. Scenario 2 – Move to CRV (15 States)

This chapter considers the case of introducing the CRV network in the Asia/Pacific region.

2.2.1. Benefit Analysis

2.2.1.1. Support Global Air Navigation Plan (GANP) roadmap

'ICAO's Global Air Navigation Plan (GANP) (ICAO Doc 9750)' has introduced the Aviation System Block Upgrade (ASBUs) framework and roadmaps in 2013. As a follow-up to APANPIRG/24 Conclusion 24/2, regarding the establishment of Regional Priorities and Targets, and referring to the ICAO APAC Seamless ATM plan v1.0, the initial regional priorities endorsed by APANPIRG/25 in September 2014 should be:

- ATFM/A-CDM (B0-NOPS);
- AIM (B0-DATM);
- AIDC (B0-FICE);
- FUA (B0-FRTO);
- Surveillance (B0-ASUR); and
- Data-link ADS-C and CPDLC (B0-TBO).

To enable specifically AIDC (B0--FICE) in the initial regional priorities, implementation of a common network internationally is essentially required. According to the ICAO APAC Survey, currently, there are many problems, such as described in 1.1 Current Status to the introduction of IPLs. For catering to the future services, the communication infrastructure is required in an environment that can take advantage of IT technology.

A dedicated, common regional virtual private network operated by a communication service provider will be of utmost importance in the Asia/Pacific region, in order to promote the implementation of the GANP roadmap and is under consideration to replace the current configuration. Common networks had successfully been deployed in some other ICAO regions (e.g. PENS in the EUR Region and MEVA in the CAR Region).

2.2.1.2. CRV technology is the enabler for future services:

The CRV network shall be established by using the IP based virtual private network (IP-VPN) service, which will be a closed private IP network via the access line.

Specific service level agreement (SLA) will be put in place between States and a common service provider to guarantee the speed of the circuit, the quality of service (QoS) and other performance and quality parameters.

The usage fee shall be determined based on bandwidth usage or other similar criteria as agreed upon or quoted by a common service provider and is expected to be lower than the one of existing IPL.

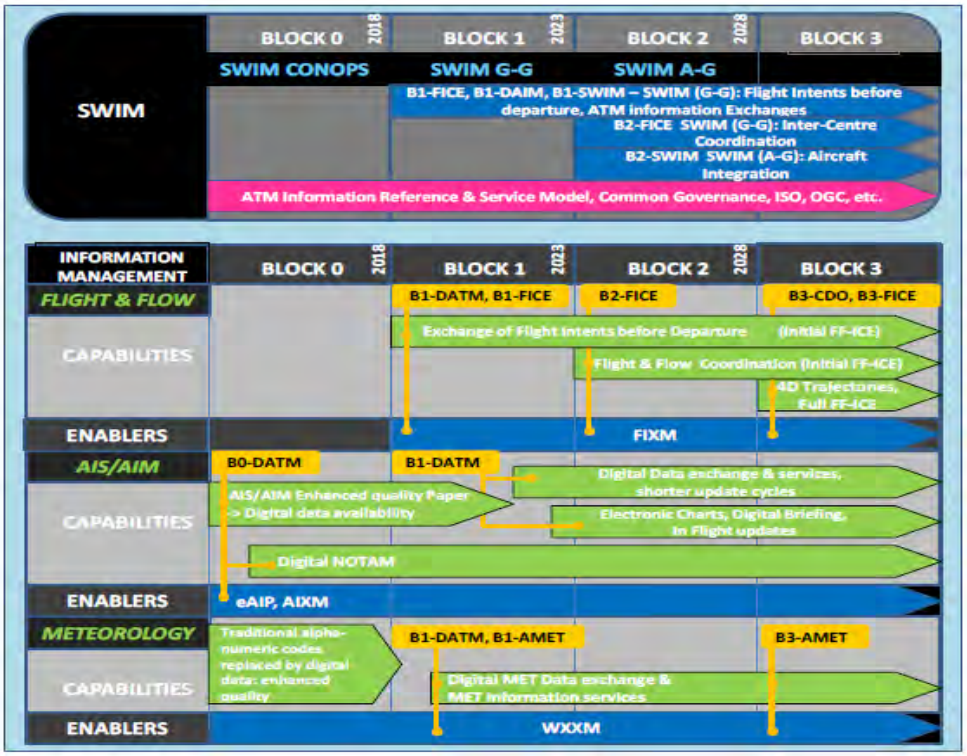
As compared to IPL services, such as wide-area Ethernet or conventional Frame Relay, the IP-VPN is advantageous in terms of low running cost, and easy to construct with a flexible network configuration. In addition, priority control and bandwidth control is also feasible, thereby allowing high speed and large capacity of data flow enabling voice communication as well using VoIP.

Therefore, the CRV is sufficient to meet the technical requirements of demands on future concepts, as applications may be developed using IT technology according to the future concepts.

2.2.1.2.1. SWIM

The SWIM is mainly contained in the ASBUs B1-SWIM and B2-SWIM. In addition, the modules relating to service improvement through digital aeronautical information management and integration (B0-DATM & B1-DATM) as well as modules for improving operational performance through FF-ICE (B1-FICE, B2-FICE, and B3-FICE) are important early components of overall SWIM.

Figure 6: *Roadmap of Global Air Navigation Plan*



As an IP network based on IP-VPN, the CRV network will be the future communication infrastructure to support the SWIM.

2.2.1.2.2. ASBUs – B0-FICE

The ICAO, B0-FICE in ASBUs is required to be implemented during the period Block0 (2013 ~ 2018).

Figure 7: *Summary of Module B0-FICE in ASBUs*

B0-FICE	
Item	Increased Interoperability Efficiency and Capacity through Ground – Ground Integration
Summary	Supports the coordination of ground – ground data communication between ATSU based on ATS Inter-facility Data Communication (AIDC) defined by ICAO Document 9694.
Comment	Increased Interoperability, Efficiency and Capacity though Ground – Ground Integration Improves coordination between air traffic service units (ATSUs) by using ATS inter-facility data communication (AIDC) defined by ICAO's Manual of Air Traffic Services Data Link Applications (Doc9694). The transfer of communication in a data link environment improves the efficiency of this process, particularly for oceanic ATSUs.

It is set as the target in the short term. Therefore, the reduction in lead time to introduce the procedures will greatly contribute to the achievement. The whole process to implement AIDC with adjacent FIR can be expedited by implementing the CRV instead of establishing IPL which will be expensive and difficult to manage.

