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SERIES F: NON-TELEPHONE TELECOMMUNICATION
SERVICES

Audiovisual services

**Service description and requirements for
videotelephony services over IP networks**

ITU-T Recommendation F.724



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ITU-T Recommendation F.724

Service description and requirements for videotelephony services over IP networks

Summary

The purpose of this Recommendation is to define the videotelephony services provided over IP networks. The services enable two users in different locations to have conversational communications over IP networks. The service description, function model, service profiles, application scenarios and requirements of the IP videotelephony services are provided. The IP videotelephony services are one class of the generic services identified in ITU-T Rec. F.720, and their description follows the methodology described in ITU-T Rec. F.701. The requirements for the IP videotelephony services are derived from the scenarios for different applications the said services can support. Therefore, the services requirements accommodate the demands of different kinds of users and assist in enabling intercommunications between the services provided by different telecom operators and/or different IP videotelephony systems.

Source

ITU-T Recommendation F.724 was approved on 13 September 2005 by ITU-T Study Group 16 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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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.

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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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ITU-T Recommendation F.724

Service description and requirements for videotelephony services over IP networks

1 Scope

This Recommendation provides the service descriptions, function model, service profiles, application scenarios and requirements of the videotelephony services based on the IP network. The objective is to describe the service requirements, facilitate interoperability, and provide a guideline to the user, service provider, network carrier, and administrator as well for deploying videotelephony services over IP networks.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this 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; 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. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

2.1 Normative References

None.

2.2 Informative References

- ITU-T Recommendation F.700 (2000), *Framework Recommendation for multimedia services*.
- ITU-T Recommendation F.701 (2000), *Guideline Recommendation for identifying multimedia service requirements*.
- ITU-T Recommendation F.703 (2000), *Multimedia conversational services*.
- ITU-T Recommendation F.720 (1992), *Videotelephony services – General*.
- ITU-T Recommendation Y.1541 (2002), *Network performance objectives for IP-based services*.
- ITU-T H-series Recommendations – Supplement 1 (1999), *Sign language and lip-reading real time conversation using low bit-rate video communication*.

3 Definitions

This Recommendation defines the following terms:

3.1 basic videotelephony service: A videotelephony service supporting basic voice, video, real-time text and optional multimedia data or control facility.

3.2 enhanced videotelephony service: A videotelephony service supporting advanced voice, video, real-time text and at least one type of multimedia data and/or control facility.

4 Conventions

In this Recommendation the following conventions are used:

- "shall" indicates a mandatory requirement.
- "should" indicates a suggested but optional course of action.
- "may" indicates an optional course of action rather than a recommendation that something take place.

5 Prose descriptions

The IP videotelephony service provides real-time end-to-end bidirectional communications between two subscribers in different locations on the IP network by means of voice, video, real-time text and other forms of multimedia data and/or control facility.

The way to place a call on IP videotelephony services is the same as that for conventional telephony services in the sense that the subscriber dials a number, or enters another type of identifier, to initiate a call. In addition to videotelephony calls, the subscriber can also use the videotelephony services in other applications.

A subscriber of IP videotelephony services can be located in any place covered by IP networks, e.g., office buildings, meeting rooms, hotels, residences, telephone booths on the street or even on board a transport vehicle.

There are two types of IP videotelephony calls:

- Point-to-point calls;
- Multiparty calls (utilizing devices for audio, video and text mixing, e.g., the Multipoint Control Unit (MCU)).

There are two major types of IP videotelephony terminals:

- Videotelephony sets;
- Softphones running on computers.

Other types of videotelephony terminals, such as PSTN videophones, ISDN videophones or even conventional phones and mobile phones, can communicate with the IP videophones. These terminals may have limited capabilities regarding sending or receiving various types of information in videotelephony calls, but they can at least intercommunicate with IP videophones in a voice-only mode.

