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INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

OVERALL NETWORK ASPECTS AND FUNCTIONS

B-ISDN ATM ADAPTATION LAYER (AAL) FUNCTIONAL DESCRIPTION

ITU-T Recommendation I.362

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation I.362 was revised by the ITU-T Study Group XVIII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation I.362

B-ISDN ATM ADAPTATION LAYER (AAL) FUNCTIONAL DESCRIPTION

(Geneva, 1991; revised Helsinki, 1993)

1 Introduction

The ATM adaptation layer (AAL) enhances the services provided by the ATM layer to support the functions required by the next higher layer. The AAL performs functions required by the user, control and management planes and supports the mapping between the ATM layer and the next higher layer. The functions performed in the AAL depend upon the higher layer requirements. The AAL supports multiple protocols to fit the needs of the different AAL service users. The AAL is therefore service-dependent.

1.1 Scope of the Recommendation

The scope of this Recommendation is the interaction between different user, control and management requirements on one side and the ATM layer on the other side.

Architecturally, the AAL is a layer between the ATM layer and the next higher layer in each of the user plane, the control plane and the management plane. The B-ISDN protocol reference model is given in Recommendation I.321. Examples of services provided by the AAL include:

- handling of transmission errors;
- handling quantization effect due to cell information field size;
- handling of the lost and misinserted cell condition;
- flow control and timing control.

Adaptation layer functions for the control and management planes require further study.

1.2 Objective of this Recommendation

The objective of this Recommendation is to provide a classification of services[1)] (based on the attributes of timing relation between source and destination, bit rate and connection mode) which may require AAL capabilities accessed through different service access points (SAPs). It also gives an introduction to the services provided by the AAL and the functions performed in the AAL.

The service classification and AAL functional organization indicated in this Recommendation are provided to assist in the development and selection of suitable methods to support a wide range of services. The AAL specifications described in Recommendation I.363 are recommended where they are considered to be appropriate, taking into account all the service and network considerations. It is intended that Recommendation I.363 should not preclude standardization of other AAL protocols.

2 Basic principles of the AAL

The AAL isolates the higher layers from the specific characteristics of the ATM layer by mapping the higher layer protocol data units (PDUs) into the information field of the ATM cell and vice-versa. The AAL entities exchange information with the peer AAL entities to support the AAL functions.

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1) The term "service" in this Recommendation is used in two different meanings. In one case, it is used in the sense of a layer service and in the other case in the sense of a telecommunication service, e.g. voice service, data transmission service.

2.1 Sublayering of the AAL

To support services above the AAL, some interdependent functions must be performed in the AAL. These functions are organized in two logical sublayers, the convergence sublayer (CS) and the segmentation and reassembly sublayer (SAR). These sublayers may be further subdivided.

a) *SAR* – The prime functions are:

- segmentation of higher layer information into a size suitable for the information field of an ATM cell;
- reassembly of the contents of ATM cell information fields into higher layer information.

b) *CS* – The prime function is to provide the AAL service at the AAL-SAP. This sublayer is service-dependent.

SAPs are not defined between the sublayers. The need for SAPs between these sublayers is for further study. Different combinations of SAR and CS provide different SAPs to the layer above the AAL. In some applications, the SAR and/or CS may be empty.

2.2 Service classification for the AAL

In order to minimize the number of AAL protocols, a service classification is defined based on the following parameters:

- timing relation between source and destination (required or not required);
- bit rate (constant or variable);
- connection mode (connection-oriented or connectionless).

Other parameters such as assurance of the communication are treated as quality of service parameters, and therefore do not lead to different service classes for the AAL.

Since not all combinations of the above parameters are foreseen, four classes are distinguished, according to Figure 1.

NOTE – This classification is specific to the AAL and is not intended to be a general service classification.

<table>
<tr><th></th><th>Class A</th><th>Class B</th><th>Class C</th><th>Class D</th></tr>
<tr><td>Timing relation between source and destination</td><td colspan="2">Required</td><td colspan="2">Not required</td></tr>
<tr><td>Bit rate</td><td>Constant</td><td colspan="3">Variable</td></tr>
<tr><td>Connection mode</td><td colspan="3">Connection-oriented</td><td>Connectionless</td></tr>
</table>

FIGURE 1/I.362

Service classification for AAL

Examples of services in the classes A, B, C and D are as follows:

- Class A Circuit emulation; constant bit rate video
- Class B Variable bit rate video and audio
- Class C Connection-oriented data transfer
- Class D Connectionless data transfer

2.3 Relation between service classes for AAL and the AAL protocols (Recommendation I.363)

Recommendation I.363 describes AAL protocols which consist of combinations of SAR and CS functions, to support higher layer services belonging to one of the above defined classes (A to D). Other combinations of the described SARs and CSs may be used to support specific services.

Different services within a given service class may be provided by different combinations of SARs and CSs. Other SARs or CSs may be defined and standardized according to service requirements. However, a preferred combination of SAR and CS should be standardized for any given service. A preferred combination of SAR and CS for a given service requires further study.

To simplify the realization of the AAL functions, maximum commonality between the protocol elements of the AAL protocols is preferred.

The provision of constant bit rate services (CBR services) utilizes AAL type 1 as described in Recommendation I.363. The standardization of other AAL types for CBR services is for further study.

The provision of a connectionless service utilizes AAL type 3/4 including speech as described in Recommendation I.363.

The additional functions which are required to support the connectionless (CL) service include network layer addressing and routing. These additional functions provide the CL service by using the service of the AAL; thus they reside in a layer above the AAL. The standardization of other AAL types for CL services is for further study.

The provision of AAL service class C services utilize AAL type 3/4 as described in Recommendation I.363; in addition, signalling can also use AAL type 3/4. The standardization of other AAL types for class C services and signalling is currently under study[2)].

The specific association of other services with an AAL type is for further study.

Some AAL service users may find the ATM service sufficient for their requirements. In that case the AAL protocol may be empty in the following sense:

1) the AAL protocol control information (PCI) is not present; and
2) the AAL functions are reduced to the reception/delivery of the ATM-SDUs.

Annex A

(to Recommendation I.362)

Alphabetical list of abbreviations used in this Recommendation

(This annex forms an integral part of this Recommendation)

AAL	ATM adaptation layer
CL	Connectionless
CS	Convergence sublayer
PCI	Protocol control information
PDU	Protocol data unit
SAP	Service access point
SAR	Segmentation and reassembly sublayer
SDU	Service data unit.

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2) It is the intention of the CCITT to recommend only one AAL type for signalling.