2.2.1.3. Manageability

The CRV will provide a seamless and homogeneous service in view of better management and service level agreements that will be in place between individual states and the communication service provider. Service provider will be in a better position to manage, report and restore the circuits in case of failure. In addition, dynamic increase in bandwidth of the circuits and network will be possible as per the requirement on short notice. The network will be using the underlying IP protocol and thus COTS products/applications will be easily available. The system of monitoring and the maintenance by service provider will be built in 365 days 24 hours. Fault detection will be easy and fault status and reporting can be determined by point of contact quickly and fault section and report generated end-to-end. Monitoring of communication equipment and the circuits shall be possible remotely (e.g. Ping Monitoring, CPU utilization, Memory usage/rate, Traffic (in/out)). In addition, the country that connects to the CRV will be able to ensure the monitoring environment using the WEB.

2.2.2. Cost Analysis

2.2.2.1. Initial One-off deployment costs

To assess the one-off deployment costs, a survey was carried out on several IP-VPN service providers (KDDI, NTT communications). The results of the survey are as follows.

(1) The one-off deployment does not depend on the bandwidth.

(2) If 21 locations in the 15 States of ICAO APAC Survey introduce IP-VPN, the estimated amounts would be:

A) Large difference occurs in the estimated amount by the situation of the communications infrastructure in each State.

B) From US$ 600 ~ to: US$ 50,000.

Based on the information above, following a conservative approach, the initial one-off deployment costs of introducing the CRV would be assumed to be as follows:

- The one-off deployment costs should be assumed that it will be introduced as the most expensive case to communication facility of 21 locations.
    - 21(locations) x 50,000(US$) = US$ 1,050,000
    - The costs necessary to TCB for CRV introduction is estimated at: US$ 180,000
    - Adapting the current equipment owned by States to interface with the CRV network is assessed as not needed, because the common service provide will deploy and maintain all necessary equipment.
- The costs for States representatives to participate in the CRV task force are estimated as follows:
    - 15(States) x 5,000(US$) x 10(times) = US$ 750,000
- It is required 100 days until operation after application for IP-VPN. In addition, Project management, Design, Safety, Installation and Tests cost for the creation of the network for 15 States (21 locations) for States would be assumed to be US $ 700 per day.
    - 21(locations) x 100(Days) x 700(US $) = US$ 1,470,000

As a result, the initial one-off deployment cost conservative estimative for 15 States (21 locations) amounts to US$ 3,450,000.

2.2.2.2. Total cost of ownership over 10 years

To compare the cost of the two scenarios on a fair basis, the cost of moving to the CRV has to be estimated over the CRV lifecycle, 10 years (initial 5 years contract plus 5 years extension), including the initial one-off deployment costs to implement the CRV network.

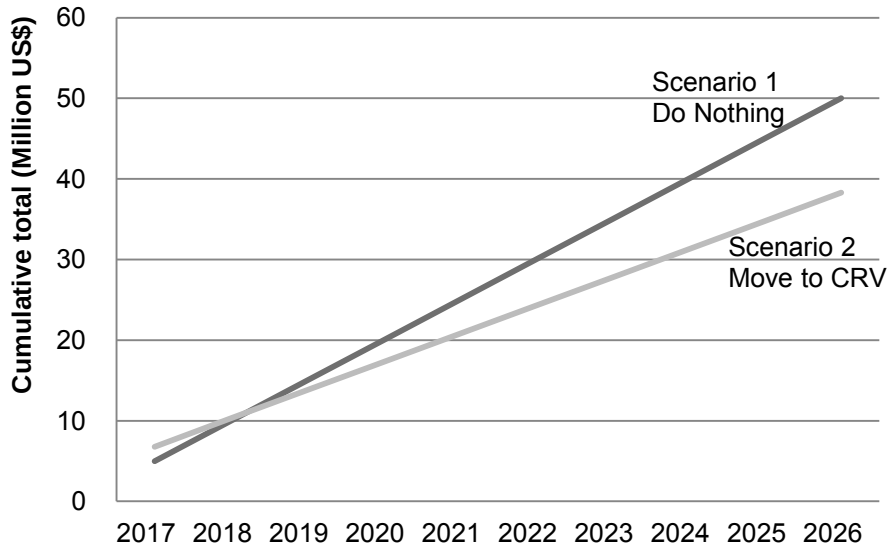
According to *Proposed Asia/Pacific Internet Protocol (IP) Virtual Private Network (VPN) (APANPIRG/24 - WP/20*, using an IP-VPN could result in 30% cost saving and significant additional bandwidth when compared to point-to-point circuits.

The initial one-off deployment costs could be recovered in one or two years, even if it is assumed that the introduction of IP-VPN would only encompass all connected points that were reported in the ICAO APAC Survey (conservative approach).

Figure 8: *Total cost of ownership over 10 years for 15 States, for the 2 scenarios*

		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Scenario 1 Do Nothing	One-off costs (15 States)	0	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated), (15 States)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Cumulative total	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
Scenario 2 Move to CRV	One-off costs (15 States)	3.45	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated), (15 States)	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
	Cumulative total	6.95	10.45	13.95	17.45	20.95	24.45	27.95	31.45	34.95	38.45

Figure 9: *Compared total cost of ownership over 10 years for 15 States, for the 2 scenarios*



In reality it is foreseeable that the number of connections will have to be increased in both scenarios as more States opt in.

If the number of connecting points is increased, the IPL network in Scenario 1will need to be further meshed and the service costs will increase accordingly. In the Scenario 2, the IP-VPN network is not sensitive to the increase in the number of connecting points, which will augment the distance between the 2 scenarios, in favour of Scenario 2.

For example, for an IP network of 1Mbytes with 5 connecting points, the cost comparison between IPL and IP-VPN would be estimated by the following modeling approach:

- Current IPL line is composed of domestic access lines and international IPL line. The costs of the global IPL line is assumed to be 100, in addition, total costs of access lines to the end of both on the global IPL is assumed to be 100. In this case, it becomes 200 to carry out 1 line.

- Regarding the IP-VPN access, since the cost of IP-VPN becomes at least 30% reduction compared with the cost of international IPL line, the cost of the global IP-VPN is assumed to be 70. Since there is no difference in the cost of the access line to the global IP-VPN, it is assumed to be 100.

- It should be noted that, if there is no requirement to increase the bandwidth and access lines, it is not necessary to implement one more line even if the number of connecting States has increased.

