INTERNATIONAL TELECOMMUNICATION UNION

ITU-T G.722.1

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Annex A
(02/00)

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

Digital transmission systems – Terminal equipments – Coding of analogue signals by methods other than PCM

Coding at 24 and 32 kbit/s for hands free operation in systems with low frame loss

Annex A: Packet format, capability identifiers and capability parameters

ITU-T Recommendation G.722.1 – Annex A

(Previously CCITT Recommendation)

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
INTERNATIONAL ANALOGUE CARRIER SYSTEM	
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TESTING EQUIPMENTS	
TRANSMISSION MEDIA CHARACTERISTICS	G.600–G.699
DIGITAL TRANSMISSION SYSTEMS	
TERMINAL EQUIPMENTS	G.700–G.799
General	G.700–G.709
Coding of analogue signals by pulse code modulation	G.710–G.719
Coding of analogue signals by methods other than PCM	**G.720–G.729**
Principal characteristics of primary multiplex equipment	G.730–G.739
Principal characteristics of second order multiplex equipment	G.740–G.749
Principal characteristics of higher order multiplex equipment	G.750–G.759
Principal characteristics of transcoder and digital multiplication equipment	G.760–G.769
Operations, administration and maintenance features of transmission equipment	G.770–G.779
Principal characteristics of multiplexing equipment for the synchronous digital hierarchy	G.780–G.789
Other terminal equipment	G.790–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999

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

ITU-T RECOMMENDATION G.722.1

CODING AT 24 AND 32 kbit/s FOR HANDS FREE OPERATION IN SYSTEMS WITH LOW FRAME LOSS

ANNEX A

Packet format, capability identifiers and capability parameters

Summary

To enable H.323/H.324 communication systems to communicate using G.722.1 and negotiate G.722.1 in a standard way, the capabilities must be defined. This requires defining the packetization (for H.323) and the generic capability to be defined. To accommodate these needs, it is proposed that a new annex, Annex A, be added to G.722.1. This annex details the packet format and the capability identifiers/parameters necessary in H.245.

Source

Annex A to ITU-T Recommendation G.722.1 was prepared by ITU-T Study Group 16 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 17 February 2000.

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.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

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

CONTENTS

Introduction

This annex describes the packet format for G.722.1 when used in H.323 systems. The same payload structure defined here is also applicable to other packet transport systems. The capability identifier and parameter tables necessary for H.323 are also provided.

Recommendation G.722.1

CODING AT 24 AND 32 kbit/s FOR HANDS FREE OPERATION IN SYSTEMS WITH LOW FRAME LOSS

ANNEX A

Packet format, capability identifiers and capability parameters

(Geneva, 2000)

A.1 References

[1] ITU-T Recommendation H.225.0 (1999), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.

A.2 Packet structure for G.722.1 frames

The audio coding algorithm defined in Recommendation G.722.1 encodes wideband audio signals with a 50 Hz-7 kHz bandwidth into one of two bit rates, 24 kbit/s or 32 kbit/s, using 20 ms frames and a sampling rate clock of 16 kHz. The bit rate can be changed at any 20 ms frame boundary, although rate change notification is not provided inband with the bitstream. When operating at 24 kbit/s, 480 bits (60 octets) are produced per frame, and when operating at 32 kbit/s, 640 bits (80 octets) are produced per frame. Thus, both bit rates allow for octet alignment without the need for padding bits.

The number of bits in a frame is fixed. However, within this fixed frame G.722.1 uses variable length coding (e.g. Huffman coding) to represent most of the encoded parameters. Except for the categorization control bits parameter, all other bit stream parameters are represented by variable length codes – a variable number of bits. Figure A.1 illustrates this point, and the order of the transmitted parameter fields. All variable length codes, and the categorization control bits, are transmitted in order from the left most (most significant – MSB) bit to the right most (least significant – LSB) bit. The use of Huffman coding means that it is not possible to identify the various coder parameters/fields contained within the bit stream without first completely decoding the entire frame.

