INTERNATIONAL TELECOMMUNICATION UNION

ITU-T X.85/Y.1321

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Amendment 1
(04/2004)

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Public data networks – Transmission, signalling and switching

SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT GENERATION NETWORKS

Internet protocol aspects – Transport

IP over SDH using LAPS

Amendment 1: Bit-oriented method for LAPS

ITU-T Recommendation X.85/Y.1321 (2001) – Amendment 1

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ITU-T Recommendation X.85/Y.1321

IP over SDH using LAPS

Amendment 1

Bit-oriented method for LAPS

Summary

This amendment presents a bit-oriented method related to IP over PDH using LAPS and Ethernet over PDH (i.e., IP traffic data and Ethernet frame are transported in a PDH signal).

Source

Amendment 1 to ITU-T Recommendation X.85/Y.1321 (2001) was approved on 29 April 2004 by ITU-T Study Group 17 (2001-2004) under the ITU-T Recommendation A.8 procedure.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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 Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 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.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU 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.

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ITU-T Recommendation X.85/Y.1321

IP over SDH using LAPS

Amendment 1

Bit-oriented method for LAPS

1) Clause 2.1.2 – Other normative references

Add the following references in alphanumerical order to clause 2.1.2:

– ITU-T Recommendation G.804 (1998), *ATM cell mapping into plesiochronous digital hierarchy (PDH)*.

– ITU-T Recommendation G.832 (1998), *Transport of SDH elements on PDH networks – Frame and multiplexing structures*.

– ITU-T Recommendation X.86/Y.1323 (2001), *Ethernet over LAPS*.

– IETF RFC 3518 (2003), *Point-to-Point Protocol (PPP) Bridging Control Protocol (BCP)*.

– IETF RFC 2472 (1998), *IP Version 6 over PPP*.

– IETF RFC 1332 (1992), *The PPP Internet Protocol Control Protocol (IPCP)*.

2) New Annex D

Add a new Annex D as follows:

Annex D

Bit-oriented operation

The scope of this annex is located at Ethernet frame, IPv4 and IPv6 over single PDH channel defined in ITU-T Rec. G.703, using bit-oriented method for LAPS.

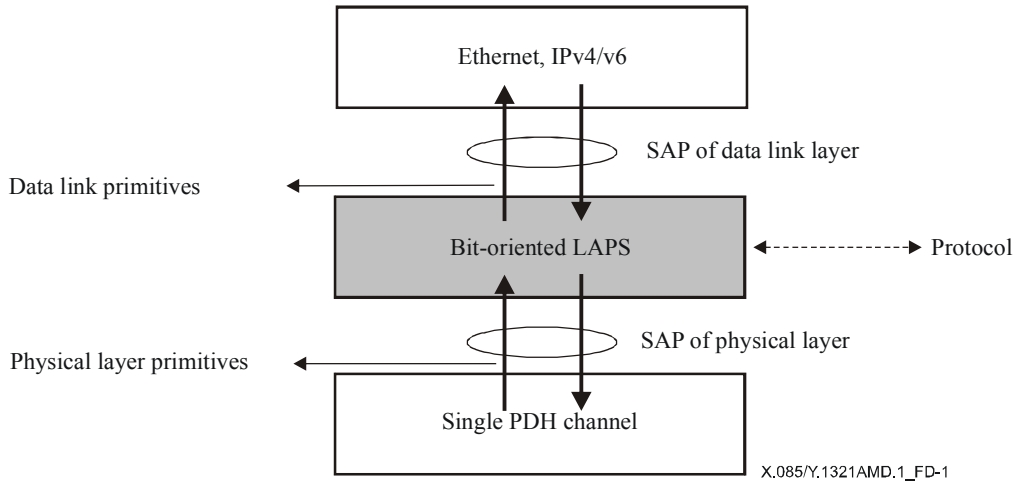

Figure D.1/X.85/Y.1321 – The relationship between PDH physical layer, LAPS data link layer and upper layer

(It is noted that "single PDH channel" in Figure D.1 means a pure PDH transport, or mixed PDH/SDH transport with PDH in the access and further transported via SDH in the core.)

The purpose of this annex is to provide uniform specification of Ethernet, IPv4 and IPv6 over single PDH channel on the basis of the main body of this Recommendation.

