



Fourth ATN Transition Task Force Meeting

Mumbai, India, 8 - 12 April 2002

Agenda Item 3: Review ATN technical documents and transition issues.

**AN EXAMPLE OF TECHNICAL MEMORANDUM OF
COOPERATION (TMC)
FOR BI-LATERAL AGREEMENT**

(Presented by Japan)

Summary

This document is presented as an example of Technical Memorandum of Cooperation (TMC) for bi-lateral agreement on AMHS implementation. It is recommended for the states who are going to implement AMHS connection using ATN Router to refer this paper when needed during the future action. The meeting is invited to note the information provided in this paper.

1. Introduction

Many States are recently planning ATN/AMHS implementations in the Asia/Pacific region. For the implementation, there will be coordination work between States; normally bi-lateral agreement between two States.

2. Discussion

An example of the Technical Memorandum of Cooperation (TMC) for bi-lateral agreement is presented. This document is based on the previous TMC of JCAB, but the names (e.g. A-CAA of STATE A and B-CAA of STATE B) and the schedule are fictitious. The contents can be revised according to the difference of situation of each State when they will use the document.

3. Action by the meeting

The meeting is invited to note the information provided in this paper.

TECHNICAL MEMORANDUM OF COOPERATION

BETWEEN

*CIVIL AVIATION AUTHORITY
STATE A*

AND

*CIVIL AVIATION AUTHORITY
STATE B*

**AMHS TRIALS AND SERVICE
BETWEEN STATE A AND STATE B**

The Civil Aviation Authority, STATE A, hereinafter referred to as “A-CAA” and the Civil Aviation Authority, STATE B, hereinafter referred to as “B-CAA”, hereby enter into a cooperative Technical Agreement to conduct the trials and service of ATS Message Handling System, hereinafter referred to as “AMHS”, between the two ATS authorities. This agreement shall be referred to as a Technical Memorandum of Cooperation (TMC).

ARTICLE I - PURPOSE OF THE TMC

This TMC identifies and defines the procedures by which each party will jointly conduct AMHS trials and service between A-CAA and B-CAA.

ARTICLE II - REFERENCE DOCUMENTS

Letter of A-CAA Ref. XXXX dated XX XX XXXX.

Letter of B-CAA Ref. XXXX dated XX XX XXXX responding to the letter of A-CAA.

ARTICLE III - FINANCIAL TERMS

Each party shall be responsible for all associated cost from their local end up to the international interconnection points through their respective telecom carriers for the AMHS connection, as well as any associated equipment costs required for the AMHS Trial and the subsequent AMHS service.

**ARTICLE IV - TECHNICAL AND FUNCTIONAL SPECIFICATION
FOR THE SERVICE**

SPECIFICATION:

The AMHS shall be based on the ATSMHS Standards and Recommended Practices (SARPs) and Technical Provisions which are in the Sub-volume III of Doc. 9705 and Annex 10/ Volume III/ Part 1 /Chapter 3 published by ICAO. The overview specification of the AMHS connection is described in the attachment of this TMC titled AGREEMENT OF AMHS TRIALS AND SERVICE BETWEEN A-CAA AND B-CAA. The more detailed specification will be the matter to be coordinated between the two parties according to the following Project Schedule;

PROJECT SCHEDULE:

Activity	Schedule Date
Agreement on TMC	April 2003
AMHS Technical Trial	November to December 2003
AMHS Operational Trial	April to May 2004
Initiation of AMHS Operational Service to replace current AFTN Service	September 2004
Decommissioning of AFTN service	January 2005 (tentative)

The detailed schedule is given at the attachment of this TMC.

ARTICLE V - AMENDMENTS

This TMC may be amended by mutual agreement of the parties to provide for changes in requirements, or service details. Proposed changes will be prepared by the initiating party and coordinated with the other party. Modifications may be made by paragraph change or attachment to the basic TMC, as appropriate.

