

## Preface

The *ATS Message Handling System (AMHS)* has been specified by ICAO to provide messaging services above the level available with AFTN and CIDIN.

The service enhancements include extensions in supported character sets and message length, transfer of unstructured binary data and integrity of user data.

To take advantage of these enhanced messaging services at a global scale, States and Organisations are encouraged to replace the today's AFTN and CIDIN communications by AMHS or at least take appropriate actions in support of the international AMHS communication.

The AMHS is embedded in the architecture of the ICAO *Aeronautical Telecommunication Network (ATN)* which provides ground-to-ground and air-to-ground communication services. Conceptually, the AMHS is defined as an ATN *ground-to-ground application* and makes use of the common *ATN internet communications service* and *ATN directory services*, and is integrated in the framework of the *ATN systems management*.

The modular architecture of the ATN permits to implement the AMHS independently from other types of ATN applications.

AMHS services are mainly provided by an implementation of a profile (or functional subset) of the ISO/IEC 10021 standard series (or the corresponding ITU-T Recommendations X.400) for *Message Handling Systems (MHS)*. AMHS specific amendments are limited to the operational use of certain MHS service elements and the provision of a gateway facility for intercommunication between AMHS users and such of the AFTN/CIDIN during the transition phase to AMHS.

The AMHS specifications have been developed in an evolutionary manner: A first package of AMHS services, referred to as the *Basic ATS Message Service*, became an ICAO standard in 1998. Further, in 2002, the *Extended ATS Message Service* became an ICAO standard. The latter amends the Basic ATS Message Service by use of additional MHS service elements (as the transfer of unstructured binary data and secure communications) and includes provisions for directory services and systems management. The Extended ATS Message Service is backward compatible with the Basic ATS Message Service.

The currently applicable technical specifications of the ATN (and AMHS) are laid down in the ICAO document

- Doc 9705 (Edition 3) - The Manual of Technical Provisions for the ATN

which was published in 2002. Subsequent amendments are included in the Draft Edition 4 of Doc 9705 which was technically approved at the first meeting of the Aeronautical Communications Panel (ACP) in May 2007. The ACP is tasked, among others, with the maintenance and further development of the ATN specifications.

The specifications in Doc 9705 are based on the 7-layer ISO/OSI Reference Model and associated ISO/OSI communication protocols. The reason is that at the time of starting the ATN (and AMHS) specifications in the early nineties, there was a common belief that the ISO/OSI model would become the ultimate standard for data communication. However, later on the ISO/OSI standardised Internet Protocol Suite (IPS) became the dominant commercial architecture.

In recognition of this general paradigm change from OSI to IPS communications, in 2002 a number of European States and Organisations proposed that the AMHS implementations in the European Region should make use of an underlying Internet communication service instead of the (OSI based) ATN internet communications service. In 2005 this proposal was approved as an essential element of the European AMHS communication profile. Now the Draft Edition 4 of Doc 9705 (2007) specifies the implementation of AMHS over an Internet communication service as an alternative configuration.

At the level of global ATN standardisation, in 2005, after preceding feasibility studies, it was agreed that in the future the ATN shall either use OSI standards (ATN OSI) or use standards of the Internet Protocol Suite (ATN IPS). For the related technical specifications two new ICAO documents have been defined:

- Doc 9880 - Manual of Detailed Technical Specifications for the ATN using ISO/OSI standards and protocols
- Doc xxx - Manual of Detailed Technical Specifications for the ATN using IPS standards and protocols (the number xxx needs still to be defined)

Current ICAO specification work (in 2007) aims firstly at the transfer of the content of the Draft Edition 4 of Doc 9705 to the new structured Doc 9880 (ATN OSI); and secondly at the development of the above "ATN IPS" related Manual. Note, that Doc 9880 will not include AMHS technical provisions different from those of the Draft Edition 4 of Doc 9705, however, the document structure and paragraph numbering may change in respect to Doc 9705.

The following AMHS descriptions are primarily based on the published and currently applicable Edition 3 of Doc 9705. References to the Draft Edition 4 are made to inform on significant AMHS amendments which should be taken into account for planning of AMHS systems. In addition, an outline of the current AMHS migration process to the Internet Protocol Suite is given.

The material of this book was originally developed as hand-out documentation for participants of the 4-day AMHS seminar offered by AC-B. As this documentation is also suitable for self-study and reference purposes, we decided to turn the seminar material into a separate book.

## **Acknowledgements**

Special thanks go to the DFS Deutsche Flugsicherung who gave us the opportunity to work for many years in ICAO working groups and in the European SPACE study. Without the expertise gained from this team work it would not be possible to develop an AMHS book of this scope. In addition, from the cooperative development of an AMHS conformance test facility by DFS and AC-B the authors received advice for topics which needed to be addressed in this book.

Acknowledgements also go to the participants of the AC-B's periodical AMHS seminars for their helpful suggestions concerning improvements of form and content of the seminar documentation.

## **Target Audience**

The book provides a comprehensive technical and operational survey of the ATS Message Handling System (AMHS). The target audience includes system engineers tasked with the specification and commission of AMHS facilities, implementers and test engineers are provided with introductory material which facilitates the study of the ICAO AMHS specifications and the underlying ISO/IEC standard series for Message Handling Systems (MHS).

A CD-ROM containing all the figures of this book is available as supplementary package which may be used by instructors for staff training.

## **Update Service**

The technical specifications of the AMHS are a "living" document. In particular, the Draft Edition 4 of ICAO Doc 9705 (or the planned Doc 9880) includes essential amendments. Even though these amendments are already considered in this book, the main reference is the currently applicable Edition 3 of Doc 9705. In the future, further amendments can also be expected in response to

problems reported in the course of ongoing AMHS implementations and increasing operational use.

Considering the further refinement of the AMHS technical specifications, AC-B offers, as a supplementary package, an update service by means of change pages. Using this service, readers are enabled to keep their AMHS knowledge up-to-date with the latest developments in AMHS standardisation.

## How to Use the Book

The style of the provided material will serve both as a self-study guide and as useful reference source that can be revisited as needed. The modular nature of this book allows flexible use to suite needs of readers visiting the AMHS for a first time and for professionals.

This book does not replace AMHS related standard documents, however, it provides introductory text and background information, which is often missing in standard texts.

## Division in Volumes

The book is divided in two volumes:

- **Volume A** provides basic information on the AMHS features and identifies the framework of specifications. Key aspects are the communication architecture with its functional components, user addressing, routing concepts and interworking with users of the AFTN by means of gateways.
- **Volume B** highlights AMHS internal communication mechanisms in terms of messaging procedures and supporting protocols, explains the elements of information objects and describes in great detail the specified conversion functions of the gateway to the AFTN. In addition, the need of regional preparation and coordination work prior to AMHS implementations is indicated by a look at such activities as performed in the European Region. - An understanding of the provided details needs a level of AMHS knowledge as learnt by the study of Volume A.

## Visual Approach

Each handled subject is presented by one or more figures and explanatory text in appropriate detail. More detailed, more advanced, or background information is highlighted and can be excluded from a first reading. Detailed references to ICAO, ISO/IEC, ITU-T and other primary documentation enable further studies. An extensive list of acronyms is attached to both Volumes.