



INTERNATIONAL TELECOMMUNICATION UNION

# ITU-T

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

# G.722.1

**Annex B**  
(11/2000)

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

Digital terminal equipments – Coding of analogue signals  
by methods other than PCM

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

**Annex B: Floating-point implementation  
for G.722.1**

ITU-T Recommendation G.722.1 – Annex B

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# **ITU-T Recommendation G.722.1**

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

### **Annex B**

#### **Floating-point implementation for G.722.1**

##### **Summary**

G.722.1 implements a fixed-point algorithm. This annex contains the description of a floating-point extension to G.722.1, which will allow for easier implementation of the standard in general-purpose processors.

This annex includes an electronic attachment containing the reference code and the test vectors for ITU-T G.722.1/Annex B floating-point algorithm implementation verification.

##### **Source**

Annex B to ITU-T Recommendation G.722.1 was prepared by ITU-T Study Group 16 (2001-2004) and approved under the WTSA Resolution 1 procedure on 17 November 2000.

## 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.

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As of the date of approval of this Recommendation, ITU had 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 G.722.1

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

### Annex B

#### Floating-point implementation for G.722.1

##### B.1 Introduction

This annex provides a description of the floating-point arithmetic implementation for ITU-T Rec. G.722.1.

##### B.2 Algorithmic description

This floating-point version of ITU-T Rec. G.722.1 has the same basic algorithmic steps as the fixed-point version.

##### B.3 ANSI C code

ANSI-compliant C code simulating the floating-point version of ITU-T Rec. G.722.1 is available as an attachment to this annex. The algorithmic description given by the C code shall take precedence over the texts contained in the main body of ITU-T Rec. G.722.1 or this annex.

The files in Table B.1 comprise the floating-point source C code.

**Table B.1/G.722.1 – List of software files specific to G.722.1 floating-point source code**

File Name	Description
common.c	routines used by encoder and decoder
dct4.c	forward and inverse DCT
decode.c	main program for decoder
decoder.c	routines for decoder
encode.c	main program for encoder
encoder.c	routines for encoder
rmlt_coefs_to_samples.c	inverse MLT
samples_to_rmlt_coefs.c	MLT
defs.h	parameter definitions
huff_defs.h	definitions for Huffman coding
huff_tables.h	declaration of Huffman tables

Once the stand-alone (floating-point) program is compiled into the encoder file, *encode*, and the decoder file, *decode*, then the command line format for using the coder is as follows:

```
encode bit-stream-type input-audio-file output-bit-stream-file bit-rate
decode bit-stream-type input-bit-stream-file output-audio-file bit-rate
```

where:

bit-stream-type = 0	specifies using the compacted bit stream;
bit-stream-type = 1	specifies using the ITU-T Rec. G.192 bit stream format for test purposes;
input-audio-file	name of 16-bit PCM audio file to read samples from;
output-audio-file	name of 16-bit PCM audio file to save decoded output;
input-bit-stream-file	name of file to read the input bit stream from;
output-bit-stream-file	name of file to save the encoded bit stream output;
bit-rate = 24 000 or 32 000	for 24 kbit/s and 32 kbit/s operation respectively.





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