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SERIES F: NON-TELEPHONE TELECOMMUNICATION
SERVICES

Audiovisual services

**Service description and requirements for
multimedia conference services over IP
networks**

ITU-T Recommendation F.733



ITU-T F-SERIES RECOMMENDATIONS
NON-TELEPHONE TELECOMMUNICATION SERVICES

TELEGRAPH SERVICE	
Operating methods for the international public telegram service	F.1–F.19
The gentex network	F.20–F.29
Message switching	F.30–F.39
The international telemesssage service	F.40–F.58
The international telex service	F.59–F.89
Statistics and publications on international telegraph services	F.90–F.99
Scheduled and leased communication services	F.100–F.104
Phototelegraph service	F.105–F.109
MOBILE SERVICE	
Mobile services and multideestination satellite services	F.110–F.159
TELEMATIC SERVICES	
Public facsimile service	F.160–F.199
Teletex service	F.200–F.299
Videotex service	F.300–F.349
General provisions for telematic services	F.350–F.399
MESSAGE HANDLING SERVICES	F.400–F.499
DIRECTORY SERVICES	F.500–F.549
DOCUMENT COMMUNICATION	
Document communication	F.550–F.579
Programming communication interfaces	F.580–F.599
DATA TRANSMISSION SERVICES	F.600–F.699
AUDIOVISUAL SERVICES	F.700–F.799
ISDN SERVICES	F.800–F.849
UNIVERSAL PERSONAL TELECOMMUNICATION	F.850–F.899
HUMAN FACTORS	F.900–F.999

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

ITU-T Recommendation F.733

Service description and requirements for multimedia conference services over IP networks

Summary

The purpose of this Recommendation is to define the multimedia conference services based on IP networks. The service provides real-time communication between several users in different locations over an IP network. The service description, functional model, application scenarios and requirements of the IP multimedia conference services are provided. The IP multimedia conference service is one class of the generic services identified in ITU-T Rec. F.702, and its description follows the methodology described in ITU-T Rec. F.701. The requirements for the IP multimedia conference 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 systems provided by different telecom operators, or between the equipment manufactured by different manufacturers.

Source

ITU-T Recommendation F.733 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.

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CONTENTS

	Page
1 Scope	1
2 References.....	1
2.1 Normative references.....	1
2.2 Informative references.....	1
3 Definitions	1
4 Convention.....	2
5 Prose description.....	2
6 Application functional model	3
6.1 Functional model	3
6.2 Multimedia conference mode	4
6.3 User roles.....	4
7 Scenarios.....	5
7.1 Multimedia interactive conference	5
7.2 Multicast conference	7
7.3 Mixed mode conference	7
8 Requirements of IP multimedia conference	8
8.1 User requirements.....	8
8.2 Application requirements	9
8.3 Numbering requirements	9
8.4 Security requirements.....	9
8.5 Authentication and accounting requirements	10
8.6 QoS requirements	10
9 Interworking and intercommunication	10
9.1 Terminals with different capabilities.....	10
9.2 Terminals in different networks	10
9.3 Different IP multimedia conference systems	11

ITU-T Recommendation F.733

Service description and requirements for multimedia conference services over IP networks

1 Scope

This Recommendation describes the multimedia conference service system over IP networks, its application scenarios and service requirements.

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.702 (1996), *Multimedia conference services*.
- ITU-T H-Series Recommendations – Supplement 1 (1999), *Application profile – Sign language and lip-reading real-time conversation using low bit-rate video communication*.

3 Definitions

This Recommendation defines the following terms:

3.1 chairman: the user who chairs the meeting and manages the conference.

3.2 communication mode: a communication mode is defined by the various channels supporting the media used for the conference. Changes in communication mode may occur during the course of the conference, in order to set up or eliminate one of the media, or to change its quality level and thus the bit-rate allocation. The mode change may be used for instance to temporarily add a channel for transmitting still pictures.

3.3 conference convener: The user who has organized the conference.

3.4 centralized multipoint conference: A centralized multipoint conference is one in which all participating terminals communicate in a point-to-point fashion with special control or processing facilities.

3.5 decentralized multipoint conference: A decentralized multipoint conference is one in which the participating terminals multicast their audio, video and text to all other participating terminals.

