

AERONAUTICAL TELECOMMUNICATION NETWORK PANEL (ATNP)

SECOND MEETING

Montreal, 4 to 15 November 1996

Agenda Item 3: Development of the ATN SARPs

Overview of Upper Layer Communication Service SARPs Material

(Presented by ATNP WG3 Rapporteur)

WORKING PAPER

Summary

ATNP/WG3/SG3 has completed work on the CNS/ATM-1 Upper Layer Communication Service SARPs. The SARPs provide for common application structure, naming and addressing, data encoding, and dialogue control.

References

Report of the first meeting of the ICAO Aeronautical Telecommunication Network Panel, June 1994', WG3 Terms of Reference

1. INTRODUCTION

ATNP/WG3/SG3 has produced the Upper Layer Communication Service SARPs. These are section 4 of the Annex 10 Appendix material.

Steve Van Trees (USA) and Bo Overgaauw (France) chaired the group between ATNP/1 and ATNP/2. Tony Kerr (Eurocontrol) served as document editor.

Many experts contributed to the work, among them are Stephen Pearce (Australia), Frederic Picard (France), Fif Edem (SITA), and John Day, Jim Moulton, and Jim Simpkins (USA).

2. BACKGROUND

The ATN is an Open Systems Interconnection (OSI) network. It should be noted that WG3/SG3 invested a great deal of effort in the adaptation of OSI standards to ATN requirements. ATN personnel have been involved in the ISO standardization process.

The Upper Layers thus offer application layer structure, naming and addressing, data encoding, and dialogue control, in a manner tailored to the bandwidth requirements of ATN subnetworks.

3. DISCUSSION

3.1 Functional Description of the SARPs

The group produced Standards and Recommended Practices (SARPs) for the initial version of the ATN Upper Layers (UL). The UL specification supports all current ATN applications except the ATS Message Service defined in Section 3. This specification is designed to optimise the use of communications bandwidth, and consequently restricts the functionality available from the OSI Session and Presentation layers.

These SARPs address the ATN requirements for Session Layer (Layer 5), Presentation Layer (Layer 6), and a part of the Application Layer (Layer 7) of the OSI reference model. Figure 1 shows a conceptual view of the scope of these SARPs. The remaining part of the Application Layer is the province of the individual ATN application SARPs (i.e. the ADS, CM, CPDLC and FIS (ATIS) SARPs for air-ground applications, and the ICC (AIDC) and MHS (Pass-Through Service) SARPs for ground-ground applications).

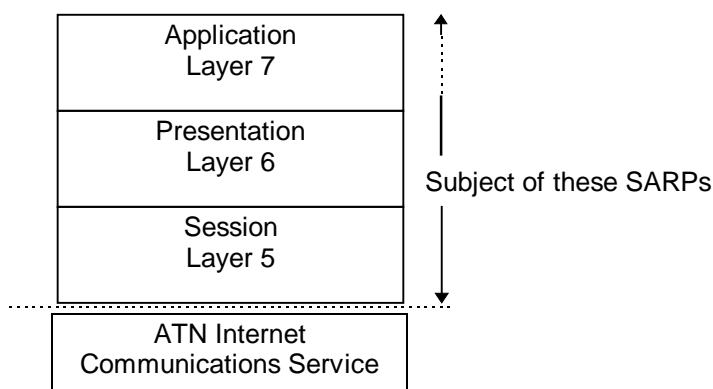


Figure 1. Conceptual view of the scope of the UL SARPs

Background

The communication aspects of the ATN applications are modelled as Application Entities (AEs). Figure 2 illustrates an example of the application layer structure for the Air-Ground and Ground-Ground applications.

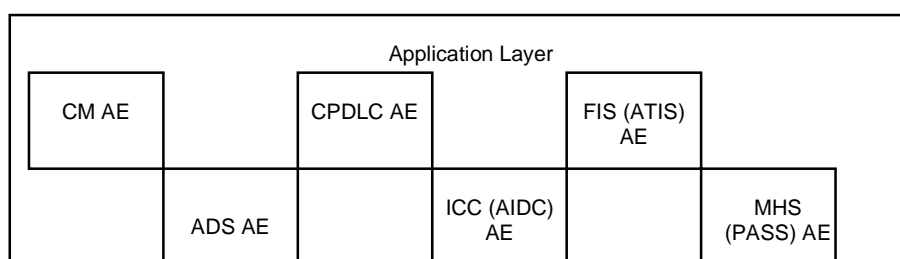


Figure 2. Conceptual view of Application Layer

These SARPs define a profile for the protocols in the upper layers, an AE structure and a number of common application services.

Upper Layer Profile Overview

These SARPs specify a profile for the connection oriented protocols of Session layer, Presentation layer and the Association Control Service Element (ACSE). The Session portion of the profile specified in these SARPs is based on the efficiency enhancements to the Session protocol which are standardised in ISO/IEC 8327-1 Amendment 2.

