



*International Civil Aviation Organization*

**Fifth Meeting of Aeronautical Telecommunication Network (ATN)  
Transition Task Force of APANPIRG**

Phuket, Thailand, 9 – 13 June 2003

**Agenda Item 4: Review the development status of ATN technical documents.**

**Proposed Initial Draft of Asia/Pacific Regional ATN/AMHS  
System Management Transition Guideline Document**

(Presented by the Rapporteur of the ATNTTF Ad Hoc Working Group)

**SUMMARY**

This information paper presents the initial draft of the development of transitional System Management guidance in regard to facilitating the implementation of ATN/AMHS in the Asia Pacific region. The initial proposed draft of the document is attached to this information paper.

**1. Background**

ICAO has published ATN SARP's (Doc 9705) with include technical provisions for System Management in the ATN environment.

**2. Discussion**

In order to maintain interoperability between states and domains within the region and develop the necessary procedures and agreements necessary to promote the efficiency and implementation of the ATN/AMHS network in the region it is essential to identify, develop and define elements critical to the management of the Network

**3. Action by the Meeting**

a) Review the attached document, provide comments, and recommend changes, additions, or deletions.

b) Recommend that all States and Domains within the region adopt and implement ATN/AMHS network System Management based on the SARPs and transitional guidance.



**International Civil Aviation Organization  
Asia and Pacific Office**

**Draft  
Asia/Pacific Regional ATN/AMHS  
System Management Transition Guideline Document**

**SUMMARY**

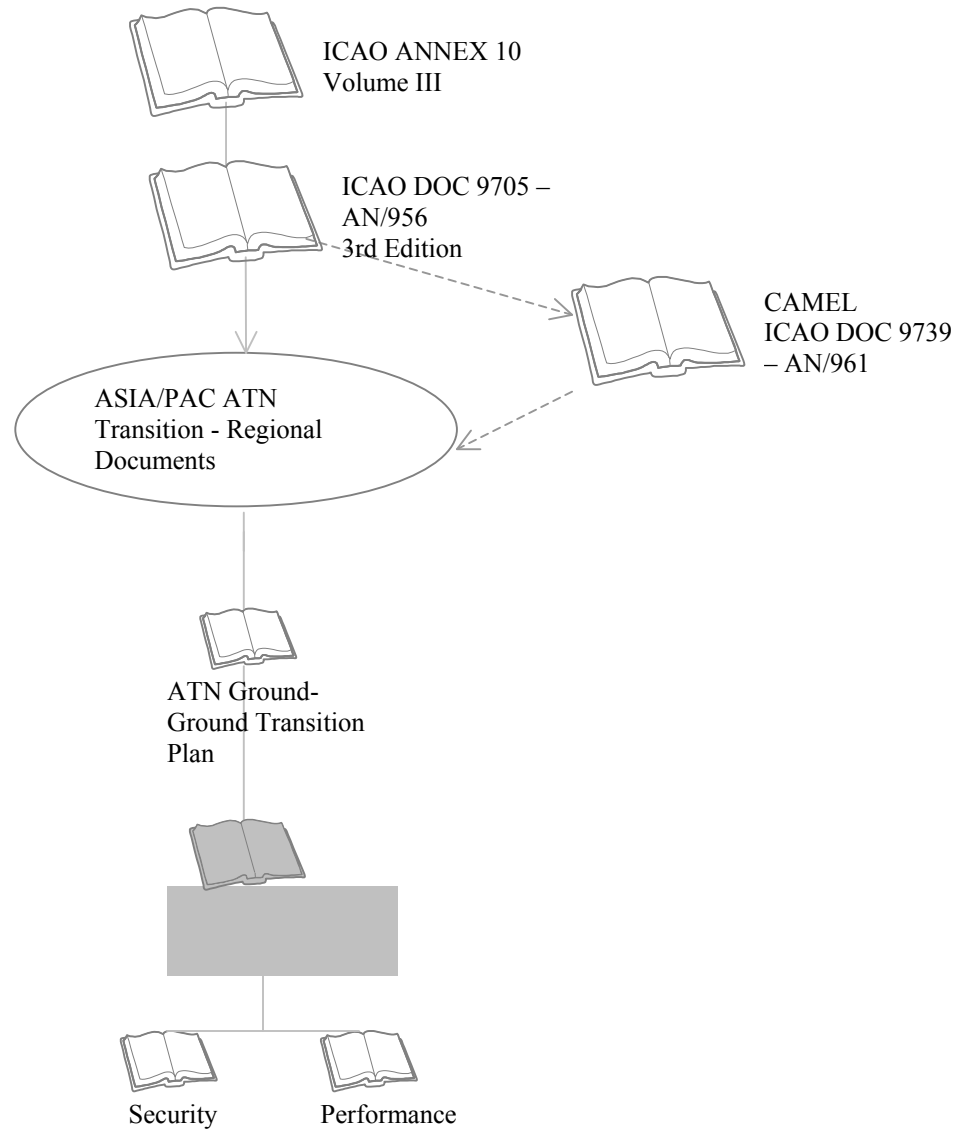
This document is intended to provide initial direction and guidance in the identification, development, and selection of ATN/AMHS management tools and needs for transition from current systems and methods to the ATN/AMHS.

