International Civil Aviation Organization

Twenty Fourth Meeting of the Communications/ Navigation and Surveillance Sub-group (CNS SG/24) of APANPIRG

Web-conference, 30 November – 4 December 2020

Agenda Item 3: Aeronautical Fixed Service (AFS)

3.1 Review Report of the Seventh Meeting of the Aeronautical Communication Services Implementation Coordination Group (ACSICG/7) including the outcome of the Seventh Meeting of Common aeRonautical VPN Operations Group (CRV OG/7);

REVIEW REPORT OF THE SEVENTH MEETING OF THE AERONAUTICAL COMMUNICATION SERVICES IMPLEMENTATION COORDINATION GROUP (ACSICG/7)

(Presented by the Secretariat)

SUMMARY

This paper presents the outcomes of the Seventh Meeting of the Aeronautical Communication Services Implementation Coordination Group (ACSICG/7) which was held using VTC, from 21 to 23 July 2020.

1. INTRODUCTION

1.1 The Seventh Meeting of the Aeronautical Communication Services (ACS) Implementation Co-ordination Group (ACSICG/7) was held from 21 to 23 July 2020. The meeting was an on-line meeting using MS TEAMS.

1.2 The Meeting was attended by 95 participants from 19 States/Administrations and one (01) International Organization including Bangladesh, Brunei Darussalam, China, Hong Kong China, Macao China, Fiji, India, Indonesia, Japan, Lao PDR. Malaysia, Myanmar, Nepal, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, USA, IATA and representatives from two (02) industries (Frequentis and NCS).

1.3 The meeting considered 9 working papers, 7 information papers, 2 Flimsies and a number of responses to the survey on AMHS capability. The papers and report of ACSICG/7 meeting are available at: https://www.icao.int/APAC/Meetings/Pages/2020-ACSICG7.aspx

2. DISCUSSION

Election of a co-chair of the ACSICG

2.1 Proposed by USA, seconded by Hong Kong China, Mr. Chonlawit Banphawatthanarak, chief, Policy and Strategy Management Bureau of AEROTHAI was unanimously elected as co-chair of the Aeronautical Communication Service Implementation Group of APANPIRG.

The APANPIRG/30's outcome on Aeronautical Communications

2.2 The meeting noted the outcome of APANPIRG/30 and CNS SG/23 meetings (IP/02) on aeronautical communications and works accomplished by the Sixth Meeting of ACSICG and noted the follow-up actions to be taken by the ICAO Regional Office.

2.3 The meeting reviewed and further updated the ATN/AMHS and AIDC implementation status table based on the outcomes of APA TF/6 held on 14-16 July 2020 and the latest information on planning and implementation of ATN/AMHS including progress of CRV implementation presented to the meeting. The updated implementation status is provided in Appendix A to this Paper.

Action taken on the Report of CRV OG/7 Meeting

2.4 The Seventh Meeting of the Common aeRonautical Virtual Private Network Operations Group of APANPIRG (CRV OG/7) was held in ICAO Asia and Pacific Office from 20 to 22 January 2020. The documents and meeting report of CRV OG/5 are available on the ICAO APAC meeting website at: https://www.icao.int/APAC/Meetings/Pages/2020-CRV-OG7.aspx

2.5 The meeting updated the information contained in the APAC CRV Implementation Table provided in Appendix B to the paper. According to the latest updates in April 2020 from PCCWG, Russia, India, and Mongolia were negotiated for the contract. Some States were waiting for the internal approval (completed the contract negotiation): PNG, Indonesia, Malaysia, Nepal, China, Thailand, and Bahrain. Bhutan has signed the order and CRV would be set up in second half of 2020 with target date in June 2020. Singapore and Republic of Korea have joined the CRV. The meeting recognized the challenges and difficulties faced by States/Administrations under current pandemic situation and recommended to postpone the target year of regional implementation of CRV from 2020 to the end of 2021. It was informed by the Secretariat that PCCWG also agreed to extend the target year for regional CRV implementation from 2020 to 2021.

2.6 Currently, eleven States/Administrations have joined CRV and implemented operations: Australia, Bhutan, China, Hong Kong China, Fiji, Japan, New Zealand, Philippines, Republic of Korea, Singapore and USA. Additional nine States/Administration have plan to join CRV: France-New Caledonia and Polynesia, India, Indonesia, Malaysia, Nepal, PNG, Russia, Thailand.

CRV Implementation Progress and performance Report by the service provider

2.7 PCCWG presented annual service performance report for the year 2019 to the CRV OG/7 meeting for those States/Administration, who had signed off the CRV service, i.e. Australia, Hong Kong China, Fiji, Japan, New Zealand, Philippines, and USA. The information on the inventory, fault ticket reported, fault case details, Site Availability of the subscribed services. The CRV OG member States were happy with the report format and information provided in the report. Such reports are expected to be presented to the CRV OG annually and provided on the CRV OG portal site or meeting site of CRV OG meetings. The meeting encouraged States to make similar review with PCCWG individually and with CRV OG regularly.

Draft CRV Operations Manual

2.8 The meeting noted the discussions by CRV OG/7 on the draft CRV Operations Manual. The meeting recalled that the manual is based on ITIL 2011 Processes, which would be used to govern the operations and performance of the CRV Network. The meeting considered that more work would be required to polish the draft operations manual. USA recommended that the co-chair from Fiji should

be requested to lead a small ad hoc working group with CRV OG members from USA, Singapore, and New Zealand to further improve the draft and to get it ready for consideration by CNS SG through a joint working paper. Thailand also agreed to provide some support to review the revised draft.

2.9 At CRV OG/7 meeting, India proposed to develop a CRV user's checklist for daily operation, which could be appended to the Operations Manual. States/Administrations were encouraged to contribute for the development and input from PCCWG is also expected.

CRV for AMHS Centres of the Russian Federation Interacting of COM Centres in the APAC Region

2.10 Russian Federation provided updates on their plan and progress of joining CRV at number of centres (Moscow, Khavarosk, Irkusk) in Russia to interact with COM centres (Fukuoka, Beijing, and Ulaanbaatar) in the APAC Region as well as COM centres in USA (Salk Lake City and Anchorage). In following up the outcome of COM Coordination Meeting in May 2019, Russian Federation is considering options to join CRV at those designated entry/exit points in Russia with entry/exit points in the APAC Region. It was informed that minimum three months would be required for Russian Federation to perform the tender process.

2.11 The meeting noted that CRV OG supported Russian Federation to join CRV. China supported Russian Federation to join CRV as it would be more cost-effective solution to replace the landline between Beijing and Khavarovsk, which updated recently. Japan expressed no objection for Russian Federation to join CRV for use of the service to support circuits between Japan and Russia. In following up the outcome of the meeting, the ICAO Secretariat sent a letter with reference of: T 8/2.10-AP-CNS0020/20 dated 20 February 2020 to Russian Federation

MPLS/IP Based Inter-Regional Connection

2.12 The meeting agreed to a proposal to develop a high level concept on the interconnection of the CRV with other regional network such as REDDIG/MEVA/PENS. A number of States that connect to the CRV are also required to connect to other regional networks. There are potential benefits with implementing interconnections among regional networks such as harmonization and efficiency in the connection for services like SWIM and reducing costs for States that connect to other regional networks. Some States had already expressed their interest in a connection to other regional networks such as New Zealand to REDDIG and Singapore to PENS. It's noted that USA has established service with REDDIG and MEVA and in the process to join PENS.

2.13 Noting these requirements, early discussions with these regional networks, the CRV OG and PCCWG will enhance the discussions with these regional networks at future opportunity to consider how the CRV can potentially be interconnected with other regional networks.

CRV and AFS Safety and Protection planning

2.14 In following up the outcome of CNS SG/23 meeting, the AFS Safety and Protection joint working group meeting scheduled for 21 to 23 April 2020 in Nevada, USA has been postponed without a firmed date. The meeting considered necessary and timely to address safety and security concerns as more and more AFS and other new applications being transferred to and exchanged over CRV. This meeting was also planning to discuss inter-network connection as indicated in section 2.12 above.

Voice over IP Dial Plan

2.15 USA shared with the meeting on a proposed dial plan to address the Voice over IP (Internet Protocol) dialing table used for communications between Japan and FAA. Air Traffic Service (ATS) voice communications over CRV will be used for air traffic transfer between Japan ATMC and the FAA. PCCWG will perform IP digit manipulation. A comprehensive dial plan is required to provide to PCCW to ensure proper call routing.

2.16 The phone numbers for the various Air Traffic Controller positions in Japan and the FAA are required. Implementing VoIP into current CRV telecomm design requires Japan and the FAA submit information about dialing procedures performed by each entity and their voice switching equipment. These procedures will have dial sequences that will be translated between the two organizations using CRV network equipment. Translation of digits should be transparent to Air Traffic Controllers.

2.17 Adherence to ICAO dial plan format is necessary. ICAO has developed a format in which these translations should occur. An 8-digit numbering plan that looks like this:

- 1-3 digits will be for the Country Code/Area Identifier (AA) – E.164;
- 2 digits will be for the ANSP Centre code (CC) – ANSP provided; and
- 3 digits for the operator position (OO) – ANSP provided

2.18 CRV OG considered necessary to maintain a table with VoIP dial plan for whole APAC Region. The table should be kept updated by PCCWG for posting on the CRV Portal.

FAA International User Portal

2.19 USA informed the meeting of a proposed plan to address the FAA's platform for providing IP services connectivity to external users using the International User Portal (IUP). The detailed introduction is provided in the report of CRV OG/7 and the paper presented by USA to the CRV OG/7 meeting.

Proposal to use CRV for Space based ADS-B

2.20 PNG and ICCAIA jointly made a presentation on the use of CRV for delivery of surveillance data from spaced based ADS-B. PNG Air Services Limited (PNGASL) has contracted for the supply of space based ADS-B data from Aireon LLC and is intending to contract for a CRV connection in early 2020 for a number of applications including space based ADS-B. One prime purpose for using CRV is to reduce the need for point to point circuits and would result in lower data communications costs for ANSPs. Aireon and PNG ASL believe that delivery of space based ADS-B via CRV will achieve these objectives. Indonesia expressed support to PNG's proposal to use CRV for distribution of space based ADS-B data.

2.21 The meeting was informed that the space based ADS-B is now fully operational. The service is being used by Canada and United Kingdom to separate aircraft in the Atlantic Ocean (using trial ASEPS procedures) and over continental Canadian airspace using 5 NM separation standards. In June 2019 Aireon was officially approved by the European Union Aviation Safety Agency (EASA) as an Air Navigation Service Provider (ANSP) Organization to provide Air Traffic Management (ATM)/Air Navigation Service (ANS) surveillance services, to support the separation of aircraft. This authorizes Aireon as the first-ever certified provider of aircraft surveillance-as-a-service.

2.22 The meeting noted that in following the agreed procedure, co-chair of CRV OG from Australia conducted survey with members of CRV OG regarding the service provider Aireon LLC's joining CRV. The co-chair from Fiji was requested to provide the result of the consultancy on the CRV portal.

SWIM Demonstration on CRV

2.23 The meeting noted that SWIM Demonstration on CRV to be hosted by Hong Kong China scheduled for March 2020 has been postponed without a definite date. Hong Kong China was requested to keep the Secretariat informed of the new date of the Demonstration once available.

CAAP-FAA AMHS/AIDC PLANNED ROUTING CHANGES

2.24 Considering the upcoming Air Traffic Services (ATS) Message Handling System (AMHS) service between Civil Aviation Authority of the Philippines (CAAP) and USA Federal Aviation Administration (FAA) will become operational in 1Q2021, the Philippines and USA proposed to make following routing changes:

- USA will route all "RP" traffic directly to the Philippines with existing route via Japan as alternate.

- The Philippines will route all "C", "K", "M", "P", "S" and "T" traffic directly to the USA as primary and to Hong Kong China as an alternate.

2.25 USA and the Philippines will coordinate with AMC for these routing changes. The ICAO Regional AFTN/AMHS Routing Directory may also be updated to reflect the new traffic routes.

2.26 The meeting noted that the AMHS connection between FAA and CAAP would carry AIDC traffic after successful implementation of AMHS.

AMHS Readiness to Support Metrological Information Exchange Model – IWXXM

2.27 USA recalled that IWXXM has been adopted by APANPIRG with service beginning in November 2020. AMHS is the designated distribution mechanism for IWXXM. Some AMHS have been in operation since 2005 and there are twenty ANSPs in APAC Region completed implementation, per information from the ATS Messaging Management Centre (AMC). The following ANSPs should be able to support IWXXM using their respective AMHS with FTBP capability: Australia; Bangladesh; Bhutan; Cambodia; China; Hong Kong China; Macao China; Fiji; India; Japan; Republic of Korea; Myanmar; Nepal; New Zealand; Pakistan; Philippines; Singapore; Sri Lanka; Thailand; and USA.

2.28 The meeting recommended that States with designated BBIS: Australia, China, Hong Kong China, Fiji, India, Japan, Singapore, Thailand and USA should increase their respective connection bandwidth to greater than 64kbps, if feasible and applicable.

2.29 Any ANSPs that are not on the above list should upgrade their AMHS with FTBP functionality to support IWXXM traffic. In this connection, the Secretariat (ICAO Regional Office) was requested to issue a reminder to States/Administrations that have no AMHS with FTBP capability to implement or upgrade their AMHS with FTBP function as soon as possible. States/Administrations should also be requested to deploy AMHS connection with a minimum of 64Kbps bandwidth.

Description of FAA AMHS SWIM Gateway

2.30 USA informed the meeting that FAA is developing an AMHS SWIM Gateway (ASG) prototype to enable international exchange of the ICAO Meteorological Information Exchange Model (IWXXM) data. The AMHS SWIM Gateway will send and receive Operational Meteorology (OPMET) data formatted using IWXXM utilizing AMHS File Transfer Body Part (FTBP) attachments. This exchange method integrates with the existing AMHS X.400 message software, whose method of sending attachments is FTBP. More description of its purpose and deployment plan was introduced in IP/03.

The SWIM/AMHS Gateway activities in Europe

2.31 The Frequentis informed the meeting that under the roof of the European ICAO AFS to SWIM Transition Task Force (ICAO AST TF), the AMHS/SWIM Gateway Study Group (SWAMWAY SG) was initiated last year. Members of AMHS/SWIM Gateway Study Group include some ANSPs such as Enaire (Spain) and Austro Control (Austria) and some industry partners: Frequentis Comsoft; Thales; Indra/Avitech; Copperchase and Telefonica.

