INTERNATIONAL TELECOMMUNICATION UNION

CCITT F.710

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

TELEMATIC, DATA TRANSMISSION AND TELECONFERENCE SERVICES OPERATIONS AND QUALITY OF SERVICE

GENERAL PRINCIPLES FOR AUDIOGRAPHIC CONFERENCE SERVICE

Recommendation F.710

Geneva, 1991

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation F.710 was prepared by Study Group I and was approved under the Resolution No. 2 procedure on the 11 of March 1991.

CCITT NOTE

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

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Recommendation F.710

GENERAL PRINCIPLES FOR AUDIOGRAPHIC CONFERENCE SERVICES

1 Introduction

This Recommendation defines the rules to be followed in the international audiographic conference (AGC) service. Specific infrastructure, terminal and network aspects of the service are described in the AV.200, AV.300 and AV.400-Series of Recommendations.

2 Definition

The **Audiographic Conference (AGC) service** is an international service, offered by Administrations, enabling participants to conduct a real-time teleconference between users situated in different locations, connected by terminals and telecommunications networks.

The AGC service is a type of Teleconference service (TCS) in which audio signals are exchanged together with non-voice graphics information (data, text, images, etc.) except for motion video.

The AGC service may utilize computer conference or other data storage facilities when unique features provided by these facilities are required to augment a real-time audiographic conference.

Unless otherwise noted, the terms and definitions relating to teleconferencing used in this Recommendation are as defined in Annex B of Recommendation F.701.

3 Description

3.1 *General*

The AGC service provides the necessary arrangement for a real-time conference in which audio signals, together with graphics information, are exchanged among individuals or groups of individuals at two or more locations connected by means of a telecommunications network(s). A conference can be established between personal terminals and other personal terminals, between conference rooms and other conference rooms, or a combination of the two.

An essential characteristic of the AGC service is that it provides the basic level of compatibility (see § 3.4) between all terminals participating in the service. Optional service features may be added when required to serve particular conferencing needs.

A Multipoint control unit (MCU), to which all locations are connected individually, is required for the interconnection of terminal equipment used in conferences involving three or more locations. The MCU provides proper distribution of the various audiographic signals among the connected locations and takes part in maintaining the proper procedures between the connected terminals.

Two or more MCUs may be interconnected when required to extend the conference to participants for which distance or other limitations preclude the use of a single MCU.

Two important features for the AGC user are quality of sound and speed of transmission of documents. When the overall bit rate is limited, these two features may be alternately given preference by dynamic switching between audio codecs controlled through H.221/AV.221 BAS codes in accordance with the communications procedures defined in Recommendation H.242/AV.242.

3.2 *Service modes*

There are two states for the Audiographic Conference service:

– *Main mode:* An operational mode that supports full error detection and correction in a point-to-point or multipoint graphics information communications environment. Primary service requires, as a minimum, two-way communications between the MCU and each participant to achieve full error detect and correct (EDC) operation;

– *Auxiliary mode:* A distribution only mode of operation for networks where two-way communication is either not available or not desirable due to the large number of units involved. Receive only graphics terminals may be developed to support the auxiliary mode only.

Provisions are made to permit combined operation of both states where some units are broadcast receivers listening to other units utilizing two-way operation.

3.3 *Functional model*

3.3.1 *Participants*

The model for AGC interaction implies an exchange of information between four types of role players. These players are:

– *Conference convenor:* One who summons participants to a meeting and makes all necessary prior arrangements.

– *Presenter:* One who controls the visual information being actively discussed in the meeting.

– *Audience member:* One who participates in an audiographic conference other than the Presenter.

– *Conference conductor:* One who leads or guides the technical management of the audiographic conference.

Information exchanged between the players are of two types:

– audio and graphics (imagery) information exchange;

– conference establishment/release and control.

The roles of Presenter and Audience member may be interchanged any number of times during the conduct of a given conference.

A single individual may act as both the Conference convenor and Conference controller. Usually, this same individual will also act as a Presenter during the course of the meeting.

3.3.2 *Configuration*

An example of the functional model is depicted in Figure 1/F.710. This example may be expanded to include real-time access to a remote data base or other file storage facility when required to satisfy a particular conference requirement.