Version 1.0 – March 2003

## **Table of Contents**

1. Location in Regional Transition Documentation Tree
2. Introduction
  - 2.1. Objectives
  - 2.2. Scope
  - 2.3. References
3. OSI Network Management Model
  - 3.1. Configuration elements
  - 3.2. Fault Elements
  - 3.3. Performance elements
  - 3.4. Security elements
  - 3.5. Accounting elements
4. General Requirements for Network Management
5. Supporting Agreements
  - 5.1. Service Level Agreements
  - 5.2. Technical Memorandums of Cooperation
  - 5.3. Memorandums of Agreement
6. Legacy Systems
7. Informational Knowledge Base System Management Elements for ATN/AMHS network
  - 7.1. Points of Contact
  - 7.2. Offices of responsibility
  - 7.3. Generation of performance reports
  - 7.4. Publication of performance reports
  - 7.5. Distribution of performance reports
8. Verification and Certification activities and recommendations for network participants
9. Summary of Recommendations
10. Appendix A: Example: Service Level Agreement (SLA)
11. Appendix B: Example: Technical Memorandum of Cooperation (TMC)
12. Appendix C Example: Memorandum of Agreement (MOA)

# 1 Location in Documentation Tree



## 2. Introduction:

The Aeronautical Telecommunication Network Transition Task Force is preparing documents that will facilitate and guide the Asia and Pacific regions in the introduction and implementation of ATN/AMHS in the region. This document is developed as a reference guideline for the introduction of network management principles and application of the principles. In-depth technical provisions and specifications that support network management referred but not included and considered beyond the scope of this document.

### 2.1 Objectives

The objective of this document is the facilitation and establishment of network management practices that augment operational practices, policies, and procedures within the region. The document will identify the basic needs and requirement for management of networks comprising the entire network identified as the ATN/AMHS.

### 2.2 Scope

Scope includes:

- Introduction of applicable management concepts
- Establishment of documents governing network management
- Managed areas and elements
- Activities performed
- Definition of management information

### 2.3 References

References include:

- Manual of technical provisions for the ATN (Doc 9705-AN/956) Third Edition
- ISO/IEC and ITU-T International standards for the OSI environment
- The list is endless

## 3.0 OSI Network Management Model

**Recommendation:** Implement management systems that embody all the concepts of the OSI Reference Model. Any technology that is not capable of implementing the reference model abstract is in all likelihood unsuitable as an implementation base and deficient in some respect.

The Open Systems Interconnection (OSI) reference model is one of the most basic yet essential elements of network computing. The *model is an abstract* and actual network implementations need not strictly adhere. The OSI model provides a structured approach and introduction to network management concepts. OSI is a product of the International Standards Organization.

There are 5 essential or basic elements comprising the model. Each basic element is expanded to include additional sub-elements to broaden the basic categories. When developing and identifying System Management applications and agents the basis of requirements and recommendations should be derived from the OSI model.

- Configuration Management
- Fault Management
- Performance Management
- Security Management
- Accounting Management

### **3.1 Configuration elements**

Basic configuration elements that the OSI model identifies that should be managed, and maintained in regard to the operational and physical configuration of primary as well as supporting network elements.

Five (5) basic configuration element:

- Change Control
- Inventory Hardware
- Inventory Software
- Software
- Configuration Information

### **3.2 Fault elements**

Elements of system management that are basic and all system management applications and agents should consider. How they are reported, controlled, and mitigated are the essence of the baseline response of the management application in regard to system problems.

The OSI model identifies 6 basic areas regarding managed fault elements.

- Events
- Alarms
- Problem Identification
- Troubleshooting
- Problem Resolution
- Fault Logging

### **3.3 Performance elements**

These sub-elements comprise the basic spheres of performance defined by the OSI model for system management. The performance elements defined for the ATN/AMHS will encompass and capture the elements defined in the model. Titles and definitions may vary slightly but ATN/AMHS performance metrics should maintain the essence of the model.