The coordination points between A-CAA and B-CAA for any required amendments to this TMC, are designated as follows:

For the A-CAA: Mr. X

(title)
(section)
Civil Aviation Authority

(address), STATE A
TEL: XXX XXXX XXXX
FAX: XXX XXXX XXXX
E-mail: XXXXXX@XXX.XXX.XX

For the B-CAA: Mr. Y

(title)
(section)
Civil Aviation Authority

(address), STATE B
TEL: XXX XXXX XXXX
FAX: XXX XXXX XXXX
E-mail: XXXXXX@XXX.XXX.XX

ARTICLE VI - AUTHORITY

The A-CAA and B-CAA agree to the provisions of this agreement as indicated by their signatures, or that of their authorized representatives, as indicated below.

Civil Aviation Authority, STATE A

BY:

X
(title)
(section)

Date: _____

Civil Aviation Authority, STATE B

BY:

Y
(title)
(section)

Date: _____

Attachment:

AGREEMENT OF AMHS TRIALS AND SERVICE
BETWEEN A-CAA AND B-CAA
(Specification Overview of AMHS Trials and Operational Service)

1. Introduction

A-CAA and B-CAA have agreed on a specification overview such as AMHS Functions, Network Configuration, Protocol Specification Overview and Coordination Schedule as described below.

2. AMHS Functions

AFTN/AMHS Gateway function will be available in A-CAA and B-CAA for conducting joint AMHS Technical Trial and Operational Trial. Subject to satisfactory results obtained in these trials, the AFTN/AMHS Gateways at both A-CAA and B-CAA will be put into Operational Service, with exact date to be mutually agreed upon a joint review, to provide an operational ATN/AMHS connection between A-CAA and B-CAA to replace the existing AFTN circuit.

3. Network Configuration

3.1 AMHS Technical Trial

The AMHS Technical Trial will be conducted between A-CAA Test Center (A-TC) and B-CAA Test Center (B-TC). The intersystem configuration for the trial is shown in Fig 1 below.

During the Technical Trial, simulated AFTN messages will be exchanged between trial equipment at both A-CAA and B-CAA. They will comprise AFTN development systems (DEV), AMHS (with AFTN/AMHS Gateway function) and ATN G/G Routers. Public X.25 Packet Switched Data Network (PSDN) will be used to interconnect the ATN G/G Routers at both sides.

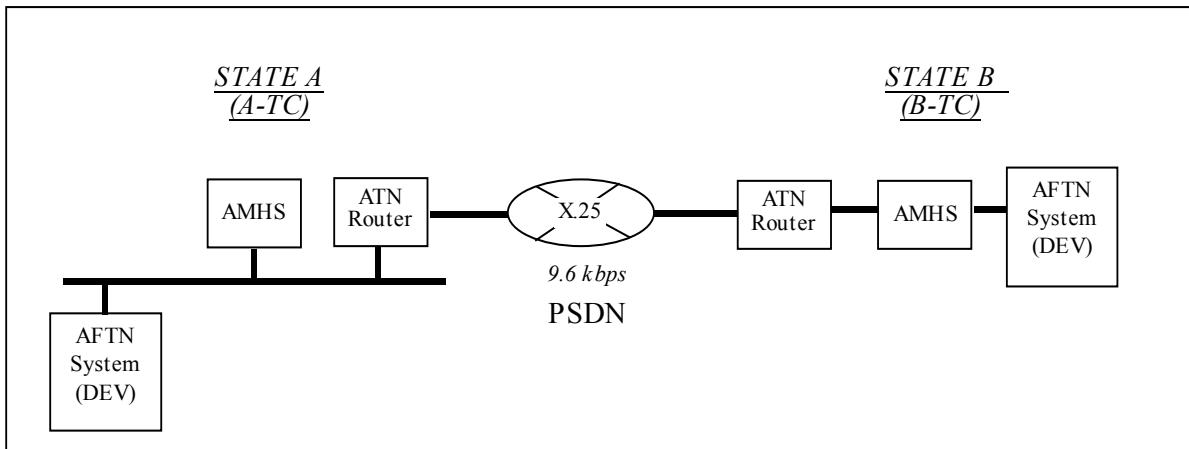


Figure 1 - Connection Configuration for AMHS Technical Trial

Example of Technical Memorandum of Cooperation for Bi-lateral Agreement

ATTACHMENT to the Technical Memorandum of Cooperation (TMC) AMHS Trials and Service between STATE A and STATE B

