INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.962
Amendment 1
(06/97)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

Digital transmission systems – Digital sections and digital line system – Digital section and digital transmission systems for customer access to ISDN

Access digital section for ISDN primary rate at 2048 kbit/s

Amendment 1: Maintenance channel

ITU-T Recommendation G.962 – Amendment 1

(Previously CCITT Recommendation)

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For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION G.962

ACCESS DIGITAL SECTION FOR ISDN PRIMARY RATE AT 2048 kbit/s

AMENDMENT 1

Maintenance channel

Source

Amendment 1 to ITU-T Recommendation G.962, was prepared by ITU-T Study Group 13 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 20th of June 1997.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. 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, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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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As of the date of approval of this Recommendation, the ITU had/had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Recommendation G.962

ACCESS DIGITAL SECTION FOR ISDN PRIMARY RATE AT 2048 kbit/s

AMENDMENT 1

Maintenance channel

(Geneva, 1997)

Introduce a new subclause C.7 into Recommendation G.962, Annex C.

C.7 Maintenance channel

C.7.1 Introduction

The Maintenance Channel (MC) consists of a 4 kbit/s data channel using the international S_{a4} bit in the non-frame alignment TS 0 word. The MC shall be used for transporting reports and sending commands between the ET and the other FUs. See Figure C.1.

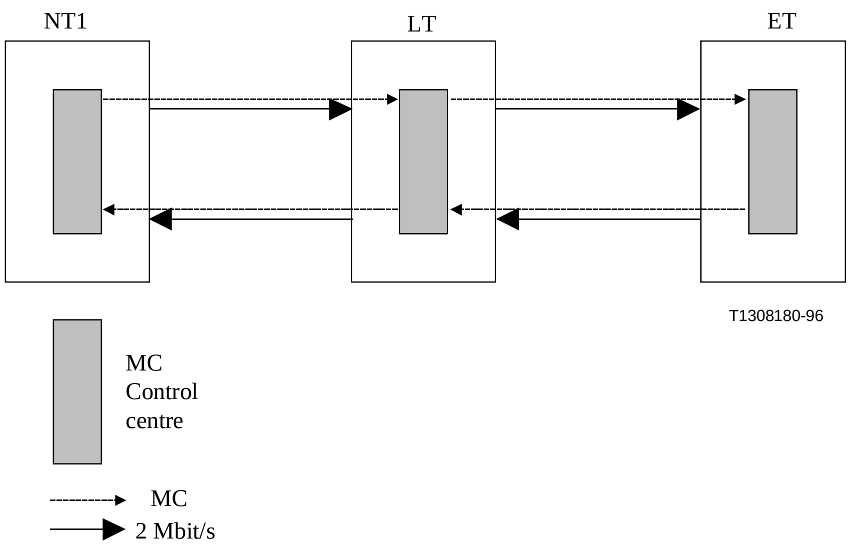


Figure C.1/G.962 – Maintenance channel outline for PRA

The maintenance channel includes a data protocol which is capable of a maximum of 70 messages/second and should function as specified and be secure with a maximum BER of 1×10^{-3} for the PRA digital section.

Each PRA digital section shall use its own MC for message signals pertaining to its own operation and maintenance facilities.

C.7.2 Maintenance channel layered structure

The structure of the MC is based on a three-layer model. These are:

1) physical layer;

2) digital section control layer;

3) message layer.

C.7.2.1 Physical layer

The data for the MC are inserted and removed in the TS 0 non-frame alignment word bit 4. This bit is specified in Recommendation G.704 as S_{a4}**.** Each FU shall generate a data stream toward its counterpart as well as monitoring it. The S_{a4} bit occurs every 250 microseconds giving an effective data rate of 4 kbit/s.

C.7.2.2 Digital section data link control layer

The protocol used to convey the messages between the FU shall be LAPD which is a protocol that operates at the data link layer of the OSI architecture. This protocol is specified in Recommendations Q.920 and Q.921. Because the uncomplex function that the protocol is put to, only the **unacknowledged** operation is required in this case. With this type of operation, the layer 3 messages are transmitted in **Unnumbered Information** (UI) frames. At the control layer, the UI frames are not acknowledged as this is covered in acknowledgment messages at the layer 3 level. Even if transmission and format errors are detected, no error recovery mechanism is defined at this layer.

When the MC is in an idle state, each control layer generator shall continuously send the idle code which is 01111110.

The ET shall act as the network provider and the NT1, LT as the user. The format of the LAPD frame is shown in Figure C.2 below.

Data link layer peer-to-peer exchanges are in frames conforming to Figure C.2.

8	7	6	5	4	3	2	1	**Bit** / **Octet**
FLAG 0	1	1	1	1	1	1	0	1
ADDRESS high-order octet								2
ADDRESS low-order octet								3
CONTROL								4
MESSAGE LAYER								5 to n-3
FCS								n-2
FCS								n-1
FLAG 0	1	1	1	1	1	1	0	n

Figure C.2/G.962 – Data link frame structure

C.7.2.2.1 Flag sequence

All frames shall start and end with the flag 01111110 sequence. The closing flag sequence of a frame cannot be used as the opening flag for the following frame.