3.6 IP multimedia conference service: A type of multimedia conference service based on IP network that utilizes networks for control and media transfer.

3.7 multicast conference: A multicast conference is one in which there is one transmitter of media streams and many receivers. There is no bidirectional transmission of control or media streams. Such conferences may be implemented using network transport multicast facilities, if available.

3.8 multipoint interactive conference: A multipoint interactive conference is one in which all participants are transmitters and receivers. There is bidirectional transmission of control or media streams. Such conferences should be implemented using special control or processing facilities, if available.

3.9 multimedia conference service: A multimedia conference service provides real-time transmission of voice together with motion video, real time text and/or various types of multimedia information between groups of users in two or more locations.

3.10 muting: Preventing sound to be transmitted from a terminal equipment.

3.11 presenter: The participant in a conference who controls the visual information being actively discussed.

4 Convention

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 description

An IP multimedia conference system provides real-time communication between several users in different locations, combining the audio, video and real-time text information of the participants, and other multimedia information if needed.

The service can be bidirectional, and provide for interconnection of two or more multimedia conference terminals on an equal basis; it can also be unidirectional, where part of the terminals can only receive, while others can only send. If there are two or more terminals in the conference, equipment that can provide multimedia information control and exchange is needed. Network side equipment that can manage and control the conference, and provide authentication and billing is also necessary.

The multimedia conference services may be provided after prior arrangement with a service provider, or they may be generally available. The conference connection can be established by a user or by a management system.

The location of a multimedia conference participant could be anywhere where the network is accessible, e.g., meeting room, office, home, or even on the highway. The participants take part in the meeting by means of a multimedia conference terminal. The terminals may access the network by wire or wireless means. There are three types of terminal:

- Hardware-based terminals, which include two sub-types of terminal:
 - a) Special conference terminals for studios dedicated to and equipped for multimedia conferences;
 - b) Portable terminals which are only used on a part-time basis for teleconferencing and which can be moved from one place to another.

- Software-based terminals running on computers.
- Other types of terminals, e.g., POTS terminals, could also be used in the conference. Although there are certain limitations regarding their capability to send and receive different types of information used in a multimedia conference call, they are at least able to exchange speech, allowing their users to take part in the discussion.

6 Application functional model

6.1 Functional model

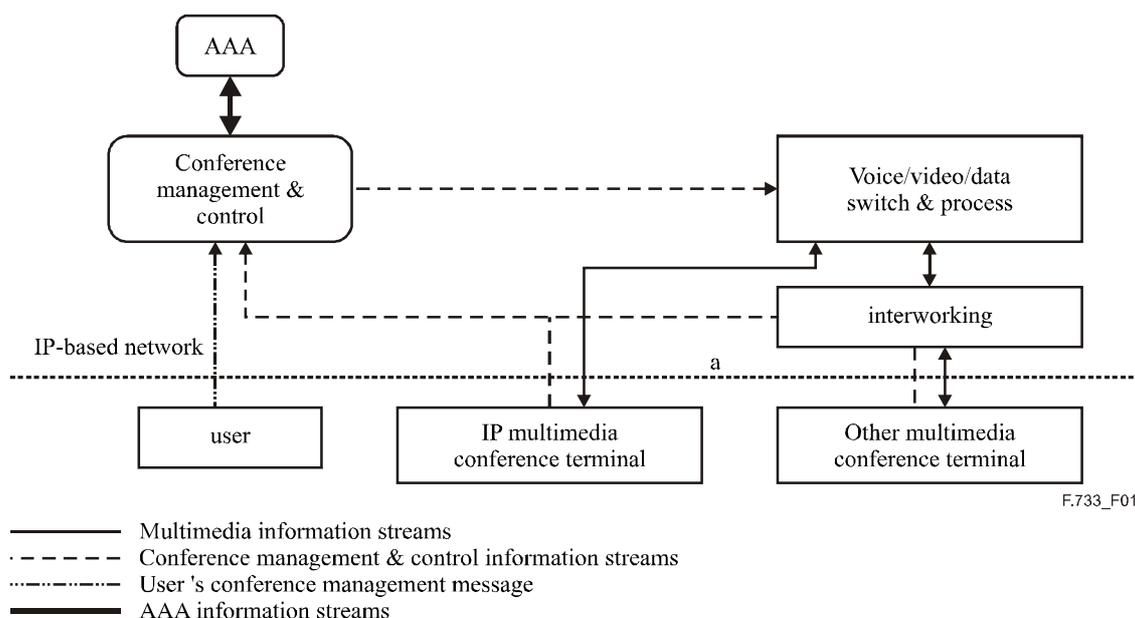


Figure 1/F.733 – The multimedia conference functional model

The IP multimedia conference functional model is shown in Figure 1. Multimedia conference terminals can access IP-based networks with several kinds of modes, e.g., LAN, WLAN, xDSL, PLMN, and PSTN.