This annex presents the uniform bit-oriented LAPS related to both IPv4/v6 and Ethernet over PDH channel within SDH VCs or independent PDH transmission system. As defined in this Recommendation, PPP operation is indicated by setting the Address Field to 0xFF. The procedures defined in RFC 1662 and associated RFCs for encapsulation of IPv4 (RFC 1332), IPv6 (RFC 2472) and Ethernet (RFC 3518) should also be used for carrying these protocols over PPP on a PDH channel.

D.1 PDH channels

It is also strongly recommended to use the G.703 E11/E12/E21/E22/E31/E32/E4/T12 interfaces. ITU-T Rec. G.703 specifies the digital hierarchy which shall be used to carry bit-synchronous signals, bit rates and code as follows:

– E11: 1544 kbit/s, code: AMI or B8ZS;
– E12: 2048 kbit/s, code: HDB3;
– E21: 6312 kbit/s, code: B6ZS or B8ZS;
– E22: 8448 kbit/s, code: HDB3;
– E31: 34 368 kbit/s, code: HDB3;
– E32: 44 736 kbit/s, code: B3ZS;
– E4: 139 264 kbit/s, code: CMI.

The LAPS treats an E11/E12/E21/E22/E31/E32/E4/T12 channel as bit-oriented synchronous full-duplex links in the bit-oriented case, and the associated control signals are not used for the physical layer.

D.2 Operation

The operation is the same as in the octet-oriented case unless otherwise noted. The opening Flag sequence, Address field, Control field, SAPI field, information field and FCS field are applied as specified in A.2.

D.2.1 Flag sequence

The bit stream is examined on a bit-by-bit basis for the binary sequence 01111110 (hexadecimal 0x7e).

D.2.2 Transparency

Unlike the octet-oriented case, an octet stuffing procedure is not used. Instead, after FCS computation, the transmitter examines the entire frame between the two flag sequences. A "0" bit is inserted after all sequences of five contiguous "1" bits (including the last 5 bits of the FCS) to ensure that a flag sequence is not transmitted. In the receiving side, prior to FCS computation, any "0" bit that directly follows five contiguous "1" bits is discarded.

D.2.3 Invalid frames

Frames that end with a sequence of more than six "1" bits are silently discarded, and not counted as a FCS error.

D.2.4 Scrambling

For consistency with existing bit-oriented implementations of HDLC, scrambling is not enabled.

D.2.5 Rate adaptation for Ethernet over PDH

If the rate adaptation is needed in the LAPS transmit processing, transmit entity adds the rate-adaptation octet(s) "0xdd" within the frame by sending sequence(s) of {0x7d, 0xdd}. This function is performed just after transparency processing and before the end flag is added. In receive direction, receive entity will remove the rate adaptation octet(s) "0xdd" within the LAPS frame when detecting sequence(s) of {0x7d, 0xdd}. This function will be done just before transparency processing and after the end flag is detected.

Unlike the octet-oriented case, the functionality of the rate adaptation is not applied for Ethernet over PDH since the overhead bits are very short while Ethernet data stream is coming during the period of PDH overhead bits. The flag sequence must be transmitted during inter-frame time fill.

D.3 Mapping of LAPS frames into 1544 kbit/s

D.3.1 Frame format

The multiframe structure for the 24-frame multiframe as described in ITU-T Rec. G.704 shall be used in this case. The LAPS frame is mapped into bits 2 to 193 (i.e., time slots 1 to 24 described in ITU-T Rec. G.704) of the 1544 kbit/s frame with the octet structure of the 1544 kbit/s frame (see Figure D.2).