6 Functional model and service profile

6.1 Functional model

The functional model of IP videotelephony services is shown in Figure 1. IP videotelephony terminals exchange voice, video, real-time text and multimedia data in a point-to-point or multipoint way over IP networks. They can also intercommunicate with other videotelephony or conventional telephony terminals via interworking units. The call control unit processes call signalling and controls sessions, and the Authentication, Authorization and Accounting (AAA) unit performs the function of user, authentication, authorization and accounting.

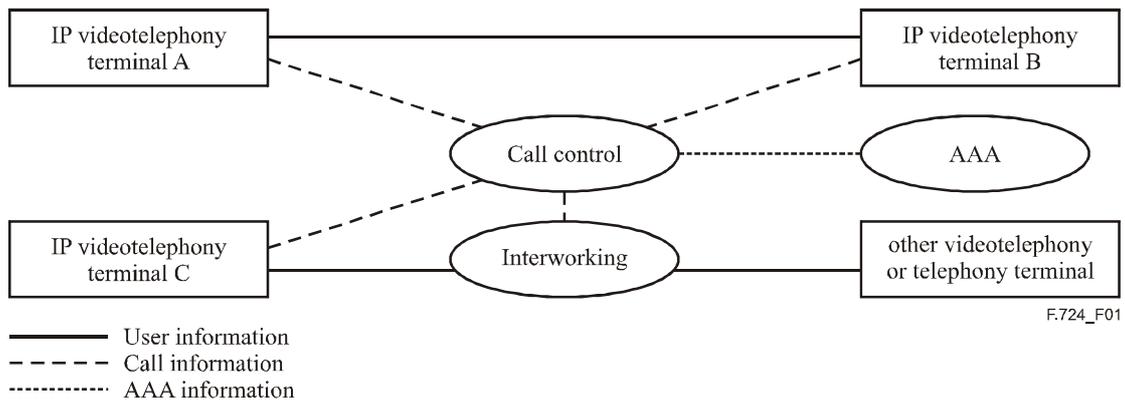


Figure 1/F.724 – Functional model of IP videotelephony services

6.2 Service model

6.2.1 Service model: the functional view

There are two models for IP videotelephony services from the functional view. Other models may exist or can be developed. However, they are a subject beyond the scope of this Recommendation and are thus for further study.

1) Basic videotelephony services

They refer to those IP videotelephony services that support the mandatory basic features. Only the voice, video and real-time text of conversational parties are transmitted between them.

2) Enhanced videotelephony services

They refer to those IP videotelephony services that support the enhanced optional features (i.e., other forms of multimedia data and/or remote control function). In addition to voice, video and real-time text, multimedia data like still pictures, pre-recorded audio/video clips, text messages, and collaboration-related data such as white-boarding information can be transmitted between videophones. Other optional features should include convening of a conference and control of a conference, support for far-end camera control and other remote control.

6.2.2 Service model: the usage view

From the view of use environment, there are two types of IP videotelephony services.

1) Residential videotelephony services

For residential videotelephony service users, the following applications should be supported:

- Face-to-face conversation with audio, video, and real-time text;
- Face-to-face conversation with simultaneous transfer of pictographical data such as picture, pre-recorded video clips and files of other kinds;
- Remote video surveillance for home security inspection and unmanned baby-sitting for kids, etc;
- Emergency calls in audio, video and text.

2) Business videotelephony services

For business service users, the following applications should be supported:

- Face-to-face conversation with audio, video, and real-time text;
- Face-to-face conversation with simultaneous transfer of pictographical data such as images, documents and files of other kinds;

- Remote video surveillance;
- Remote consultation;
- Remote diagnosis in telemedicine;
- Participation in videoconferencing;
- Emergency calls in audio, video and text.

6.3 Service profiles

While all videotelephony services have the common capability for transmission of audio, video and real-time text, they can be divided into different types of profiles according to the quality level of audio and video, and other multimedia data exchanged.

