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# Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols

## Part I — Air-Ground Applications

Approved by the Secretary General
and published under his authority

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# AMENDMENTS

Amendments are announced in the supplements to the *Catalogue of ICAO Publications;* the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

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# FOREWORD

This manual amends and replaces the third edition of the *Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN)* (Doc 9705). This manual is a result of ongoing validation and operational experience gained during implementation of elements of the ATN. Amendments were reviewed at the first meeting of the Aeronautical Communications Panel (ACP) Working Group of the Whole in June 2005 and further updated at the ACP Working Group N/6 meeting held in July 2006. Relevant background material is available on the website www.icao.int/anb/panels/acp.

This manual contains the detailed technical specifications for the ATN based on relevant standards and protocols established for open systems interconnection (OSI) by the International Organization for Standardization (ISO) and the Telecommunication Standardization Sector of the International Telecommunication Union (ITU-T). A separate manual, the *Manual on the Aeronautical Telecommunication Network (ATN) using Internet Protocol Suite (IPS) Standards and Protocols* (Doc 9896), addresses detailed technical specifications for the ATN based on standards developed for the IPS by the Internet Society (ISOC). Standards and Recommended Practices (SARPs) for the ATN/IPS are contained in Annex 10 — *Aeronautical Telecommunications,* Volume III — *Communication Systems*. Where necessary and to avoid duplication of material, Doc 9896 refers to this manual.

Editorial practices in this document are as follows:

- The detailed technical specifications in this manual that include the operative verb "shall" are essential to be implemented to secure proper operation of the ATN.
- The detailed technical specifications in this manual that include the operative verb "should" are recommended for implementation in the ATN. However, particular implementations may not require this specification to be implemented.
- The detailed technical specifications in this manual that include the operative verb "may" are optional.

This manual is published in the following parts:

Part I: Air-Ground Applications (replaces Doc 9705, Sub-volume II)

Part II: Ground-Ground Applications — Air Traffic Services Message Handling Services (ATSMHS) (replaces Doc 9705, Sub-volume III)

Part III: Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS) (replaces Doc 9705, Sub-volumes IV and V)

Part IV: Directory Services, Security Services and Systems Management (replaces Doc 9705, Sub-volumes I, VI, VII, VIII and IX).

Structure of Part I:

This part of Doc 9880 contains technical provisions for air-ground applications. It is structured as follows:

Chapter 1: INTRODUCTION

Chapter 2: CONTEXT MANAGEMENT APPLICATION

Chapter 3: CONTROLLER-PILOT DATA LINK COMMUNICATIONS APPLICATION

Chapter 4: FLIGHT INFORMATION SERVICES (FIS) (to be developed)

Chapter 5: AUTOMATIC DEPENDENT SURVEILLANCE — CONTRACT (ADS-C) (to be developed)

Chapter 6: ATN MESSAGE INTEGRITY CHECK ALGORITHM

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACP | Aeronautical Communications Panel |
| ADM | Administration identifier |
| ADS | Automatic dependent surveillance |
| ADS-C | Automatic dependent surveillance — contract |
| AE | Application entity |
| AFI | Authority and format identifier |
| APDU | Application protocol data unit |
| ARS | Administration region selector |
| ASE | Application service element |
| ASN.1 | Abstract Syntax Notation One |
| ATIS | Automatic terminal information service |
| ATN | Aeronautical telecommunication network |
| ATS | Air traffic services |
| ATSC | Air traffic service communications |
| CF | Control function |
| CM | Context management |
| Cnf | Confirmation |
| CPDLC | Controller-pilot data link communications |
| DLIC | Data link initiation capability |
| DS | Dialogue service |
| DSC | Downstream clearance |
| FIS | Flight information services |
| FU | Functional unit |
| IC | Integrity check |
| ICAO | International Civil Aviation Organization |
| ICS | Internet communications service |
| IDI | Initial domain identifier |
| IDP | Initial domain part |
| IEC | International Electrotechnical Commission |
| IFR | Instrument flight rules |
| Ind | Indication |
| IPS | Internet Protocol Suite |
| ISO | International Organization for Standardization |
| ITU-T | International Telecommunication Union — Telecommunication Standardization Sector |
| Km | Kilometre |
| Nm | Nautical mile |
| NSEL | Network selector |
| OID | Object identifier |
| OSI | Open systems interconnection |
| P/OICS | Protocol/Operational Implementation Conformance Statements |
| PDU | Protocol data unit |
| PER | Packed Encoding Rules |
| QOS | Quality of Service |
| RDF | Routing domain format |
| RDP | Router domain part |
| Req | Request |

| | |
|---|---|
| RER | Residual error rate |
| RFC | Request for comments |
| Rsp | Response |
| SARPs | Standards and Recommended Practices |
| SSO | System security object |
| TSAP | Transport service access point |
| TSEL | TSAP selector |
| ULCS | Upper layer communications service |
| UTC | Coordinated universal time |
| VER | Version |
| VMC | Visual meteorological conditions |

