§

INTERNATIONAL TELECOMMUNICATION UNION

CCITT **I.362**

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

OVERALL NETWORK ASPECTS AND FUNCTIONS, ISDN USER-NETWORK INTERFACES

B-ISDN ATM ADAPTATION LAYER (AAL) FUNCTIONAL DESCRIPTION

Recommendation I.362

§

Geneva, 1991

Printed in Switzerland

FOREWORD

permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation I.362 was prepared by Study Group XVIII and was approved under the Resolution No. 2 procedure on the 5 of April 1991.

CCITT NOTES

1)
indicate both a telecommunication Administration and a recognized private operating agency.

2) A list of abbreviations used in this Recommendation can be found in Annex A.

Preamble to B-ISDN Recommendations

In 1990, CCITT SG XVIII approved a first set of Recommendations on B-ISDN. These are:

I.113 — Vocabulary of terms for broadband aspects of ISDN

I.121 — Broadband aspects of ISDN

I.150 — B-ISDN asynchronous transfer mode functional characteristics

I.211 — B-ISDN service aspects

I.311 — B-ISDN general network aspects

I.321 — B-ISDN Protocol Reference Model and its application

I.327 — B-ISDN functional architecture

I.361 — B-ISDN ATM Layer specification

I.362 — B-ISDN ATM Adaptation Layer (AAL) functional description

I.363 — B-ISDN ATM Adaptation Layer (AAL) specification

I.413 — B-ISDN user-network interface

I.432 — B-ISDN user-network interface — Physical Layer specification

I.610 — Operation and maintenance principles of B-ISDN access

These Recommendations address general B-ISDN aspects as well as specific service- and network-oriented issues, the fundamental characteristics of the asynchronous transfer mode (ATM), a first set of relevant ATM oriented parameters and their application at the user-network interface as well as impact on operation and maintenance of the B-ISDN access. They are an integral part of the well established I-Series Recommendations. The set of Recommendations are intended to serve as a consolidated basis for ongoing work relative to B-ISDN both within CCITT and in other organizations. They may also be used as a first basis towards the development of network elements.

CCITT will continue to further develop and complete these Recommendations in areas where there are unresolved issues and develop additional Recommendations on B-ISDN in the I-Series and other series in the future.

PAGE BLANCHE

Recommendation I.362
Recommendation I.362

B-ISDN ATM ADAPTATION LAYER (AAL) FUNCTIONAL DESCRIPTION

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

---

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.

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.

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).

a) *SAR:* The prime functions are:

— information field of an ATM cell;

— information.

b) *CS:*
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/I.362.

Note — This classification is specific to the AAL and is not intended to be a general service classification.

μ

Class A

Class B

Class C

Class D

Timing relation between source and destination

Required

Not required

Bit rate

Constant

Variable

Connection mode

Connection-oriented

Connectionless

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 bitrate 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 4 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 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

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

¤