An IP videotelephony service may be offered with two levels of audio quality, three levels of video quality, one level of real-time text, five types of exchanged data and two types of control facility. The basic audio quality is level A0, equivalent to 3.4 kHz PCM telephony; the enhanced audio quality is level A1, equivalent to 7 kHz or 14 kHz wideband audio. The three levels of video are level V1 for QCIF video, level V2 for CIF video and level V3 for SDTV video. The level of real-time text is T2, good conversational text. The five types of exchanged multimedia data are still pictures, video clips, text messages, file transfer and joint editing. The two types of control facility are remote control and conference conductor.

Taking into account the factors mentioned above, the following profiles of videotelephony service are defined. The service profile descriptions are not intended to impose a particular and detailed way of offering the services, but to illustrate the approach to the profile definition.

- Profile a: Basic videotelephony service: basic audio, QCIF or CIF video, real-time text, optional multimedia data or control facility;
- Profile b: Enhanced Basic videotelephony service: wideband audio, CIF video, real-time text, optional multimedia data or control facility;
- Profile c: Enhanced videotelephony service: wideband audio, CIF or SDTV video, real-time text, multimedia data and/or control facility.

The above defined service profiles are summarized in Table 1.

Table 1/F.724 – Service profiles

Profile	Audio	Video	Text	Still pictures, pre-recorded video clips, text messages, file transfer and/or joint editing	Control functions
Pa	A0	V1 or V2	T2	O	O
Pb	A1	V2	T2	O	O
Pc	A1	V2 or V3	T2	1M	1M
A0, A1	Minimum mandatory audio quality level				
V1, V2, V3	Minimum mandatory video quality level				
T2	Mandatory text level				
1M	At least one of the media components mandatory				
O	Optional				

These profiles ensure at least a minimum level of communication. Conformance to a profile ensures intercommunication with other terminals of the same profile. A terminal or a service function unit may conform to one or several profile(s), and may have capabilities beyond those embodied in the profile(s).

7 Service scenarios

This clause describes typical service scenarios to illustrate the videotelephony service and to derive its technical requirements.

7.1 Business videotelephony service scenarios

7.1.1 Business call

The branch offices of Company A are geographically distributed all over its country and Company A has equipped all its branch offices with videophones for routine work-related communications.

Step 1: Jacky, head of the branch office in regional division X, encounters some problems with his sales and he calls Hans, director of sales at headquarters, using videophone, to seek help and guidance and to discuss possible solutions with him.

Step 2: Hans takes Jacky's video call. Because Jacky and Hans are old friends, they exchange some greetings (e.g., "you look healthy", "I like your tie", etc.). Jacky reports the problems to Hans, in the hope that the sales strategies can be adjusted. They then discuss different possibilities and methods to solve these problems under the existing sales strategies. Hans says he will start collecting information on the current status of the branch offices in the other regional divisions and then convene a meeting to discuss these problems if they are found to be common. The two end the call.

Step 3: Hans makes video calls with other branch offices to talk about their execution of sales strategies, and finds that similar problems to those he has encountered also exist in these branch offices. So he decides to convene a meeting to discuss these problems.

Step 4: Hans' secretary reserves a meeting through the videoconferencing service system and specifies that the videoconferencing terminal be placed in the headquarters meeting room, and the videophones in the branch offices of the four regional divisions, as the meeting participants.

Step 5: At the scheduled start of the meeting, the system calls the reserved terminals. Hans does not use the videophone on his desk this time; instead, he goes to the meeting room to participate in the meeting. After the meeting is established, Hans successfully requests to be the chairman and begins to chair the meeting.

Step 6: Hans first asks Jacky to report on the problems he has encountered. When Jacky begins his talk, the image of Jacky appears on the screens of all the meeting participants' terminals. After Jacky finishes his speech, Allan, head of branch office Y, requests to make an intervention. So Hans grants Allan the floor and switches the image on the screens of all the meeting participants' terminals to the image of Allan.

