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INTERNATIONAL TELECOMMUNICATION UNION

CCITT **I.361**

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

INTEGRATED SERVICES DIGITAL NETWORK (ISDN) OVERALL NETWORK ASPECTS AND FUNCTIONS, ISDN USER-NETWORK INTERFACES

B-ISDN ATM LAYER SPECIFICATION

Recommendation I.361

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Geneva, 1991

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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.361 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.

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B-ISDN ATM LAYER SPECIFICATION

1 Introduction

This Recommendation specifically addresses:

a) the cell structure and the ATM cell coding;

b) the ATM protocol procedures.

2 Cell structure coding

Two different coding schemes are adopted according to the interface being considered, i.e. the user-network interface (UNI) or the network-node interface (NNI). They are described in §§ 2.2 and 2.3.

2.1 *Cell structure*

The cell consists of a five octet header and a 48-octet information field as shown in Figure 1/I.361.
FIGURE 1/I.361 = 6,5 cm

Note — The header will be sent first followed by the information field.

When a field within the header is contained within a single octet, the lowest bit number of the field represents the lowest order value.

When a field spans more than one octet, the order of bit values within each octet progressively decreases as the octet number increases; the lowest bit number associated with the field represents the lowest order value.

This leads to the following conventions:

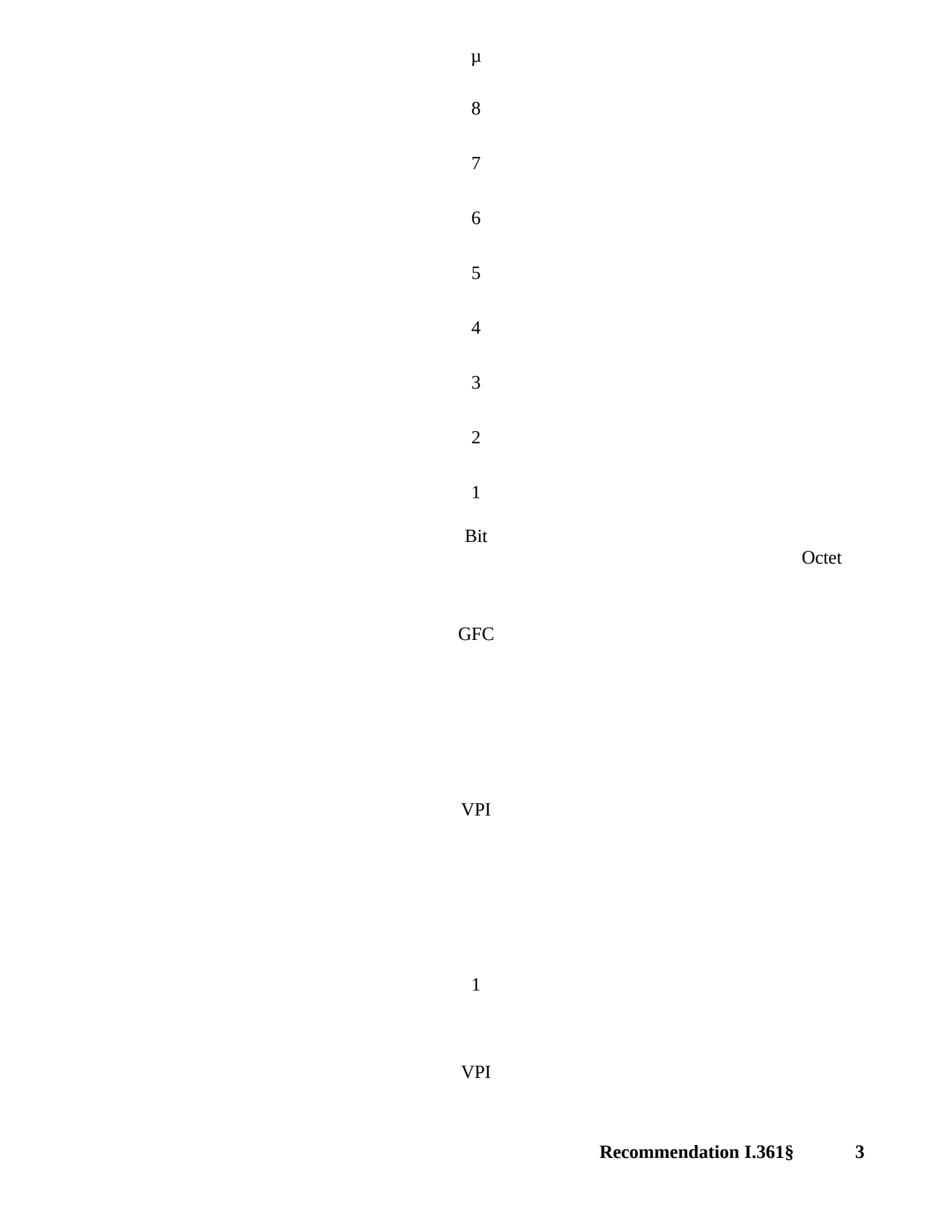
— bits within an octet are sent in decreasing order, starting with bit 8;