2.32 The members joined efforts in the spirit of working together on the concept of a gateway between AMHS and SWIM, the AMHS/SWIM gateway, in support of interoperability. The SWAMWAY SG aims at developing a minimum set of technical specifications for the AMHS/SWIM gateway, which could become a recognised standard.

Readiness status of AMHS to support IWXXM in Indonesia

2.33 Indonesia informed the meeting of their readiness status of AMHS, particularly in Jakarta, to support the IWXXM service by November 2020.

2.34 Indonesia conducted stage 1 of trial on AMHS Jakarta for delivering OPMET messages with IWXXM format on 14 February 2020. The stage 2 of the trial planned in April 2020 had been postponed due to the COVID-19 pandemic situation.

2.35 The stage 1 of the trial successfully confirmed the conversion from OPMET messages into IWXXM format data (Version 3.0) and the ability of AMHS to support the exchanged of IWXXM service. The purpose of stage 2 of the trial stage is to ensure the exchange of OPMET messages with IWXXM format between Indonesia Meteorological Bureau and RODB Singapore. Indonesia had prepared the concept of operation and scenarios for stage 2 of the trial and was coordinating with RODB Singapore for the trial.

Readiness status of AMHS and CRV to support IWXXM Service(Singapore)

2.36 Through the information paper, Singapore presented the progress/status of Singapore's AMHS and CRV implementation to support/ test IWXXM service.

2.37 Singapore had completed its AMHS implementation and subsequent upgrade to support and test IWXXM over AMHS in March 2011 and March 2019, respectively. The implementation of Common aeRonautical Virtual private network ("CRV") was completed in November 2019 to facilitate IWXXM over AMHS testing with other CRV subscribers.

2.38 The AMHS upgraded in March 2019 allows/supports File Transfer Body Part ("FTBP") and Interpersonal Message ("IPM") Heading Extension ("IHE") for the exchange of IWXXM messages. Each AMHS message (including FTBP) of up to 4 MB is permitted, to meet IWXXM

guidelines. The CRV connections facilitated the IWXXM testing with other CRV subscribers without the need to subscribe additional point-to-point links. Singapore has subscribed two CRV package 'A' connections, and one of them was setup to support the AMHS/ IWXXM over AMHS testing using the CRV.

2.39 Singapore has started AMHS/ FTBP over CRV testing with Japan since December 2019 and testing is still on-going. AMHS over CRV testing with Australia and the Philippines are planned in Q3 2020. Singapore is also arranging inter-regional IWXXM over AMHS testing with United Kingdom. Singapore is open to AMHS/ IWXXM over AMHS testing using CRV with interested States/ Administrations.

Readiness Status of AMHS and CRV to support IWXXM Service(ROK)

2.40 Republic of Korea provided updates on the progress/status of their AMHS and CRV implementation to support IWXXM service.

2.41 It was informed that the Korea Aviation and Meteorological Administration was developing solution to support IWXXM traffic. Their testing facilities were updated to support IWXXM v. 3.0 from Version 2.1.1. For conducting testing, the IWXXM test server is connected to the SWIM test server. The Republic of Korea is working on an AMHS system upgrade to support the IWXXM service, and the AMHS upgrade would be completed by the end of the year 2022.

2.42 The implementation of Common aeRonautical Virtual private network (CRV) was completed in November 2019 to facilitate IWXXM over AMHS testing with other CRV members.

AMHS Readiness Report for Supporting IWXXM Traffic (Fiji)

2.43 Fijj completed in June 2019 the transition of ATN BBIS to IPS for the AMHS service between Nadi and Salt Lake/USA & Brisbane/Australia over the CRV network. The local end user still operates on AFTN terminal, which is converted to AMHS over the AFTN/AMHS Gateway.

2.44 The Comsoft AMHS System used by Fiji supports File Transfer Body Part (FTBP). The system has the capability of exchanging IWXXM reports of a maximum size of 4MB.

2.45 Regarding the capacity status of the operational AFS links to support the exchange of the required meteorological information in both IWXXM GML form and TAC form: Nadi has contracted a 1.0Mbps bandwidth using CRV Package C+ for both Voice & AMHS services. Of the total bandwidth, 768 Kbps is allocated for voice and data while 64 Kbps is reserved for AMHS for message exchange with Brisbane & Salt Lake Centers.

AMHS Readiness Report for Supporting IWXXM Traffic (Japan)

2.46 Japan provided brief report on the survey attached to the letter of invitation. ATN BBIS router and AMHS was initially installed at Fukuoka Centre in year 2000. Connection tests with USA during years from 2000 to 2004. The AMHS was put into operational in 2005. AMHS was transferred over CRV in February 2019. Connection tests with Hong-Kong and Singapore using AMHS/FTBP over CRV have been conducted since December 2019 and the testing is still on-going.

2.47 AMHS/FTBP over CRV implementation with China is planned for 4Q2020 and with Korea is scheduled for Q2021

2.48 Readiness Status of AMHS for supporting File Transfer Body Part (FTBP). The AMHS of Japan has been able to support exchange of IWXXM messages based on FTBP since August 2015. It is also capable to send, receive and transfer up to 2,147,483,647 Byte for the contents such as FTBP, IPM and IHE.

2.49 Japan considered that the line bandwidth required to accommodate both meteorological information in both IWXXM GML and TAC form would be 192 Kbps.

2.50 In this connection, the meeting was informed that the MET/IE WG and ICAO Secretariat are preparing another IWXXM/AMHS survey of States and is developing a Webinar (in Aug, Sep or Oct) to assist States for the implementation. The online survey would be conducted via the Survey Monkey application. The concerns on the appropriate AFS connection signal speed based on traffic calculation could be further discussed at the Webinar.

APAC regional Strategies on AMS and Air-Ground Data Link (WP/03)

2.51 Based on a task given by the CNS SG/23 meeting in 2019, China took the lead and worked together with Australia, Japan and USA to review the regional AMS strategy adopted by APANPIRG in 2013 and the Datalink strategy adopted by APANPIRG in 2005. The draft on the revised strategies were distributed among members and discussed through a teleconference on 1 July 2020. As a result, the ad hoc group agreed to submit the proposed changes to the ACSICG/7 for consideration.

2.52 The meeting reviewed the draft on the revised strategies attached to WP presented by China, Australia, Japan and USA. The meeting further discussed some additional changes proposed by Singapore. As a result of discussion, the meeting endorsed the revised regional strategies and formulated the following Draft Conclusion for consideration by CNS SG:

<table>
<tr><td colspan="3">Draft Conclusion ACSICG/7/1 - the Revised Regional Strategies on AMS and Datalink</td></tr>
<tr><td colspan="2">What: That, the revised Aeronautical Mobile Service (AMS) Strategy for the Asia/Pacific Region provided in Appendix C and the revised Strategy for Implementation of the Air-Ground Data Link in the Asia/Pac Region provided in Appendix D to the Report be adopted.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: Need to update the regional strategies on AMS and Datalink based on the latest developments</td><td colspan="2">Follow-up: ☒Required from States</td></tr>
<tr><td>When: 1-Dec-20</td><td colspan="2">Status: Adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☒ Sub groups ☒ APAC States ☐ICAO APAC RO ☐ICAO HQ ☐Other: XXXX</td></tr>
</table>

2.53 The meeting expressed appreciation to China, Australia, Japan and USA for the development of the revised strategies and to Singapore for the comments on further improvement.

2.54 The meeting also agreed to a proposal to forward the draft strategies agreed by the meeting to the FANS Interoperability Team Asia (FIT-Asia/10) for comments and endorsement at its next meeting scheduled for early August 2020 before its final adoption by CNS SG in December 2020. The meeting was reminded that the review by FIT-ASIA would be relevant to those wordings on PBCS and FANS based datalink.

Amendment to AFTN/AMHS-based ATFM Interface Control Document (ICD)

2.55 The Tenth Meeting of the Asia/Pacific ATFM Steering Group (ATFM/SG/10, Video Teleconference, 04 to 08 May 2020) proposed amendment to the AFTN/AMHS-based ATFM ICD which was endorsed by ACSICG and adopted by CNS SG/23 meeting in 2019.

2.56 The proposed amendments include the change from the message format of the International Telegraph Alphabet No. 2 (ITA-2) to the message format of the International Alphabet No. 5 (IA-5) per provisions of Vol II section 4.4.15 as shown in the Table below:

Field #	Description	Format	Example
1	Start of Message/ Start of heading	~~4 letters~~ 1 character	~~ZCZC~~ 0/1
2	Transmission Identification	3 letters + 3 numbers	HAR001
3	Additional Service Indication	Optional <11 characters	123456
4	Priority Indicator	2 letters	FF
5	Addressee of the message	8 letters	EGLLZRZX
6	Day / time of the message	DDHHMM (UTC)	041345
7	Originator of the message	8 letters	OPSTZQZX
8	Optional Heading Information	ODF – See AIDC	See AIDC
9	ATS Message Payload	…	…
10	End of Message	~~4 letters~~ 1 character	~~NNNN~~ 0/3

Table 1: Amendment to the ICD to conform with Annex 10 Volume II specifications

2.57 Subsequent to the ATFM/SG/10 meeting the Secretariat conducted a further editorial review of the ICD, in consultation with the ATFM/SG/10 Chair and the AMNAC Technical Sub-group. The document was the further amended to correct some errors and minor omissions.

2.58 In view of the foregoing, the meeting endorsed the following Draft Conclusion formulated by ATFM/SG/10 meeting for consideration by CNS SG.

<table>
<tr><td colspan="3">DRAFT Conclusion ACSICG/7-X (ATFM/SG/10-3) - Amendment of the AFTN/AMHS-based Interface Control Document (ICD) for ATFM</td></tr>
<tr><td colspan="2">What: That, the AFTN/AMHS-based Interface Control Document for ATFM Version 2.0 provided in Appendix E to this Report be adopted and posted on the ICAO Asia/Pacific Regional Office website to supersede the existing version, for use by Asia/Pacific Administrations in implementing cross-border ATFM communications in accordance with the provisions of the Regional Framework for collaborative ATFM.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: To align with message format provisions of Annex 10 Vol II, and to support implementation by States through amendment to specific provisions.</td><td colspan="2">Follow-up: ☒ Required from States</td></tr>
<tr><td>When: 1-Dec-20</td><td colspan="2">Status: Draft to be adopted by Subgroup</td></tr>
</table>

Who:	☒Sub groups ☒ APAC States ☐ICAO APAC RO ☐ICAO HQ ☒ other: ACSICG/7

Update on Space-based VHF Voice Communications Service

2.59 Singapore presented an update on Singapore's technical studies on the space-based VHF Voice Communication Service. The working paper recalled that the space-based VHF concept was first endorsed in 2018 by the ICAO Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) and supported by ICAO Communications Panel (CP) and Frequency Spectrum Management Panel (FSMP). Singapore has since embarked on design studies with various communications vendors and satellites service providers. The paper further introduced the next steps of studies on space-based VHF radio communications concept.

2.60 The paper also highlighted the future work regarding frequency allocation. An amendment to the ITU Radio Regulations would be required in order to authorize the satellite reception and transmission of VHF radio relay communications to/from aircraft, succinctly expressed an authorization to the AMS(R)S would be required to permit this concept of communications. This requirement is identical to that which was needed at WRC-15 for the AMS(R)S allocation to space-based ADS-B in order to legally authorise the service in accordance with the ITU Radio Regulations.

2.61 Singapore encouraged States/Administrations to support the potential development of space-based VHF and invited interested States/Administrations to join Singapore in the space-based VHF technical studies and POC trials. Singapore also proposed a draft Conclusion to urge States/ Administrations to actively participate in the relevant ICAO and ITU WP5B meetings to support the space-based VHF communications concept and the need to support for inclusions of this new service into the AMS(R)S spectrum allocation in the Radio Regulation.

2.62 Considering the initial ICAO positions for WRC-2023 is being developed by Frequency Spectrum Management Panel (FSMP) and ICAO member States will be requested to support ICAO position at regional and international forums of ITU, the meeting recommended Singapore to develop a working paper highlighting the detailed proceedings and expected supports from States for review and consideration by CNS SG.

Certification & Authorization of Aeronautical Station Operators - ASO

2.63 India shared with the meeting on the task completion of Certification & Authorization of Aeronautical Station Operators (ASO) in accordance with provisions specified in ICAO Annex 1 - Personnel Licensing. Director General of Civil Aviation (DGCA), India published Civil Aviation Requirement (CAR) for issuing Certificate and Authorization of Aeronautical Station Operators (ASO) on 1 January, 2020 and the guidelines for implementation on 29/05/2019. India has four Aeronautical Stations at Mumbai, Kolkata, Chennai and Delhi. India also has VOLMET broadcast on HFRT at Mumbai and Kolkata. By 31 December, 2019, 246 operators had been issued with certificates and authorized as Aeronautical Station Operators.

Review and update Subject/Tasks List

2.64 The meeting reviewed and updated the subject/task list (WP/08) resulted from ACSICG/6 meeting. The Subject/Task list of ACSICG updated by the meeting is provided in Appendix F to this Report.

Future Meetings

2.65 The ACSICG/8 is scheduled for second half 2021. The Secretariat will inform the member States of the exact dates and venue of the meeting at due course.

2.66 The Co-chairs thanked the participants for the useful information and updates provided to the meeting and active discussions on the implementation issues during meeting. Mr. Li Peng who retired after this meeting expressed his best wishes to all participants and member States for successful implementation of CRV, ATN/AMHS, AIDC, SWIM and air/ground data link and the improved air/ground voice communications in the APAC Region.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;
b) review the ATN/AMHS/AIDC Implementation status in **Appendix A;**
c) review the Updated CRV Implementation Status Table provided in **Appendix B;**
d) review the Revised AMS Strategy for the APAC Region provided in **Appendix C;**
e) review the Revised APAC Strategy for Implementation of the Air-Ground Data Link provided in **Appendix D;**
f) review the AFTN_AMHS-Based ICD FOR ATFM- Ver. 2 provided in **Appendix E**;
g) note the ACSICG work programme provided in **Appendix F;**
h) endorse or adopt, as required, two draft conclusions and decisions in this paper; and
i) discuss any relevant matter as appropriate.