Figure 10: *The Cost Comparison between IPL and IP-VPN connectivity*

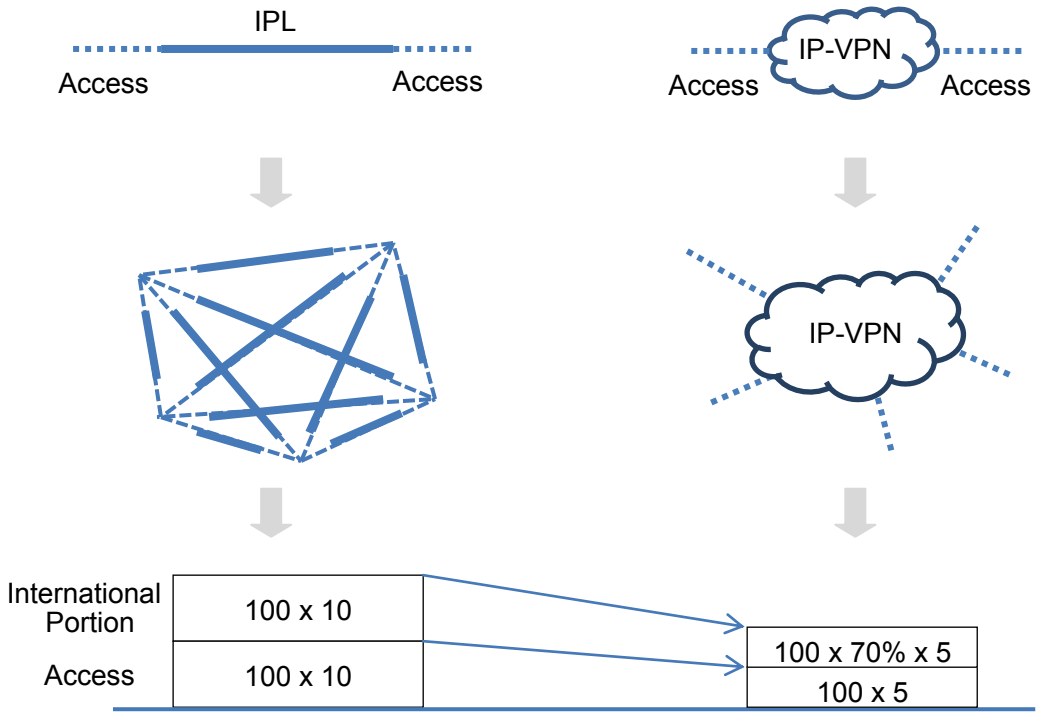
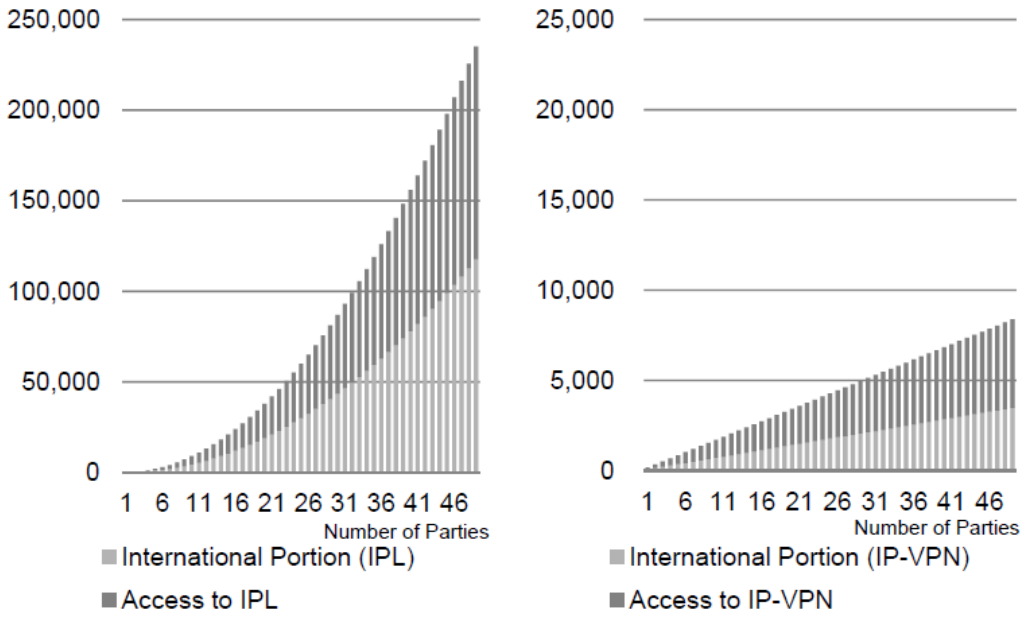


Figure 11: *The Costs increase of IPL and IP-VPN with an increasing number of Parties*



This shows that the distance between the 2 scenarios as regards the total cost of ownership has been estimated in a conservative way. Costs increase induced by greater connectivity is exponential in Scenario 1 and linear in Scenario 2. Any new need of connectivity would favour even more the scenario 2.

2.3. Summary (first iteration, Apr. 14)

Currently, the Aeronautical Fixed Telecommunication Network (AFTN) and Air Traffic Service Message Handling System (AMHS) provide ground to ground message switching functions based on point-to-point IPLs in the Asia/Pacific Region. The protocol in use is mainly X.25 protocol, which is almost obsolete and becoming difficult to maintain.
In the Scenario 1, Do Nothing, the acquisition of new IPL circuits by half circuit arrangement between States will become increasingly difficult and require lot of time to establish. Its sustainability may even be threatened by equipment and technology obsolescence.

The Scenario 2 presents strong advantages. Since the AMHS in BBIS is equipped with a dual-stack ATN router, it corresponds to the IP network. Therefore, the IP network is a strong candidate while considering setting up of a new network to facilitate intra region communication. In addition, to achieve the GANP ROADMAP, when considering the introduction of the SWIM, the IP network is essential as a common communication platform that can be connected by various stakeholders. The implementation of the common IP network in the Asia/Pacific region will solve issues of obsolescent technology and enable the introduction of new applications.

The overall architecture of the CRV will provide use of optimum bandwidth and number of circuits for connecting between Asia/Pacific states thus providing sufficient cost benefits and will be a cost effective solution. In the future, the aircraft movement in Asia/Pacific region is forecasted to grow exponentially. Considering the above issues, the introduction of the CRV network is essential, in particular, to build up a system that can correspond to the introduction of new technology for performing collaborative decision-making.