— octets are sent in increasing order, starting with octet 1;

— for all fields, the first bit sent is the most significant bit (MSB).

2.2 *Cell header format and encoding at UNI*

The structure of the header is shown in Figure 2/I.361. The fields contained in the header and their encoding are described in the following sections.


µ
8
7
6
5
4
3
2
1
Bit
Octet
GFC
VPI
1
VPI

2.2.1 *Pre-assigned values of the cell header*

Pre-assigned values of the cell header (to differentiate cells for the use of the ATM Layer from cells for the use of the Physical Layer) are given in Table 1/I.361. All other values are for the use of the ATM Layer.

2.2.2 *Generic flow control (GFC) field*

The GFC field contains 4 bits. When the GFC function is not used, the value of this field is 0000. When the GFC mechanism is standardized, all values of this field are available for coding. This coding is for further study.

2.2.3 *Routing field (VPI/VCI)*

24 bits are available for routing: 8 bits for virtual path identifier (VPI) and 16 bits for virtual channel identifier (VCI). Pre-assigned combinations of VPI and VCI values are shown in Table 2/I.361. Other pre-assigned values of VPI and VCI are for further study. The VCI value of zero is not available for user virtual channel identification.

μTABLE 1/I.361

Pre-assigned cell header values at the UNI
(excluding the HEC field)

Octet 1	Reserved for use of the physical layer (Notes 1, 2 and 3)
Octet 2	PPPP0000
Octet 3	00000000
Octet 4	0000PPP1

Unassigned cell identification (Note 1)

AAAA0000

00000000

00000000

0000AAA0

A Indicates the bit is available for use by the ATM Layer.

P Indicates the bit is available for use by the Physical Layer.

Values assigned to these bits have no meaning with respect to the fields occupying the corresponding bit positions at the ATM Layer.

Note 1 — In the case of Physical Layer cells or ATM Layer unassigned cells, the bit in the location of the cell loss priority (CLP) indication is not used for the CLP mechanism as specified in § 3.4.2.3.2 of Recommendation I.150.

Note 2 — Cells having header values which are identified as reserved for use of the Physical Layer are not passed to the ATM Layer from the Physical Layer.

Note 3 — Specific pre-assigned Physical Layer cell header values are given in Recommenda-
tion I.432.

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µTABLE 2/I.361

Combinations of pre-assigned VPI and VCI values at the UNI

VPI

VCI

Meta-signalling virtual channel identification (Note)

00000000

00000000 00000001

General broadcast signalling virtual channel identification (Note)

00000000

00000000 00000010

Note — See Recommendation I.311 for use of other VPI/VCI combinations for meta-signalling.

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The number of bits of the VPI and VCI fields used for routing are established by negotiation between the user and the network as described in § 3.1.2.3 of Recommendation I.150. The bits within the VPI and VCI fields used for routing are allocated using the following rules:

- — the allocated bits of the VPI field will be contiguous;
- — the allocated bits of the VPI field will be the least significant bits of the VPI field (beginning at bit 5 of octet 2);
- — the allocated bits of the VCI field will be contiguous;
- — the allocated bits of the VCI field will be the least significant bits of the VCI field (beginning at bit 5 of octet 4).

In addition, unallocated bits, i.e. bits not utilized by the user or the network, within the 24-bit routing field will be set to zero.

