INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

F.723

(07/96)

SERIES F: NON-TELEPHONE TELECOMMUNICATION SERVICES

Audiovisual services

Videophone service in the Public Switched Telephone Network (PSTN)

ITU-T Recommendation F.723

(Previously «CCITT Recommendation»)

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FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (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 (Helsinki, March 1-12, 1993).

ITU-T Recommendation F.723 was prepared by ITU-T Study Group 1 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 19th of July 1996.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

CONTENTS

Recommendation F.723

VIDEOPHONE SERVICE IN THE PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

(Geneva, 1996)

1 Introduction

This Recommendation contains the descripti on and network specific service requirements for videophone services offered in the Public Switched Telephone Network (PSTN). The substance of this Recommendation complements the main body of the Supplement to Recommendation F.720, which deals with network independent service requirements for respective Low Bit Rate (LBR) videophone services provided in networks such as PSTN and digital mobile telecommunication networks across Low Bit Rate (LBR) channels. The difference between the service requirements in these two network domains stems from variations in access rates, mobility, robustness of digital wireless transmission and different terminal environments. In addition to network specific requirements, the network independent requirements for LBR videophone services and general requirements for all videophone services, included in Recommendation F.720, apply for the service as well.

Due to bandwidth and technical restrictions, the quality of service is limited and may be inadequate for many applications, in particular in the professional domain. Hence, it is essential that users of the service can utilize the reduced network capabilities as efficiently as possible with a flexibility in the channel allocation between voice, video, image and data.

This service can be used on a stand-alone basis or as part of a multimedia application. In the latter case, the same requirements apply.

2 Normative references

The following Recommendations and other references contain provisions which, through reference in the text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- ITU-T Recommendation G.723.1 (1996), *Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbit/s.*
- ITU-T Recommendation H.223 (1996), *Multiplexing protocol for low bit rate multimedia communication.*
- ITU-T Recommendation H.245 (1996), *Control protocol for multimedia communication.*
- ITU-T Recommendation H.263 (1996), *Video coding for low bit rate communication.*
- ITU-T Recommendation H.281 (1994), *A far-end camera control for videoconferences using H.224.*
- ITU-T Recommendation H.324 (1996), *Terminal for low bit rate conversational multimedia communication.*
- ITU-T Recommendation T.120 (1996), *Data protocols for multimedia conferencing.*
- ITU-T Recommendation T.126 (1996), *Multipoint still image and annotation protocol.*
- ITU-T Recommendation V.8 *bis* (1996), *Procedures for the identification and selection of common modes of operation between DCEs and between DTEs over the general switched telephone network and on leased point-to-point telephone-type circuits.*
- ITU-T Recommendation V.34 (1994), *A modem operating at data signalling rates of up to 28 800 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits.*

3 Definitions

For the purposes of this Recommendation, the following definitions apply.

3.1 channel aggregation: The capability to aggregate basic PSTN data connections in given discrete data rate increments to establish one higher bit rate data channel.

3.2 dynamic channel allocation: The principle of allocating in a flexible way the available channel capacity between various types of data, comprising audio, video, control information, still pictures and other application specific data to maximize the quality of service.

3.3 fall-back[1)]: A procedure, initiated by either the videophone or the network that reduces the bit rate of the voiceband connection.

3.4 in-band signalling: Signalling between videophone units that support user control functions, monitoring functions, user alerts or advisory information about the status of the videophone units or the network connection.

3.5 basic videophone: A videophone containing mandatory features only and conforming to performance parameters contained in the Recommendations without any optional features nor any improved performance parameters.

3.6 enhanced videophone: A videophone containing enhanced operational features and conforming with performance parameters defined as "optional" in the Recommendations.

3.7 motion rendition: The ability of the receiving entity to reproduce motion from the transmitted video.

4 Terminology

For the purposes of this Recommendation, the following abbreviations are used.

CIF	See Recommendation F.720 (Supplement)
PSTN	Public Switched Telephone Network
QCIF	See Recommendation F.720 (Supplement)
SQCIF	See Recommendation F.720 (Supplement)

5 Description

5.1 General description

The general service description characteristics to all LBR videophone services is included in the Supplement of the F.720 Recommendation.