Step 7: After Allan finishes speaking, Hans suggests a free discussion and sets the picture mode to the four-in-one continuous presence mode so that everyone can see everyone else in the ensuing discussion.

Step 8: At the end of the discussion, Hans makes a summary and the image switches back to the image of Hans. Hans first expresses appreciation for the efforts and achievements of the various sales offices, then says it is possible to reasonably adjust the sales strategies based on the different opinions given, and schedules a date to release the new sales strategies. Hans then declares the end of the meeting and the participants say goodbye to one another. After all exit, the meeting automatically terminates.

7.1.2 Business trip

Hans often goes on business trips. To ensure that he does not miss any important calls, he sets his office phone calls to be forwarded to his mobile phone prior to leaving on a business trip. Hans has recently become a subscriber to 3G services so he can use his new 3G cellular phone to take forwarded video calls.

Step 1: Hans gets off the plane and takes a taxi to the hotel, when a videotelephony call from Jacky comes through. Hans takes the video call with his 3G mobile phone in the taxi. Jacky requests information on an important sales project and the two have a discussion on this project.

Step 2: Hans' mobile phone displays a low battery warning, so Hans chooses to switch off the video function and leaves only the voice in use.

Step 3: After the conversation is over, Jacky hangs up. The videotelephony service provider charges the call between Jacky and Hans (the call involves both video conversation and voice-only conversation) according to the corresponding rates.

7.1.3 Customer service

Peter has bought a new digital product from Company B. However, the product malfunctions when Peter tries to use it. So Peter dials Company B's free call service number. What is special is that the number is a videophone number.

Step 1: Peter uses his home videophone to place the call and a receptionist of Company B takes the call.

Step 2: Peter explains the problem to the receptionist and demonstrates the malfunction in front of the camera of the videophone. Since this problem is not on the FAQ list, the receptionist cannot provide an immediate answer and says she needs to consult the technical support engineer. She asks Peter to hold on whilst she consults one of the technical support engineers for advice. In order to make Peter feel comfortable while he is waiting, the receptionist plays a video clip of Company B via the videophone to Peter who can view the clip on his videophone screen.

Step 3: The receptionist then comes back with a solution and explains the problem was caused by the fact that Peter did not do the settings correctly. The receptionist then demonstrates to Peter how to set the product using video and the problem is solved.

Step 4: Peter thanks the receptionist and the receptionist also thanks Peter for purchasing one of Company B's products. Peter then hangs up.

7.1.4 Call between a deaf and blind person and a service centre

Sally is deaf and blind. She was born deaf but later became blind, so she learned sign language very well and still likes to express herself in sign language when her conversation partner understands it. She has learnt to read Braille to be able to communicate in text.

Step 1: Sally calls with her videophone equipped with Braille display, to ask her service centre about a leaflet she has received.

Step 2: The service centre is staffed with signing personnel. Marco answers this call, recognizes his customer Sally, and types the greeting "Hi Sally, this is Marco, how can I help you?"

Step 3: Sally reads the response on the Braille display, and then signs in front of the camera: "I received a leaflet that I would like you to tell me about. I am placing it under my document camera so you can look at it."

Step 4: Marco types: "OK, I will take a look." And he activates the supplementary video channel and zooms in on the leaflet, reads it and types to Sally. "It says that there is a discussion meeting in your building tonight about the opportunity to build a balcony on to your apartment. 7 P.M. in the coffee shop."

Step 5: Sally signs: "Wonderful, thanks and bye."

Step 6: Marco types: "Cheers, bye" and hangs up.

7.2 Residential videotelephony service scenarios

7.2.1 Family call

John is in charge of sales in a big multinational company and he often goes on business trips. His son Tom is in primary school and his daughter Jessie is in kindergarten. Every time John goes for a business trip, John misses his family very much and he always uses the videophone in his hotel room to make video calls home.