3.2 AMHS Operational Trial

The AMHS Operational Trial will be conducted for A-CAA Test Center (A-TC) with B-CAA Test Center (B-TC). The intersystem configuration is shown in Fig 2 below.

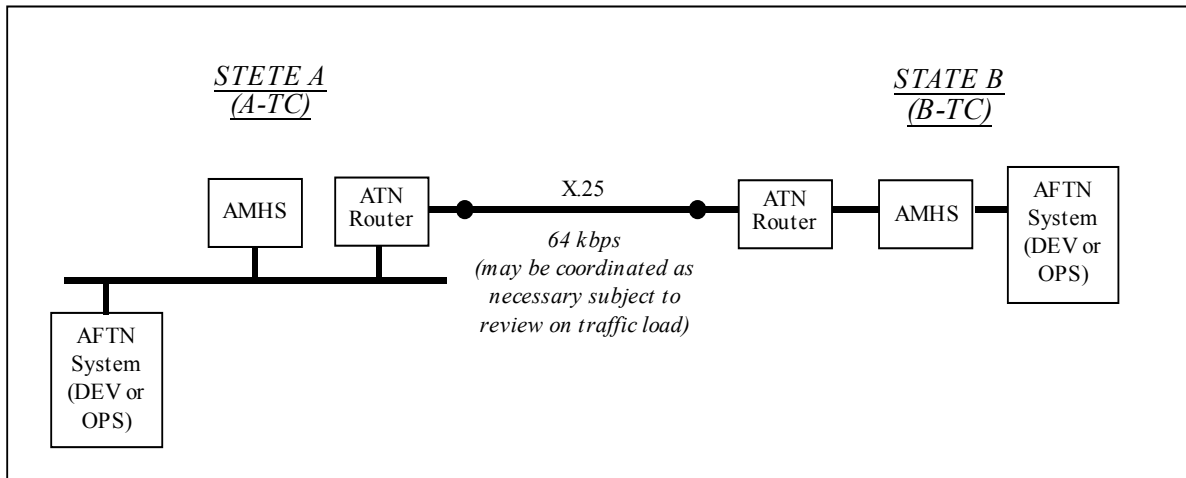


Figure 2. Connection Configuration for AMHS Operational Trial Phase I

Note: AFTN System (DEV) is the development system used for the trial.

Before the Operational Trial, appropriate final AMHS (AFTN/AMHS Gateway) and final ATN G/G Router for the use of Operational Service will be developed by two sides.

During the Operational Trial, simulated AFTN messages are to be exchanged between final systems at both A-CAA and B-CAA. They will comprise AFTN development systems (DEV), final AMHS (with AFTN/AMHS Gateway function) and final ATN G/G Routers. Final leased circuit for Operational Service will be used to interconnect the ATN G/G Routers at both sides. The data rate of the leased circuit will be reviewed and coordinated based on the ATN circuit loading with the AMHS message traffic.

After the successful completion of exchange test of simulated AFTN message, live AFTN traffic of the existing AFTN circuit will be duplicated and exchanged over the AMHS (AMHS/AFTN Gateways) and ATN G/G Routers of both sides through the same leased circuit.

Example of Technical Memorandum of Cooperation for Bi-lateral Agreement

ATTACHMENT to the Technical Memorandum of Cooperation (TMC) AMHS Trials and Service between STATE A and STATE B

3.3 AFTN/AMHS Transition

Subject to satisfactory results of the Operational Trial, AFTN/AMHS Transition will then be conducted between the AFTN Communications Centers (ACC) of A-CAA and B-CAA, with the intersystem configuration as shown in Fig 3.