Figure 12: *Summarized Cost Benefit Analysis for CRV*

	Scenario 1 – Do Nothing (based on ICAO survey)	Scenario 2 – Move to CRV
Quantitative benefits		
Cost	Scenario of reference Costs increase induced by greater connectivity is exponential	Expected reduction of the total cost of ownership by 23% over 10 years for 15 States (same number as for Scenario of reference) Initial one-off deployment efforts paid back in one to two years Costs increase induced by greater connectivity is linear
Performance	Lower performance due to low speed/obsolescent technology and unsuitable design	Better performance based on performance and safety monitoring, and ad hoc design including high speed technology (1~2 Mbps connectivity)
Diversity	Fallback solutions by Operator when available	Solutions available on the market (logical fallback on IP-VPN and physical diversity etc) but shall be required through user requirements and monitored
Reactivity (Delays)	Longer period to implement a new line with poor control of delays (a couple of months) Poor synchronisation in change management between APAC States	Reduced time to coordinate and implement any upgrade following pre-established and homogeneous contractual requirements (a couple of weeks)

Qualitative benefits		
Safety	Lay down by Point to point, secured by physical	Ensured through network design
International commitment	Not possible to meet ICAO GANP objectives	Possible to meet ICAO GANP objectives
Contingency	Manage with coordinating each half-circuit by both Service Providers	Manage a whole network by Service Provider
Upgradeability	Need for new line and facility to upgrade Bandwidth	Easy to upgrade Bandwidth without installing additional facility

II. Second iteration, based on RFI (Jan. 15)

3. Review of the scenarios analysis

The Request for Information (RFI) indicated the actual costs which were estimated by several IP-VPN service providers from August to December 2014 as an outcome of Task 28 "Update CBA for ACSICG/2 from RFI".

The estimated costs comprise the initial one-off deployment costs (Project management, installation), the recurrent service costs, depending upon whether data and voice are included or not. Among the service providers having responded to the RFI, several service providers introduced the detailed costs to implement CRV for all member states in ICAO Asia/Pacific region.

The CBA in the first iteration was a simplified approach without any market survey. In addition to the update of costs based on estimations provided by the communication service providers during the RFI, this iteration considers other scenarios to take into account the issue of the poorer communication infrastructure available in Pacific islands, and more generally, of the States with a poor communication infrastructure.

3.1. Scenario 3 – Move Data and Voice to CRV and keep external independent back-up for critical services (15 States)

This scenario is based on cost estimations received during the Request For Information, for the same baseline of 15 States having participated initially in the ICAO survey (scenario 1) and the scenario 2.

It consists in moving data and voice to CRV while keeping external independent back-ups for critical services.

3 sub scenarios are considered:

- Scenario 3a: Move data and voice to CRV (MPLS, lower offer): the cost estimations correspond to the **lowest costs** received during the RFI for an **IP MPLS** provision, 2Mbps, 15 states, 23 sites
- Scenario 3b: Move data and voice to CRV (MPLS, higher offer) the cost estimations correspond to the **highest costs** received during the RFI for an **IP MPLS** provision, 2Mbps, 15 states, 23 sites
- Scenario 3c: Move data and voice to CRV - Private VSAT network: the cost estimations correspond to the costs received during the RFI for a **Private VSAT** network 2Mbps, 15 states, 23 sites

For this analysis, the external back-up for critical services costs correspond to the internet based VPN costs which were included in the RFI.

3.2. Scenario 4 – Move Data only to CRV, Current infrastructure kept for voice (15 States)

In this scenario, the infrastructure currently used for voice by APAC States will be kept to maintain the redundancy between data communication and voice communication.

The one-off costs and annual service costs quote the highest costs within the RFI. In addition, the current infrastructure used for voice services costs quote the annual services costs for voice services as per ICAO survey 14th Jan. (Figure 13).

Figure 13: *Total cost of ownership over 10 years for 15 States, for the 4 scenarios*

		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Scenario 1 Do Nothing (Current costs as per ICAO Survey Jan.14, extrapolated)	One-off costs (15 States)	0	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated) (15 States)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Cumulative total	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
Scenario 2 Move data and voice to CRV (initial CBA, Apr. 14)	One-off costs (15 States)	3.45	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated) (15 States)	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
	Cumulative total	6.95	10.45	13.95	17.45	20.95	24.45	27.95	31.45	34.95	38.45
Scenario 3a Move data and voice to CRV (MPLS, lower offer) 1) data and voice on CRV 2) independent external back ups for critical services (updated with RFI, Dec.14)	One-off costs (15 States)	0.21	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated) (15 States)	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
	One-off costs **external back-up** (15 States)	0.03	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated), external back-up (15 States)	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
	Cumulative total (Includes external back up for critical services)	2.13	4.03	5.93	7.82	9.72	11.61	13.51	15.41	17.30	19.20
Scenario 3b Move data and voice to CRV (MPLS, higher offer) 1) data and voice on CRV 2) independent external back ups for critical services (updated with RFI, Dec.14)	One-off costs (15 States)	0.00	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated) (15 States)	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38
	One-off costs **external back-up** (15 States)	0.03	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated), external back-up (15 States)	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
	Cumulative total (Includes external back up for critical services)	3.03	6.03	9.02	12.02	15.02	18.02	21.02	24.01	27.01	30.01
Scenario 3c Move data and voice to CRV - Private VSAT network 1) data and voice on CRV 2) independent back ups for critical services (updated with RFI, Dec.14)	One-off costs (15 States)	0.91	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated) (15 States)	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
	One-off costs **external back-up** (15 States)	0.03	0	0	0	0	0	0	0	0	0
	Annual service costs (extrapolated), external back-up (15 States)	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
	Cumulative total (Current external infrastructure kept for voice)	3.16	5.37	7.59	9.80	12.01	14.23	16.44	18.66	20.87	23.08
Scenario 4 Move data only to CRV 1) data on CRV 2) voice kept on external infrastructure (updated with RFI, Dec.14)	One-off costs (15 States)	0.15	0	0	0	0	0	0	0	0	0
	Annual service costs (voice), as per ICAO survey Jan.14 (15 States)	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22
	Annual service costs (extrapolated) (15 States)	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
	Cumulative total (Current external infrastructure kept for voice)	4.03	7.90	11.78	15.65	19.52	23.40	27.27	31.14	35.02	38.89

3.3. Scenario 5 – Move Pacific States to CRV (6 States)

The first iteration of Cost Benefit Analysis for CRV indicated indeed that the expected cost saving was about 23% for the 15 States, but did not refine the case of the small Pacific island states (for example Fiji, Kiribati, Tuvalu, Vanuatu, Wallis & Futuna and New Caledonia).

The member States of CRV TF mentioned the impact of RFI on Cost Benefit Analysis on smaller Pacific island states by WP/02 in CRV TF/3.