- Network-Capacity Planning
- Availability
- Response time
- Accuracy
- Throughput
- Utilization

### **3.4 Security elements**

Essential elements that comprise the broader area of providing levels of system integrity in regard to the distribution and protection of information transported and stored on networks comprising the ATN/AMHS.

- Policy
- Authority
- Access Level
- Exceptions
- Logging
- Authentication failure

### **3.5 Accounting elements**

Elements identified in the OSI model that provide the basis abstract of what to consider in regard to the fiscal policies, agents, methods, and requirements to control costs and utilize networks to minimize the cost of the delivery and collection of information.

- Asset Management
- Cost Control
- Charge-back

#### **4.0 General Requirements for Network Management**

Performance of the ATN/AMHS depends on the effective and efficient exchange of network information derived from machine sources as well as the operational procedures and guidelines of those using, operating and maintaining the systems. To properly monitor and maintain the ATN/AMHS to provide the necessary quality of service (QoS) general provisions of what is exchanged in what manner and when must be determined and agreed. General requirements for network management should be defined. There is a minimum set of systems management requirements which applies to each type of ATN system (ES, BIS, IS, etc.).

In general:

- Systems management events shall be logged locally for subsequent processing report generation and performance requirements.
- Systems shall have the capability of notifying local systems of relevant events to systems management subsystems.
- Systems management shall have the capability to manually and automatically configure network elements to optimise performance and mitigate failures.
  - This is a local matter for independent domains.
  - Boundary systems will require some designation of responsibility for configuration, monitoring, and intervention.

#### **5.0 Supporting Management and Implementation Agreements**

- Service Level Agreements (SLA)
  - Those documents developed between participants (domains) that identify and commit the participants to effective and efficient management and operation of the ATN/AMHS once commissioned. These documents minimally will be bilateral and with the expansion of ATN/AMHS expected to be multilateral.
    - Example: Appendix A
- Technical Memorandums of Cooperation (TMC)
  - Documents developed bilaterally, and multilaterally governing the commitment and responsibility of participants during the development, implementation, and testing phases of the ATN/AMHS deployment prior to operational commissioning. These documents will logically be replaced by SLA's and SOA's governing responsibility subsequent to operational integration and commissioning.



- Example: Appendix B
- Memorandums of Agreement(MOA)
  - Documents developed between Authorities and other participants in the ATN/AMHS networks governing requirements and commitments that promote the efficiency of the service and provide information necessary to achieve a mutually agreed objective or commitment.

## 5.1 Service Level Agreement

**Recommendation:** ATN/AMHS participants will develop Service Level Agreements between independent domains, states, and service providers to facilitate performance and restoration.

**Recommendation:** SLA's will be developed internally within domains to assure domain performance supports and makes possible the global ATN.

**Recommendation:** Service level agreements (SLA) should depict the domain responsible for configuration, monitoring, and intervention of shared boundary devices utilized by the entire network. This does not necessarily designate maintenance or repair responsibility only the operation and configuration in the dynamic in-service environment.

The agreement should contain at a minimum the following information:

- Purpose:
  - Statement of the essential rationale for the development of the document
- Scope of Services:
  - Description of the basic commitments and services that shall be performed by the signatories to the document.
- Performance Goals:
  - Surrounding substance and achievements identified and defined that spell out accomplishment relative to mutually agreed performance expectations of the participating parties.
- Performance Measures:
  - Identified and detailed formats that specify the measures and methods used by the participants to achieve Performance Goals.
- Constraints:
  - Controls identified and cited by the participants that limit the parties abilities to achieve fully some services identified in the scope of the agreement, specific stipulations.
- Maintenance Schedules:
  - Information provided by the participating parties to make participants aware of independent maintenance activities effecting the joint performance and operation of the ATN. Also, published availability of technical support services.

- Terms of Agreement:
  - Declaration of the participating party's intent to abide by and fulfill the covenants and stipulations of the agreement.
- Amendments
  - A description of the requirements of the parties and the procedure necessary to change or amend the agreement. The agreement can be amended either by attachment or modification of the body.
- Approval/Authority:
  - Signature page of the document that identifies those individuals acting as appropriately designated representatives of their organizations or businesses and they have the authority to commit the organization or business to fulfill the terms of the agreement.

## 5.2 Technical Memorandums of Cooperation

**Recommendation:** States and organizations that develop and deploy ATN/AMHS systems in the Asia Pacific region should develop and publish TMC's that outline their activities and formalize their intent.

**Recommendation:** Achievements, problems, and lessons learned from activities associated with the TMC should be published and shared among interested parties.

The TMC agreement at a minimum should contain the following information.