C.7.2.2.2 Address field

This field shall consist of two octets as shown in Figure C.3.

8	7	6	5	4	3	2	1	**Bit** / **Octet**
SAPI						C/R	EA 0	2
0	1	0	1	0	0	0	0	Setting
TEI							EA 1	3
			See below				0	Setting

TEI = 0000000 for NT2
TEI = 0001000 for NT1
TEI = 0001011 for LT
TEI = 0001110 for ET

Figure C.3/G.962 – Address field format

C.7.2.2.3 Control field

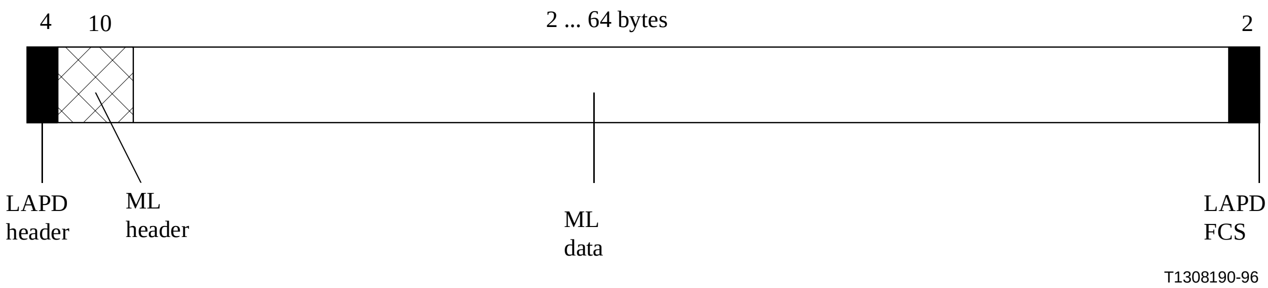
The control field is a single octet shown in Figure C.4. As no dialogue occurs at layer 2, the P/F bit is always set to 1.

8	7	6	5	4	3	2	1	**Octet**
			P/F					4
0	0	0	1	0	0	1	1	Setting

Figure C.4/G.962 – Control field format

C.7.2.3 Message Layer (ML)

The structure of a LAPD frame consists of a four-byte LAPD header and a two-byte LAPD trailer framing the maintenance channel header and data as shown below.



C.7.2.3.1 Message layer header

The message layer header section follows the standard LAPD header and has the following format:

Byte	Description
1	Transmission direction
2	Pad byte – not used
3	Primary destination SAPI
4	Pad byte – not used
5-6	Destination descriptor
7-8	Source descriptor
9	Length
10	Pad byte – not used

C.7.2.3.1.1 Transmission direction

The transmission medium byte is set to 02H for Upstream (NT1 to ET) messages and 03H for Downstream (ET to NT1) messages.

C.7.2.3.1.2 Primary destination SAPI

The primary destination Service Access Point Identifier (SAPI) is used as a router address. If the SAPI address is corresponding to one shown in Table C.5, then the destination descriptors are not read and the complete message layer information is passed on as per the routing address. If however the SAPI is not one listed in Table C.5 but is one belonging to Table I.4, then the destination descriptor information is used.

Table C.5/G.962 – Primary destination service access point identifiers

Routing SAPI	Routing address
RELAY_MIU	21H
RELAY_ET	20H
RELAY_LT	1EH
RELAY_NT1	1CH
RELAY_HALF_LT	1FH
RELAY_HALF_NT1	1DH

C.7.2.3.1.3 Destination descriptors

The destination descriptor is encoded as a sequence of bit fields in 2 contiguous bytes.

Bit	Description
15-12	Card type
11-6	Secondary destination SAPI
5-2	Position

The destination card types are listed in Table C.6 called Card types.

Table C.6/G.962 – Card types

Card	Value
MIU	00H
ASU	01H
LINE_ASU	02H
LT_ASU	03H
NT1_ASU	04H
ET	05H
LT	06H
NT1	07H
HALF_LT	08H
HALT_NT1	09H
LOCAL	0AH
ALL_CARDS	0BH

The secondary destination service access point identifiers can be directed to particular applications service access points. An example is given in Appendix I, Table I.4 called Secondary destination service access point identifiers, and can have a range of 00H to 3FH.

The destination position is the slot number within a particular type of functional unit, such as LTs or NT1s and can take any value from 01 to 0EH with 0FH for undefined position.

C.7.2.3.1.4 Source descriptor

The source descriptor is encoded as a sequence of bit fields in 2 contiguous bytes.

Bit	Description
15-12	Source card type (src. card)
11-8	Source position (src. pos)
7-4	Bearer

The source card types and positions have the same definition as in C.7.2.3.1.3.

Bearer is the bearer number along which the message was transmitted and can have any value between 01 and 0FH.

C.7.2.3.1.5 Length

This byte indicates the length of the data section. The minimum length is 2 while the maximum is 64 bytes. The values are given hexadecimal format.