Their current costs (as per Dec. 14) are as follows:

Figure 14: *estimated cost based on current services*

State	Estimated Bandwidth	Estimated Cost US$ (Monthly)	Communication Service
Tuvalu	·PSTN	100	·Voice/Fax
Kiribati	·PSTN	100	·Voice/Fax
Vanuatu	·PSTN ·Data(VPN over internet)	150	·Voice ·AFTN(via Brisbane AFTN system)
Wallis & Futuna	·PSTN ·Data(VPN over internet)	150	·Voice ·AFTN(via Tontouta AFTN system)
New Caledonia	·PSTN ·1.0Mbps Data(VPN over internet)	200	·Voice ·AFTN
Fiji	·PSTN ·1.5Mbps Data(VPN over internet IPLC)	4,000	·Voice ·AFTN/AMHS

(Estimated Costs (Monthly) CRV TF/3-WP/02, Dec.14)

The motive of joining the CRV is mainly the increasing of communication bandwidth, the performance, the expected cost savings and the integration of all States on the same infrastructure.

This working paper referred to the communication infrastructure which is not well developed in the small Pacific islands. For this reason, the service providers would propose VSAT communications, and the cost was expected to be more than the VPN over Internet option but it would provide a more secure and high reliable communication for the current and future services.

The result from RFI is as follows:

Figure 15: *Communication Link Available and estimated cost based on communication service*

State	Estimated Bandwidth	Estimated Cost US$ (Monthly)	Communication Service	Communication Link Available
Tuvalu	· 2.0Mbps IP-VPN	14,XXX	· VOIP, AMHS, ADS-B, SWIM	· Satellite
Kiribati	· 2.0Mbps IP-VPN	21,XXX	· VOIP, AMHS, ADS-B, SWIM	· Satellite
Vanuatu	· 2.0Mbps IP-VPN	13,XXX	· VOIP, AMHS, ADS-B, SWIM	· Satellite
Wallis & Futuna	· 2.0Mbps IP-VPN	12,XXX	· VOIP, AMHS, ADS-B, SWIM	· Satellite
New Caledonia	· 2.0Mbps IP-VPN	7,XXX	· VOIP, AMHS, ADS-B, SWIM	· Satellite
Fiji	· 2.0Mbps IP-VPN	9,XXX	· VOIP, AMHS, ADS-B, SWIM	· Southern Cross Cable · Satellite

(Estimate Cost (Monthly) RFI, Dec.14)

As an outcome, the VSAT costs may prove prohibitive for some States and the benefits expected for other APAC States are not reaped in the case of these islands.

For this reason costs of services were explored with the IP-VPN service providers based on VPN over Internet for the non-critical applications. This would be the cheapest option subject to the secured internet gateway in place. The use of the internet as a means of communication for non-time-critical aeronautical ground-ground applications is mentioned by the document "*Guidelines on the Use of the Public Internet for Aeronautical Applications* (Doc 9855 First Edition-2005)".

The result from RFI is as follows:

The VPN over Internet option has an advantage over Satellite Communications on the cost as shown by figures 16, 17, and 18 and costs are affordable. However the performance cannot be guaranteed as the communications rely on Internet and best effort.

A fourth option (scenario 5-4), consisting of a private VSAT network with guaranteed performance, seems a credible intermediate option:

Figure 17: *Total cost of ownership over 10 years for 6 Pacific Islands States, for the 4 scenarios*

		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Scenario 5-1 Do Nothing (Current estimated costs as per CRV TF/3-WP/02, Dec.14)	One-off costs (6 States)	0	0	0	0	0	0	0	0	0	0
	Yearly service costs (6 States)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	Cumulative total	0.06	0.11	0.17	0.23	0.28	0.34	0.39	0.45	0.51	0.56
Scenario 5-2 Move to CRV - Critical application (Satellite) (updated with RFI, Dec.14)	One-off costs (6 States)	0.53	0	0	0	0	0	0	0	0	0
	Yearly service costs (extrapolated) (6 States)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
	Cumulative total	1.49	2.44	3.40	4.35	5.31	6.27	7.22	8.18	9.13	10.09
Scenario 5-3 Move to CRV - Non-Critical application (VPN over Internet) (updated with RFI, Dec.14)	One-off costs (6 States)	0.13	0	0	0	0	0	0	0	0	0
	Yearly service costs (extrapolated) (6 States)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	Cumulative total	0.20	0.27	0.34	0.41	0.48	0.55	0.62	0.69	0.76	0.83
Scenario 5-4 Move to CRV - Critical application (private VSAT network) (updated with RFI, Dec.14)	One-off costs (6 States)	0.19	0	0	0	0	0	0	0	0	0
	Yearly service costs (6 States)	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
	Cumulative total	0.45	0.71	0.97	1.23	1.49	1.75	2.01	2.27	2.53	2.79

3.4. Summary (second iteration, Jan. 15)

3.4.1. States/Administrations with a performant terrestrial connectivity

The table presented in the chapter 2.3 is still valid and gaps are even strengthened in favor of the move to CRV scenario for the States/Administrations with a good terrestrial connectivity:

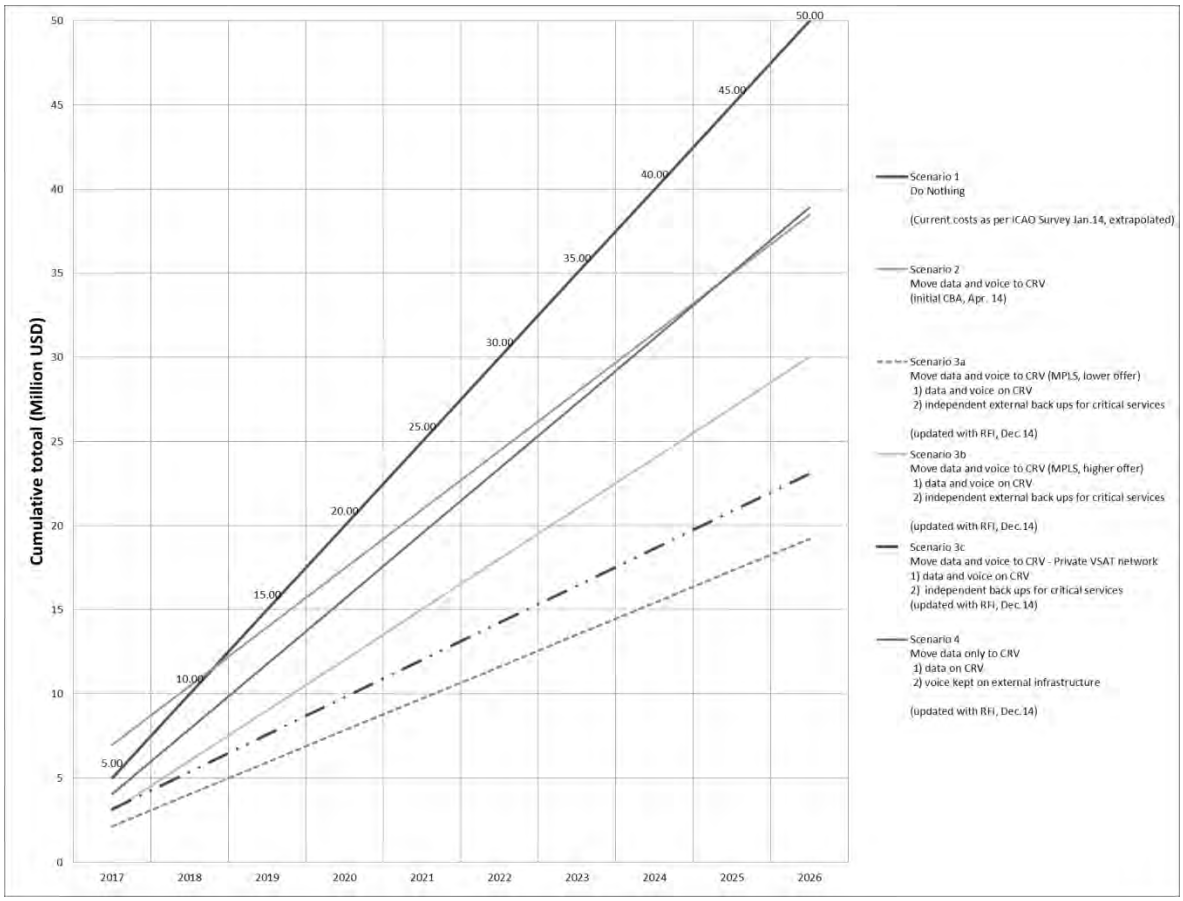
Figure 18: *Compared total cost of services over 10 years for 15 States for a performant (MPLS-based) terrestrial connectivity*

Scenario	Costs are for 15 States and include…	TCO 2017-2026, 15 States, in US million USD	Cost impact 2017-2026
1- Do nothing	*Current costs for data and voice as per ICAO Survey Jan.14, extrapolated over 10 years*	*50*	*Reference scenario See paragraph 2.2.2.2*
2- Move to CRV (initial CBA, Apr. 14)	Move data and voice to CRV (1st iteration, initial CBA, Apr. 14)	38.45	- 23.10% compared to the Reference scenario
3a - Move data and voice to CRV (MPLS, lower offer)	Move data and voice to CRV (MPLS, lower offer) 1) data and voice on CRV 2) independent external back ups for critical services (updated with RFI, Dec.14)	19.20	- 61.6% compared to the Reference scenario
3b - Move data and voice to CRV (MPLS, higher offer)	Move data and voice to CRV (MPLS, higher offer) 1) data and voice on CRV 2) independent external back ups for critical services (updated with RFI, Dec.14)	30.01	- 40% compared to the Reference scenario
3c - Move data and voice to CRV - Private VSAT network	1) data and voice on CRV 2) independent back ups for critical services (updated with RFI, Dec.14)	23.08	- 53.8% compared to the Reference scenario
4 - Move data only to CRV	1) data on CRV 2) voice kept on external infrastructure (updated with RFI, Dec.14)	38.89	- 22.22% compared to the Reference scenario

The overall result shows that the best economical option is to move to CRV, integrate voice and data on CRV as soon as possible, while making sure that all safety requirements are met through potential external and independent redundancies for critical services such as voice or surveillance data exchanges, particularly in high density areas.

The figure 19 illustrates this graphically:

Figure 19: *Compared total cost of ownership over 10 years for 15 States, for the 5 scenarios*



3.4.2. States/Administrations with a poor terrestrial connectivity

Concerning the States with poor terrestrial connectivity (where a MPLS connectivity is not offered), the scenario 5-2 Move to CRV with VSAT is the most expensive, while the scenario Move to CRV with VPN over internet remains comparable with the Do Nothing scenario.

However it should be noted that this scenario 5-2 is based on 2MBps prices obtained during the RFI[1]. Probably those costs would significantly decrease based on 64 or 128 Kbps bandwidth.

[1] Prices for smaller bandwidths were not requested during RFI

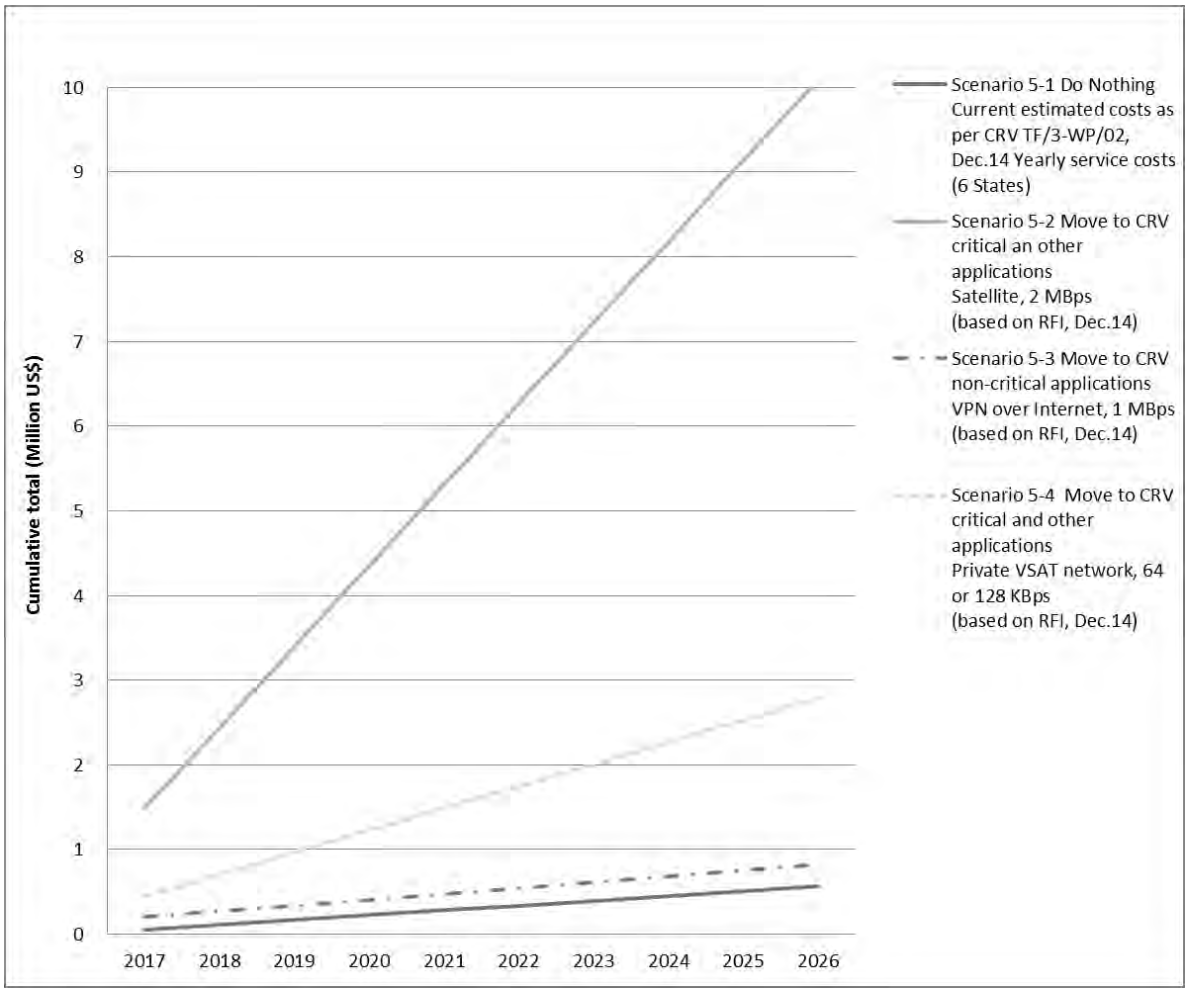
Figure 20: *Compared total cost of ownership over 10 years for 6 Pacific Islands States, for the poorer communication infrastructure*