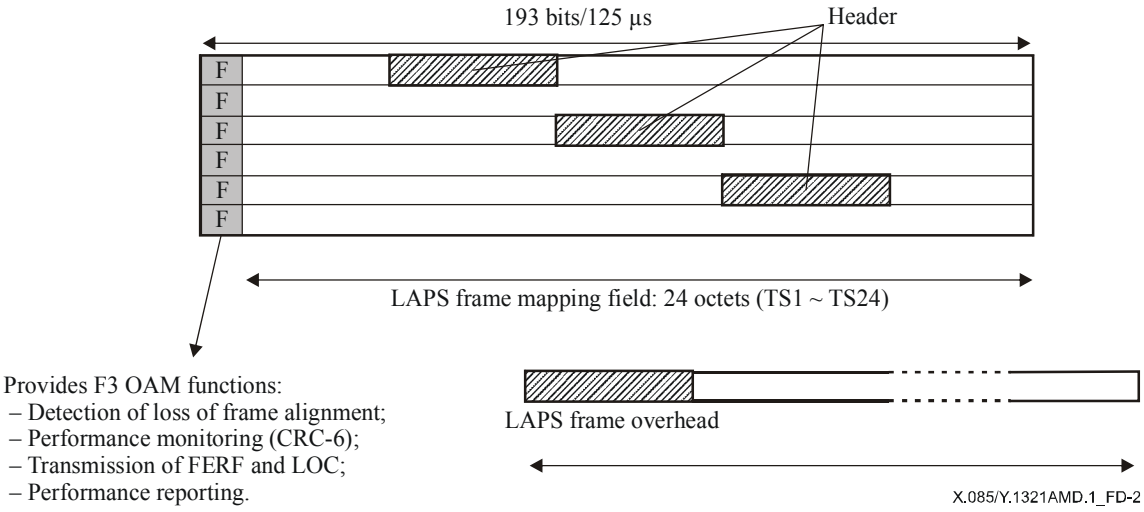

Figure D.2/X.85/Y.1321 – Frame structure for 1544 kbit/s used to transport LAPS frames

D.4 Mapping of LAPS frames into 2048 kbit/s

D.4.1 Frame format

The basic frame structure at 2048 kbit/s as described in ITU-T Rec. G.704 shall be used in this case.

The LAPS frame is mapped into bits 9 to 128 and bits 137 to 256 (i.e., time slots 1 to 15 and time slots 17 to 31 described in ITU-T Rec. G.704) of the 2048 kbit/s frame with the octet structure of the 2048 kbit/s frame (see Figure D.3).

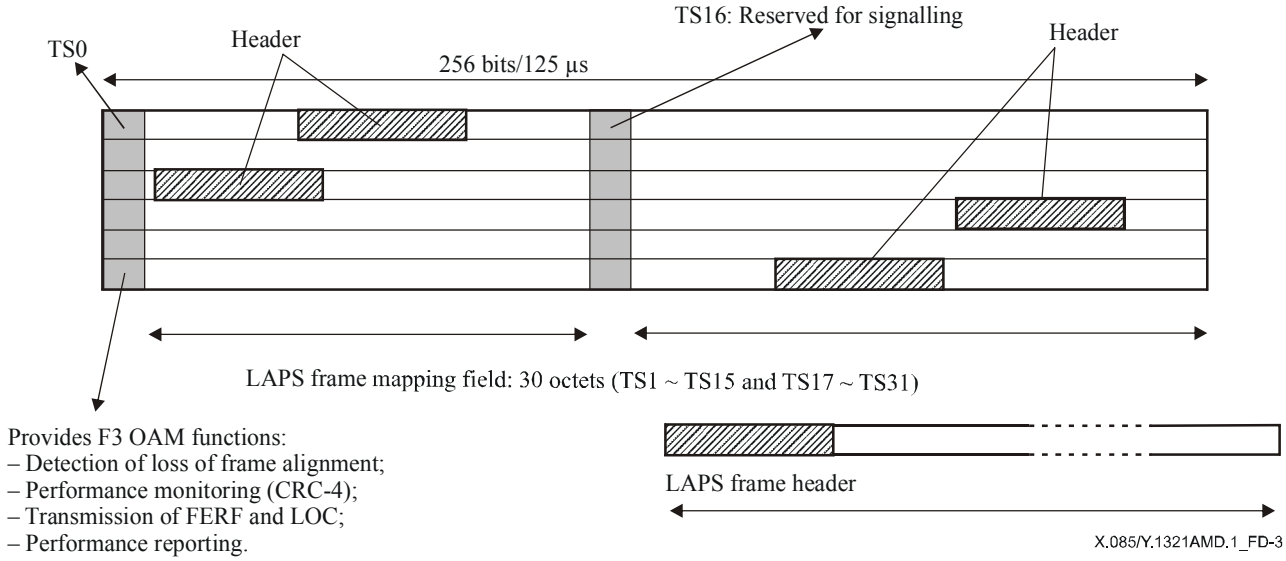

Figure D.3/X.85/Y.1321 – Frame structure for 2048 kbit/s used to transport LAPS frames

D.5 Mapping of LAPS frames into 6312 kbit/s

D.5.1 Frame format

The basic frame structure at 6312 kbit/s as described in ITU-T Rec. G.704 shall be used in this case.