- Preamble
  - Identifies the participants in the agreement and the general purpose of the agreement, and that the agreement is a Technical Memorandum of Cooperation (TMC).
- Article I - Purpose of the TMC
  - This identifies and defines the procedures by which each party will jointly conduct ATN/AMHS trials and service between participants.
- Article II - Reference Documents
  - This article identifies the documents leading to the development of the TMC.
    - Initial inquiries and formal letters desiring cooperation
    - Supporting documents relied on in the development of the TMC.
- Article III - Financial Terms

- Identifies the parties responsibilities in regard to telecommunications costs and equipment costs relative to testing and implementation.
- Article IV - Technical and Functional Specification for the Service
  - Technical and implementation specifications.
  - High level project schedule identifying significant accomplishment points.
    - A more detailed schedule should be provided as an attachment to the TMC.
- Article V – Amendments
  - The description of the procedure and requirements necessary to amend or modify the agreement
- Article VI – Authority
  - Signature page of the document that identifies those individuals acting as appropriately designated representatives of their organizations or businesses and having the authority to commit the organization or business to fulfill the terms of the agreement.

### **5.3 Memorandums of Agreement**

- A living agreement between parties detailing the responsibilities of the individual parties in the attainment of the articles of the agreement.
-

## **6.0 Managing Legacy Systems**

To meet fully the requirements to provide distributed systems management across the full range of ATN/AMHS systems that will comprise the ATN/AMHS information and network management environments, it is also necessary to integrate the management of legacy (proprietary) systems.

Characterized by their use of management systems based on protocols and interfaces that are not conformant or obsolescent legacy systems can fail to conform to ATN standards and practices.

**Recommendation:** To provide interoperability between technologies it is critical to identify management applications that provide interoperability with legacy systems. This may allow legacy systems to be integrated into distributed, heterogeneous management systems, however, this integration is limited to interoperability between management systems, and will not provide for portability of management software between systems. Management systems can be implemented using a variety of technologies.

## **7.0 Informational Knowledge Base System Management Elements for ATN/AMHS network:**

**Recommendation:** Principle and supporting organizations, businesses, and states should at a minimum gather, retain, and keep current the items identified as Basic Operational Knowledge Base Elements. Availability and currency of these items will facilitate repair, and efficient performance of the ATN/AMHS service.

Many of these items can be maintain as informational objects in the Management Information Base (MIB), and Cross Domain MIB (CDMIB) of system management applications. Facilities and offices should make available to organizations responsible for network management these items.

- 7.1 Points of Contact
- 7.2 Offices of responsibility
- 7.3 Generation of performance reports
- 7.4 Publication of performance reports
- 7.5 Distribution of performance reports

## **8.0 Verification and Certification activities and recommendations for network participants**

**Recommendation:** ATN/AMHS network participants should verify their system compatibility, interoperability, and system integrity via an ICAO authorized, recognized or contracted testing or certification facility. Participants should have a method to validate

that the systems and equipment they place into service as a part of the ATN/AMHS meet certain requirements.

## **9.0 Summary of Recommendations:**

**Recommendation:** Implement management systems that embody all the concepts of the OSI Reference Model. Any technology that is not capable of implementing the reference model abstract is in all likelihood unsuitable as an implementation base and deficient in some respect.

**Recommendation:** ATN/AMHS participants will develop Service Level Agreements between independent domains, states, and service providers to facilitate performance and restoration.

**Recommendation:** SLA's will be developed internally within domains to assure domain performance supports and makes possible the global ATN.

**Recommendation:** Service level agreements (SLA) should depict the domain responsible for configuration, monitoring, and intervention of shared boundary devices utilized by the entire network. This does not necessarily designate maintenance or repair responsibility only the operation and configuration in the dynamic in-service environment.

**Recommendation:** States and organizations that develop and deploy ATN/AMHS systems in the Asia Pacific region should develop and publish TMC's that outline their activities and formalize their intent.

**Recommendation:** Achievements, problems, and lessons learned from activities associated with the TMC should be published and shared among interested parties

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# Appendix A

## Service level agreement

### Table of Contents

1.	Purpose	2
2.	Scope of Services	2
3.	Performance Goals	2
4.	Performance Measures	2
5.	Constraints	2
6.	Maintenance Schedules	3
7.	Terms of Agreement	3
8.	Approval	3
9.	Addendum A: Technical Support Availability Schedule.	4
10.	Addendum B: Response and Restoration Commitments	4
11.	Addendum C: Reports.	4
12.	Addendum D: Performance Measures.	5
13.	Addendum E: Contact List.	5

# Service level agreement

## 1 Purpose

This agreement is between **ATN LOCATION A and ATN LOCATION B** this document outlines service level roles, responsibilities, and objectives of **ATN LOCATION A and ATN LOCATION B** in support of the **ATN**.