Network functions above the dashed line constitute an IP multimedia conference service platform directly related with users:

- Conference Management and Control Function: it can initiate an immediate conference according to the user's demand, or accept the user's conference reservation and allocate the system resource.
- Multimedia Switch and Process Function: it provides control functions to the conference, switches and processes the audio, video and text, and/or data streams.
- Interworking function: other multimedia conference terminals can access the IP multimedia conference network via the interworking function.
- Authentication, Authorization and Accounting (AAA): it provides the Conference Management and Control Function with the user's identification information, and processes accounting information from the Conference Management and Control Function.

6.2 Multimedia conference mode

Two types of basic multimedia conferences service modes are addressed in this Recommendation. Other types are left to the creativity of the service providers and equipment manufacturers.

a) *Multipoint interactive conference mode*

In this mode, all participating terminals communicate in a point-to-point fashion, possibly with the involvement of the Multimedia Switch & Process Function. The centralized multipoint conference, and the decentralized multipoint conference are two examples.

b) *Multicast conference mode*

In this mode, only one terminal in the conference transfers local multimedia information streams to the Multimedia Switch & Process Function, but does not receive them. Other terminals in the conference only receive the information from Multimedia Switch & Process Function but do not transfer information themselves.

6.3 User roles

According to their different roles in the conference, users can be identified as a Conference Controller, Conference Chairman and Conference Participant.

A Conference Convener can initiate a conference on demand or reserve a conference. The conference convener is also the conference controller. The accounting information is bound to the role of Conference Convener. The role of Conference Controller can be moved to another user or terminal. The basic¹ functions include:

- a) Reserving a conference;
- b) Cancelling/modifying the reservation;
- c) Initiating a conference on demand;
- d) Terminating the conference;
- e) Inviting a new participant;
- f) Accepting a new participant;
- g) Disconnecting a participant from the conference.

Controller's advanced¹ functions include:

- a) Splitting the conference;
- b) Extending the conference.

During a conference, a participant can apply to be chairman. A chairman is responsible for its management. Basic functions are:

- a) Managing the conference;
- b) Displaying him or herself, or one of the other participants, on the terminal screens.

The chairman's advanced functions include:

- a) Giving the floor to a participant;
- b) Ensuring the conference terminals broadcast in turn;
- c) Muting another terminal;
- d) Organizing or allowing a private conversation;

¹ In this Recommendation, "basic" refers to a mandatory requirement, while "advanced" refers to a suggested but optional feature or procedure.

- e) Controlling data transfer;
- f) Controlling remote equipment.

The conference participant's basic functions include:

- a) Participation in the conference;
- b) Muting local microphones.

The conference participant's advanced functions include:

- a) Requesting to be nominated as chairman;
- b) Requesting the floor;
- c) Receiving certain indicative information, such as site and time;
- d) Initiating a data conference, such as remote collaboration and transferring of files;
- e) Recording the conference.

7 Scenarios

This clause describes typical service scenarios illustrating the multimedia conference service and deriving its service requirements.

7.1 Multimedia interactive conference

7.1.1 Formal conference

TTP is a big international company. Annually, a highly formal conference is held to sum up the year's work on the 10th December. S is the CEO of the company who makes a report on all aspects of the company to the board of directors. The directorate consists of 5 members. Generally, these directors are located in different locations. Their offices are equipped with special conference terminals. Usually, the year-end reporting conference progresses in the following way:

Step 1: Reserve the conference. Conventionally, the CEO's secretary submits information such as the starting time, the duration of the conference, participants, the bandwidth, codec and text requirement to the multimedia conferencing system in advance. Since this conference is very formal, the bandwidth is set to the largest value that the system supports, in order to achieve a high resolution of images.