The Presentation portion of the profile specified in these SARPs is based on the efficiency enhancements to the Presentation protocol which are standardised in ISO/IEC 8823-1 Amendment 2.

As a consequence of using the Session and Presentation protocol efficiency enhancements, the protocol control information transferred by these protocols amounts to two octets in each direction during the connection establishment phase, and zero octets at all other times.

The ACSE portion of the profile specified in these SARPs is based on ISO/IEC 8650-1, including the extensibility notation as specified as Amendment 2 to that standard.

Application Entity (AE) Structure

The AE structure specified within these SARPs is based on the application layer structure defined in ISO/IEC 9545, where the concepts of Application Service

Element (ASE), Application Service Object (ASO) and Control Function (CF) are defined.

Figure 3 shows the generic structure of an AE with arrows representing the abstract service boundaries of the various elements. The “upper” service boundary is the abstract service provided by an ASE to its user(s). The “lower” service boundary is the abstract service which is provided to the ASE by the CF. The ASE is an element engineered to perform a required task. ISO/IEC 9545 describes how two or more ASEs may be combined, together with a CF to coordinate their operation to form an ASO. In turn, an ASO may be combined with other ASOs or ASEs with a CF to form larger ASOs. The AE is the outermost ASO.

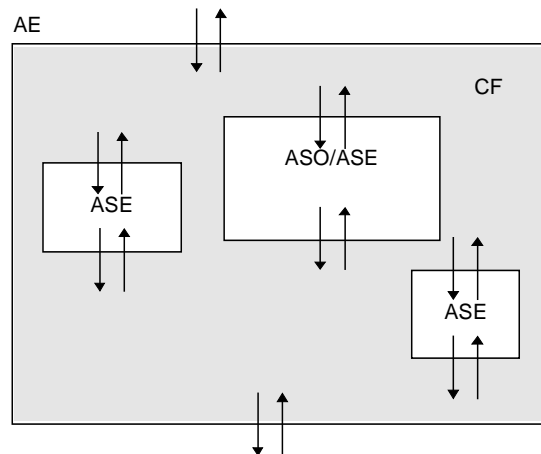


Figure 4.1-3. Generic Application Entity structure

Application Services

These SARPs specify various abstract services. The services are provided at abstract service boundaries.

For each of the current ATN applications a specific ASE exists, and is specified in the relevant ATN Application SARPs. The generic name “ATN-App ASE” is used for these specific ASEs.

Figure 4 shows the AE structure which is used to model the ATN applications

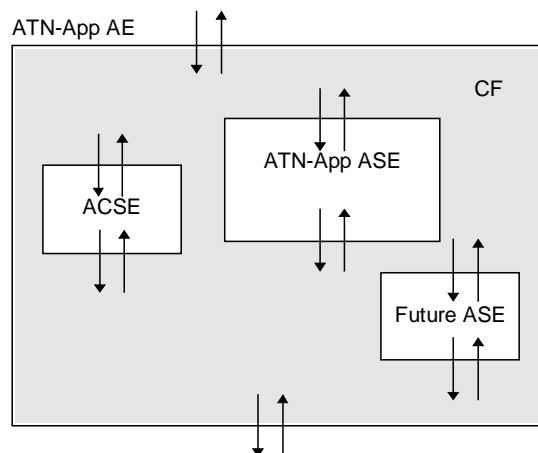


Figure 4. ATN-specific AE structure

The Dialogue Service (DS) as defined in these SARPs is the abstract service which the ATN-App AEs use to interact with the communication facilities defined in these SARPs. That is, the DS is the combination of specific internal primitives made available by the CF at the lower boundary of the ATN ASE/ASO - it is the application's "world view". In order to provide this service, the CF uses the services of ACSE.

3.2 System Requirements Fulfillment by the SARPs

The SARPs contribute to the fulfillment of the following System Level Requirements:

1. OSI Conformance
9. Peer Information exchange
11. Notification of Lack of Path Availability
12. Unambiguous Addressing
13. Originator Identification
19. Exchange of Address Information
20. CM Association
21. CM Primacy
22. ADS Association
23. CPDLC Association
24. FIS (ATIS) Association
26. ICC (AIDC)

3.3. Interrelationship of the Upper Layer SARPs with other areas of ATN SARPs

The Upper Layer SARPs supports the air-ground application SARPs (context management, automatic dependent surveillance, controller-pilot datalink communication, and flight information services (automatic terminal information service)). The Upper Layer SARPs also satisfy requirements for the inter-centre communications (ATS interfacility data communications) application.

The Upper Layer SARPs utilizes the services of the Internet SARPs.

4. RECOMMENDATION

It is recommended that the ATN Panel accept the proposed Upper Layer Communication Service material for inclusion in the ATN SARPs.