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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. AMHS has been migrated to CRV. Connection with Singapore using AMHS was implemented October 2016; Another AMHS connections pending CRV (target date by March 2020) including both connection with New Zealand and USA. AMHS connection with Indonesia pending on CRV implementation AMHS connection with South Africa has been established Plan to upgrade AMHS support IWXXM traffic from Nov. 2020.	COMSOFT	AFTN/AMHS 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. Implementation in July 2017. LOA needs to be updated.		

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	In Q1/2013, Bangladesh installed ATN/AMHS and BIS Router at Dhaka (VGHS) with User Agents at Chittagong (VGEG) and Sylhet (VGSY).	COMSOFT	Tentative date of implementation of AIDC is Q4 of 2023 with Kolkata and Yangon.		Implementation of AIDC is included in the "Modernization of CNS-ATM System of CAAB" project which is going on G2G agreement with French Government and likely to be implemented by the end of 2023.
BHUTAN	ATN/AMHS circuits, using IP over VPN, with Thailand (Bangkok) and India (Mumbai) commissioned in June and July 2017 respectively. IOT and POT with Mumbai completed on 27th June 2017. IOT and POT with Thailand completed on 2nd May 2017. TMC signing with both countries at final stage.	AEROTHAI'S AMHS System	Currently not applicable. If required in the future, will be decided after CRV implementation (scheduled for mid-2019).		

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
BRUNEI DARUSSALAM	ATN BIS Router planned for 2015 and AMHS planned for 2015				
CAMBODIA	BIS Router and AMHS installed. Cambodia (CATS) AMHS connected with Bangkok via VSAT IP link since 10 December 2013	AVITECH	AIDC function and capability made available. Ready for testing with neighbors ATS Facilities starting from 2017 and target date of implementation with Bangkok in 4Q2019	THALES which supports AIDC ICD Version 1.	
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. The Beijing-Hong Kong AMHS link was put into operation in 2018; With Thailand is completed POT, after sign the TMC was put into operation in Q12020 AMHS/ATN technical tests with Macau completed in 2009. Plan for ATN/AMHS implementation with Macao China is TBD.	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 China put into operational use since 8 Feb 2007. AIDC between Dalian and Incheon	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. The Beijing-Hong Kong AMHS link was put into operation in 2018;	IN-HOUSE (Aero-Info Technologies Co., Ltd)

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
	ATN/AMHS circuit with ROK has been put into operation since June 2011. ATN/AMHS tests with India has been put into operation since 2016. ATN and AMHS IOT with Mongolia is completed in May 2018. Plan for commissioning after POT completion in 2020 Connection tests with Nepal is TBD. AMHS testing with Japan in Q4 2020. AMHS testing with Russia in 2020.		implemented in Nov. 2016; AIDC between Shanghai/Guangzhou and Tapei put in to operational use since 2013. AIDC between Guangzhou and Hong Kong China put into operational use since May 2018. OLDI between Shenyang and Khabarovsk put into operational use since Oct.2019. For Beijing/Ulaanbaatar, Further testing is planned in 2020. Kunming/Yangon under test and progress since May 2017	With Thailand is completed POT, after sign the TMC circuit and was put into operation in Q12020 AMHS/ATN technical tests with Macau completed in 2009. Plan for ATN/AMHS implementation with Macao China in 2019. ATN/AMHS circuit with ROK has been put into operation since June 2011. ATN/AMHS tests with India has been put into operation since 2016. ATN and AMHS IOT with Mongolia is completed in May 2018. Plan for commissioning after POT completion in 2020	

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
			Kunming/Vientiane under test and progress since Dec. 2018. Sanya/Hanoi under test trial since 2019.	Connection tests with Nepal is TBD. AMHS testing with Japan in 2020. AMHS testing with Russia in 2020	
HONG KONG, CHINA	**Manila / Philippines** CRV/AMHS circuit was put into operation in May 2019. **Beijing / China** ATN/AMHS circuit was put into operation in 2018. Plan to migrate to CRV in Q4 2020. Macao / China ATN/AMHS circuit was put into operation in December 2009. Wait for Macao to join CRV. **Bangkok / Thailand** ATN/AMHS circuit was put into operation use in 2014. Wait for Thailand to join CRV.	COMSOFT	AFTN-based AIDC with Sanya put into operational use in Feb 2007. AIDC with Taibei put into operational use in Nov 2012. AIDC with Guangzhou put into operational use in May 2018. AIDC with Manila put in operational use in May 2019.	Raytheon ATM system Support AIDC ICD Version 3 commissioned in November 2016.	Already support exchange of IWXXM messages based on FTBP. Support of IHE is planned for October 2020.

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
	Fukuoka / Japan Currently on AFTN. Plan to carry out IOT of CRV/AMHS in July 2020 and cut over to CRV/AMHS in Q3 or Q4 2020. **HoChiMinh / Vietnam** Currently on AFTN. Simple AMHS IOT was conducted in Dec 2019. Wait for Vietnam to join CRV. **Taibei** CRV/AMHS circuit was put into operation in June 2020.				
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. Upgrade of ATN/AMHS to support IPS and IWXXM planned with tentative target date of Q3 2021.	COMSOFT	[Not applicable for using AIDC, looking into the possible application 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		
FIJI ISLANDS	ATN BBIS IPS router and AMHS implemented over CRV for connection to USA in April, 2019 with Australia planned for June, 2019. . For connections with sub-regional centers: For New Caledonia using AMHS since 2017; For connection with Kiribati using UA/AMHS implemented in 2015.	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)*	Planned for implementation of AMHS in 2020. Using IP with New Zealand since 2017.		Implementation of AIDC (based on Version 3) with adjacent centers (Oakland and Auckland) since 2009.	THALES EUROCAT for AIDC	Alternate routing for backup between Tahiti and Christchurch via

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
					Tahiti/New Caledonia IP link
INDIA	Dual stack ATN/IP router and AMHS implemented at Mumbai in 2011. Operational AMHS connections with Bangkok, Dhaka, Singapore, Kathmandu, Karachi implemented. With Beijing implemented in 2016; With Colombo implemented in May2017; With Bhutan implemented in July 2017; Planned for IOT with Nairobi and Muscat forQ4 2020.	COMSOFT	Initially-15-May-2017, AIDC implemented between Chennai and Kuala Lumpur with ABI and EST messages. India is currently using APAC AIDC ICD version 3. **A. Implementation within India:** Trials have been carried out between various ATS units listed below I Delhi: Ahmedabad, Varanasi, Nagpur I. Chennai: Mumbai, Kolkata, Trivandrum, Mangalore, Trichy, Hyderabad, Bengaluru II. Kolkata: Chennai, Nagpur, Varanasi, Guwahati		

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
			III. Mumbai: Chennai, Ahmedabad, Nagpur AIDC operations between Chennai and Mumbai have been put into regular operations. **B: Implementation with Neighbouring States:** The status on trails with following ATSUs of neighboring FIRs is as under: I. **Chennai & Kuala Lumpur** (Malaysia) – ABI, EST successful. CDN is done with voice confirmation. TOC/AOC will be implemented later. LOA signed. II. **Chennai & Male (Maldives)** –Trails have been successful. LOA in process. III. **Chennai & Colombo** (Sri Lanka) - Colombo in process to address the syntax errors in ABI. Thereafter, trails will be conducted. LOA		

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
			in IV. **Chennai & Yangon** (Myanmar) – Trials commenced in January 2018. Issues of incorrect reference number in Counter CDN from Yangon persists V. Mumbai & Male (Maldives) – Operational. LOA signed. VI. Ahmedabad & Karachi (Pakistan) – Automatic message exchange (e.g. ABI, EST) happens for most of the East bound flights between Karachi & Ahmedabad. Karachi Automation system not generating auto ACP message in response of EST messages. VII Kolkata & Yangon (Myanmar) – Trials under process. Most of the message exchanges were successful		

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
			C. Under Planning I. To conduct operational trials between Mumbai-Muscat, Kolkata-Dhaka, Mumbai Karachi (Pakistan), Delhi – Karachi (Pakistan), Delhi – Lahore (Pakistan), Chennai-Jakarta and Varanasi-Kathmandu subject to readiness from the concerned states. II. AFTN (AMSS) system upgradation to IP based AMSS is underway at various stations to address the latency issues for exchange of AIDC data.		
INDONESIA	ATN BIS Router and AMHS with Singapore implemented since February 2018; AMHS Trial (IOT) with Brisbane pending for CRV implementation.	IDS	AIDC implementation in Ujung Pandang ACC conducted as follows: 1) Ujung Pandang ACC –Brisbane ACC: Implemented since July 2017. 2) Ujung Pandang ACC – Manila ACC: - Operational trial since October 2019;	Thales TopSky in Makassar able to support ICD version 3 since December 2015.	For CRV, target of contract in 4Q2020 and implementation in 1Q2021.

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
			- Target date for implementation in 3Q2020. 3) Ujung Pandang ACC – Kota Kinabalu ACC: - Successfully tested and target date for operational trial in 4Q2020; - Target date for implementation 1Q2021. 4) Ujung Pandang ACC – Oakland ARTCC: - Successfully tested and target date for implementation in 4Q2020. 5) Ujung Pandang ACC – Port Moresby ACC: - Successfully tested on 7 July 2020; - Target date for operational trial in 3Q2020. - Target date for implementation 1Q2021.		

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
			6) Ujung Pandang ACC – Jakarta ACC (4Q2020); AIDC implementation in Jakarta ACC will be carried out with the following priorities: 1) Jakarta – Ujung Pandang (4Q2020); 2) Jakarta – Chennai (3Q2021); 3) Jakarta – Melbourne (4Q2021); 4) Jakarta – Colombo (2Q2022); 5) Jakarta – Singapore (3Q2022); 6) Jakarta - Kuala Lumpur (4Q2022); 7) Jakarta – Kota Kinabalu (4Q2022).		Priority is in accordance with Hot Spot identified by RASMAG/23
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	NEC	AIDC implemented between Fukuoka ATMC and Oakland ARTCC in 1998. AIDC implemented between Fukuoka ATMC		Japan and USA conducting testing AIDC over AMHS and cutover date is 5 May 2017.

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
	not currently connecting is started after update. Upgrading connection with Hong Kong and Singapore using VPN will be implemented in 2020 after implementation of CRV. Coordinating for all other circuits upgrading. Connection tests with Hong-Kong and Singapore using AMHS/FTBP over CRV since Dec 2019 and testing is going. AMHS/FTBP over CRV implementation with Beijing/China in 4Q2020, and with Incheon/Korea in 1Q2021.		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 implemented. AIDC between Fukuoka ACC and Shanghai ACC under negotiation.		
KIRIBATI	Connection with Nadi using UA/AMHS implemented in 2015.				
LAO PDR	ATN BIS Router and AMHS completed, planned for operation with Bangkok since 4Q 2016.	THALES	AIDC testing with Bangkok in 2017 and target for implementation in 4Q2019.	THALES which is able to support ICD Version 2.	

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
			Testing with Hanoi on-going since 2017; with Cambodia operational test again in June 2018, and implementation 2Q 2019. Testing with Kunming and Yangon ongoing.		
MALAYSIA	ATN BIS Router completed 2007. AMHS for Malaysia – Singapore implemented in March 2020. AMHS for Malaysia – Thailand implemented in Dec 2019.	FREQUENTIS	AIDC technical test between Kuala Lumpur ACC and Bangkok ACC conducted since November 2016 (ABI/EST/ACP/LAM/LRM/CDN/REJ/TOC/AOC). The operational trial commenced in August 2019 (EST/ACP/LAM/LRM). The operational implementation commenced on 14th March 2020 (EST/ACP/LAM/LRM). AIDC technical test between Kuala Lumpur	SELEX which is able to support ICD Version 3.	

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
			ACC and Chennai OCC conducted since February 2013. The operational trial implemented in phases from September 2016 (ABI/EST/MAC/LAM/LRM/ACP). Review on the CDN message implementation conducted in August 2017. SOP signed 26 April, 2017. The MOU signed on March 2020. The operational implementation commenced on 1st April 2020 (ABI/EST/ ACP/LAM/LRM/CDN/REJ/MAC). The operational trial for TOC/AOC started on 1st July until 1st August 2020. AIDC technical test between Kuala Lumpur		

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
			ACC and Singapore ACC conducted since April 2015 (ABI/EST/ ACP/LAM/LRM/CDN/REJ). The operational trial started on September 2018 (EST/ACP/LAM/ LRM). The operational implementation commenced on 1st November 2019 (EST/ ACP/LAM/LRM). AIDC technical test between Kuala Lumpur ACC and Ho Chi Minh ACC To Be Discussed (TBD). AIDC technical test between Kuala Lumpur ACC and Jakarta ACC TBD. AIDC technical test between Kota Kinabalu ACC and Manila ACC		

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
			started on May 2019 (EST/ACP/ LAM/LRM). The operational trial plan to be started in 4Q2020 (EST/ACP/ LAM/LRM). The operational implementation plan to be started in 1Q2021 (EST/ACP/LAM/ LRM). AIDC technical test between Kota Kinabalu ACC and Ujung Pandang ACC started on August 2019 (EST/ACP/LAM/ LRM). The operational trial plan to be started in 4Q2020 (EST/ACP/ LAM/LRM). The operational implementation plan to be started in 1Q2021 (EST/ACP/LAM/ LRM). AIDC technical test between Kota Kinabalu		

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
			ACC with Jakarta ACC TBD. AIDC technical test between Kota Kinabalu ACC and Singapore ACC started on November 2019 (EST/ACP/LAM/ LRM). The operational trial to be commenced on October 2020 (EST/ ACP/LAM/LRM). The operational implementation to be started in 1Q2021 (EST/ACP/LAM/ LRM). AIDC technical test between Kuching ACC and Singapore ACC started on November 2019 (EST/ACP/LAM/ LRM). The operational trial to be commenced on 20th July until 18th October		

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
			2020 (EST/ACP/LAM/ LRM). The operational implementation to be started in 4Q2020 (EST/ACP/LAM/ LRM). AIDC between Kuching ACC and Jakarta ACC TBD.		
MALDIVES	In the process of replacing the existing operational AFTN system by AMHS. It is expected to complete the installation before the end of 2019. With the new AMHS, it is planned to establish a new IP connection between an additional neighboring ATSU as the current link is an X.25 connection between Colombo. Also will look for the possibility of implementing the CRV network to use with AMHS and AIDC during the same phase.		Connection established with all the adjacent ATSUs. Interoperability tests successfully completed in 2017. LOA signed for operational trials between Mumbai, Chennai, and Trivandrum. Operational trials were also successful with these ATSUs, while several issues were resolved from both ends.	SELEX which is able to support ICD Version 3.	