Step 2: As the scheduled time approaches, the conferencing system calls each reserved terminal. S's secretary, together with the other six formal participants, participates in the conference to log the conference. He may only listen but may not take the floor. There is also a typing interpreter booked for the meeting because C has a hearing impairment and needs to have simultaneous text support to be sure he perceives everything correctly. When the conference is established, director A applies to be the chairman, and then begins to moderate the conference.

Step 3: The chairman lets the CEO of the company speak. S has organized the contents into PPT formats. When he begins to report, all participants' screens are divided into two parts. The PPT is on the background while a movable window is displaying S who is speaking on the foreground. The chairman thinks that the picture is not clear enough, nor the voice loud enough. He then adjusts S's camera and the microphone to ensure everyone sees and hears S clearly. The typed interpretation of the speaker appears in a text window directly under the video image.

Step 4: Director B is confused by a figure in the presentation. He then presses the floor key. When A receives the request, he notifies S to pause, and lets B speak. Then all participants, except B, can see B, while B sees his previous speaker's picture, that is, the picture of S. When B finishes speaking, S takes the floor again. S then answers the question and sends the related report forms to other participants to make the problem clear.

Step 5: The typing interpreter listens in on the conference and types on a chord keyboard at normal talking speed. C can perceive the conference very well by combining the hearing, the good quality, smooth video that provides the possibility for lip reading, and the types interpretation. C asks to make a short comment and the chairman gives him the floor to make an important comment from his long experience in the company.

Step 6: Since S's speech is longer than planned, the reserved time will soon run out after the discussion. The chairman extends the conference by half an hour. When S finishes speaking, the chairman changes the conference to voice control mode. Text control mode may be also supported. The person who takes floor is displayed on the screens of other participants. But the participants feel uncomfortable with this mode, so the chairman applies six sub-pictures. The participants can then see each other.

Step 7: After the discussion, the chairman begins to make a summary. The video is changed to display the chairman only. A praises the company's achievement, and points out what should be improved. Then A cancels his chairmanship, and they chat at random.

Step 8: The conference is over. The participants say good-bye to each other. The conference is terminated automatically after everyone has left.

Step 9: After the conference, the typed interpretation is kept for the secretary who will draw up the formal minutes of the meeting.

7.1.2 Discussion conference

While the year-end conference is in progress, the engineers of the company, located in different places, are discussing their new product via the multimedia conference system. They use portable desktop terminals. The conference progresses in the following way:

Step 1: John is in charge of the new product. Since he is going to introduce the new product, he uses the special conference terminal located in the assembly room, whose performance is better than others. First, he calls the other twenty engineers named B, C, D, E, etc., who are in charge of the different aspects of the product. Each engineer has a terminal. Due to the capability restriction of the other desktop terminals, the bandwidth is lower. The resolution of the picture is not as high as on John's special conference terminal, but the picture is still clear enough.

Step 2: John introduces the product to others, and shows the sample. Because the other twenty terminals could not display all the details of the product, John transfers some photos to show details more clearly.

Step 3: The discussion begins after John has finished his introduction. The meeting is then split into four sub-conferences. All sub-conferences use voice control mode so the participants can speak freely and at the same time send text or graphics.

Step 4: Fifteen minutes later, the discussion is finished. The four sub-conferences are combined into one conference. The majority of the participants agree that the initial requirement for the new product has been accomplished, and put forward some suggestions for what should be improved. However, engineer C considers that they should hear the suggestions of the marketing people. John, as the convener of the conference, then invites two marketing people named Aa and Bb to join the discussion. Aa and Bb accept the invitation.

Step 5: Aa and Bb ask various questions and receive the relevant information. They put forward their suggestions on the marketing aspect and leave. John sums up all the suggestions and compiles a file. All participants modify this file with the file coordination function. John then makes plans for the next step according to the final file.

Step 6: John announces the conference is over. After John leaves, the conference is terminated.

7.1.3 Family chatting

John goes back home after a full day work. He decides to call his parents to discuss the New Year holiday plan.

Step 1: John initiates a videophone call to his parents. The call rate is not high considering the terminal's capability and cost. Although the image resolution is low, they can still see each other clearly. A small text window is visible below the video, for the real-time text component.