Step 1: This time John finds that the hotel where he stays does not offer a room videophone. So he goes to the commerce centre of the hotel to use the videophone there. John arrives at the commerce centre and dials the number of his home videophone. The call is connected.

Step 2: John's wife Lisa answers the call. After they talk for a while, their children come to talk with John. Tom shows the model aeroplane he has made in his handicraft class before the camera while Jessie sings a song for her daddy.

Step 3: John transmits the scenic photos he has taken with his digital camera during his journey via the USB port of the videophone to Lisa, Tom and Jessie. While looking at the photos displayed on the screen, comments are made on the beautiful photos and John promises that he will return with Lisa, Tom and Jessie to go for sightseeing trip in the summer vacation. John types the exact name of the place in the text area so that Lisa can make a note of it and start looking for booking opportunities. Tom, Jessie and Lisa then are very happy.

Step 4: John talks with Lisa for a while again and then the call ends. After hanging up, John pays the commerce centre for his call.

7.2.2 Monitoring

John takes all his family on vacation and hopes that he can keep an eye on his house whilst they are away. Thanks to his home videophone which provides monitoring functionality, it can be done.

Step 1: Before leaving home, John enables the monitoring function on his videophone and sets an authentication password.

Step 2: During his vacation, John uses the hotel videophone to call his home videophone. He keys in the password and his home videophone automatically starts transmitting the video captured from the camera mounted on the ceiling of the living room.

Step 3: John then switches to the camera in his garage using remote control and then to the cameras in his kids' bedrooms and his backyard in succession.

Step 4: After John gets back home from vacation, he cancels the monitoring settings of his home videophone.

8 IP videotelephony service requirements

8.1 User requirements

Basic requirements:

- Ability to exchange real-time video, audio and real-time text;
- Ability to select audiovisual mode or voice-only mode;
- Ability to make videotelephony calls at any place covered by IP networks;
- Ability to make videotelephony calls in handset mode and handsfree mode;

- Ability to make videotelephony calls by people with hearing or speech disabilities.

Enhanced requirements:

- Ability to exchange multimedia data including still images, live and pre-recorded video clips, and collaboration data such as whiteboard;
- Ability to implement remote control;
- Ability to join and conduct a videoconference.

8.2 Application requirements

Basic requirements:

- Voice and video switching processing;
- Allow for various access means, such as xDSL, Ethernet, WLAN, GSM and 3G etc., and videotelephony service provider should support at least one of them;
- Support for interworking between different videotelephony systems or networks through gateways;
- Support for subscriber management and numbering. Use of E.164 numbering plan is mandatory;
- Support for PSTN-like dialling modes. A keypad should be implemented on the videophone;
- Support for audio arrangement of handset function and handsfree function;
- Support for entry and display of real-time text. The specific method for text entry (e.g., keypad, integral or detachable keyboard, touch screen, verbal recognition) is beyond the scope of this Recommendation. The specific method for text display (e.g., video screen, Braille, verbal) is beyond the scope of this Recommendation.

Enhanced requirements:

- Support for dynamic creation and termination of video streams;
- Support for fallback from audiovisual mode to voice-only mode;
- Support for upgrading from voice-only mode to audiovisual mode;
- Support for real-time multimedia data exchanging, such as still pictures, live and pre-recorded video clips, text messages, and collaboration data;
- Support for other types of dialling modes, such as use of aliases.

8.3 Security requirements

The security of IP videotelephony calls should be guaranteed. There are three levels of security:

- Subscriber authentication and authorization;
- Call security;
- Security of media streams.

8.4 Authentication and accounting requirements

The subscriber authentication of IP videotelephony services is used to ensure that only legal subscribers can have access to IP videotelephony services and accurate accounting should be implemented for the IP videotelephony calls made by subscribers.

8.5 Interworking and intercommunication requirements

Three types of interworking or intercommunication are related to IP videotelephony service:

- Interworking and intercommunication between terminals with different capability sets;
- Interworking and intercommunication between terminals in different networks (PSTN, ISDN, 3G etc.);
- Interworking and intercommunication between different IP videotelephony systems.