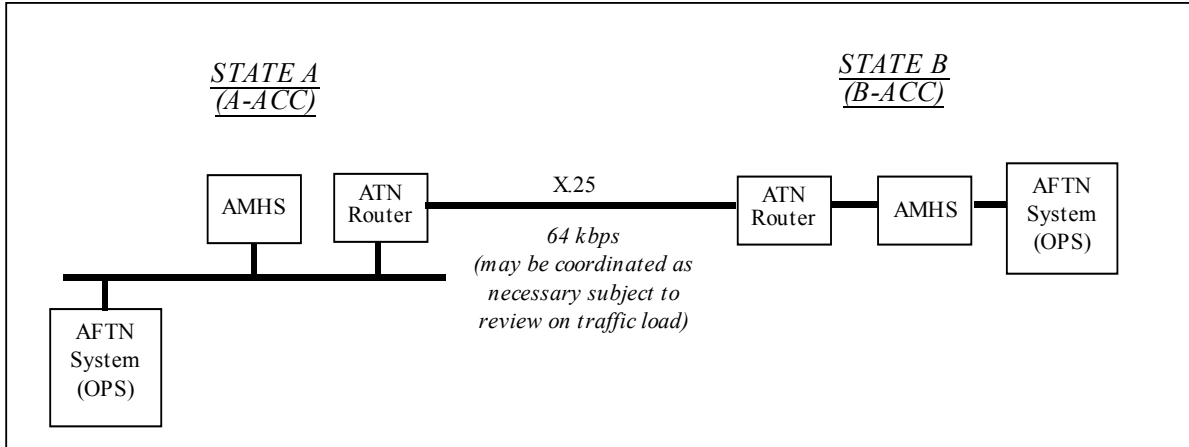


Figure 3. Connection Configuration for AMHS Operational Trial Phase II and Operational Service

The AFTN/AMHS Transition will be mainly for the Connection Test between A-CAA and B-CAA only with limited test for the confirmation that the same result of Operational Trial will be obtained after the connection change of the systems from “A-TC/ B-TC” to “A-ACC/ B-ACC”.

Under this stage, live AFTN traffic will be exchanged over the A-CAA/ B-CAA ATN/AMHS connection for subsequent replacement of the existing AFTN circuit which will still be used for fallback purpose.

3.4 Operational Service

Subject to the testing of the agreed procedures and the satisfactory operational trials, A-CAA and B-CAA will put the AFTN/AMHS gateways and ATN G/G router structure into operational service with the exact date to be mutually agreed upon a joint review.

4. Protocol Specification Overview

4.1. Protocol Stack of AMHS and ATN Router

Figure 4 shows the OSI protocol stack of End System (ES) and Intermediate System (IS) in the ATN. AMHS is ES and ATN Router is IS.