The LAPS is mapped into bits 1 to 768 (i.e., time slots 1 to 96 described in ITU-T Rec. G.704) of the 6312 kbit/s frame with the octet structure of the 6312 kbit/s frame. Bits 769 to 784 (time slots 97 and 98) are reserved for user communication channels and the last five bits (F-bits) are used for frame alignment and OAM (see Figure D.4).

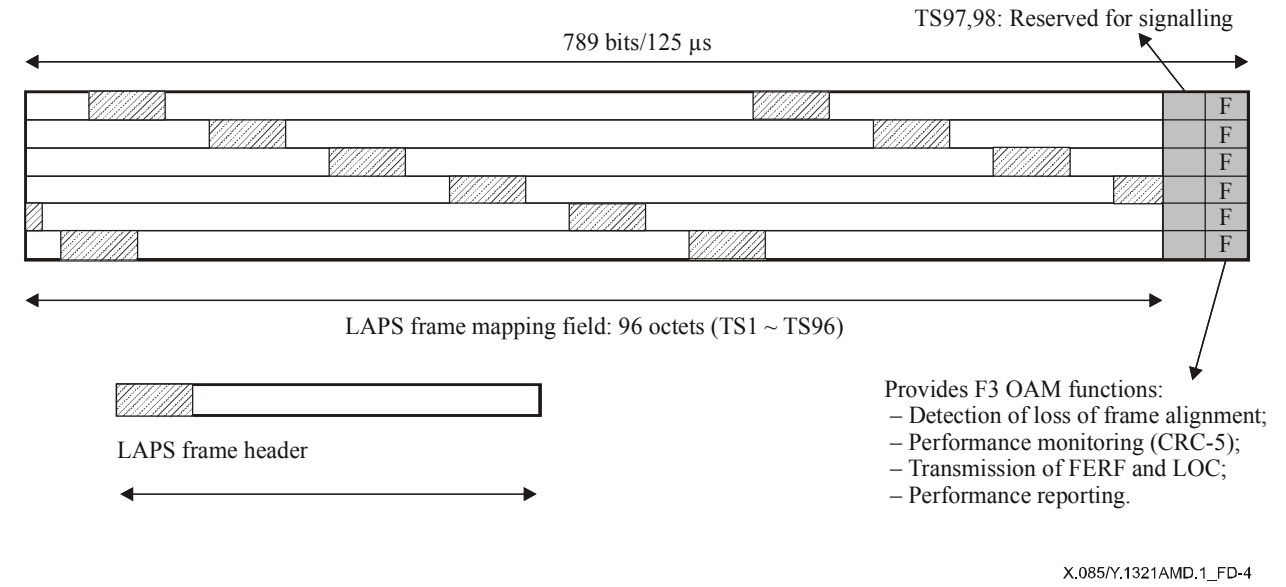

Figure D.4/X.85/Y.1321 – Frame structure for 6312 kbit/s used to transport LAPS frames

D.6 Mapping of LAPS frames into 8448 kbit/s

For further study.

D.7 Mapping of LAPS frames into 44 736 kbit/s

For further study.

D.8 Mapping of LAPS frames into 34 368 kbit/s

D.8.1 Frame format

The basic frame structure at 34 368 kbit/s as described in ITU-T Rec. G.832 shall be used in this case.

The LAPS frames are mapped into the 530 payload octets of the 34 368 kbit/s frame with the octet structure of the 34 368 kbit/s frame (see Figure D.5).