Figure A.2 illustrates how the G.722.1 bit stream maps into an octet aligned RTP [1] payload described in Recommendation H.225.0.

An RTP packet shall only contain G.722.1 frames of the same bit rate. The RTP time stamp shall be in units of 1/16000th of a second.

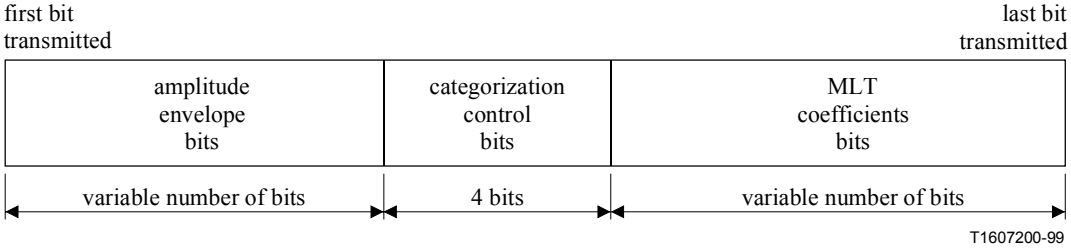

Figure A.1/G.722.1 – Major bit stream fields and their order in transmission

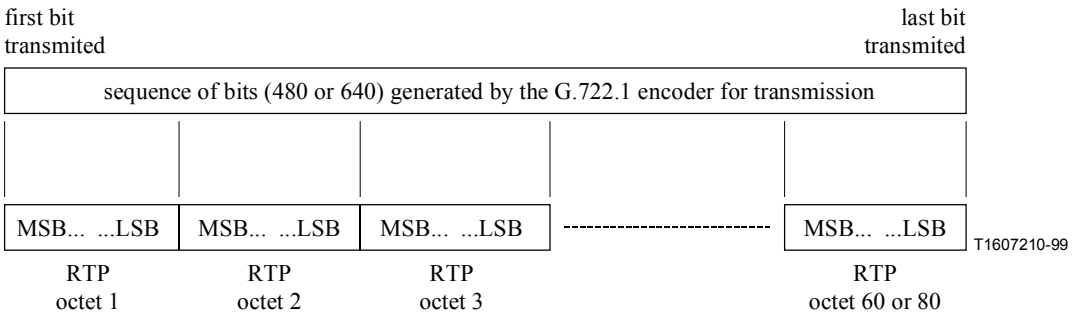

Figure A.2/G.722.1 – The G.722.1 encoder bit stream is split into a sequence octets (60 or 80 depending on the bit rate), and each octet is in turn mapped into an RTP octet

A.3 Capability Identifiers and Parameters for use with Recommendation H.245

The **GenericCapability** is used in H.245 for the G.722.1 capability exchange. Here the necessary tables for the capability identifiers and parameters are defined. See Tables A.1 and A.2.

Table A.1/G.722.1 – Capability identifier table for G.722.1

Capability name	ITU-T Recommendation G.722.1
Capability class	Audio
Capability identifier type	Standard
Capability identifier value	{ itu-t (0) recommendation (0) g (7) 7221 generic-capabilities (1) 0 }
maxBitRate	This parameter shall be set to a value of 32 000, representing 32 kbit/s, or 24 000, representing 24 kbit/s.
NonCollapsingRaw	This field is not used
Transport	This field is not used

Table A.2/G.722.1 – Generic Capability parameter table for G.722.1, describing the maximum number of frames allowed in an RTP packet

Parameter name	maxFramesPerPacket
Parameter description	This is a Collapsing GenericParameter. The value of maxFramesPerPacket specifies the maximum number of encoded G.722.1 frames that may be included in a single RTP packet
Parameter identifier value	1
Parameter status	Mandatory
Parameter type	unsignedMin
Supercedes	This field is not used

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	**Transmission systems and media, digital systems and networks**
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure
Series Z	Languages and general software aspects for telecommunication systems

18030

Printed in Switzerland
Geneva, 2000