Scenario	Costs include…	TCO 2017-2026, 6 Island States, in US million USD	Cost impact 2017-2026
5-1 Do nothing	*Current costs extrapolated over 10 years*	*0.56*	*Reference scenario*
5-2 Move to CRV	Move to **CRV critical and other applications** **Satellite, 2 Mbps** (based on RFI, Dec.14)	10.09	+1788.96% compared to the Reference scenario
5-3 Move to CRV	Move to **CRV non-critical applications** **VPN over Internet, 1 Mbps** (based on RFI, Dec. 14)	0.83	+147.16% compared to the Reference scenario
5-4 Move to CRV	Move to **CRV critical and other applications** **Private VSAT network, 64 or 128 Kbps** (based on RFI, Dec.14)	2.79	+494.68% compared to the Reference scenario

However it should not be deduced that the status quo is acceptable. As a matter of fact flight operations are more and more integrated and while the operational context will remain less demanding than in high density traffic areas, a reliable ground-ground communication infrastructure will be necessary for AIDC, SWIM etc. Voice will come as an enabler for a better cost benefit analysis if the infrastructure is performant enough. This means that the scenarios 5-2 and 5-4 have to be chosen if/when critical applications are carried over CRV.

Figure 21: *Compared total cost of ownership over 10 years for 6 Pacific Islands States, for*

the 4 scenarios



However a performant infrastructure may prove not affordable for most Islands.

4. Final recommendations

The final recommendations are as follow:

Recommendation 1: allotment

To make a bid allotment sorting States with a good terrestrial connectivity resulting in an open/competitive offer based on MPLS services (lot A) and those with a poor terrestrial offer (lot B) based on VSAT technology (be it a private or shared VSAT-based network). Tenderers with MPLS and VSAT technology should be invited to bid on the 2 lots.

Based on the ICAO survey in January 2014 and RFI, the proposed list is as follows:

	Lot A - MPLS		Lot B - VSAT		Existing Interregional connectivity
	Site(s)	Bandwidth	Site	Bandwidth	
Afghanistan			1	128	
American Samoa			1	64	
Australia	2	2048			
Bangladesh	1	2048			
Bhutan			1	64	
Brunei Darussalam	1	2048			
Cambodia	1	2048			
China	2	2048			
China, Hong Kong	1	2048			
China, Macau	1	2048			
China, Taipei	1	2048			
Cook Islands			1	64	
Democratic People's Republic of Korea			1	128	
Fiji			1	128	
French Polynesia			1	64	
India	2	2048			
Indonesia			1	128	
Japan	2	2048			
Kiribati			1	64	
Lao People's Democratic Republic			1	64	
Malaysia	2	2048			
Maldives			1	64	
Marshall Islands			1	64	
Micronesia (Federated States of)			1	64	
Mongolia			1	64	EUR (Russia)
Myanmar			1	64	
Nauru			1	64	
Nepal			1	64	
New Caledonia			1	64	
New Zealand	2	2048			
Niue Islands			1	64	
Pakistan	1	2048			
Palau			1	64	

	Lot A - MPLS		Lot B - VSAT		Existing Interregional
Papua New Guinea			1	64	
Philippines	1	2048			
Republic of Korea	1	2048			
Samoa			1	64	
Singapore	2	2048			EUR (UK)
Solomon Islands			1	64	
Sri Lanka	1	2048			
Thailand	2	2048			EUR (Italia)
Timor Leste			1	64	
Tonga			1	64	
Tuvalu			1	64	
United States	2	2048			
Vanuatu			1	64	
Viet Nam	2	2048			
Wallis and Futuna			1	64	

Total Sites **30 sites** **28 sites**

Note: future sites in MID ICAO region may have to be included

The list should be reviewed and agreed by States.

Some States of lot A may also consider to use lot B services for back up purpose instead of their existing solutions.

Recommendation 2: Network services requested

For the lot A, request only offers based on MPLS.

For the lot B, request explicitly two types of services in the sealed tender process as follows:

- VSAT offer operated by telecommunication service providers (shared network); and
- private VSAT network, for 64kbps and 128 kbps bandwidths.

There should be a termination mechanism in the lot B to enable a State to contract with lot A provider.

Recommendation 3: Network integration and performance management

Define clearly an interface between lots A and B. This definition should be stated in lots A and B.

To the lot A provider, request end to end performances between end users of lot A (internally) based on OSED performance profiles and application data carried

To the lot B provider, request end to end performances between end users of lot B (internally) based on OSED performance profiles and application data carried

To the lot A provider, request end to end performances between end users of lot A and interface with lot B based on OSED performance profiles and application data carried

To the lot B provider, request end to end performances between end users of lot B and interface with lot A based on OSED performance profiles and application data carried

A requirement should be added that the engineering (design/validation) should be done cooperatively between lot A and lot B.

Note: the very favorable case may appear that the same provider would bid for the 2 lots (example: a telecom service provider subcontracts the lot B). In that case the Network integration and performance management will be easier.