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
			Ready to sign LOA with Melbourne and is expected during the 2nd quarter of 2019. Trials with Colombo had few issues, which Colombo is working to resolve it on their end with the automation system supplier. Connections between all 5 ATSUs are turned ON in the ATS automation system to conduct pre-notified operational trials.		
MARSHALL ISLANDS					
MICRONESIA (EDERATED STATES OF)					
Chuuk					
Kosrae					
Pohnpei					
Yap					

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
MONGOLIA	AMHS/AFTN gateway implemented 2012. ATNBIS router implemented in 2014. ATN and AMHS IOT with China was completed in May 2018. Plan for commissioning after POT completion in 2019.	COMSOFT	ATM automation system supports both AIDC and OLDI. Coordinating with Russia on OLDI connection in target date 2016. Coordinating with China on AIDC connection between Beijing/Ulaanbaatar technical trials in progress. Planned date of testing in 2019.	INDRA Aircon 2100 supporting AIDC ICD Version 2.	
MYANMAR	AMHS including AFTN/AMHS gateway implemented in Nov 2011. Connection with Thailand implemented in 4Q2016. Planned for AMHS connection with Beijing. Target date TBC.	THALES	AIDC connection pre-operation test with Thailand conducted in 4Q2017 and Target date of implementation 4Q2020; AIDC testing with Chennai, Kolkata and Vientiane conducted in 2020. Myanmar improved ATS Surveillance Coverage at coordination point with China and will start	THALES Automation system (Topsky ATC) supports APAC AIDC ICD Ver. 2.	AMHS including AFTN/AMHS gateway implemented in Nov 2011. Connection with Thailand implemented in 4Q2016. Planned for AMHS connection with Beijing. Target date TBC.

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
			AIDC test again with Kunming ACC in 2020.		
NAURU					
NEPAL	AFTN/AMHS Gateway implemented in 2012. AMHS implemented with India since June 2014. AFTN connection with China. Plan to test AMHS connection soon.	COMSOFT	Nepal uses custom built ATM system from NEC. Some issues regarding ICD need to be resolved in order to proceed ahead with AIDC testing with India and China.		
NEW CALEDONIA	New router and AMHS commissioned December 2016	COMSOFT			
NEW ZEALAND	AMHS connection with the USA over CRV was implemented in April 2019. AMHS connection to Australia over CRV is scheduled for June 2019.	COMSOFT	AIDC implemented between New Zealand, Australia, Fiji, Tahiti, Chile and USA.	Supported the Basic 5 message set. ATM systems are LEIDOS and ADACEL	
PAKISTAN	ATN/AMHS connections with Mumbai since 2015.	COMSOFT	Implemented between Karachi and Lahore ACCs	ATM system from Intra AIRCON 2100	Existing Radar system being upgraded.

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
	Planning for AMHS connection with Beijing and Kuwait after upgrading existing facilities between the Countries. Target dates for implementation TBC.		Further testing to be conducted between Delhi/Karachi & Delhi/Lahore after system upgradation at Indian end; Mumbai/Karachi &AHM/Karachi on trial operation. For testing with Muscat planned for 4Q2019. Coordination for testing with Tehran is in progress.		
PAPUA NEW GUINEA	Currently AFTN over IP. AMHS implementation is planned for after successful implementation of CRV this year. AMHS implementation planned for 2020.	COMSOFT is the supplier of PNG AFTN/AMHS system	AIDC using AFTN operational with Australia, testing/trial with Oakland (USA) started late last year and in progress. AIDC implementation with Indonesia to happen after CRV implementation this year.	New ATM System from Thales (TopSky-ATC) implemented and operational now supports AIDC V3.	
PHILIPPINES	New ATN/AMHS was installed at the New CNS/ATM Center in Manila. Site Acceptance was successfully done on October 2015.	**Frequentis - Comsoft**	**MANILA with:** **HONG KONG** – Implemented	THALES which is able to support ICD Version 2.	New ATN/AMHS was installed at the New CNS/ATM Center in Manila.

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
	The new AMHS commissioned and operational in March 2018. The AMHS Implemented over CRV with **HONG KONG** - May 2019. The AMHS Implemented over CRV with **TAIPEI** - September 2019. Planned AMHS implementation over CRV with **SINGAPORE** by end of 3Q2020. Planned AMHS implementation over CRV with **OAKLAND, USA** by 1Q2021.		May 2019 via CRV; **SINGAPORE** – Implemented November 2019 via X25; **TAIPEI** – Implemented December 2019 via CRV; **UJUNG PANDANG** - Operational Trial since April 2020 via **SINGAPORE** (X25); **HO CHI MINH** – Tests conducted on October 2019. For further tests; **KOTA KINABALU** – Tests conducted on May and October 2019 via **SINAGPORE** (X25). For further tests; **OAKLAND** – Planned AIDC tests after AMHS		Site Acceptance was successfully done on October 2015. The new AMHS commissioned and operational in March 2018. The AMHS Implemented over CRV with **HONG KONG** - May 2019. The AMHS Implemented over CRV with **TAIPEI** - September 2019. Planned AMHS implementation over CRV with **SINGAPORE** by end of 3Q2020. Planned AMHS implementation over CRV with

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
			successful implementation.		**OAKLAND, USA** by 1Q2021.
REPUBLIC OF KOREA	ATN/AMHS circuit with China put into operational use in June 2011. AMHS implementation with China over CRV in 2Q2020. AMHS implementation with Japan over CRV in 4Q2020.	SAMSUNG	AIDC implemented between ACC and Fukuoka ATMC in 2010 AIDC between Incheon and Dalian implemented in Nov. 2016.	Rockheed Martin System	
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. ATN/AMHS circuit with Australia put into operational use in October 2016. ATN/AMHS circuit with Indonesia put into operational use in February 2018. ATN/ AMHS circuit with Malaysia put into operational in March 2020.	FREQUENTIS COMSOFT	Operational with Ho Chi Minh implemented July 2014 Kuala Lumpur operational trial started since September 2018 and is implemented Nov. 2019. Manila operational trial started in February 2019. Implementation Nov. 2019 Technical trials with Jakarta ACC will be initiated once the Jakarta	THALES supports ICD Version 3 since December 2018	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. ATN/AMHS circuit with Australia put into

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
	Inter-Operability Test (IOT) with Japan and Vietnam started in 2019. IOT with Philippines, Sri Lanka, Bahrain and Brunei targeted in 2020/2021.		ACC ATMS renewal is completed.		operational use in October 2016. ATN/AMHS circuit with Indonesia put into operational use in February 2018. ATN/ AMHS circuit with Malaysia put into operational in March 2020. Inter-Operability Test (IOT) with Japan and Vietnam started in 2019. IOT with Philippines, Sri Lanka, Bahrain and Brunei targeted in 2020/2021.
SRI LANKA	ATN BIS Router Planned for 2013. IP based AMHS implemented by Oct. 2017. - Mumbai tested May 2017 operational planned for Q4 2017; - Singapore testing in Q4 2017 operational for 2018; - Male testing and operational date TBD.	IDS	Trials with Male planned for in 3Q2019. Trial with Chennai on-going. Plan for implementation in 2018 and with Melbourne plan for 1Q2018.	INTELCAN which is able to support ICD Version 3.	

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
THAILAND	BBIS/BIS Routers already implemented. AMHS has been implemented since July 2011. Connection with Bangladesh, Bhutan, Cambodia, China, India, Lao PDR, Myanmar, Singapore, Hong Kong China, and Malaysia implemented. Bangkok -Viet Nam Circuit • IOT Test: Done • POT Test: Planned for end of 3Q2020 Bangkok - Rome Circuit • IOT Test: Planned for 4Q2020 Connection with SITA (SITA AMHS Gateway inter-connections) implemented.	AEROTHAI's AMHS System	The implementation with • Malaysia has done on 14th March 2020 • Lao PDR has done on 14th July 2020 In addition, it is planned to implement AIDC with Cambodia and Myanmar by 3Q2020 and 4Q2020 consecutively.	THALES which supports AIDC feature, APAC AIDC ICD V.3.	
TONGA	AMHS planned for 2008. The provider is linked to the New Zealand AFTN				CPDLC and ADS-C is not considered for lower airspace

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
UNITED STATES	- Australia (1/2019) - Fiji (1/2019) - New Zealand (1/2019) - Japan (2/2019) - Philippines (1Q2021)	IN-HOUSE	- Fiji, Japan, New Zealand, - Tahiti (via New Zealand), - Papua New Guinea (via Australia) (4Q2021) - Philippines (3/2021) - Indonesia via Australia (2020) - Russian Federation (pending joining CRV)	IN-HOUSE which is able to support APAC and NAT ICDs currently Version 2.	
VANUATU					
VIET NAM	AMHS (basic) implemented. Trial phase from 4Q/2015 to 3Q/2018. IOT with Thailand in progress from 4Q/2017 Plan to use AMHS in 4Q/2018; Planned for IOT with Hong Kong, Singapore and Thailand in 2019 For IOT with Laos PDR and Cambodia in 2019.	IN-HOUSE	Operational between Ho Chi Minh and Singapore since July 2014. Trial for additional messages sets since 2018. Implementation between Ho Chi Minh with Philippines planned for 4Q2020;	Support ICD Version 1.0 with THALES at Ho Chi Minh ATM system. Support ICD Version 3.0 with Selex at Hanoi ATM System.	

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
			Technical testing with Cambodia already done; Trials between Hanoi and Vientiane, Lao. PDR on going. with Malaysia TBC Testing with Cambodia on – going; For operation trial TBC.		
Wallis and Futuna (FRANCE)	AMHS implementation planned for end of 2017			COMSOFT	

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CRV IMPLEMENTATION TABLE

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
Australia	Contract in May2018 and service readiness in 3Q 2018	AFTN, ADS-B, AMHS, Voice With: **Australia** February,2019(AMHS/AIDC), March,2019(Voice) **Fiji** March,2019 (AMHS June 2019/AIDC, Voice completed April) **New Zealand,** February, 2019 (AMHS June 2019, AFTN May 2019/AIDC), March, 2019 (Voice April 2019 completed) **Indonesia** 4Q2019 (TBC) (AMHS/AIDC, Voice, ADS-B); **PNG** 4Q2019(TBC), (AMHS/AIDC, Voice) **Singapore** 2Q2019 TBC (AMHS/AIDC, Voice); **South Africa TBC** 3Q2019 TBC (AMHS/AIDC, Voice); **Japan** would be end of 2019.	staged approach	Termination of current COM contract
Bhutan	Contract in 3Q2019, service readiness in 4Q2019	Data(AMHS, AFTN) and voice		Administrative approval from the management for the direct contract and approval from BCAA
Cambodia	As early as convenient, dependent on neighboring countries			Internal decision making

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
China	Contract signed on 21 June 2020.	Applications targeted: Data(AMHS) With: Hong Kong 3Q2020; Japan 4Q2020; Thailand TBD; India TBD. Republic of Korea 4Q2020 ATFM test with Japan and ROK at Sep 2020 over CRV	staged approach	
DemocraticPeople's Republic of Korea	Contract in 3Q2018 and service readiness in 4Q2018	AFTN and VoIP		
Hong Kong, China	Contract signed on 6 April 2018. Connection was installed successfully in June 2018. CRV-Voice with Manila was put into operation in August 2018. CRV-AMHS with Manila was put into operation in May 2019. CRV-AMHS with Taibei was put into operation in May 2020.	DATA (AMHS) With: Beijing 4Q2020; Japan 3Q or 4Q 2020; Thailand (tbc with Aerothai);	staged approach	Need to coordinate with relevant CAAs/ANSPs in joining CRV in a harmonized manner, etc.
Macao, China	Service readiness in Q4 2021	To be confirmed	Staged approach	Migration from X.25 to IPS

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
Fiji	Contract in May 2018 and service readiness in 3Q 2018	Data (AMHS) and VoIP With: Australia ATS voice April 2019 completed, AMHS completed in June 2019, NZ ATS voice completed April 2019 and USA ATS voice completed in March 2019 and AMHS completed in April 2019.	Staged approach	CBA, safety case
France (New Caledonia and French Polynesia)	2019 is target for DNSA to sign contract subject to internal security assessment (done).	ATS Voice, AMHS with Fiji & AIDC, AMHS with USA, AIDC/AMHS with NZ and ATS voice.		CBA, cost must be affordable *Wallis and Futuna: no dedicated connection to CRV*
India	Contract for CRV implementation with M/s PCCW in India will be signed in 4Q of 2020 and CRV Service will be ready in 1Q of 2021 based on the readiness of other BBIS states.	Data first then voice.	staged approach	Internal Administrative approvals & safety case
Indonesia	Contract in 4Q2020 and service readiness in 1Q2021.	AFTN, AMHS, ADS-B and voice		CBA completed
Japan	Contract signed in Nov.2017 and service readiness in1Q 2018for Fukuoka	Data first: With: Hong Kong 1Q2020 USA completed 1Q 2019 Singapore 3Q2019; China 2Q2020 Voice Plan with USA 3Q2020 Daegu (R.O.K) 1Q2021	staged approach	

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
Malaysia	Contract to be signed 4Q 2020 and service readiness in 1Q 2021	AFTN, AMHS, ADS-B and ATS voice	staged approach	New ATC centre operational in 2021 Contract issue with the new ATC main contractor. COM Project is part of the main contract.
Myanmar	Contract will be signed 4Q2020.	AFTN/AMHS, AIDC, ADS-B and voice	staged approach	One of counterparts join in
Nepal	Nepal intends to join CRV on staged approach with AMHS data connectivity as first priority and intends to sign the contract with PCCW within 2020.			
New Zealand	Contract inMay2018 and service readiness in 3Q 2018	Australia AMHS June 2019, French Polynesia AMHS and Voice Chile AMHS (SAM regional network REDDIG)		CBA attractive if all counterparts join in
Philippines	Contract signed in March 2018 and service readiness in 2Q2018	Completed: with **HONG KONG** AIDC - May 2019 AMHS - May 2019 Voice - August 2018 with **TAIPEI** AIDC December 2019 AMHS September 2019, Voice 1Q 2019 with **USA** Voice – July 2019	staged approach	Success transition to the New ATM centre in 4Q2018