## 2 Scope of services

**Location A and Location B** support the day-to-day operations of **ATN** through the maintenance and support of hardware and software elements, objects and applications that comprise the **ATN** network and the physical and operational interfaces between **ATN** individual domains that operate in an interdependent environment.

### 2.1 Service offerings include:

• Systems Operations	Access to and operation of a network data distribution environment for the ATN, including data handling, switching, routing, message handling, message and information distribution, backup, and recovery
• Backups	Provision for regular backups
• Recovery	All hardware and software problems will be covered by operational management agreements. Data recovery, when required, will be completed in accordance with ATN recommended standards and practices.
• Infrastructure	Shall be maintained and operated in accordance with ATN recommended standards and practices.
• First Level Support	Provisions for operational support of existing application software, and network hardware to facilitate troubleshooting and correction of network information management and information distribution problems
• Consulting	Provide expertise to support ATN/AMHS operation and consult on operational requirements, performance objectives and planning needs

## 3 Performance goals

To be determined

## 4 Performance measures

To be determined

## 5 Constraints

To be determined

## 6 Maintenance schedules

- Routine posted and shared maintenance schedules
  - Hours of Operation
  - Hours of available technical support
- As scheduled and agreed in advance with affected units

## 7 Terms of agreement

The signatures of this document indicate agreement to its content, that it is valid, has achievable objectives, and represents the intent of the parties to meet the system needs, report performance, and achieve cooperative performance goals as identified above.

This document is controlled by **Location A, responsible director and Location B, responsible director**. These directors or their duly authorized representatives are the primary signatories of this agreement. Any modifications to this agreement require the review and approval of both parties. Inputs relative to the content or distribution of this document should be forwarded to the director(s).

This document will remain in effect until replaced with an updated version. It will be reviewed annually for currency, accuracy, and completeness. The next review is scheduled for **(Month, day) 200\_\_**.

## 8 Approval

_____ Signature	_____ (Print Name)	_____ Date
--------------------	-----------------------	---------------

Title/Position, organization, and location.

_____ Signature	_____ (Print Name)	_____ Date
--------------------	-----------------------	---------------

Title/Position, organization, and location.

## 9 Addendum A: Technical support availability schedule

Described here times, dates, hours, and offices that support the operation of the system or network. Preferred Points of Contact POC's are responsible offices and organizations rather than individuals.

## 10 Addendum B: Response and restoration commitments

Agreement between the parties in regard to mutually agreed response and restoration of failed elements or processes. This is the basic commitment of the parties regarding to their obligation to respond and restore failed or degraded operations or elements.



## **11 Addendum C: Critical reports**

Described here the performance reports that will be produced by participants, frequency, and distribution. How the reports will be delivered, to whom and in what manner, method or form.

## **12 Addendum D: Performance Measure**

Described here the performance measures that the parties mutually agree to apply as a basis to determine effective operation of resources within the local administration and the resources shared to achieve the global goal.

## **13 Addendum E: Contact list**

A list of hierarchical contacts, timeframes for contact, nature of contact, and time to escalate to the next level for action.

# **Appendix B**

## **Technical memorandum of Cooperation:**

**An Example of Technical Memorandum of Cooperation (TMC)  
For multilateral Agreement, an abstract, actual agreements need not  
adhere.**

### **1. Introduction**

This document is presented as an example of Technical Memorandum of Cooperation (TMC) for multilateral agreement on ATN/AMHS implementation. It is recommended for the states who are going to implement ATN/AMHS connections using ATN Routers refer to this information when needed for future action. The example provided in this appendix refers to a mutual agreement between 2 (two) participants (bilateral). TMC's could in fact involve multiple participants.

### **2. Discussion**

Many States are planning ATN/AMHS implementations in the Asia/Pacific region. For the efficient implementation, coordination and agreements supporting the implementation should be developed between States; normally this will involve a bilateral agreement between two States. The development and lessons learned should be shared between states to further augment and facilitate transition. An example of the Technical Memorandum of Cooperation (TMC) for bilateral agreement is presented. This document is based on 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 situation of the State's when they develop the document. The example is conceptual and as such is meant only as a basis for development.