Recommendation 4: Network integration

Request to the lot B provider to set up and operate a gateway for ensuring the integration between lot A and lot B end users in line with the overall design.

Recommendation 5: cost sharing scheme

If despite the allotment, the costs of lot B are not bearable by small States or not attractive enough for them to join CRV, OOG should be able to manage a cost sharing scheme between States.

The Sealed Tender should embark the necessary requirements in the billing part (example: charge X % of the recurrent costs to the State X and 100- X % to the subsiding State).

Recommendation 6: tracking the migration of aeronautical applications (including voice)

Considering that the migration of voice to the CRV network is highly cost efficient (it would

result in a reduction of between 18% and 39.6% of the total cost of services as compared to the existing situation) but that it also requires the implementation of the necessary independent backups, the migration of applications should be monitored by the CRV operations oversight group. It would additionally make sure that the CRV services are used in accordance with the plans. Not doing so may conduct to not reap the expected benefits, and in the worst case scenario, to the abandon of the project.

Recommendation 7: evaluation criteria

In the Sealed Tender evaluation, the scoring of the commercial proposal should be based on a total cost of services (initial and recurrent costs) over 10 years, based on recommendation 1. The lots should be awarded accordingly.

-END-

Project	Task	Regional Priority	Planned Start	Planned completion	Dependencies	Leader	Contributors	F2F/Webconf/email/portal	Comment
	Revise Strategy for implementation of Communications Systems to support ATM operations in APAC		2016						
AMHS Implementation	Implement AMHS transition including migration of concerned connections to SITA Type X mid 15 and updating APAC AMHS Naming Plan		2015	2017					
	Continue coordination with members and other regions to maintain the AMC		On-Going	On-Going					
Support AIDC implementation	Support Implementation of AIDC including PAN Regional AIDC ICD		2015	2017					
SWIM implementation APAC framework (SIAF) Project	Develop Cost Benefit Analysis to support SWIM using existing underlying ATN and IP sub-network				SWIM ConOPs and Technical Manual				
	Develop SWIM implementation roadmap and B1-SWIM ANRF		2016	2017	SWIM ConOPs and Technical Manual				
	Develop SWIM CONOPS refinement for APAC (FIXM. WXXM, AIXM, NOTAM) - models/infrastructure				SWIM ConOPs and Technical Manual				
	Develop SWIM guidance and requirements (performance, functional, safety, security)				SWIM ConOPs and Technical Manual				
	Develop SWIM governance architecture				SWIM ConOPs and Technical Manual				
	Develop SWIM governance entity/procedures				SWIM ConOPs and Technical Manual				
	Develop SWIM access points/services architecture and definition (iterative)				SWIM ConOPs and Technical Manual				
	Support testing of SWIM based applications (FIXM, IWXXM)		2015	2017					
	Coordinate SWIM implementation and transition from existing environment to SWIM		2015		SWIM ConOPs and Technical Manual				May be built upon OOG
CRV Project (under the TOR of CRV Task Force)	MSA/DOA		2014	2015					
	Cost Benefit Analysis		2014	2015					
	Users requirements (including performance and safety requirements)		2014	2015					
	RFI		2014	2016					
	Sealed Tender								
	Develop/agree on CRV Design (including an IPv6 address plan)								
	Implementation plan								
	Set up CRV OG								
OOG functions									
Support ATFM Implementation	Support development of ATFM IP ICD		2015	2017					
	Coordinate the IP network service for ATFM		2016	2019					
Support transition of ATC voice service	Coordinate the use of VoIP technology to support the existing service based on Multiplexer		2015	2019					

ATTACHMENT 1

Second Meeting of the Aeronautical Communication Services Implementation Coordination Group (ACSICG/2)

Bangkok, Thailand (20 – 22 May 2015)

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International Civil Aviation Organization

THE SECOND MEETING OF AERONAUTCAL COMMUNICATION SERVICE (ACS) IMPLEMENTATION CO-ORDINATION GROUP OF APANPIRG (ACSICG/2)

Bangkok, Thailand, 20 - 22 May 2015

LIST OF WORKING, INFORMATION PAPERS AND PRESENTATIONS

WP/IP/ SP No.	Agenda	Subject	Presented by
		WORKING PAPERS	
WP/1	-	Provisional Agenda	Secretariat
WP/2	2	Outcome of APANPIRG/25 on Aeronautical Communication Implementation	Secretariat
WP/3	7	Preparing a SWIM Seminar in APAC	Secretariat
WP/4	5	ICAO Documents 7910 and 8585 Update	USA
WP/5	6	Inter-Regional Telecommunication Connections	USA
WP/6	5	AMHS Implementation Planner	India
WP/7	8	ATS Inter-facility Data Communication (AIDC) Implementation in India & with adjacent ATS Units in the Sub-region and the Issues Thereof	India
WP/8	7	ATFM Steering Group Outcomes	Secretariat
WP/9	6	Outcome of CRV TF/4	Thailand & Secretariat
WP/10	4	Review FASID Table for AMHS Planning and Other AFS related Tables	Secretariat
WP/11	5	AMHS and AIDC Implementation Status in APAC Region	Secretariat
WP/12	9	Review Work Programme for ACSICG	Chairman & Secretariat
WP/13	5	Revised AMHS Naming Plan	Hong Kong, China & Thailand
		INFORMATION PAPERS	
IP/1	7	Options to Support System Wide Information Management (SWIM) Environment	USA

WP/IP/ SP No.	Agenda	Subject	Presented by
IP/2	5	Thailand ATN/AMHS Implementation Activities	Thailand
IP/3	5	ATN/AMHS Implementation Status in India	India
IP/4	10	VHF Data Link System Implementation in Republic of Korea	Republic of Korea
IP/5	5	ATN/AMHS Implementation Status of Sri Lanka	Sri Lanka
IP/6	5	ATN/AMHS Implementation Status in China	China
IP/7	5	A Large-scale Front End System Renovation Plan of JCAB	Japan
IP/8	5	The Implementation Status of Renewed ATN/ AMHS in Japan	Japan
IP/9	3	Updates from APANPIRG Contributory Bodies Review Task Force (ABSRTF)	Secretariat
IP/10	8	Updates on PAN Regional AIDC ICD related Activities	Secretariat
IP/11	5	Report of ATN/ AMHS Status in Indonesia	Indonesia
IP/12	5	AMHS Implementation Status of New Zealand	New Zealand
IP/13	5	Bangladesh ATN/AMHS Implementation	Bangladesh

PRESENTATIONS		
SP/01	ICAO MEVA III VSAT Network Project	Comsoft
SP/02	Operational Use of EDS	Comsoft
SP/03	Information Management at CARATS	Japan

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