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
		Planned: with **SINGAPORE** AMHS – early 4Q2020 with **USA** AMHS - 1Q 2021 AIDC - 1Q 2021 after successful implementation of AMHS		
Republic of Korea	Contract in 3Q2019 and service readiness in 4Q 2019	Data (AMHS), AIDC and VoIP With CHN AMHS 4Q2019 With JPN xx	staged approach	
Singapore	Contract signed in May 2019 and service readiness in 3Q 2019	Data (AMHS over IP) with: Australia 3Q/4Q 2020; Japan 3Q/4Q 2020; and Philippines 4Q 2020. Voice with: Philippines Mar 2020.	Staged approach	CBA attractive if all counterparts join in
Sri Lanka	As soon as CRV is available	AMHS connectivity with Mumbai, Singapore and Male. Direct Speech facilities with Chennai, Trivendrum, Mumbai, Male, Jakarta, Melbourne, Singapore	Phased approach with the implementation of CRV	CBA

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
Thailand	Contract in 3Q 2020 and service readiness in 1Q2021	Data first Then voice, subject to safety case: China 1Q2021 Hong Kong 1Q2021; Singapore 1Q2021; India 2021.	Staged approach	

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
United States	Contract in May 2018 and service readiness in 3Q 2018	1) with Australia AFTN to AMHS over IP: Feb 2019 Voice: March, 2019 2) With Fiji AMHS/AIDC Feb 2019 Voice March, 2019 3) With New Zealand AMHS/AIDC, Voice March 2019 4) With Japan AMHS/AIDC Feb 2019 VOICE: 9/2020 With Philippines AMHS/AIDC 3Q2019 AMHS 1Q2021 VOICE: September, 2019 5) With Indonesia Voice/AMHS 2021 6) With Russian Federation Pending joining CRV 7) With PNG Voice/AMHS: 2021 via Australia with direct CRV planned for 2020 8) other FIRs as opportune (French Polynesia, Samoa, etc.) 7) ATFM, AMHS with Attachment 8) BBIS with Fiji, Australia and Japan 3Q2018 (for only AMHS)	Staged approach	
Viet Nam	To be confirmed later (After discussed with PCCW Global)			

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AERONAUTICAL MOBILE SERVICE (AMS) STRATEGY FOR THE ASIA/PAC REGION

The AMS strategy for the Asia/Pac Region is to:

a) Ensure that all communications are provided within the Aeronautical Mobile (R) Service AM(R)S and the Aeronautical Mobile Satellite (R) Service -AMS(R)S, and protect the use of all radio frequency bands allocated for AM(R)S and AMS(R)S;

b) Retain the VHF voice service as the primary medium for air-ground communication;

c) Supplement voice communication with data-link Flight Information Service (DFIS) applications including D-VOLMET, D-ATIS, DCL and other new applications related to the safety and regularity of flight to reduce congestion of the VHF spectrum, reduce workload, and enhance safety;

d) Retain 25 kHz as the minimum channel spacing in the band 118 – 136 MHz by 2025;

e) Use the frequency band 136 – 137 MHz exclusively for the air-ground VHF data-link applications;

f) Use PBCS approved CPDLC to provide DCPC (Direct controller pilot communications) for more efficient communication and enhanced ATM, especially to improve the capability of Trajectory Based Operation and enhance en-route situation awareness;

g) Retain HF voice for communication in areas where VHF coverage is not available;

h) Provide satellite voice (SATVOICE) where appropriate. States providing SATVOICE service should publish relevant details in their AIP;

i) Enhance AM(R)S and AMS(R)S applications within a performance-based communication and surveillance (PBCS) framework;

j) Strengthen the PBCS monitoring and improve its specifications as well as relevant safety assessments on emerging technologies for communication and surveillance supporting ATM operations in accordance with ICAO DOC 9869 and DOC 10037;

k) Encourage applying Satellite Communications (SATCOM) with suitable performance standards on safety data or voice applications in accordance with ICAO Annex 10 and DOC 10037;

l) Conform to the regional implementation priorities of ASBU, plan and implement new ATS communication services to meet the demands of aviation in the ASIA/PAC Region with the involvement of all stakeholders and taking account of costs and benefits. Taking Trajectory Based Operation (TBO) as thread, promote the ASBU operational concept and technology at the regional level.

Note:

Doc 10037: Global Operational Data Link (GOLD) Manual

Doc 9869: Performance-Based Communication and Surveillance (PBCS) Manual

Doc 9750: Global Air Navigation Plan

STRATEGY FOR IMPLEMENTATION OF THE AIR-GROUND DATA LINK IN THE ASIA/PAC REGION

Considering that:

a) The benefit of data communications to improve safety, efficiency and capacity through the reduction of voice communications and process automation to meet the operational requirement and consistent with the Air Traffic Management Operational Concept;

b) Current operation application of data link to support CPDLC, ADS-C, Data link Flight Information Service (DFIS) including D-VOLMET, D-ATIS and DCL, the need to maintain the functional service of these applications;

c) Current technology such as Satellite data link, HF data link, AeroMACS being acceptable for operations and standardized in SARPs and/or industry standards;

d) Ongoing implementation of VHF ACARS, VDL-Mode 2 AoA (ACARS over Aviation VHF Link Control), VDL-Mode 2 ATN and the need to improve data link communication coverage and capacity;

e) The need for PBCS implementation is prescribed in the Performance-Based Communication and Surveillance (PBCS) Manual (Doc 9869) to ensure that data communications operations are carried out in a safe and efficient manner;

f) The Global Operational Data Link (GOLD) Manual (Doc 10037) provides the globally harmonized guidance on data link service, CPDLC and ADS-C implementation, PBCS specifications and post-implementation monitoring and analysis;

g) Trajectory-Based Operations is fundamental for realizing the ICAO Global ATM Operational Concept and the evolution towards TBO is expected to align with the deployment of Aviation System Block Upgrades (ASBU) as described in the *Global Air Navigation Plan*, (ICAO Doc. 9750);

h) Development of standardized LDACS (L-Band Digital Aerospace Communication System);

i) The future growth of data communications to improve operations and the exchange of information including graphical meteorological information;

j) The need to assure global interoperability and harmonization; and

k) The need to assure communication safety and security.

THE GENERAL STRATEGY FOR THE IMPLEMENTATION OF THE AIR-GROUND DATA LINK INFRASTRUCTURE IN THE ASIA/PAC REGION SHOULD BE AS FOLLOWS:

a) Maintain or ensure compatibility of existing data links to support all current ATM and meteorological applications without change to the application or application specific system.

b) New deployment of VHF data link ground systems should be capable of supporting VDL-Mode 2 in addition to supporting ACARS based on ASBU Block Implementation.

c) In the near term there is no intent to implement VDL-Mode 3, VDL-Mode 4.

d) States are encouraged to work co-operatively to assist each other on a multinational basis to implement the air-ground ATN/IPS based on their operational requirements while maintaining service to support ATN/OSI during the transition period. States should consider implementing ATN OSI/IPS Gateway to support aircrafts equipped with either ATN/OSI or ATN/IPS in addition to existing ACARS.

e) HF voice services used in remote continental and oceanic areas should be transitioned to datalink communications.

f) Deploy new applications on aerodrome surface, terminal and en-route of flight which related flight safety and security based on current and new datalink technology in accordance with ICAO Annex10 and Doc 10037 to reduce congestion of the VHF spectrum, reduce workload, and enhance safety.

g) Apply an RCP specification related to the data link systems for relevant airspace complying with Doc 9869, and establish PBCS monitoring programs to assess against the RCP specification.

h) Encourage states to provide the service of VHF ACARS, VDL-Mode 2 AoA, VDL-Mode 2 ATN and the deployment of appropriate Satellite communications (SATCOM) on safety data or voice applications in accordance with ICAO Annex 10 and Doc 10037.

i) Undertake and monitor research and development of communications technology for the future evolution of data link services in line with ICAO Global Air Navigation Plan (GANP).

j) Implement the Security Services and associated policies and requirements specified in the standards, guidelines, and practices of ICAO SARPS, manuals and guidance materials to ensure continued security, safety and continuity of aeronautical communications services.

Note:

Near-Term: now to 10 years

Long-Term: 15+

Doc 10037: Global Operational Data Link (GOLD) Manual

Doc 9869: Performance-Based Communication and Surveillance (PBCS) Manual

Doc 9750: Global Air Navigation Plan

Doc 7030: Regional Supplementary Procedures

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Project	Task	Regional Priority	Planned Start	Planned completion	Dependencies	Leader	Contributors	F2F/Webconf/email/portal	Comment
AMHS Implementation Registration	Continue coordination with members and other regions to maintain the AMC		On-Going	On-Going		Thailand	All states/Administrations		On-going
Support AIDC implementation	Support Implementation of AIDC including PAN Regional AIDC ICD		2015	2021			States with priorities identified		On-going
Monitoring the SWIM implementation and work of APAC SWIM Task Force	Demonstrate capability of CRV to support SWIM and evaluate the impacts on network bandwidth to incorporate AMHS service.		2016	2021		Hong Kong China, Singapore and Thailand	IATA as reporter to SWIM TF		On-going
	Coordinate SWIM implementation and transition from existing environment to SWIM and confirm role of CRV (SWIM over CRV - role has been confirmed in 2019)		2017	2020					Completed
CRV-OG	Oversight CRV operations and migration of applications		2016	2021					On-going
AMHS Support IWXXM requirement 2020	Implement AMHS FTBP to meet the requirement of IWXXM including the basic AMHS plus FTBP sub-set of extended AMHS as defined in Doc9880. (Requirment for implementation is 5 November 2020) and monitor the possible compression soution following the ICAO guidelines for IWXXM implementation		2017	2020		All States/Administrations			On-going
AFTN/ATSMHS Routing Directory and coordination with AMC	Update to the Directory and prepare a draft new Edition of the Directory		2018	on going		All States/Administrations			Completed
CRV Operations Manual	Develop first draft of CRV Operations manual		2020	2020		CRV OG co-chair, New Zealand, USA, Singapore	Thailand		

Completed Task and Actions items as of ACSICG/7meeting listed below:

COM Strategies	Revise Strategy for implementation of Communications Systems to support ATM operations in APAC		2016	2017 Further updates in 2018		Australia	New Zealand, and USA		COMPLETED
CRV Project (under the TOR of CRV Task Force)	MSA/DOA		2015	2015					Completed
	Cost Benefit Analysis		2014	2015					Completed
	Users requirements (including performance and safety requirements)		2014	2015					Completed
	RFI		2014	2015					Completed
	Sealed Tender		2014	2016					Completed
	Develop/agree on CRV Design (including an IPv6 address plan)			2016					Completed
	Implementation plan			2018					Initial plan done
	Set up CRV OG			2016					Established 12/16
Support ATFM Implementation using FIXM over CRV	Support development of ATFM IP ICD including coordiantion on the use of CRV to support ATFM FIXM (IP ICD developed by ACSICG has been provided to ATFM Group which is considered completed)		2015	2018		Australia			Completed

Project	Task	Regional Priority	Planned Start	Planned completion	Dependencies	Leader	Contributors	F2F/Webconf/email/portal	Comment
Support transition of ATC voice service over IP	support transition to voice over IP (Done through CRV OG/5 Meeting's recommendation)		2015	2019					Completed
Update AMS and Datalink Strategies	Review and update AMS and Datalink Strategies (task given by CNS SG/23 Meeting)		2019	2020/Completed					
AMHS Gateway Implementation	Implement AMHS transition including migration of concerned connections to SITA Type X mid 17 and updating APAC AMHS Naming Plan		2015	2019		Singapore, Thailand and Australia	All states/Administrations		Implemented

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA/PACIFIC REGION
AFTN/AMHS-BASED INTERFACE CONTROL DOCUMENT
FOR
AIR TRAFFIC FLOW MANAGEMENT

Version 2.0

Approved by the Communications, Navigation and Surveillance Sub-Group of APANPIRG (CNS SG)

RECORD OF AMENDMENTS

Version	Description	Date	Authored By	Approved By
1.0	-		ATFM/SG/9	CNS SG/23
2.0	Amendment Outcomes from ATFM/SG/10		ATFM/SG/10	CNS SG/24

TABLE OF CONTENTS

LIST OF ACRONYMS

ADEP .....Departure Airport

ADES .....Arrival Airport

ADEXP .....ATS Data Exchange Presentation

AFIL .....Flight Plan Filed in the Air

AFTN .....Aeronautical Fixed Telecommunications Network

AIDC .....ATS Interfacility Data Communications

AMHS .....ATS Message Handling System

ANSP .....Air Navigation Service Provider

ARCID .....Aircraft Identification

ARR .....Arrival message

ASCII .....American Standard Code for Information Interchange

ATC.....Air Traffic Control

ATFCM .....Air Traffic Flow and Capacity Management

ATFM .....Air Traffic Flow Management

ATS .....Air Traffic Services

ATSU .....Air Traffic Services Unit

CCITT .....~~ITU-T Telecommunication Standardization Sector of the International Telecommunications Union (formerly known as Consultative Committee for International Telephony and Telegraphy)"~~ Consultative Committee for International Telephony and Telegraphy, now known as the Telecommunication Standardization Sector of the International Telecommunications Union (ITU-T)

CDM .....Collaborative Decision Making

CTOT .....Calculated Take-Off Time

DEP .....Departure message

DOF.....Date of Flight Departure

EOBD .....Estimated Off-Block Date

EOBT .....Estimated Off-Block Time

ETFMS .....Enhanced Tactical Flow Management System

FMP.....Flow Management Position

FPL .....Flight Plan message

HDG .....Heading

IA5 .....International Alphabet Number 5

IATA .....International Air Transport Association

ICAO .....International Civil Aviation Organization

ICD .....Interface Control Document

IFPLD .....Individual Flight Plan

IFPLID .....Individual Flight Plan Identifier

IFPS.....Integrated Initial Flight Plan Processing System

IOBD .....Initial Off-Block Date

IOBT .....Initial Off-Block Time

IP .....Internet Protocol

ITU-T.....ITU-T Telecommunication Standardization Sector of the International Telecommunications Union (formerly known as the Consultative Committee for International Telephony and Telegraphy - CCITT)

K .....Kilometre

M .....Mach

N .....Knot

NM .....Network Manager

OBT.....Off Block Time

ODF.....Optional heading information Data Field

REG.....Aircraft Registration

RVR .....Runway Visual Range

SAM .....Slot Allocation Message

SLC .....Slot Cancellation Message

SMI .....Standard Message Identifier

SRM .....Slot Revision Message

TOT .....Take Off Time

UTC.....Coordinated Universal Time

…….