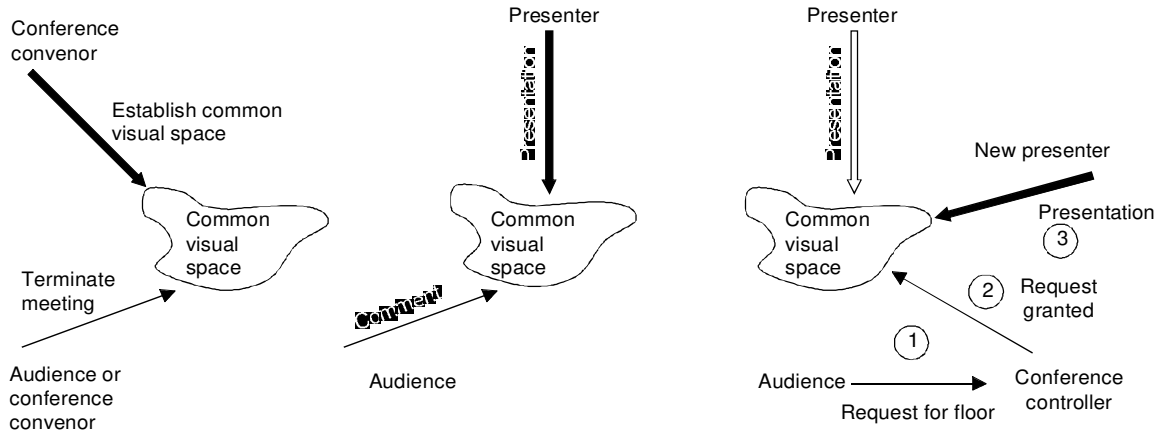


FIGURE 1/F.710

A functional model of the Audiographic conference

3.4 *Basic requirement*

3.4.1 The general requirements of the AGC service are as follows:

a) A basic level of compatibility is provided between all terminals participating in the AGC service, both nationally and internationally, so that each may communicate audio, basic image and annotation – coded information to all other participants. This is to be achieved by requiring that terminals comply with Recommendations AV.310 and AV.311.

b) It is for each Administration to decide on the network(s) which the AGC service will be carried. There shall be no restriction on the type of network to be used.

c) It should be possible to extend AGC service to any number of Administrations.

d) To permit private use applications, for example encryption, there should be no restrictions placed on the bit sequences used to transmit audio and imagery information.

e) A received AGC image may be displayed, printed or recorded as decided by the recipient and the characteristics of the receiving terminal.

f) It is essential that interworking be provided at least on an audio basis.

g) The ability to control the conference from a single location is required in a multipoint communications environment.

h) It is intended that the AGC service should require no fundamental change to the Recommendations for existing services or networks.

3.4.2 The AGC service is comprised of the following elements (audio is presumed to be always available without interruption):

a) *Establish conference:* Call set up, conference establishment and conference clearing at the network level.

b) *Initiate image:* Generation of an electronic image signal from a number of common sources.

c) *Coding/Compression:* Reducing the amount of redundant data required to represent the image.

d) *Transmission:* Conveying the information defining the image to other terminals via a communications channel.

e) *Display:* Presenting the received or locally generated image signal visually for conference purposes.

f) *Protocol:* Managing the network and terminal protocols in order to make available, during the various AGC phases, the services required.

g) *Image manipulation:* Interactive manipulation of the image and augmentation such as pointers, highlight and annotation (telewriting).

h) *Multiplex:* Combining the audio signal with the visual data when a common channel is used for transmission.

i) *Bridging:* the ability to conference simultaneously among three or more remote locations.

j) *Control:* actions initiated by the conference conductor to coordinate and manage conference interaction between the various participants.

3.4.3 The following features apply to the AGC service:

a) *Image input sources,* such as:

– paper/film (scanner);

– electronic images (terminal resident, imported);

– video capture (camera, VCR).

b) *Graphics information in a variety of formats,* such as:

– digitized video (PAL, NTSC, RGB);

– facsimile (G3, G4);

– other document formats (raster, ODA/ODIF, structured);

– videotex/teletex.

c) *Conference configuration,* such as:

– add;

– drop;

– participation status.

Note – Features are arbitrated as users are added to the conference.

3.4.4 In addition to the above basic requirements, the general features of the Teleconferencing service (TCS) described in Recommendation F.701 also apply.

3.5 *Standardized options*

3.5.1 It is recognized that some conferences may need to communicate both nationally and internationally using service features that are not included in the basic requirements. A number of CCITT standardized options should, therefore, be defined. However, the provision of any option in a service leads to some degree of incompatibility and the number of standardized options should be restricted, as shown below, to those features for which a clear international need can be foreseen.