Step 2: After exchanging conventional greetings, they begin to talk about the plan for the coming holiday. John's daughter Sasa calls John during their discussion. John tells Sasa that he is talking about their holiday plan with her grandparents, and Sasa asks to join in the discussion. Sasa joins the call after John's parents have agreed. Since Sasa is using a mobile terminal, she chooses to receive the call in the "voice only" mode.

Step 3: John's father had a stroke a couple of years ago. It affected his speech. So, when he wants to contribute to the discussion, he types in the text area and the text appears nearly character-by-character on the participants' terminals. All appreciate sharing his experience of an earlier trip to China and his hints on the wonderful nature trips to be made in the Sichuan and Tibet areas.

Step 4: The result to the New Year's plan discussion is that John's family will travel to China, and back to the house of their grandparents, the day before Christmas Day, for a party. John then invites his sister Lindy to join the conference call because she is in China on business. They have not seen each other for a long time, so John asks the system to change the picture mode. Sasa joins the conference with audiographics-only mode (audio plus still-image and graphics).

Step 5: When they talk about the travel issue, Lindy announces that she has taken many photos in China. She then shows these pictures, together with text annotation, to the others. All the terminals display Lindy's photos. They continue their discussion based on these pictures. Finally, they decide that the destinations of the trip shall be Beijing and Tibet. John types a link to a travel information site where they can all get information to continue their planning after the call.

Step 6: After the holiday arrangement is decided, John ends the family discussion.

7.2 Multicast conference

The following is an education scenario.

In order to increase the whole corporation's ability to face increasing market competition, TTP's management department decides to give a market education seminar to the department managers. A famous marketing expert is responsible for the seminar. The expert is very busy so he makes a videodisc on the seminar. The organizer holds a multicasting meeting for the educational seminar.

Step 1: Before the seminar begins, the educational organizer calls all the managers;

Step 2: The organizer plays the videodisc. The audience, each located in his/her own office, receives the educational seminar;

Step 3: The meeting is terminated after the videodisc is over.

7.3 Mixed mode conference

The following scenario is on a new product release situation.

After the discussion on the TTP's new product, several modifications have been made. John who is responsible for the new product has decided it can be now released. Several means are used to release the new product. There are four target groups for the product release. The members of the first group are the relevant persons inside the company. Those from the second group are the major customers of the company. Those from the third group are the customers who registered by Internet after receiving advertisements of the product's release. Those from the fourth group are anonymous

customers who watch the product release via Internet multicast. The first two classes of customers have full privileges to participate in the conference. The third class of customers can take the floor with the chairman's permission. The last class of customers can only observe, but they can leave messages on the bulletin board system.

Step 1: Before the product is released, John calls all who comprise the first three classes of customers, and begins the broadcast through the Internet.

Step 2: At the beginning, John shows and introduces the new product to everyone and makes a detailed presentation. During this procedure, John answers some questions from the second class of customers.

Step 3: After the product presentation is completed, John answers questions from the third class of customers and replies to the messages on the bulletin board from the fourth class of customers.

Step 4: The product release presentation is very successful. Both the major customers and the registered customers are satisfied with the product and the release presentation. A month later, John's colleague David retrieves and replays John's product release from the storage system and derives many good ideas for his own product release from it.

8 Requirements of IP multimedia conference

8.1 User requirements

Basic requirements:

- The user can initiate a multipoint conference on demand, or reserve a conference in several ways. For example, the user can reserve a conference or initiate an instant conference from the terminal, or login the conference management server and submit the conference information, or call the service provider operator;
- Interactive audio, video and text in real-time, clear and smooth voice and video;
- Users can access a multimedia conference from anywhere, if necessary;
- Users can participate in the conference in different roles: convener (controller), chairman, participant, auditors and anonymous participants.

Advanced requirements:

- Users can request conference prolongation and conference termination ahead of the scheduled termination time during the conference;
- Multi-subpictures can be displayed on the terminal's screen, and terminals can distribute multiple videos to display on several screens;
- Terminals can join a multimedia conference with different codecs and different rates;
- Data transfer function should be supported, e.g., document sharing, coordination, electronic white bulletin and slide demo etc., can be used;
- Users can control remote terminals, such as the camera, microphone, etc.;
- Conference can be multicast according to the controller's demand;
- One conference can be split into several subconferences, and each subconference can be held as an individual conference under the control of the controller;
- New participants can join or be invited into the ongoing conference, and each terminal may be disconnected from the conference at any time;
- The means to participate in the conference and to handle the terminals and services can be provided to people with disabilities;
- Users can retrieve and replay the archived conference.