1. ICD SCOPE

This section identifies the scope, purpose, and organization of this Interface Control Document (ICD) and identifies the subsystem responsibility list.

1.1 Introduction

The Distributed Multi-Nodal Air Traffic Flow Management (ATFM) Network concept is based on a network of Air Navigation Service Providers (ANSPs) leading independent ATFM operation within their area of responsibility and connecting to each other through information sharing framework.

Unlike regional-centralized ATFM where there is an overarching authority responsible for ATFM operation for the entire region, each ANSP together with associated Airspace Users (AUs) and Airport Operators (AOs) within their ~~respective FIR (Flight Information Region)~~ area of responsibility comprising one or more Flight Information Regions (FIRs), or airspace within the area of responsibility of ANSPs without an assigned FIR, ~~participating~~ participates in cross-border ATFM following this Distributed Multi-Nodal ATFM Network concept, and ~~form~~ forms an ATFM Node where the ANSP as a Node Leader is responsible for ~~engagement~~ engaging with various Node stakeholders and ensuring that the Node as a whole is ready and able to participate in the regional cross-border ATFM process.

By establishing common ATFM operating procedures and utilizing fully-interconnected information sharing mechanism among ATFM Nodes, ATFM programs based on Collaborative Decision Making (CDM) process, involving both domestic and intra-regional international flights can be effectively implemented in the region.

To achieve the efficient information dissemination required for such ATFM operation, the baseline standard for information exchange among related stakeholders is needed. This Interface Control Document (ICD) specifies the interface requirements which ATFM support system of each Node Leader must meet in order to be able to communicate with systems of other ATFM Nodes participating in the cross-border ATFM and to ensure the compatibility between them.

1.2 Scope

This ICD details the interface between nodes of the distributed Multi-Nodal ATFM.

This ICD:

- Establishes data exchange, functional, and performance requirements
- Assigns responsibilities for interface implementation and maintenance

1.3 Subsystem Responsibility List

The ~~node leader of each FIR~~ leader of each node develops and maintains ~~their~~ its own ATFM software in accordance to this ICD.

1.4 Operational Requirement

The Distributed Multi-Nodal ATFM Network comprises ATFM Nodes, each of which is led by an ANSP responsible for ATFM operation within their ~~respective FIR~~ area of responsibility. With various ATFM support systems ~~which have been developed or procured independently~~ developed independently or procured by different ANSPs and lack of information linkage ~~between~~ among them, ~~a major~~ an airline operating flights across such areas falling within the area of responsibility of different ANSPs ~~with a number of flights originating from many places~~ is required to access different systems to obtain ATFM information on ~~all~~ their flights, ~~consequently creating a possible roadblock to scaling the ATFM Network due to the high workload in accessing their related information~~. The requirement of accessing multiple and varying ATFM support systems increases workload the on part of an airline and so creates a possible roadblock to expanding the ATFM Network to areas falling within the area of responsibility of different ANSPs. This calls for the need of a so-called single-point information access able to be achieved by establishing the interconnection between ATFM support systems aiming at enabling the seamless information sharing among stakeholders. However, to maintain the flexibility to accommodate new users and additional customized functions of ATFM support systems developed or procured separately as previously mentioned and to minimize the impact of changes ~~between~~ among them, loose system coupling is still required. Furthermore, to attain cost-effective communication among stakeholders and to gain the network-wide scalability, common standards for information exchange are needed to be considered. On the other hand, with the nature of decentralized ATFM operational approach where ATFM support system of each ATFM Node locating geographically dispersed, security across systems is of paramount importance. Technical requirements to address the operational need for information sharing between ATFM support systems stated above can be summarized as follows:

1) Loose system coupling
2) Common standards for information exchange
3) System-wide security

To facilitate the aforementioned requirements, this document describes an interface connection that is designed using the currently deployed AFTN networking (or AMHS).

In particular, considering variation in interactions ~~between~~ among stakeholders required at different phases of ATFM operation and keeping in mind the objective of having systems loosely coupled, a data exchange architecture based on existing messaging is chosen to exchange ATFM information. This solution is intended to eventually be deprecated and replaced by a SWIM based solution that uses FIXM data models. However, considering the timeline for deployment of all nodes of the multi-nodal network, it is considered a necessary first step to initially deploy ATFM using data exchange with AFTN/AMHS.

2. APPLICABLE DOCUMENTS

List of all applicable documents:

ICAO DOC 4444

ICAO DOC 9971

Asia/Pacific Regional Framework for Collaborative ATFM

Asia/Pacific Regional ATFM Concept of Operations

FIXM 4.1.0 core

FIXM XXX APAC extension for MN

SWIM Version of the Multi-Nodal ICD

~~MN COP~~ Multi-Nodal Common Operating Procedure

3. INTERFACE CHARACTERISTICS

This section provides the general, functional, and physical characteristics for each AFTN node and the AFTN/AMHS interface.

3.1 General Characteristics

This section identifies the interfacing subsystem(s); the point(s) of interface including associated cable terminations, functions, and services provided by the interface; and each layer implemented within the interfacing subsystem(s) necessary to achieve connectivity.

Figure 1 (next page) identifies the interface described within this ICD and depicts how the systems fit into the logical architecture context of the implementation.

3.1.1 Data Format

In general, data that is sent to the local ATFM System across the interface will use text-based messages, as defined by the *ICAO Doc 4444* standard for exchange of flight information messages. Specifically, the communication described in this ICD is based on the message transfer requirements necessary to exchange character-based International Alphabet Number 5 (IA-5) AFTN message data[1] between two ATM systems. IA-5 is a modified subset of American Standard Code for Information Interchange (ASCII) characters that can only be supported by AFTN and AFTN/AMHS Gateway. The information in this document pertaining to the message transmission is based on the CCITT 1984 X.25 standard[2].

[1] This ICD includes a collection of information from several standards that are applicable to the interface. This is because the Multi-Nodal concept only needs a subset of all of the messages available from the relevant standards. Universally, when discussing the general characteristics of the data format of the messages: the message composition is defined as IA-5 as described in *ICAO Annex 10, Volume I*, paragraph 4.11.1; message format is as specified in *Volume II*, section 4.4.16; and message text shall be as specified in *Volume II*, section 4.4.16.3.

[2] https://icao.int/APAC/Documents/edocs/cns/ICD_X25Protocol.pdf

The messages in this ICD are not defined ~~by~~ in ICAO Doc 4444. ~~These are defined by AIDC and ADEXP~~ They are defined in the EUROCONTROL *ATS Data Exchange Presentation* (ADEXP). For simplicity, ~~aside from some helpful contrasting information between ICAO Doc 4444 and AIDC messaging,~~ only messages related to multi-nodal ATFM operations are included in this ICD.

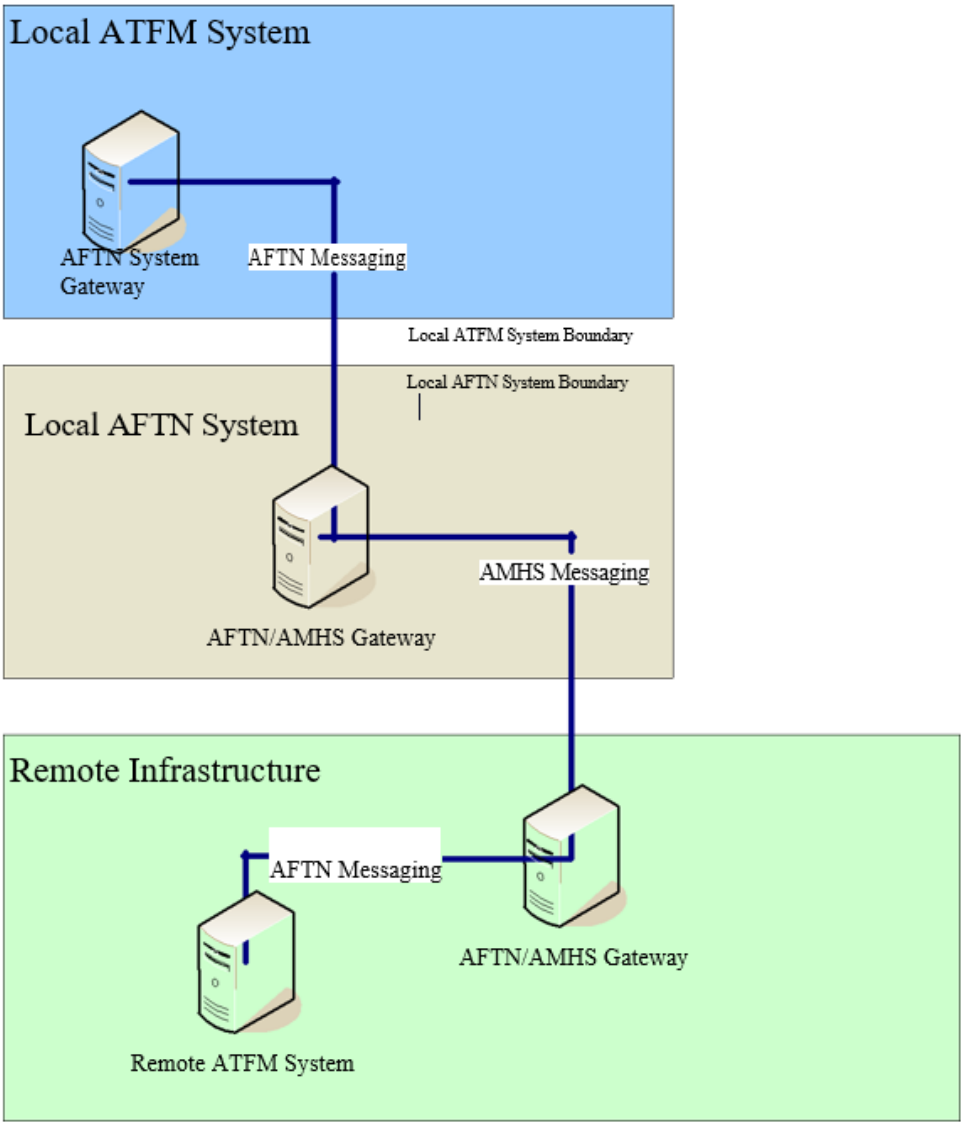


Figure 1: Logical Architecture showing interface demarcation between the Local ATFM System and AFTN/AMHS

3.1.2 Messages defined by ADEXP

For the Slot Allocation Message (SAM) and the Slot Revision Message (SRM), the Slot Cancellation Message (SLC), the standard that is applied is referenced using the EUROCONTROL document: *ATFCM User's Manual Edition 21*, dated 03 May 2018. The SAM, SRM, and SLC follow the same form as required by *ICAO Doc 4444* and as reiterated in this ICD (see section 3.1.4).

3.1.3 Message Construction

Each AFTN message, regardless of the data format, contains a specific structure that is compliant with IA-5 and defined in ICAO Annex 10. This structure is summarized in Table 1.

Field #	Description	Format	Example
1	Start of Message/ Start of heading	~~4 letters~~ 1 character	~~ZCZC~~ 0/1
2	Transmission Identification	3 letters + 3 numbers	HAR001
3	Additional Service Indication	Optional <11 characters	123456
4	Priority Indicator	2 letters	FF
5	Addressee of the message	8 letters	EGLLZRZX
6	Day / time of the message	DDHHMM (UTC)	041345
7	Originator of the message	8 letters	OPSTZQZX
8	Optional Heading Information	ODF – See AIDC	See AIDC
9	ATS Message Payload	…	…
10	End of Message	~~4 letters~~ 1 character	~~NNNN~~ 0/3

Table 1: Summary of IA-5 Fields used in messages sent via AFTN/AMHS

Generally, ICAO, ADEXP, and AIDC use the IA-5 format to send messages over AFTN/AMHS. However, there are key differences in how ICAO and ADEXP use the fields. These differences are explained in the following sections and follow the format illustrated in **Figure 2** and **Figure 3**.

```
FAB3887 251146
FF WSJCZQZX
251146 WMFDYFYX
(DEP-MAS2530/A2165-WMKK1146-WBGG-DOF/150125)
```

Figure 2: IA-5 Illustration of ICAO Message

```
WSB0903 250145
FF YMMLJSTX
250145 VTBBFDMC
—TITLE SAM
—ARCID SAA123
—ADEP FAJS
—ADES FADN
—EOBD 100303
—EOBT 1020
—CTOT 1035
```

Figure 3: IA-5 Illustration of ADEXP Message

3.1.3.1 IA-5 Message Field 1: Start of Message

The Start of Message / Start of heading is handled outside the scope of this ICD, but it is included for completeness.

3.1.3.2 IA-5 Message Field 2: Transmission Identification

The transmission identification field includes a prescribed sequence of characters intended to convey a specific keyboard (terminal) and a channel on which the terminal will communicate:

a) Transmitting-terminal letter

b) Receiving-terminal letter

c) Channel-identification letter

d) Channel-sequence number

For the purposes of this ICD, the Transmission Identification for the local ATFM system will be in alphanumeric code as locally agreed.

3.1.3.3 IA-5 Message Field 3: Additional Service Indication

For the purposes of this ICD, the additional service indication field is the time of the transmission.

3.1.3.4 IA-5 Message Field 4: Priority Indicator

The priority indicator is a two (2)-letter identifier that provides context for the associated message. The following priority indicators are possible:

- SS – Distress message
- FF – Standard Air Traffic Service (ATS) Message
- ~~SS – Distress message~~
- DD – Urgent message
- GG – One of the following:
  - Meteorological message
  - Flight Regularity Message
  - Aeronautical Information Services message
- KK – Aeronautical Administrative message.

For the purposes of this ICD, the ATFM messaging will only send FF messages.

3.1.3.5 IA-5 Message Field 5: Addressee of the Message

The addressee of the message is an eight-character code that is interpreted by the network to determine the routing location that the message will be sent.

When the number of addressees required is more than the operational system parameters allow, two or more transmissions of the message must be made. The eight (8)-letter combination addressee indicators are composed as follows:

- The four (4)-letter ICAO location indicator, as defined by *ICAO DOC 7910* (*Location Indicators*).
- A three (3)-letter designator for the facility type/office, or if no designator has been assigned, ZZZX for aircraft in flight, or YYYX for all other cases. The source of the facility designator is *ICAO DOC 8585, Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services*.
- The eighth character of the address indicates the end system application and is determined by the Air Traffic Services Unit (ATSU).