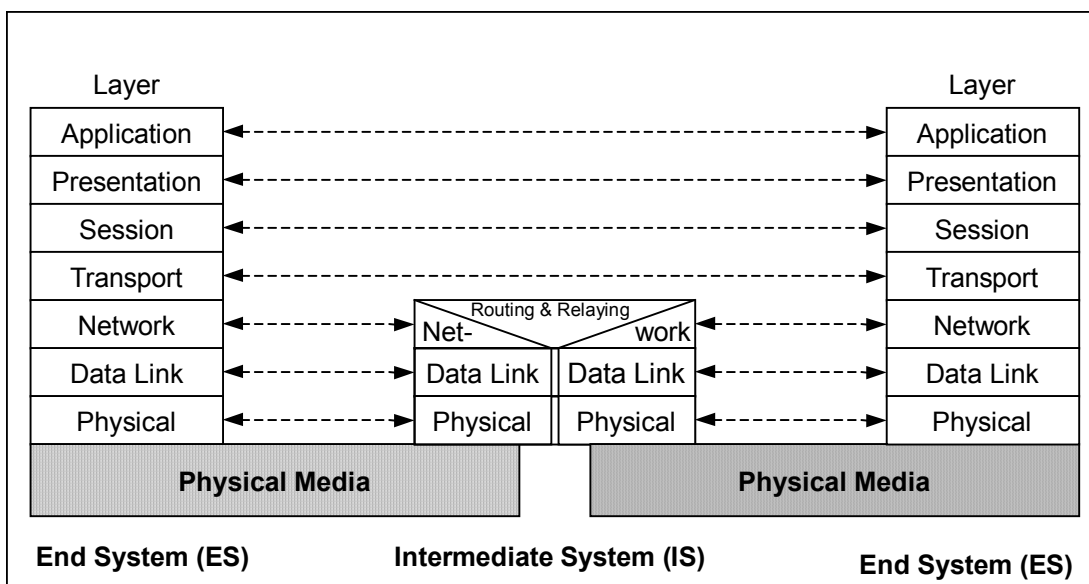


Figure 4. OSI Protocol Stack of ES and IS

Example of Technical Memorandum of Cooperation for Bi-lateral Agreement

ATTACHMENT to the Technical Memorandum of Cooperation (TMC) AMHS Trials and Service between STATE A and STATE B

4.2. AMHS Protocol Specification

The followings are the standards and/or ICAO Doc 9705/AN-956 descriptions of protocols at each OSI protocol layer, with which AMHS should comply.

(1) Application Layer

Application Layer is composed of MHS, RTSE, and ACSE.

MHS should comply with ITU-T X.400 (1988) and the additional requirements specified in 3.1 “ATS MESSAGE HANDLING SERVICE” of ICAO Doc 9705/AN-956. MHS supports all the mandatory elements of AMH11 and AMH21, and also supports the DL functional group. The other optional elements may be the matter to be discussed.

RTSE should comply with ISO 9066-2 and support the mandatory services listed below among the services specified in ISO/IEC ISP 10611-2.

RT-OPEN
RT-CLOSE
RT-TRANSFER
RT-P-ABORT
RT-U-ABORT

ACSE should comply with ISO 8650 and support the mandatory functions of normal mode specified in ISO/IEC 10611-2. Moreover, the application-context name, which is used as a parameter of A-ASSOCIATE, should comply with ISO/IEC 10021-6.

(2) Presentation Layer

Presentation Layer should comply with ISO 8823 and support mandatory functions of normal mode specified in ISO/IEC ISP 10611-2.

(3) Session Layer

Session Layer should comply with ISO 8327 and support functional units listed below which are specified in ICAO Comprehensive ATN Manual and ISO/IEC ISP 10611-2.

Kernel
half duplex
exceptions
minor synchronize
activity management

(4) Transport Layer

COTP (Connection Oriented Transport Protocol) specified in ICAO Doc 9705/AN-956 should be used. COTP should comply with ISO/IEC8073 Class 4 and 5.5 “TRANSPORT SERVICE AND PROTOCOL SPECIFICATION” of ICAO Doc 9705/AN-956. The following functions should be supported as specified mandatory by ICAO Doc 9705/AN-956.

Both Initiating CR TPDU and Responding to CR TPDU

Example of Technical Memorandum of Cooperation for Bi-lateral Agreement

ATTACHMENT to the Technical Memorandum of Cooperation (TMC)
AMHS Trials and Service between STATE A and STATE B

Function of Non-use of checksum	
CR/CC/DR/DC/DT/ED/AK/EA/ER TPDUs	
Optional Parameters of CR/CC TPDUs	
	TSAP-ID (Transport-Selector designation)
	Additional option selection parameter
	Priority
	Acknowledgment time Negotiation
	Inactivity timer Negotiation
Optional Parameters of AK TPDUs	
	Flow control confirmation
	Subsequence number

(5) Network Layer

The connection between AMHS and ATN Router is a local matter. However, CLNP (Connectionless Network Protocol) should be used for the communication of subnetwork with Transport Layer. CLNP should comply with ISO/IEC8473 and 5.6 “INTERNETWORK SERVICE AND PROTOCOL SPECIFICATION” of ICAO Doc 9705/AN-956. The following functions should be supported as specified mandatory by ICAO Doc 9705/AN-956.