The service offers a real-time conversational two-way audiovisual end-to-end communication, comprising video, audio and optional[2)] in-band data transfer capabilities. As a rule, the audiovisual information is transferred along a single PSTN connection, based on LBR data channels. The aggregation of two PSTN connections for achieving increased overall capacity and QOS may be offered as an option (further studies are required).

For the video the service should support the coding scheme defined by Recommendation H.263 and a spatial resolution conforming to QCIF and the terminal requirements covered by Recommendation H.324.

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1) Besides at set-up, fall-back may also occur under degraded network conditions through bit-rate reduction.

2) As a terminal capability in-band data transfer is optional, but as a service functionality it is mandatory.

5.2 Basic functionalities

The basic functionalities, characteristic of videophone services in general as well as those of the LBR videophone services have to be supported.

The basic PSTN speech communication facility, i.e. that of an analogue telephone, must be included in the terminal, so that the user shall be able to use the terminal as a normal telephone as well.

Concerning the fall-back, a slow repetition rate video mode, manually controllable from the receiving end, must be supported.

Dynamic channel allocation shall be provided as a mandatory system capability. Dynamic channel allocation is executed by means of a framing, synchronization and terminal negotiation mechanism in conformance to Recommendations H.245 and H.324 and other relevant ITU-T Recommendations.

5.3 Service categories

As a rule, the service employs a single PSTN connection.

The possibility to aggregate two or more PSTN connections to set up a higher bit rate connection for improving the QOS (multilink operation) as well as the possibility to temporarily extend or reduce the bearer capabilities during the call without disconnecting the call (in-call modification) are for further study.

5.4 Possible applications

In the consumer/residential segment the envisaged applications are real-time human-to-human interaction, based on head-and-shoulders view, and remote surveillance and event monitoring e.g. for baby-sitting, security, as well as other non-conversational applications.

In business/institutional segment the foreseen applications are remote expert consultation, requiring audiovisual support, remote surveillance and recognition, remote trouble-shooting, remote inspection and accessing videoconferences.

The above applications may be offered on a stand-alone basis or as part of a value-added multimedia application requiring extended terminal capabilities.

From the service point of view the basic videophone terminal has to support QCIF only for the motion video. Some terminals, i.e. enhanced videophones may support also SQCIF[3)] format or at least they are capable of receiving SQCIF video frames.

5.5 Optional features

The facilities and functionalities defined in Supplement 1 to Recommendation F.720 in general apply.

Furthermore the possibility to access a multipoint videophone call has to be provided in accordance with T.120-Series protocols. For a possible still picture data transfer in multipoint calls, as well as for data transfer of telepointer and annotation, Recommendation T.126 applies.

In case a far-end camera control is provided, Recommendation H.281 shall apply.

6 Procedures

The service is envisaged to address the consumer/residential market using low-cost stand-alone terminals with a minimum set of functionalities.

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3) According to the current Recommendation H.263, the capability of receiving SQCIF video frames is supported by all H.263 video codecs as a mandatory feature.

6.1 Normal procedures

6.1.1 Call procedures

The call set-up and call initialization procedures are defined in the Recommendation on network independent requirements for LBR videophone services (see Supplement to Recommendation F.720).

When a videophone call has been originated and the called terminal is incompatible or unable to comply with the call request, the calling subscriber is given an appropriate indication. The call will progress automatically as a telephone call if the calling user accepts the call.

7 Network aspects

The transfer rate achieved on a given PSTN line is strongly dependent on the transmission quality, i.e. crosstalk and noise level, which may have a substantial impact on the overall QOS with the consequence that operation on only the low repetition rate mode is possible. Therefore, maintaining appropriate signal/interference ratio in the local loop enabling the maximum data rate or a rate close to it is important to guarantee adequate overall QOS necessary for gaining user acceptance.

The service can be offered also on leased point-to-point telephone type circuits.

8 Terminal aspects

The service is envisaged to address the consumer/residential market using low-cost stand-alone terminals with a minimum set of functionalities. The terminals with enhanced functional capabilities may consist of PCs equipped with auxiliary plug-in units providing the needed terminal capabilities for PSTN videotelephony (see Supplement to Recommendation F.720).