3.1.3.6 IA-5 Message Field 6: Day / Time of the Message

The day/time field is the time the message is sent by a local ATFM System or filed for sending (for incoming messages). The field is a six (6)-digit date/time group that follows the format, DDHHMM in Coordinated Universal Time (UTC).

3.1.3.7 IA-5 Message Field 7: Originator of the Message

The originator of the message is an eight-character code of the ANSP, organization, and application which is sending the message. Similar to IA-5 Message Field 5, the originator address is constructed in three parts:

- The four (4)-letter ICAO location indicator, as defined by *ICAO DOC 7910* (*Location Indicators*).
- A three (3)-letter designator for the facility type/office, as defined by *ICAO DOC 8585, Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services*.
- The eighth character of the address indicates the end system application and is determined by the ATSU.

3.1.3.8 IA-5 Message Field 8: Optional Heading Information

The optional heading information field is used for AIDC messages. It is rarely used for ICAO or ADEXP messages; therefore, it is not included in this ICD.

3.1.3.9 IA-5 Message Field 9: ATS Message Payload

See section 3.1.4 and section 3.2.

3.1.3.10 IA-5 Message Field 10: End of Message

The end of message field is a specific character sequence that is indicative of the end of the AFTN message. Similar to IA-5 message field 1, this is handled by the AFTN/AMHS gateway; therefore, it is not within the scope of this ICD.

3.1.4 Message Body (ATS Message Payload)

The message body—message type and data—follows the message header. The message body contains the message type and information used to identify the flight attributes as well as maintain an updated flight state. The message body may be different depending on whether it is defined by ICAO or ADEXP. The context of this ICD Is focused on multi-nodal operations, and therefore only ADEXP related messaging is included.

3.1.4.1 Messages defined by ADEXP

In contrast with messages defined by AIDC and ICAO, the message body for ADEXP messages does not begin with an open parenthesis. Instead, they begin with the hyphen "—", followed by a keyword (TITLE), and then the three (3)-letter indicator of the message type. Although there are several complexities related to simple and compound fields in ADEXP messages, for this ICD, the focus is limited to only simple fields.

Each field is delimited a by hyphen "–", and the data elements within each field are separated by '/' or spaces. The example shown in **Figure 4** has been presented in a manner which makes it easy to read. This has been achieved through the use of carriage returns, line feeds, indents, etc. Such a layout does not form part of the ADEXP format rules; therefore, presentation of a message is at the discretion of the receiving system.

—TITLE [Message Type]
—[FIELD1][Element]
—[FIELD2][Element]
—[FIELD3][Element]
…

Figure 4: Overall structure of AFTN (ADEXP) message

Figure 5 is an example of a SAM message that follows the ADEXP structure:

—TITLE SAM
—ARCID SAA123
—ADEP FAJS
—ADES FADN
—EOBD 100303
—EOBT 1020
—CTOT 1035
—REGUL FAJS
—TAXITIME 0015
—REGCAUSE WA 84

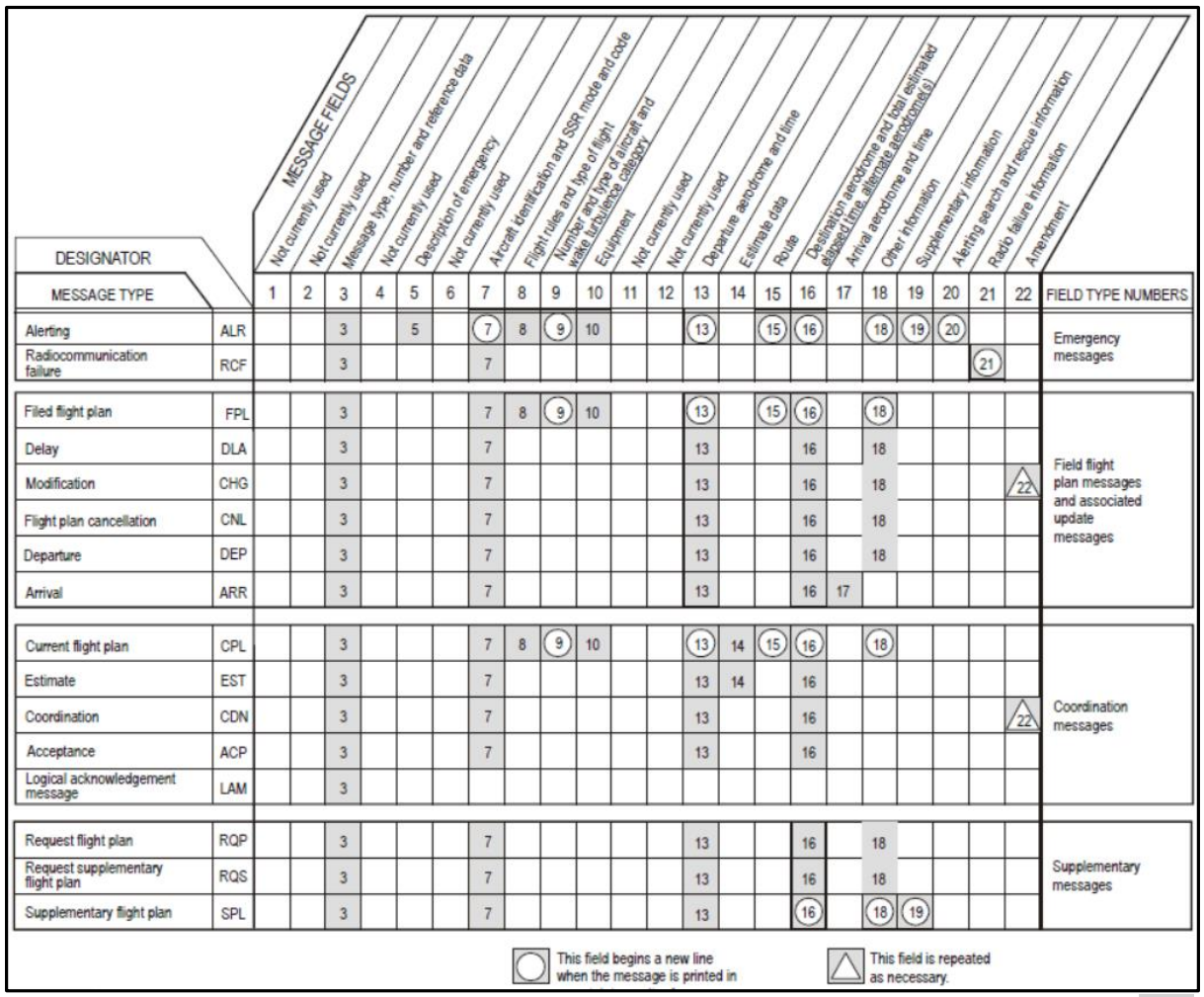
Figure 5: SAM message using ADEXP structure

3.2 Functional Design Characteristics

This subsection describes the functional design characteristics of this interface and focuses on the AFTN messages that contain the information necessary to manage flight data for multi-nodal operations, or are related to the communication between a local ATFM system and AFTN. These messages are independent of the messaging system—AFTN or AMHS.

Every AFTN message contains a combination of identifying fields for uniqueness and specific flight data attributes for the flight. **Table 2** shows the information contained in each field and which fields are sent with each message type from *ICAO Doc 4444 ~~ATM/501~~ PANS-ATM* and includes all AFTN messages. **Table 3** shows a similar table for those messages defined in ADEXP[3].

[3] **Table 3** indicates the messages, as defined in ~~by the~~ ADEXP. ~~however, the~~ The source of the table is ~~actually~~ the EUROCONTROL *Air Traffic Flow & Capacity Management Operations (ATFCM) Users Manual, edition 22.1,* dated 14 November 2018.]



DESIGNATOR / MESSAGE TYPE		1 Not currently used	2 Not currently used	3 Message type, number and reference data	4 Not currently used	5 Description of emergency	6 Not currently used	7 Aircraft identification and SSR mode and code	8 Flight rules and type of flight	9 Number and type of aircraft and wake turbulence category	10 Equipment	11 Not currently used	12 Not currently used	13 Departure aerodrome and time	14 Estimate data	15 Route	16 Destination aerodrome and total estimated elapsed time, alternate aerodrome(s)	17 Arrival aerodrome and time	18 Other information	19 Supplementary information	20 Alerting search and rescue information	21 Radio failure information	22 Amendment	FIELD TYPE NUMBERS
Alerting	ALR			3		5		(7)	8	(9)	10			(13)		(15)	(16)		(18)	(19)	(20)			Emergency messages
Radiocommunication failure	RCF			3				7														(21)		
Filed flight plan	FPL			3				7	8	(9)	10			(13)		(15)	(16)		(18)					Field flight plan messages and associated update messages
Delay	DLA			3				7						13			16		18					
Modification	CHG			3				7						13			16		18				(22)	
Flight plan cancellation	CNL			3				7						13			16		18					
Departure	DEP			3				7						13			16		18					
Arrival	ARR			3				7						13			16	17						
Current flight plan	CPL			3				7	8	(9)	10			(13)	14	(15)	(16)		(18)					Coordination messages
Estimate	EST			3				7						13	14		16							
Coordination	CDN			3				7						13			16						(22)	
Acceptance	ACP			3				7						13			16							
Logical acknowledgement message	LAM			3																				
Request flight plan	RQP			3				7						13			16		18					Supplementary messages
Request supplementary flight plan	RQS			3				7						13			16		18					
Supplementary flight plan	SPL			3				7						13			(16)		(18)	(19)				

(○) This field begins a new line when the message is printed in

(△) This field is repeated as necessary.

Table 2: Fields and corresponding flight information contained in each ICAO ~~4444~~ ATS message type (*Source – ICAO Doc 4444 PANS-ATM Appendix 3*)

PRIMARY FIELD COMPOSITION OF TACTICAL ATFCM MESSAGES EXCHANGE (1)														
Message Field	**SAM**	**SRM**	**SLC**	**SIP**	**FLS**	**DES**	**RRP**	**RRN**	**ERR**	**SMM**	**SPA**	**SRJ**	**FCM**	**RJT**
-TITLE	1	1	1	1	1	1	1	1	1	1	1	1	1	1
-IFPLID	1	1	1	1	1	1	1	1	(1)	(1)	(1)	(1)	(1)	(1)
-ADDR	(1)	(1)	(1)	(1)	(1)	(1)								
-ARCID	1	1	1	1	1	1	1	1	(1)	1	1	1	1	1
-ADEP	1	1	1	1	1	1	1	1	(1)	1	1	1	1	1
-EOBD	1	1	1	1	1	1	1	1	(1)	(1)	(1)	(1)	(1)	(1)
-EOBT	1	1	1	1	1	1	1	1	(1)	1	1	1	1	1
-IOBD	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
-IOBT	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
-CTOT	1			1			(1)	(1)		1				
-NEWCTOT		1		1			(1)	(1)			1			
-NEWPTOT							(1)	(1)						
-REJCTOT												1		
-REASON	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)					
-ADES	1	1	1	1	1	1	1	1	(1)	1	1	1	1	1
-REGUL	1<	1<		1<	0<								0<	
-ORGRTE							1	1						
-PTOT					(1)		(1)	(1)						
-NEWRTE							1	1						
-RRTEREF							(1)	1						(1)
-RVR	(1)	(1)			(1)								(1)	
-RESPBY				1	(1)		1	1						
-ORGMSG									(1)					
-FILTIM									1					
-ERRFIELD														
-MINLINEUP														
-COMMENT	0<	0<	0<	0<	0<	0<	0<	0<	0<					
-TAXITIME	1	1	1	1	1	1	1	1	(1)					
-REGCAUSE	1	1			(1)									
-OBTLIMIT - VALPERIOD							1	1						
-TTO	1	1												

'1' means: exactly one field of the specified type is required
'(1)' means : a single optional field of the specified type is allowed
a 'blank cell' means: this field is not in a message
'n<' means: n or more occurrences of this field can appear in a message

Table 3: Fields and corresponding flight information contained in each ADEXP message type

The messages needed to perform the slot management functionality are the SAM, SRM and SLC. Each message sent by the Local ATFM system to AFTN/AMHS or received by the local ATFM System from AFTN/AMHS is compliant with *ADEXP*. The table 3 above is for reference only, please refer to the table 4 below for the exact ADEXP fields to be sent in the respective SAM, SRM and SLC messages.

3.2.1 ADEXP ATS Message Payload – Message Fields

Table 4 provides an overview of the data that is contained in each field for the ADEXP messages defined in this document. The complete structure and the format of the information in each field can be found in the *EUROCONTROL Specification for ATS Data Exchange Presentation (ADEXP), version 3.2*.

Each ATFM message comprises a number of fields, some of which are mandatory and some of which are optional. This may vary from message to message. Specific requirements are given in this document according to the principles of the ADEXP Standard document already mentioned. All ATFM messages shall begin with the TITLE field. The order of other fields is optional.

The field IFPLID, the unique identifier assigned to a flight by EUROCONTROL's Integrated Initial Flight Plan Processing System (IFPS) (two (2) alphabetic characters followed by eight (8) digits, e.g. —IFPLID AA12345678), will be in all ADEXP messages issued by the Network Manager (NM). EUROCONTROL's Enhanced Tactical Flow Management System (ETFMS) will accept the IFPLID when provided in an incoming message in ADEXP format. Therefore, messages sent to NM may include the Individual Flight Plan (IFPLD). The field is optional and it is not used in any other system worldwide so the value can be anything such as AA00000000.

The M and O designation in Table 4 indicates mandatory or optional fields for the specific message; if the field is blank it is not used for the specific message.