Security Parameter
Partial Route Recording
Priority
QoS Maintenance Information
Congestion Notification
X.25 Priority procedure

CLNP uses SNDCEF (Subnetwork Dependent Convergence Function) over the subnetwork. SNDCEF should comply with ISO/IEC 8473-3 and 5.7 “SPECIFICATION OF SUBNETWORK DEPENDENT CONVERGENCE FUNCTIONS” of ICAO Doc 9705/AN-956. Only ES-IS in compliance with ISO/IEC9543 is used for addressing. Routing protocol IDRP will not be supported.

(6) Data Link Layer

The connection between AMHS and ATN Router is a local matter.

(7) Physical Layer

The connection between AMHS and ATN Router is a local matter.

Example of Technical Memorandum of Cooperation for Bi-lateral Agreement

ATTACHMENT to the Technical Memorandum of Cooperation (TMC) AMHS Trials and Service between STATE A and STATE B

4.3. ATN Router Protocol Specification

The followings are the standards and/or ICAO Doc 9705/AN-956 descriptions of protocols at each OSI protocol layer, with which ATN Router should comply.

(1) Network Layer

The connection uses ITU-T Recommendation X.25. Network Layer procedures should comply with Packet Layer procedures specified in ITU-T X.25 standards applicable for the relevant routers to be used. CLNP used to support Transport Layer should comply with ISO/IEC8473 and 5.6 "INTERNETWORK SERVICE AND PROTOCOL SPECIFICATION" of ICAO Doc 9705/AN-956.

The following functions should be supported as specified mandatory by ICAO Doc 9705/AN-956.

Security Parameter
Partial Route Recording
Priority
QoS Maintenance
Congestion Notification

CLNP uses SNDCF over the subnetwork. SNDCF should comply with ISO/IEC8473-3 and 5.7 "SPECIFICATION OF SUBNETWORK DEPENDENT CONVERGENCE FUNCTIONS" of ICAO Doc 9705/AN-956.

IDRP is used for the exchange of routing information between ATN Routers in B-CAA and A-CAA. The IDRP should support the functions specified in ISO/IEC10747 and ICAO Doc 9705/AN-956.

The support of IS-IS protocol and ES-IS protocol is a local matter.

(2) Data Link Layer

X.25 Data Link Layer procedures should comply with LAPB procedure specified in ITU-T X.25 standards applicable for the relevant routers to be used.

(3) Physical Layer

X.25 Physical Layer should be used in compliance with ITU-T X.25 standards applicable for the relevant routers to be used.

For AMHS Technical Trial, public X.25 Packet Switched Data Network (PSDN) at a data rate of 9.6 kbps will be used.

For AMHS Operational Trials and the subsequent Operational Service, international leased circuit will be used. The data rate of the leased circuit will be reviewed and coordinated based on the ATN circuit loading with the AMHS message traffic.

Example of Technical Memorandum of Cooperation for Bi-lateral Agreement

ATTACHMENT to the Technical Memorandum of Cooperation (TMC)
AMHS Trials and Service between STATE A and STATE B

5. Coordination Schedule

The following is an agreed schedule of coordination activities between A-CAA and B-CAA for the joint AMHS Trials and AMHS Operational Service.