# DEFINITIONS

***Abstract service interface.*** The abstract interface between the application entity (AE) and the application-user.

***Abstract Syntax Notation One (ASN.1).*** Abstract Syntax Notation One is defined in ISO/IEC 8824-1. The purpose of this notation is to enable data types to be defined, and values of those types specified, without determining their actual representation (encoding) for transfer by protocols.

***Addressing plan.*** A plan that provides common address syntax and management of global addresses for the unambiguous identification of all end and intermediate systems in accordance with the rules prescribed in ISO/IEC 7498-3 and ISO/IEC TR 10730.

***A ronautical administrative communications (AAC).*** Communications necessary for the exchange of aeronautical administrative messages.

***Aeronautical administrative messages.*** Messages regarding the operation or maintenance of facilities provided for the safety or regularity of aircraft operation. Messages concerning the functioning of the ATN and messages exchanged between government civil aviation authorities relating to aeronautical services.

***Aeronautical operational control (AOC).*** Communication required for the exercise of authority over the initiation, continuation, diversion or termination of flight for safety, regularity and efficiency reasons.

***Aeronautical passenger communication (APC).*** Communication relating to the non-safety voice and data services to passengers and crew members for personal communication.

***Air application service element (air-ASE).*** An abstract part of the aircraft system that performs the communication-related functions of the application.

***Air-ground application.*** An application that has one peer application on an aircraft and its other peer application on the ground. An air-ground application may require the use of ground-ground subnetworks.

***Air traffic control (ATC) clearance.*** Authorization for an aircraft to proceed under conditions specified by an air traffic control unit.

*Note 1.— For convenience, the term "air traffic control clearance" is frequently abbreviated to "clearance" when used in appropriate contexts.*

*Note 2.— The abbreviated term "clearance" may be prefixed by the words "taxi", take-off", "departure", "en-route", "approach" or "landing" to indicate the particular portion of flight to which the air traffic control clearance relates.*

***Air traffic control (ATC) instruction.*** Directives issued by air traffic control for the purpose of requiring a pilot to take specific action.

***Air traffic control (ATC) service.*** A service provided for the purpose of:

a) preventing collisions:

1) between aircraft; and

2) on the manoeuvring area between aircraft and obstructions; and

b) expediting and maintaining an orderly flow of air traffic.

***Air traffic services (ATS).*** A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

***Air user (air-user).*** The abstract part of the aircraft system that performs the non-communication-related functions of the application.

***Aircraft address.*** A unique combination of twenty-four bits available for assignment to an aircraft for the purpose of air-ground communications, navigation and surveillance.

***Aircraft flight identification.*** A group of letters, figures or a combination thereof which is either identical to, or the coded equivalent of, the aircraft call sign to be used in air-ground communication and which is used to identify the aircraft in ground-ground air traffic services communication.

***Application.*** The ultimate use of an information system, as distinguished from the system itself.

***Application entity (AE).*** Part of an application process that is concerned with communications within the OSI environment. The aspects of an application process that need to be taken into account for the purposes of OSI are represented by one or more AEs.

***Application entity service interface.*** The interface between the application-users and the application service provider.

***Application entity title.*** An unambiguous name for an application entity.

***Application process (AP).*** A set of resources, including processing resources, within a real open system which may be used to perform a particular information processing activity.

***Application protocol data unit (APDU).*** An application protocol data unit is an (N) PDU, where N refers to the application layer. An APDU is the basic unit of information exchanged between the airborne application and the ground application.

***Application service.*** The abstract interface between the (N) service and the (N) service user, where N refers to the application layer; thus it is the boundary between the AE and the application user.

***Application service element (ASE).*** The element in the communication system that executes the application specific protocol. In other words, it processes the application specific service primitive sequencing actions, message creation, timer management, and error and exception handling. The application's ASE interfaces only with the application's control function.

***Application service element (ASE) service interface.*** The abstract interface through which the ASE service is accessed.

*Note.— In version 1 of the ADS application, the ADS-ASE service interface coincides with the ADS-AE abstract service interface.*