ADEXP Field Name	Message & Example	SAM	SRM	SLC
TITLE	-TITLE SAM	M	M	M
ADDR	-BEGIN ADDR -FAC LLEVZPZX -FAC LFFFZQZX -END ADDR	O	O	O
ARCID	-ARCID AMC101	M	M	M
IFPLID	-IFPLID AA12345678	O	O	O
ADEP	-ADEP EGLL	M	M	M
ADES	-ADES LMML	M	M	M
EOBD	-EOBD 160224	M	M	M
EOBT	-EOBT 0950	M	M	M
IOBD	-IOBD 160224	O	O	O
IOBT	-IOBT 0950	O	O	O
CTOT	-CTOT 1030	M		
NEWCTOT	-NEWCTOT		M	
REGUL	-REGUL RMZ24M	O	O	O
TAXITIME	-TAXITIME 0020	M	M	M
REGCAUSE	-REGCAUSE CE 81	M	M	
REASON	-REASON	O	O	O
RVR	-RVR	O	O	O
COMMENT	-COMMENT	O	O	O

Table 4: Flight data attributes associated with ADEXP message fields

3.2.1.1 TITLE Field

The TITLE field is a three (3)-letter identifier of the message. The TITLE field always is first in the payload. The syntax required for this field is:

'-' "TITLE" titleid

3.2.1.2 ADDR Field

List field that requires BEGIN and END (i.e., -BEGIN ADDR and –END ADDR) as brackets around a listing of eight character addresses with subfields (e.g., -FAC CFMUTACT). The eight-character identifiers are the same as that which is identified for location identifiers in section 3.1.3.5. The syntax required for this field is:

'- "BEGIN" "ADDR" 1 { fac } '-' "END" "ADDR"

3.2.1.3 ARCID Field

The ARCID field is the registration marking of the aircraft, or the ICAO designator of the aircraft operator followed by the flight identifier. The syntax required for this field is:

'-' "ARCID" aircraftid

3.2.1.4 IFPLID Field

IFPS Identification. This is the unique flight plan identification which is issued by EUROCONTROL's Flight Planning System (IFPS). It is only available in flight plans that have been distributed in ADEXP format. The IFPLID is two (2) alphabetic characters followed eight (8) digits, e.g. —IFPLID AA12345678), and will be in all ADEXP messages issued by the NM. EUROCONTROL's ETFMS will accept the IFPLID when provided in an incoming message in ADEXP format. Therefore, messages sent to NM may include the IFPLD. The field is optional and it is not used in any other system worldwide, so for sending the message to any other ATFM system, the value can be anything such as AA00000000.

The Syntax required is:

'-' "IFPLID" 2{ALPHA}2 ! 8{ DIGIT }8

3.2.1.5 ADEP Field

ICAO indicator for Aerodrome of Departure. The syntax required is:

'-' "ADEP" (icaoaerodrome | 'AFIL' | 'ZZZZ')

3.2.1.6 ADES Field

ICAO indicator for Aerodrome of Destination. The syntax required is:

'-' "ADES" (icaoaerodrome | 'ZZZZ')

3.2.1.7 EODB Field

Estimated Date of Flight. The format is YYMMDD (i.e., no century). The syntax required is:

'-' "EOBD" YYMMDD

3.2.1.8 EOBT Field

Estimated Off-Block Time. The syntax required is:

'-' "EOBT" hhmm

3.2.1.9 IOBD Field

Initial Off-Block Date. The format is YYMMDD (i.e., no century). The syntax required is:

'-' "IOBD" YYMMDD

3.2.1.10 IOBT Field

Initial Off-Block Time. The syntax required is:

'-' "IOBT" hhmm

3.2.1.11 CTOT Field

Calculated Take-Off Time. Importantly, the send or receipt of an SAM message (with a CTOT) is only done at approximately two hours before EOBT. This relative delivery time will allow the ATFM systems to determine whether the CTOT is intended for the current day or next day. Specifically, if the CTOT will be late enough in the day relative to current time that it actually is for the next day, the ATFM systems can assume it is the next day and use the EOBD to determine the correct day of flight. The syntax required is:

'-' "CTOT" hhmm

3.2.1.12 NEWCTOT Field

A new Calculated Take-Off Time, as updated by an ATFM system. Importantly, the send or receipt of an SRM message (with a NEWCTOT) is only done at approximately two hours before EOBT. This relative delivery time will allow the ATFM systems to determine whether the NEWCTOT is intended for the current day or the next day. Specifically, if the NEWCTOT will be late enough in the day relative to current time that it actually is for the next day, the ATFM systems can assume it is the next day and use the EOBD to determine the correct day of flight. The syntax required is:

'-' "NEWCTOT" hhmm

3.2.1.13 REGUL Field

The —REGUL field indicates the name of the ATFM Measure affecting the flight. Several —REGUL fields may be present, the first one being the ATFM Measures field that controls the flight. The syntax required is:

'-' "REGUL" regulid

3.2.1.14 TAXITIME Field

The difference in time between the ‘off blocks time’ and the ‘take-off time’. The times referred to could be actual or estimated depending upon the context. The syntax required is:

'-' "TAXITIME" hhmm

3.2.1.15 REGCAUSE Field

In order to provide more specific nomenclature for delay causes and, at the same time, to assist the post-flight analysis, the ADEXP field —REGCAUSE comprises:

a) ATFM Measure cause code (one (1)-letter code corresponding to the cause assigned by the Flow Management Position [FMP] upon the implementation of the ATFM measure).

b) ATFM Measure Location code—one (1)-letter code: D, E or A, describing the phase of the flight (Departure, Enroute, and Arrival) of the constraint that triggered the ATFM Measure.

c) A space.

d) The IATA Delay Code in numeric (e.g., 81, 82, 83, 89) or 00 when no IATA Code available.

- The following codes comprise the list of Air Traffic Control (ATC) delay codes. There are other codes related to airline operations that are not applicable to this ICD and are therefore omitted. The codes are as follows:
    i. 81 (AT) ATFM due to ATC EN-ROUTE DEMAND/CAPACITY, standard demand/capacity problems
    ii. 82 (AX) ATFM due to ATC STAFF/EQUIPMENT EN-ROUTE, reduced capacity caused by industrial action or staff shortage, equipment failure, military exercise, or extraordinary demand due to capacity reduction in neighboring area
    iii. 83 (AE) ATFM due to RESTRICTION AT DESTINATION AIRPORT, airport and/or runway closed due to obstruction, industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights
    iv. 84 (AW) ATFM due to WEATHER AT DESTINATION
    v. 85 (AS): Mandatory security
    vi. 86 (AG): Immigration, Customs, Health
    vii. 87 (AF): Airport Facilities, parking stands, ramp congestion, buildings, gate limitations
    viii. 88 (AD): Restrictions at airport of destination, airport/runway closed due obstruction, industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights
    ix. 89 (AM): Restrictions at airport of departure, airport/runway closed due obstruction, industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights, start-up and pushback, weather phenomena.

The —REGCAUSE appears in the SAM and SRM messages, and is associated only with the controlling ATFM Measure. The code appearing in the message is the code valid at the time the delay was given to the flight.

The syntax required is:

'-' "REGCAUSE" regulationreasoncode locationccode ” “ IATAdelaycode

3.2.1.16 REASON Field

Reason to explain an action by the FMP (e.g. rejection, cancellation, etc.). The syntax required is:

'-' "REASON" 4{ALPHA}12

3.2.1.17 RVR Field

Runway Visual Range. The syntax required is:

'-' "RVR" 1{ DIGIT }3

3.2.1.18 COMMENT Field

This field provides additional information. The syntax required is:

'-' "COMMENT" 1 { LIM_CHAR }

3.2.1.19 REFDATA Field

This is reference data for the message being transmitted that collectively defines the unique message number. This field has three subfields, namely the sender subfield, the receiver (recvr) subfield, and the sequence number (seqnum) subfield. The sender subfield indicates the eight (8)-letter facility address of the sending facility; the receiver subfield indicates the eight (8)-letter facility address to which the message is being sent; and the sequence number subfield indicates the three (3)-digit serial number of the message being sent.

The message sequence number progresses sequentially from 001 to 000 (representing 1000), thence repeats from 001, for all messages sent to the same addressee, regardless of the type of message.

The three (3)-digit sequence number, the sender and receiver address, creates a unique combination used as the reference data. This is the equivalent of Field type 3, element (b) called ‘message number’ in *ICAO Doc 4444*.

The syntax required is:

'-' "REFDATA"

'-' "SENDER" '-' "FAC" 1{ LIM_CHAR }30

'-' "RECVR" '-' "FAC" 1{ LIM_CHAR }30

'-' "SEQNUM" 3{DIGIT}3

3.2.1.20 MSGREF Field

Reference data for associated, previously transmitted messages. This field has three subfields, namely the sender subfield, the receiver (recvr) subfield and the sequence number (seqnum) subfield. Together the MSGREF field is intended to provide the necessary reference context for a message being sent. The sender subfield indicates the eight (8)-letter facility address that sent the original message; the receiver subfield indicates the eight (8)-letter facility address to which the original message was sent; and the sequence number subfield indicates the three (3)-digit serial number of the original message sent.

This is the equivalent of Field type 3, element (c) called 'reference data' in *ICAO Doc 4444*.

The values of Sub-fields "sender", "recvr", and "seqnum", within Primary field "msgref", shall be those of the same Sub-fields within Primary field "refdata" of the OLDI message referred to

'-' "MSGREF"

'-' "SENDER" '-' "FAC" 1{ LIM_CHAR }30

'-' "RECVR" '-' "FAC" 1{ LIM_CHAR }30

'-' "SEQNUM" 3{DIGIT}3

3.2.2 ADEXP ATS Message Payload Types

3.2.2.1 SAM Message Composition

A SAM is sent by the local ATFM System any time a flight is assigned a CTOT. The SAM is used to inform of the Calculated Take-Off Time (CTOT) for each individual flight. The SAM is to be sent approximately 2 hours before EOBT. The construct shown in **Table 5** is inclusive of only the mandatory ~~messages~~ information.

~~TITLE~~	**~~SAM~~**
~~ARCID~~	**~~Aircraft ID~~**
~~IFPLID~~	**~~TBD value~~**
~~ADEP~~	**~~Departure Airport~~**
~~ADES~~	**~~Arrival Airport~~**
~~EOBD~~	**~~Estimated Off Block Day~~**
~~EOBT~~	**~~Estimated Off Block Time~~**
~~CTOT~~	**~~Calculated Take-Off Time~~**
~~TAXITIME~~	**~~Estimated Taxi Time~~**
~~REGCAUSE~~	**~~ATFM Measure Cause Code~~**

- TITLE	**SAM**
- ARCID	**Aircraft ID**
- ADEP	**Departure Airport**
- ADES	**Arrival Airport**
- EOBD	**Estimated Off-Block Day**
- EOBT	**Estimated Off-Block Time**
- CTOT	**Calculated Take-Off Time**
- TAXITIME	**Estimated Taxi Time**
- REGCAUSE	**ATFM Measure Cause Code**

Table 5: SAM message – mandatory information

3.2.2.2 SRM Message Composition

A SRM is sent by an ATFM system any time a flight that has already received. A SAM message, is assigned a revised CTOT. The SRM is used to inform of the new Calculated Take-Off Time (CTOT) for each individual flight. Since the goal is to send the original CTOT (via SAM) approximately 2 hours before EOBT, the SRM should not be sent until after the SAM has been acknowledged, + a short interval of time (e.g., 5 minutes). That way, the SAM will always be the first message sent with a CTOT, and SRM messages are suppressed until the CTOT is sent. All revisions to the CTOT should be sent via SRM. The construct shown (**Table 6**) is inclusive of only the mandatory messages.-

~~TITLE~~	~~SRM~~
~~ARCID~~	~~Aircraft ID~~
~~IFPLID~~	~~TBD value~~
~~ADEP~~	~~Departure Airport~~
~~ADES~~	~~Arrival Airport~~
~~EOBD~~	~~Estimated Off Block Day~~
~~EOBT~~	~~Estimated Off Block Time~~
~~NEWCTOT~~	~~New Calc Take-Off Time~~
~~TAXITIME~~	~~Estimated Taxi Time~~
~~REGCAUSE~~	~~ATFM Measure Cause Code~~

TITLE	**SRM**
- ARCID	**Aircraft ID**
- ADEP	**Departure Airport**
- ADES	**Arrival Airport**
- EOBD	**Estimated Off-Block Day**
- EOBT	**Estimated Off-Block Time**
- NEWCTOT	**New Calculated Take-Off Time**
- TAXITIME	**Estimated Taxi Time**
- REGCAUSE	**ATFM Measure Cause Code**

Table 6: SRM message – mandatory information

3.2.2.3 SLC Message Composition

A SLC is sent by an ATFM system any time a flight is no longer assigned a CTOT. The SLC is used to inform that the previously assigned Calculated Take-Off Time (CTOT) no longer applies for an individual flight. The construct shown (**Table 7**) is inclusive of only the mandatory messages.

~~TITLE~~	~~SLC~~
~~ARCID~~	~~Aircraft ID~~

~~**IFPLID**~~	~~**TBD value**~~
~~**ADEP**~~	~~**Departure Airport**~~
~~**ADES**~~	~~**Arrival Airport**~~
~~**EOBD**~~	~~**Estimated Off Block Day**~~
~~**EOBT**~~	~~**Estimated Off Block Time**~~
~~**TAXITIME**~~	~~**Estimated Taxi Time**~~

- TITLE	**SLC**
- ARCID	**Aircraft ID**
- ADEP	**Departure Airport**
- ADES	**Arrival Airport**
- EOBD	**Estimated Off-Block Day**
- EOBT	**Estimated Off-Block Time**
- TAXITIME	**Estimated Taxi Time**

Table 7: SLC Message Composition – mandatory information

3.2.3 Message Summary Table

~~Table 5~~ **Table 8** provides a summary of the required message including the ID, message title, ~~whether it is required,~~ and the message flow direction.

ID	Message Title	Message Direction
SAM	Slot Allocation Message	Local AFTN System ←→ AFTN
SRM	Slot Revision Message	Local AFTN System ←→ AFTN
SLC	Slot Cancellation Message	Local AFTN System ←→ AFTN

Table 8: Message summary table

3.2.4 Protocol implementation

TBD – dependent on specific site implementation

3.2.5 Security

This is a direct connection between AFTN / AMHS and the local ATFM system through a cable connection and after the data is ingested into local ATFM System, the interface is controlled explicitly via firewall rules and precise protocols.

3.3 Physical Design Characteristics

TBD – dependent on specific site implementation

3.3.1 Electrical Power and Electronic Characteristics

3.3.1.1 Connectors

TBD – dependent on specific site implementation

3.3.1.2 Wire/Cable

TBD – dependent on specific site implementation

3.3.1.3 Electrical Power/Grounding

TBD – dependent on specific site implementation

3.3.1.4 Fasteners

TBD – dependent on specific site implementation

3.3.1.5 Electromagnetic Compatibility

Not applicable.