## **PREAMBLE -**

### ***TECHNICAL MEMORANDUM OF COOPERATION***

### ***BETWEEN***

***CIVIL AVIATION AUTHORITY  
STATE A***

### ***AND***

***CIVIL AVIATION AUTHORITY  
STATE B***

## **ATN/AMHS TRIALS AND SERVICE BETWEEN STATE A AND STATE B**

The Civil Aviation Authority, STATE A, hereafter referred to as “A-CAA” and the Civil Aviation Authority, STATE B, hereafter referred to as “B-CAA”, hereby enter into a cooperative Technical Agreement to conduct the trials and service of the ATN/AMHS System, hereinafter referred to as “ATN/AMHS”, between the two Air Traffic Service (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 parties will jointly conduct ATN/AMHS trials and service between participants.

## **ARTICLE II - REFERENCE DOCUMENTS**

TBD

## **ARTICLE III - FINANCIAL TERMS**

Parties shall be responsible for all associated cost from their local end up to the international interconnection points through their respective telecommunications service providers for the ATN/AMHS connection, as well as any associated equipment costs required for the trial and the subsequent service.

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

### **SPECIFICATION:**

The ATN/AMHS shall be based on the ATN/AMHS ICAO Standards and Recommended Practices (SARP) most current addition sub-volume III of Appendix to Annex 10/ Volume III/ Part 1 /Chapter 3, and ICAO 9705 AN/956 current edition. The overview specification of the ATN/AMHS connection is described in the attachment of this TMC titled AGREEMENT OF TRIALS AND SERVICE BETWEEN A-CAA AND B-CAA. The more detailed specification will be the matter to be coordinated between the parties according to the following Project Schedule;

### **PROJECT SCHEDULE:--**

The schedule depicted here should identify significant and critical schedule dates regarding the activities necessary to achieve operational service.

<b>Activity</b>	<b>Schedule Date</b>
Finalized TMC	Mm/dd/yr
Technical Trial	Mm/dd/yr to mm/dd/yr
Operational Trial	Mm/dd/yr to mm/dd/yr
Operational Performance Demonstration and commissioning activities of ATN/AMHS Operational Service to replace current AFTN Service	Mm/dd/yr
Decommissioning of AFTN service	Mm/dd/yr

A more detailed schedule will be provided as an attachment to the 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.

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/Ms/Mrs. X

(title)  
(section)

Civil Aviation Authority

(address), STATE A

TEL: XXX XXXX XXXX

FAX: XXX XXXX XXXX

E-mail: XXXXXXX@XXX.XXX.XX

For the B-CAA: Mr/Ms/Mrs. Y

(title)

(section)

Civil Aviation Authority

(address), STATE B

TEL: XXX XXXX XXXX

FAX: XXX XXXX XXXX

E-mail: XXXXXXX@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

Civil Aviation Authority, STATE B

BY:

BY:

\_\_\_\_\_

X

(title)

(section)

\_\_\_\_\_

Y

(title)

(section)

Date:

\_\_\_\_\_

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 ATN/AMHS Functions, Network Configuration, Protocol Specification Overview and Coordination Schedule as described below.

**2. ATN/AMHS Functions**

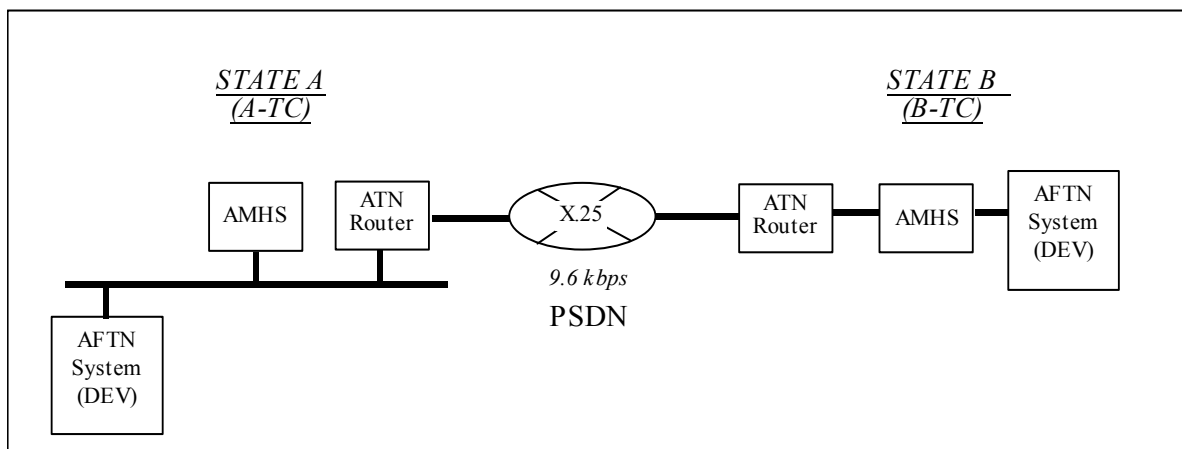
AFTN/ATN/AMHS Gateway function will be available in *A-CAA* and *B-CAA* for conducting joint technical trials and operational trials. Based on satisfactory results obtained in these trials, the ATN/AMHS Gateways at both *A-CAA* and *B-CAA* will be put into Operational Service. The exact date for the inauguration of the service shall be mutually determined after completion of a comprehensive joint review, of the operational ATN/AMHS connection between *A-CAA* and *B-CAA* to replace the existing AFTN service.