Transcoding or bit-rate conversion in the interworking unit may be needed so that each terminal receives and transmits the signals it is able to handle.

8.5.1 Terminals with different capabilities

Terminals may have different characteristics and capabilities, thus conforming to different profiles that the videotelephony service provider may offer. When they intercommunicate with each other, a common mode of the profiles will be used. This will adapt the service quality and functionalities to those of the terminal with the lowest quality level for each media component; however, communication is always possible because all terminals conform to the common basic profile.

8.5.2 Terminals in different networks

IP videotelephony service needs to intercommunicate and interwork with the videotelephony service in other (non-IP) networks. In addition, the interworking between IP videotelephony calls and conventional telephony calls should be guaranteed.

- Intercommunication and interworking between IP videotelephony terminal and PSTN/ISDN/3G, etc. videotelephony terminal;
- Intercommunication and interworking between IP videotelephony terminal and PSTN/ISDN/mobile phone.

The requirements of this type of intercommunication include:

- Audio transcoding or bit-rate conversion;
- Video transcoding or bit-rate conversion;
- Real-time text transcoding;
- Data transcoding or bit-rate conversion;
- Call control signalling conversion.

8.5.3 Different IP videotelephony systems

There may be many IP videotelephony systems, such as H.323-based and SIP-based videotelephony systems. Intercommunication is needed if the terminals are located in different service systems. The requirements of this type of intercommunication include:

- Audio/video/text/data transcoding or bit-rate conversion;
- Authentication between different systems;
- Accounting between different systems;
- Call control signalling conversion;
- Subscriber resource sharing and security.

8.6 QoS requirements

The QoS of IP videotelephony calls should be guaranteed. Since the major media elements of videotelephony calls are voice, video and text, it is necessary to guarantee clear voice, clear head-and-shoulder image, continuous and smooth video of certain motion levels and text with good performance. In enhanced videotelephony services, the quality of multimedia data should also be guaranteed.

To guarantee the QoS of IP videotelephony services, IP networks should provide QoS guarantee to support the bidirectional real-time service.

8.6.1 Audio quality

IP videotelephony should support basic audio (3.4 kHz) and wideband audio (7 kHz or 14 kHz).

IP videotelephony should be capable of performing acoustic echo-cancellation.

IP videotelephony should have error resilience mechanisms to recover from packet loss.

For a videotelephone with the audio arrangement of handset or handsfree function, the sensitivity and loudness rating should be guaranteed.

8.6.2 Video quality

IP videotelephony should be able to provide a smooth video depending on the application.

IP videotelephony should be able to provide reliable video colours.

IP videotelephony should have error resilience mechanisms to recover from packet loss.

8.6.3 Text quality

IP videotelephony should support good text quality for real-time conversation. The presentation should be smooth, covering any jerkiness caused by transmission in blocks. The delay between each character entry and its display should be low so that the experience of a direct conversation is maintained. The reliability should be good, so that transmission errors are much more rare than typing errors, and indicated to the users.

8.6.4 Lip synchronization

IP videotelephony should be capable of performing lip-synchronization so that there is no humanly perceptible asynchronism between audio and video.

8.6.5 Overall delay

The overall delay comprises two parts: network transmission delay and delay due to processing on IP videophone terminals. The latter is caused by the codec on terminals to perform encoding and decoding.

The overall delay for IP videotelephony should be within specified limits since any delay greater than this threshold will cause unacceptable degradation in QoS.

8.6.6 Network transmission quality

In order to provide videotelephony services over an IP network, the IP network should be able to provide end-to-end QoS guarantee. The required QoS has different aspects such as low delays, low jitters, and low packet loss. The required network transmission quality for the IP videotelephony service should be defined according to ITU-T Rec. Y.1541.

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