C.7.2.3.2 Message layer data

The message layer data consists of a signal definition followed by a parameter and data field. The parameter and data type fields are optional. A message layer signal may, in its own right, convey all the information required; however, in some cases, additional information may be required. In this case, parameter data is attached to a signal. If a message has no parameter data attached, the signal consists only of the signal number as 2 consecutive bytes. In a signal with attached parameters, the parameter data follows the signal definition number.

C.7.2.3.2.1 Signal definitions

The signal definition number and associated parameters go together to make a complete message. A number of examples are given in Appendix I, Table I.1 called Signal definitions.

Currently signal definition numbers have been allocated from 0001H to 00C1H. All other signal numbers have not been allocated and are available for further enhancements or other applications.

C.7.2.3.2.2 Parameter descriptor

The parameter descriptor describes every byte of the parameter data. A number of examples are given in Appendix I, Table I.2 called Parameter descriptors. Every byte can be interpreted by looking at the data type (type entry) definition in Appendix I, Table I.3 called Data types.

APPENDIX I

Examples of message layer data are given in Tables I.1 to I.4.

Table I.1/G.962 – Signal definitions

Signal name	Decimal number	Hexadecimal number
CONFIGURE_CHECK	1	01
LT_POSITION_REQUEST	2	02
NT1_POSITION_REQUEST	3	03
HALF_BEARER_SUBRACK_CHECK	4	04
HALF_STANDBY_SUBRACK_CHECK	5	05
ET_CONFIGURE_STANDBY	6	06
LT_CONFIGURE_STANDBY	7	07
ET_CONFIGURE_NORMAL	8	08
LT_CONFIGURE_NORMAL	9	09
NT1_CONFIGURE	10	0A
ALARM_PARAMETERS	11	0B
CARD_PRESENT	12	0C
ET_CARD_POWERING_UP_CONFIGURE_REQUEST	13	0D
ET_CARD_POWERING_UP_CONNECT_REQUEST	14	0E
ET_CONFIRM_CONFIGURE	15	0F
LT_FULL_PATCH_INDICATION_OFF	16	10
LT_FULL_PATCH_INDICATION_ON	17	11
PATCHED_BEARER_OK	18	12
PATCH_TO	19	13
RELEASE_PATCH	20	14
REQUEST_PATCH	21	15
STANDBY_AVAILABLE	22	16

Table I.1/G.962 – Signal definitions (*concluded*)

Signal name	Decimal number	Hexadecimal number
STANDBY_NOT_PATCHING_THIS_BEARER	23	17
STANDBY_PATCHING_THIS_BEARER	24	18
CONFIGURED_HALF_STANDBY	25	19
HALF_BEARER_POWERING_UP_CONFIGURE_REQUEST	26	1A

Table I.2/G.962 – Parameter descriptions

Parameter descriptor	Parameter byte No.	Parameter name	Data type
CONFIG_REPLY_Par	1	Reply	Config_Response
CONFIGURE_CHECK_Par	1	Standby_Position	Position8
CONFIGURED_HALF_STANDBY_Par	1	Config	Configuration_Type
HALF_STANDBY_SUBRACK_CHECK_Par	1	NT1_Protected_Position	Position8
	2	Standby_Position	Position8
LT_BEARER_REPORT_Par	1	LTtoNT1	LinkAlarmReport
	2	NT1toLT	LinkAlarmReport
	3	ETtoLT	LinkAlarmReport
	4	NT2toNT1	LinkAlarmReport
	5	NT1toNT2	LinkAlarmReprot
	6	LTPosition	Position8
	7	NT1Position	Position8

Table I.3/G.9962 – Data types

Data type	Value	Description
Alarm_Class	Bit 0	Status
	Bit 1-2	Class
	Bit 3-7	Delay
Boot	00	FALSE
	01	TRUE
Byte	00-FF	
CardType	00	MIU
	01	ASU
	02	LINE_ASU
	03	LT_ASU
	04	NT1_ASU

Table I.3/G.9962 – Data types (*concluded*)

Data type	Value	Description
	05	ET
	06	LT
	07	NT1
	08	HALF_LT
	09	HALT_NT1
	0A	LOCAL
	0B	ALL_CARDS
Config_Response	80	POSITIVE_RESPONSE
Configuration_Type	00	UNCONFIGURED
	01	UNPROTECTED
	02	PROTECTED
	03	HALF_STANDBY
	04	FULL_STANDBY
	05	OTHER
LinkAlarmReport	Bit 0	REPORT_OK
	Bit 1	LRX
	Bit 2	AIS
	Bit 3	LFA
	Bit 4	SES
	Bit 5	ES
	Bit 6	REPORT_NONE
	Bit 7	DM

Table I.4/G.962 – Secondary destination service access point identifiers

SAPI	Number
MIU_CONFIGURATION	0EH
ET_PATCH_CONTROL	10H
LT_PATCH_CONTROL	10H
NT1_PATCH_CONTROL	10H
ET_PATCH_MONITOR	11H
LT_PATCH_MONITOR	11H

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