**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.

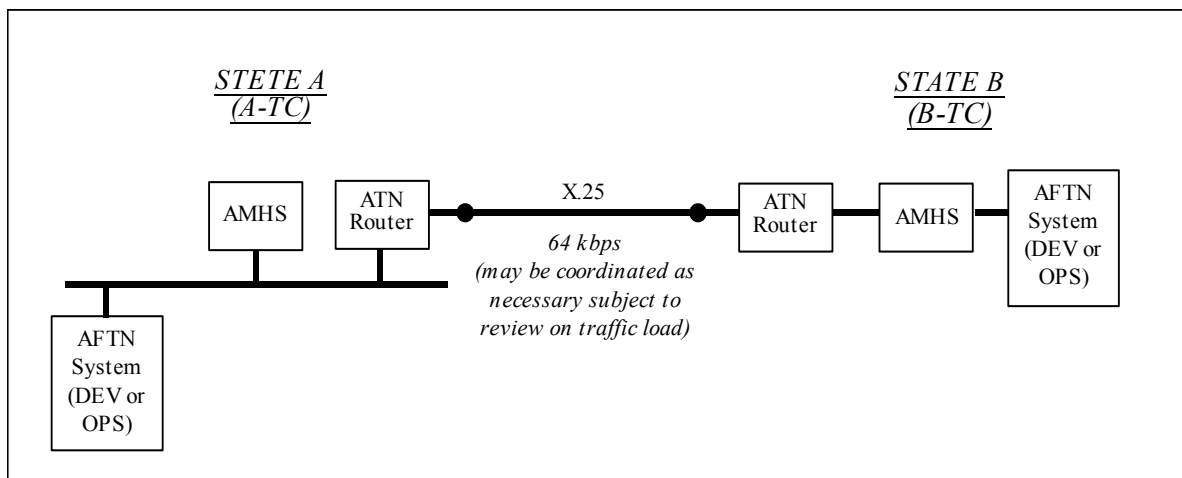
During the Technical Trial, simulated AFTN messages will be exchanged between trial equipment at both A-CAA and B-CAA. They will comprise AFTN development systems (DEV), AMHS (with AFTN/AMHS Gateway function) and ATN G/G Routers. Public X.25 Packet Switched Data Network (PSDN) will be used to interconnect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



**Figure 1 - Connection Configuration for AMHS Technical Trial**

### 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.*

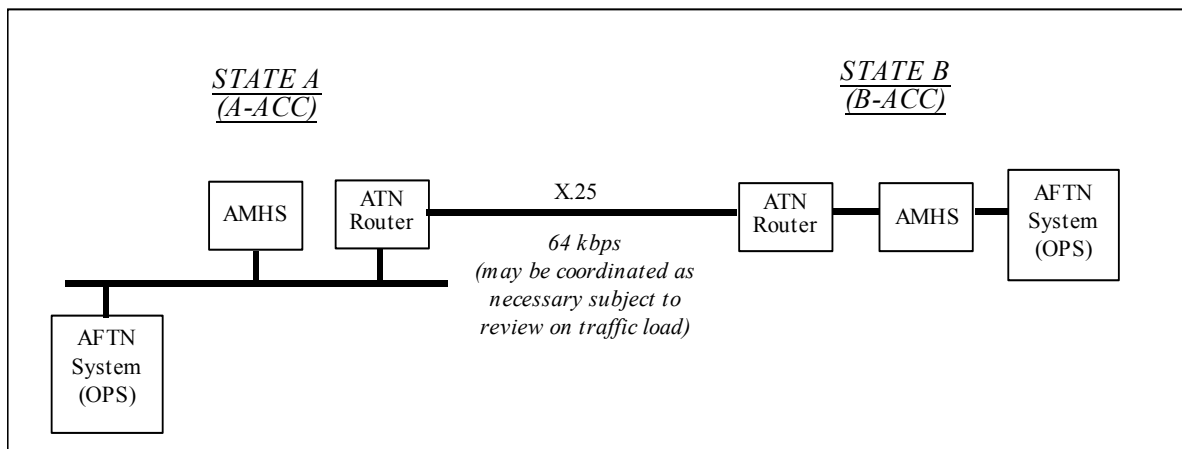
Before the Operational Trial, appropriate final AMHS (AFTN/AMHS Gateway) and final ATN G/G Router for the use of Operational Service will be developed by two sides.