8.2 Application requirements

Basic requirements:

- Reserved conference and conference on-demand can be held automatically according to the user's requests;
- Voice, video and text streams can be exchanged and processed, and QoS guarantee should be provided;
- Various access methods are allowed, such as xDSL, Ethernet, WLAN, GSM, and 3G;
- Different roles of the participants and different conference control modes are supported including voice control mode, chairman control mode, and text control mode, etc.

Advanced requirements:

- The system can schedule and manage conference resources automatically;
- One or more streaming channels can be provided, and can be set up on demand;
- The multimedia conference network can handle different codecs and different rates in one conference;
- Remote device control should be supported;
- Data transmission is supported, such as real-time text, document sharing, cooperation, bulletin board and slide demo;
- The system can broadcast to one of the conference terminals according to the conference controller's request;
- The system can support splitting a conference into several subconferences according to the conference controller's request;
- The system can disconnect or invite terminals at any time, if necessary;
- The conference can be archived, researched and reviewed.

8.3 Numbering requirements

To authorize a user, he/she should be assigned a unique identification number accompanied by other necessary information. The number should be used as the destination indication when the user is called, and as the identification for accounting. It should support the mobility of user terminals when necessary.

8.4 Security requirements

The security of a multimedia conference should be ensured: different security levels may be provided according to the user requirement. There are three classes of security:

- a) user authentication and access security;
- b) call security;
- c) media stream encryption.

When convening a conference with security, the following contents should be included:

- 1) The convener should designate whether the meeting is security-supported or not when reserving a meeting, and the level of security should also be designated;
- 2) For the conference on-demand, the security requirement and its level should also be submitted.

8.5 Authentication and accounting requirements

The system should accept the authorized user's access to a multimedia conference network, and provide authorized application to the user.

The system should not only collect and transfer accounting data of the multimedia conference service user accurately, but also provide multiple, alternative-accounting modes for different application scenarios.

8.6 QoS requirements

Time delay, jitter and packets loss due to the IP network are the main effects to QoS. The network and terminal equipment for the multimedia conference service should be capable of real-time multimedia information processing, and of maintaining clarity and smoothness of the voice, moving picture and real-time text. The equipment should also be able to receive and process other data formats properly.

9 Interworking and intercommunication

Three types of interworking or intercommunication may be related to the IP multimedia conference service:

- interworking and intercommunication between terminals with different capabilities;
- interworking and intercommunication between terminals in different networks (PSTN, ISDN, etc.);
- interworking and intercommunication between different IP multimedia conference systems.

9.1 Terminals with different capabilities

Terminals with different characteristics and capabilities may be connected in a multimedia conference. Three ways of interworking or intercommunication may then be provided:

- use of a common mode which every terminal in the call can handle; this will decrease the 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 have at least the basic audio capability;
- use of their normal mode for the terminals supporting higher quality levels, with partial functionalities only for the terminals with lower quality levels, which are thus given a secondary status; for instance, some terminals may have audio and video while others may have audio capability only; it may also happen that terminals have different and incompatible data capabilities, and thus cannot be used;
- transcoding and rate matching in the media exchange and process so that each terminal receives and transmits the signals it is able to handle.

9.2 Terminals in different networks

The multimedia conference system should accept terminals in different networks (for example, visual telephone terminals over ISDN, visual telephone terminals over GSTN, Visual telephone terminals over mobile radio). That means that, when different terminals access, the multimedia system supports the network protocol translation. The requirements for this type of interoperation are:

- audio format and code conversion;
- video format and code conversion;
- text format conversion;
- data protocol conversion;

- bit stream conversion;
- call control signalling conversion.

9.3 Different IP multimedia conference systems

There are many IP multimedia conference systems now available. Intercommunication is needed if the terminals are located in different service systems. The requirements for this type of intercommunication should support:

- authentication between different systems;
- system security;
- shared system resources;
- accounting between different systems.

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