3.5.2 The sending terminal shall ensure the transmission of documents using only those options that have been indicated as being available at the receiving terminal.

3.5.3 It shall be possible for more sophisticated terminals to provide particular features different from the basic requirement (e.g. editing, autocall setup, local view, etc.) in as far as these features do not affect the basic service to other locations participating in the conference.

3.5.4 The standardized options should provide means for:

a) different pel transmission densities;

b) optional coding schemes;

c) grey scale images;

d) colour images;

e) printable areas;

f) escape into national and private options;

g) resolution conversion algorithms;

h) confidentiality/security;

i) document control and editing functions, such as:

- document editing,
- raster image editing (zoom, rotation, pan, scroll, etc.),
- textual annotation (such as telewriting),
- erase and go-back-one (undo),
- help (local, suggested);

j) audio requirements, such as:

- enhanced quality,
- multiple speakers,
- voice annotation/audio clips;

k) active participant indicators (speaker, presenter, etc.).

Note 1 – The standardized options are negotiated during conference set-up.

Note 2 – The standardized and nationally defined options should be used in such a way as to minimize the need for the introduction of private use options.

Note 3 – There is a need for further study as the service develops. Changes may be required to this list.

4 Operational procedures

The AGC service is used for presenting the bi-level, grey scale and colour visual materials with associated oral discussion in electronic "meetings" where the locations linked by telecommunications can view and work on the same image simultaneously.

4.1 *Sequence of operation*

A meeting, using the AGC service, typically occurs in the following sequence:

– *Reservation:* The date and time of the proposed conference may be coordinated by the Conference convenor.

– *Establish communications:* Audio and graphics communications are established to all locations participating in the conference at the time and date agreed.

– *Originate an image:* The initiating location transmits an image that is simultaneously displayed at all other locations in the conference.

– *Work with the image:* Once the image is displayed, any conference location may activate an electronic pointer or annotate the image, with all other locations immediately seeing the results of this action. All changes and manipulations occur in real time.

– *Modify the image:* The displayed image may be modified locally by editing the processable form of the image. The resulting modifications, when inserted into the conference, will immediately replace the current display at all locations.

– *Record the image:* Any user can record a copy of the image currently displayed at any time without disrupting the meeting in progress. This may be accomplished by printing on a hardcopy output device or by storing on a magnetic disk.

– *Continue the meeting:* The above conference operations are repeated as the meeting progresses with any location having the ability to act as the initiating location or annotate the work of others.

– *Terminate the meeting:* End the audiographic conference session.

4.2 *Operational phases*

The sequence of operations associated with the audiographic conference can be divided into five phases:

Time →

Phase A	Phase B	Phase C	Phase D	Phase E

Phase A Call set-up
Phase B Conference set-up
Phase C Conference session
Phase D Conference recovery and reconfiguration
Phase E Call release

4.2.1 *Call set-up and release (Phases A and E)*

The establishment and release of the physical connection between terminal equipment for point-to-point operation or between terminal and MCU for multipoint operation, is as defined for a general teleconference call in Recommendation F.701.

Call release can take place from the MCU (e.g. in the case of the end of the reservation period), by action of the Convenor or by a participant (his own connection only).

4.2.2 *Conference set-up/recovery (Phases B and D)*

As soon as the physical connection between terminals or between terminals and MCU is established the terminal enters the conference set-up phase. During the active meeting session the conference set-up phase can be re-entered when participants change.

During the conference set-up phase the participating terminals exchange information important to the organization of the meeting, such as:

– terminal identity/authentication;

– names of participants;

– terminal characteristics and capabilities.

During conference recovery or reconfiguration, detection of loss of a connection to a terminal is performed by the terminal assigned responsibility for controlling the conference. If the controlling terminal is lost then the conference returns to the non-conducted mode (see § 4.2.3) and conference set-up procedures are re-initiated.

4.2.3 *Conference session (Phase C)*

4.2.3.1 The following two modes for conference control are required:

a) *Non-conducted Mode:* Any participant may speak or initiate graphics or new image activity at any time.

b) *Conducted:* A participant makes an active request to speak or initiate graphics activity. The conference Chairman must actively grant permission to switch control.

4.2.3.2 *Non-conducted session*

In the case of the non-conducted mode each participant can speak at any time he wishes. All microphones can be permanently enabled.

At the start of the conference session, the default mode of conversation is “non-conducted”.