2.2.4 *Payload type (PT) field*

2 bits are available for PT identification. The default value for user information is 00. Use of other PT values for user information and for network information is for further study.

2.2.5 *Cell loss priority (CLP) field*

If the CLP is set (CLP value is 1), the cell is subject to discard, depending on network conditions. If the CLP is not set (CLP value is 0), the cell has higher priority (see § 3.4.2.3 of Recommendation I.150).

2.2.6 *Header error control (HEC) field*

The HEC field consists of 8 bits. Use of this field is described in § 4.3 of Recommendation I.432.

2.2.7 *Reserved (RES) field*

The reserved field (1 bit) is for further enhancement of existing cell header functions or for standardized functions not yet specified. The default value of this field is zero.

2.3 *Cell header format and encoding at NNI*

The structure of the header is shown in Figure 3/I.361. The fields contained in the header and their encoding are described in the following sections.

μ

8

7

6

5

4

3

2

1

Bit

Octet

VPI

1

VPI

2.3.1 *Pre-assigned values of the cell header*

Pre-assigned values of the cell header (to differentiate cells for the use of the ATM Layer from cells for the use of the Physical Layer) are given in Table 3/I.361. All other values are for use of the ATM Layer.

µTABLE 3/I.361

Pre-assigned cell header values at the NNI (excluding the HEC field)

	Octet 1	Octet 2	Octet 3	Octet 4
Idle cell identification (Notes 1 and 2)	00000000	00000000	00000000	00000001
Physical Layer OAM cell identification (Note 2)	00000000	00000000	00000000	

00001001

Reserved for use of the Physical Layer (Notes 1 and 2)

00000000

00000000

00000000

0000PPP1

Unassigned cell identification (Note 1)

00000000

00000000

00000000

0000AAA0

A Indicates the bit is available for use by the ATM Layer.

P Indicates the bit is available for use by the Physical Layer.

Values assigned to these bits have no meaning with respect to the fields occupying the corresponding bit positions at the ATM Layer.

Note 1 — In the case of Physical Layer cells or ATM Layer unassigned cells, the bit in the location of the CLP indication is not used for the CLP mechanism as specified in § 3.4.2.3.2 of Recommendation I.150.

Note 2 — Cells having header values which are identified as idle, Physical Layer OAM, and reserved for use by the Physical Layer, are not passed to the ATM Layer from the Physical Layer.

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2.3.2 *Routing field (VPI/VCI)*

Twenty-eight bits are available for routing: 12 bits for VPI and 16 bits for VCI. Pre-assigned values of VPI and VCI are for further study. The VCI value of zero is not available for user virtual channel identification.

2.3.3 *Payload type (PT) field*

Two bits are available for PT identification. The default value for user information is 00. Use of other PT values for user information and for network information is for further study.

2.3.4 *Cell loss priority (CLP) field*

If the CLP is set (CLP value is 1), the cell is subject to discard, depending on network conditions. If the CLP is not set (CLP value is 0), the cell has higher priority (see § 3.4.2.3 of Recommendation I.150).

2.3.5 *Header error control (HEC) field*

The HEC field consists of 8 bits. The HEC mechanism of the NNI is identical to that at the UNI and is described in § 4.3 of Recommendation I.432.

2.3.6 *Reserved (RES) field*

The reserved field (1 bit) is for further enhancement of existing cell header functions or for standardized functions not yet specified. The default value of this field is zero.

2.4 *Cell information field*

2.4.1 *Pre-assigned values*

The pre-assigned values of the information field of all unassigned cells are for further study.

3 ATM protocol procedures

This section will contain procedures that describe the operation of the ATM protocol (including the peer-to-peer and inter-layer information flows).

3.1 *GFC protocol*

For further study.

ANNEX A

(to Recommendation I.361)

Alpahbetical list of abbreviations used in this Recommendation

ATM Asynchronous transfer mode

CLP
Cell loss priority

GFC
Generic flow control

HEC Header error control

MSB Most significant bit

NNI
Network-node interface

OAM Operation and maintenance

PT Payload type

RES
Reserved

UNI
User-network interface

VCI
Virtual channel identifier

VPI Virtual path identifier