No.	Coordination Activities		Estimated milestones or duration
1	Agreement on TMC and Specification Overview (this document)		Apr. 2003
2	Coordination of Functions/Service and AMHS ICD (including PICS) for Technical/Operational Trials	Proposal	May 2003
		Coordination	June 2003
		Agreement	July 2003
3	Coordination of Test Plan for Technical Trial	Proposal	Aug. 2003
		Coordination	Aug. 2003
		Agreement	Sep. 2003
4	Coordination of Test Procedure for Technical Trial	Proposal	Sep. 2003
		Coordination	Sep. 2003
		Agreement	Oct. 2003
5	ATN Router Connection Test for Technical Trial between A-TC and B-TC		Nov. 2003
6	AMHS Connection Test via ATN Routers for Technical Trial between A-TC and B-TC		Nov. to Dec. 2003
	Technical Trial		
7	Coordination of Plan for Operational Trial and AFTN/AMHS Transition	Proposal	Dec. 2003
		Coordination	Dec 2003
		Agreement	Jan. 2004
8	Coordination of Test Procedure for Operational Trial	Proposal	Feb. 2004
		Coordination	Feb. 2004
		Agreement	Mar. 2004
9	Installation of a new international leased circuit between STATE A and STATE B		Jan. 2004
10	Operational Trial		Apr. to May 2004
11	Coordination of Procedure for AFTN/AMHS Transition	Proposal	May 2004
		Coordination	May 2004
		Agreement	Jun. 2004
12	Preparation and Connection Test for AFTN/AMHS Transition between A-ACC and B-ACC		July to Aug. 2004
	AFTN/AMHS Transition		
13	Initiation of AMHS Operational Service between STATE A and STATE B to replace current AFTN Service		Sep. 2004
14	Decommissioning of AFTN service between STATE A and STATE B		Jan. 2005 (tentative)

TC : Test Center
ACC : AFTN Communication Center

6. Contents of the activities

(1) Agreement on TMC and Specification Overview

To make an agreement on the specification overview such as AMHS Functions, Network Configuration, Protocol Specification Overview or Coordination Schedule, which are necessary for the further action of the AMHS service between STATE A and STATE B, as described in this document.

(2) Coordination of Functions/Service and AMHS ICD (including PICS)

To make an agreement on the Functions and Services based on the ICAO SARPs (Doc 9705), the ICAO Comprehensive ATN Manual (Doc 9739) and the regional AMHS ICD, taking the AMHS operation into account. In order to confirm the connectivity and to make clear the conditions of each protocol, PICS (Protocol Implementation Conformance Statement) based on ISO/IEC Standard included in the AMHS ICD will be used.

(3) Coordination of Test Plan

To make an agreement on the environment, test items and schedule of the Connection Test and Trials between STATE A and STATE B.

(4) Coordination of Test Procedure

To make an agreement on the detailed test procedure of the Connection Test and Trials between STATE A and STATE B.

(5) Connection Test between STATE A and STATE B

To perform the connection test according to the Test Plan and the Procedure.

(6) Technical and Operational Trials

To perform the technical trial and operational trial according to the Test Plan and the Procedure.

(7) AFTN/AMHS Transition

To transfer the operation of international communication from AFTN to AMHS between STATE A and STATE B.

(8) Initiation of AMHS Operational Service

AMHS connection will become the main live international connection between STATE A and STATE B. The existing AFTN circuit will be retained for some months for fallback purpose.

(9) Decommissioning of AFTN service

The existing AFTN circuit will be decommissioned and totally replaced by the new AMHS service between the two AFTN Communication Centers.

Example of Technical Memorandum of Cooperation for Bi-lateral Agreement

ATTACHMENT to the Technical Memorandum of Cooperation (TMC)
AMHS Trials and Service between STATE A and STATE B

<References>

- 1) ICAO Doc 9705/AN-956, “MANUAL OF TECHNICAL PROVISIONS FOR THE AERONAUTICAL TELECOMMUNICATION NETWORK (ATN)”, SECOND EDITION (Effective 10 December 1999)
 - a) Sub-Volume I : 1.1 “DEFINITIONS AND REFERENCES”
 - b) Sub-Volume III : 3.1 “ATS Message Handling Services (ATSMHS)”
 - c) Sub-Volume V : “Internet Communication Service”
- 2) ICAO Doc 9739/AN-961 Comprehensive ATN Manual, First Edition (2000.)
- 3) ICAO Annex 10, Vol. II, Fifth edition (July 1995)
- 4) ICAO APANPIRG AMHS ICD (Version 1.0, April 2002)

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