4.2.3.3 *Conducted session*

In the case of the conducted mode the participant desiring recognition will issue a request to speak and then wait until the request is granted. The request to speak can be granted manually or verbally by the Conductor or automatically by a queueing mechanism within the conference system.

The token of conductorship assigned during the conference set-up phase can be handed over to another terminal so equipped at any time during the conference session.

The AGC service shall offer the Conductor and other conference participants the control functions required to actively conduct and participate in the conference session. These functions include:

– request for floor;

– request granted;

– request refused.

4.2.3.4 *All modes*

The Conductor always retains the capability to interrupt the current speaker, to disable the current speaker's microphone and to pass the “floor” to another participant.

A means shall be provided at each terminal location for identifying the speaker and the source of the current image being discussed.

The mode of conference control currently being invoked will be indicated at each terminal location.

4.3 *Capabilities arbitration*

A number of network, terminal and MCU-related capabilities are to be arbitrated during the call control phase. Some of the functions to be arbitrated are:

– *Interactive functions:* Drawing, pointing, editing (raster or document), undo, and live interaction.

– *Image capabilities:* resolution, image type (video, document, etc.) and pixel depth (bi-level, grey scale or colour).

– *Image compression capabilities:* Standardized techniques for specific image types (such as documents, still frame, video, etc.) and the loss threshold when non-restoring algorithms are used.

– *Network capabilities:* Time outs, add/drop tolerances, audio/data bandwidth allocation.

– *Conference control:* Means of speaker indication and speaker/graphics control switching.

5 Network aspects

5.1 *General*

The combination of functions specified for an audiographic terminal provides a complete audiographic conferencing system which may operate over a single communications channel, or over multiple communications channels between two or more locations.

The AGC service must be capable of providing both point-to-point and multipoint configurations with full interactivity among all units in the conference. A broadcast mode is also desirable.

The AGC service in the international connections between Administrations or networks shall use any of the following:

– on demand connections (automatic switching);

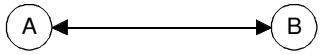
– reserved or semi-permanent connections (e.g. manual set-up).

It is intended that the AGC service be optimized for operation on one or more ISDN connections with the audio and graphics data integrated. It is desirable that the AGC service also be compatible with and available on the public switched telephone network (PSTN), the circuit switched public data network (CSPDN) and the packet switched public data network (PSPDN) where the audio and graphics may be carried in separate circuits.

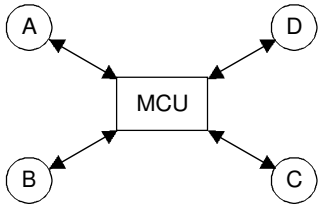
5.2 *Network topology*

AGC service can be provided using one of the following configurations as appropriate to a particular conference requirement:

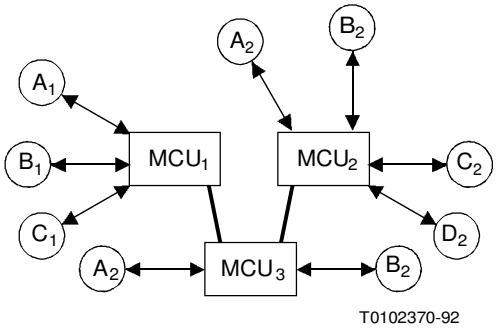
a) Direct two-party conference



b) Multipoint conference requiring a single MCU



c) Multipoint conference requiring multiple MCUs. A typical example:



5.3 *Multipoint operation*

The international multipoint AGC service is provided by means of one or more multipoint control units (MCUs). Each MCU may serve one or more AGC terminals and be interconnected with other MCUs.

The general functions of the AGC multipoint control unit are as described in Recommendation F.701. Detailed procedures for multipoint operation are given in Recommendations H.230/AV.230, AV.231 and AV.440.

There is a need for an automatic service which does not require operator assistance in setting up conference calls. The possibility of such a service is addressed in the supplement to the Series-E Recommendations relating to the operation of the International Telephone service.

6 Terminal aspects

6.1 *General*

An audiographic terminal is the device by means of which audiographic conferences are conducted through appropriate communications channels. The term "terminal", as associated with the AGC service, is meant to imply all equipment or devices used to input, output and process both the audio and graphics information signals.