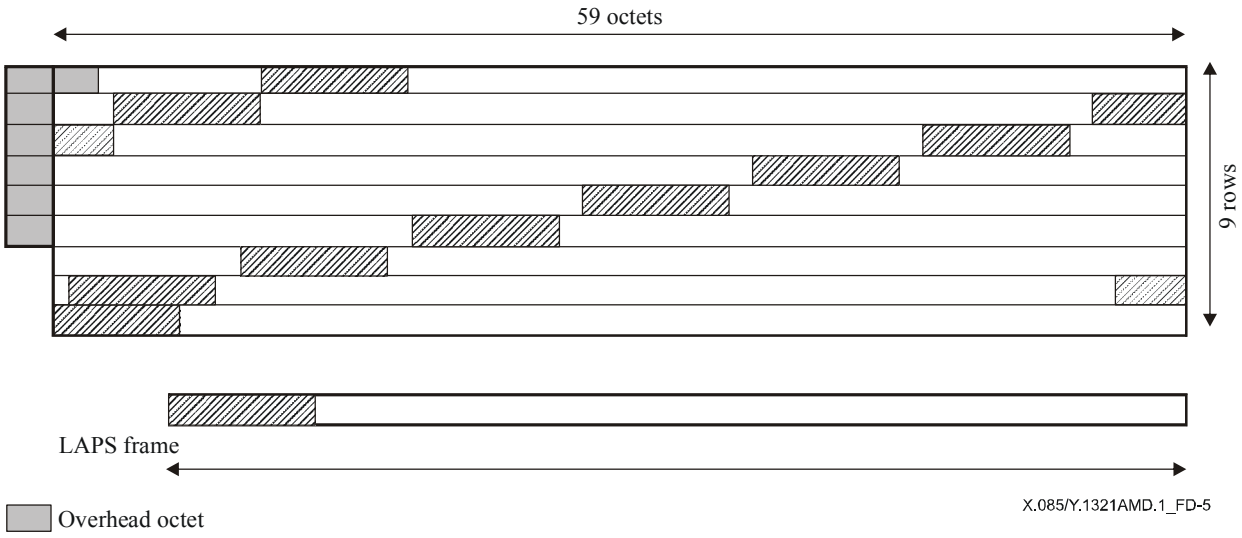

Figure D.5/X.85/Y.1321 – Frame structure for 34 368 kbit/s used to transport LAPS frame

D.9 Mapping of LAPS frames into 139 264 kbit/s

D.9.1 Frame format

The basic frame structure at 139 264 kbit/s, as described in ITU-T Rec. G.832, shall be used in this case. The LAPS frames are mapped into the 2160 payload octets of the 139 264 kbit/s frame with the octet structure of the 139 264 kbit/s frame (see Figure D.6).

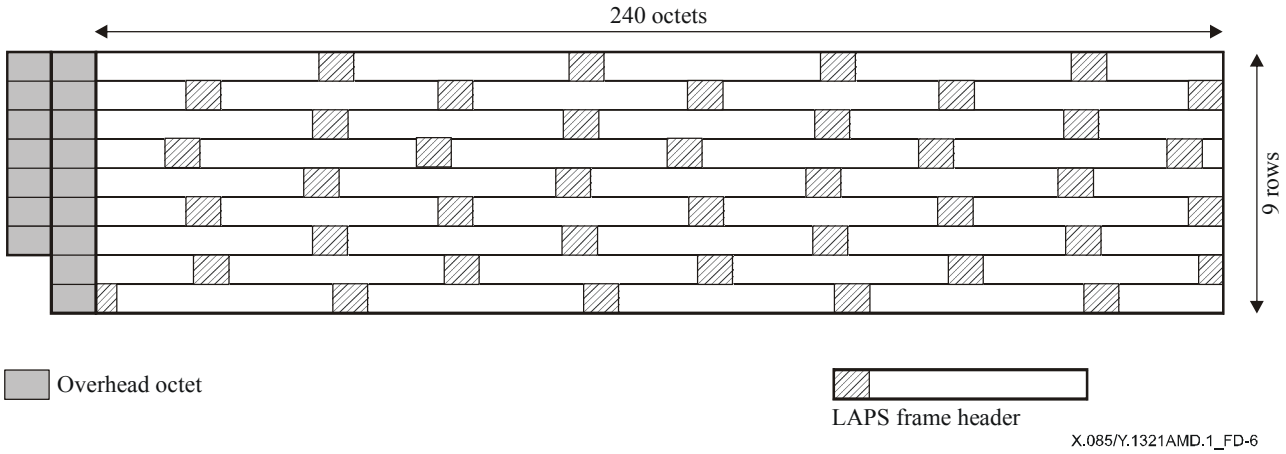

Figure D.6/X.85/Y.1321 – Frame structure at 139 264 kbit/s

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

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