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.

### 3.3 AFTN/AMHS Transition

Subject to satisfactory results of the Operational Trial, AFTN/ATN/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.

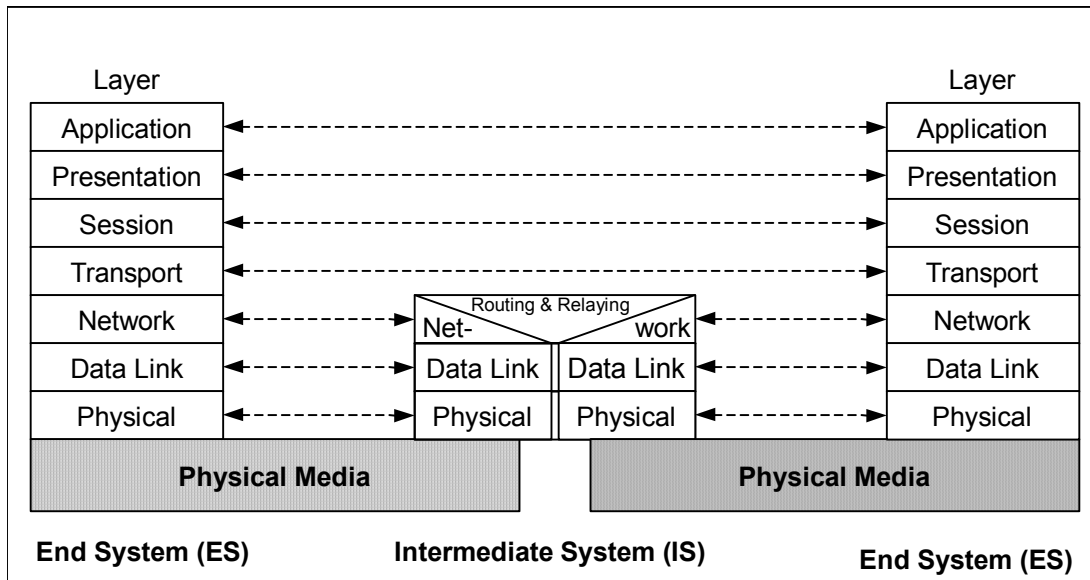


Figure 4. OSI Protocol Stack of ES and IS

## 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	
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 TPDU	
	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 SND CF (Subnetwork Dependent Convergence Function) over the subnetwork. SND CF 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.

### 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 SNDCEF over the subnetwork. SNDCEF 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.

## 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.

AMHS Trials and AMHS Operational Service.			
No.	Coordination Activities		Estimated milestones or duration
1	Agreement on TMC and Specification Overview (this document)		Mm/yr
2	Coordination of Functions/Service and ATN/AMHS ICD (including PICS) for Technical/Operational Trials	Proposal	Mm/yr
		Coordination	Mm/yr
		Agreement	Mm/yr
3	Coordination of Test Plan for Technical Trial	Proposal	Mm/yr
		Coordination	Mm/yr
		Agreement	Mm/yr
4	Coordination of Test Procedure for Technical Trial	Proposal	Mm/yr
		Coordination	Mm/yr
		Agreement	Mm/yr
5	ATN Router Connection Test for Technical Trial between A-TC and B-TC		Mm/yr
6	AMHS Connection Test via ATN Routers for Technical Trial between A-TC and B-TC		Mm/yr to mm/yr
	13.1.1.1.1 Technical Trial		
7	Coordination of Plan for Operational Trial and AFTN/AMHS Transition	Proposal	Mm/yr
		Coordination	Mm/yr
		Agreement	Mm/yr
8	Coordination of Test Procedure for Operational Trial	Proposal	Mm/yr
		Coordination	Mm/yr
		Agreement	Mm/yr
9	Installation of a new international leased circuit between STATE A and STATE B		Mm/yr
10	13.1.1.1.2 Operational Trial		Mm/yr to mm/yr
11	Coordination of Procedure for AFTN/AMHS Transition	Proposal	Mm/yr
		Coordination	Mm/yr
		Agreement	Mm/yr
12	Preparation and Connection Test for AFTN/AMHS Transition between A-ACC and B-ACC		Mm/yr to mm/yr
	13.1.1.1.3 AFTN/AMHS Transition		
13	Initiation of ATN/AMHS Operational Service between STATE A and STATE B to replace current AFTN Service. Operational capability declared.		Mm/yr
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.

**<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)