The bearer capabilities for transferring the digital audiovisual data over analogue PSTN lines are implemented using V.34 modems with bit rates up to 28.8 kbit/s and beyond[4)].

9 Quality of service

The QOS is dependent on the quality of the obtained telephone line and networks involved, which may result in a reduced modem transfer rate and impaired audiovisual quality as well as delayed call set-up due to prolonged modem start-up phase.

9.1 Picture quality

The picture quality depends on the available modem transfer rate, amount of movements in the picture and the selected channel rate. Increased amount of changes in the image content causes degraded performance of motion rendition. For further study[5)].

9.2 Audio quality

See Recommendation F.720 (Supplement).

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4) The V.34 modems are envisaged to be upgraded in the near future resulting in an increased data transfer rate of 33.6 kbit/s.

5) The exact required QOS is likely to depend on the applications and therefore further studies are required.

9.3 Overall delay

Under normal conditions, the maximum overall delay should not exceed the values applicable to international videophone calls[6].

10 Interworking/intercommunication

10.1 Intercommunication with telephony

Intercommunication with PSTN is mandatory and normally it takes place using the analogue speech communication facility of the videophone terminal. Furthermore digital speech communication is possible between two compatible videophone terminals.

10.2 Intercommunication with mobile videotelephony

Intercommunication with low bit rate mobile videophone services should be provided. Variations in the access rates of different mobile networks may require rate adaptation. This must be supported by terminals with the aid of the in-band signalling mechanism, comprising a standard set of rates.

Intercommunication with mobile videophone services of higher service categories is carried out through a potential fall-back to the best common mode, supported by the two services involved.

10.3 Intercommunication with ISDN videotelephony

See Supplement to Recommendation F.720.

Annex A

Attributes and values

(This annex forms an integral part of this Recommendation)

A.1 Low layer attributes

	Attributes	Values
1	Transfer mode	circuit
2	Transfer rate	maximum 28.8 kbit/s (and beyond), under degraded network conditions may be less
3	Transfer capability	3.1 kHz audio for Rec. V.34 (videotelephony) 3.1 kHz speech for telephone mode (analogue telephony)
4	Structure	N/A
5	Establishment of communication	on demand
6	Symmetry	bidirectional symmetric
7	Configuration of call	point-to-point

6) For international telephone calls the current limit is 400 ms determined by Recommendation G.114. A new Recommendation is under preparation in ITU-T Study Group 12 which will be applicable for audiovisual services.

A.2 Access attributes

	Attributes	Values
8	Access channel and rate	in videophone mode: 5.3/6.4 kbit/s speech and 23.5/22.4 kbit/s video, or optionally in data mode 28.8 kbit/s or in speech and data mode: 5.3/6.4 kbit/s speech and 23.5/22.4 kbit/s data
9.1	Signalling access protocol, layer 1	Rec. V.8/V.8 *bis*
9.2	Signalling access protocol, layer 2	Rec. V.8/V.8 *bis*
9.3	Signalling access protocol, layer 3	
9.4	Information access protocol, layer 1	Rec. H.223
9.5	Information access protocol, layer 2	Rec. H.245
9.6	Information access protocol, layer 3	

A.3 High layer attributes

	Attributes	Values
10	Type of user information	audio and video and/or data or plain data
11	Layer 4 protocol functions	
12	Layer 5 protocol functions	
13	Layer 6 protocol functions	Rec. G.723.1 for audio Rec. H.263 for video T.120-Series for data
14	Layer 7 protocol functions	

A.4 General attributes

	Attributes	Values
15	Supplementary services provided	for further study
16	Quality of service	audio: 3.1 kHz telephony, toll quality speech video synchronization of audio and video: no subjectively discernible delay between speech and video or minimal audio delay (inserted speech delay disabled) data: for further study
17	Intercommunication/interworking possibilities	with LBR videophone services in mobile networks with ISDN videophone service: to the extent feasible with gateways in the network with other audiovisual services (on telephony only) with telephony with other services: for further study
18	Operational and commercial aspects	for further study

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