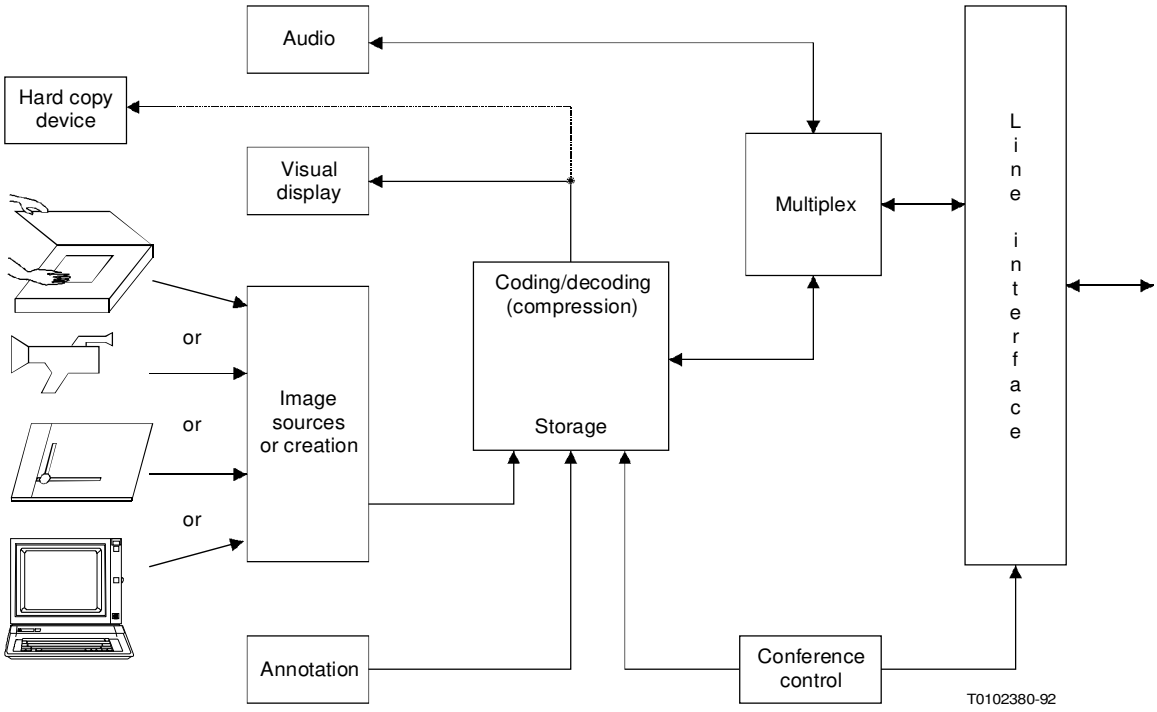
The graphics portion of the audiographic terminal can also serve as a valuable adjunct to the videoconference and videophone services by providing the means for the transmission of graphic documentation.

Each terminal used in the AGC service shall have a unique identification. It is the responsibility of the conference initiating terminal to verify the identification of the other participating terminals prior to the communications phase.

6.2 *Functional elements*

6.2.1 An audiographic terminal provides a number of basic functions as required by the definition of the AGC service. The audiographic terminal may also provide a number of auxiliary features which, while not essential to the basic operational requirement, will greatly enhance the conduct of the audiographic conference.

6.2.2 The terminal may be composed of the following functional elements (see Figure 2/F.710):



Note – These elements may be contained in either a single device or a number of devices as determined by the needs of the user for ease of operation.

FIGURE 2/F.710

Functional elements of the AGC terminal

6.2.3 The specific details of the AGC terminal are described in Recommendations AV.310 and AV.311.

6.3 *Terminal input requirements*

6.3.1 The audiographics terminal is a device for permitting simultaneous viewing, manipulation and oral discussion of the same image on multiple terminals linked by one or more telecommunications networks.

6.3.2 The terminal, depending on the application, may have one or more modes of image input:

- *Scanner:* for digitizing images from paper or film.
- *Frame capture:* for digitizing still frame video images.
- *Disk media:* for importing computer generated images.
- *Interfaces:* to other communications equipment for electronically interchanged images.
- *Creation:* of original images and documents within the terminal by means of resident software (document editor), or by direct drawing (telewriting).

6.3.3 Both hard copy and soft copy communications can be utilized in the AGC service. However, the primary conveyor of graphic information in the audiographic conference is the soft copy communication wherein the same document is displayed on all terminal displays at the same time. Voice, pointer and/or telewriting may be used in discussing the displayed document.

6.4 *Terminal display*

The interactive image display should permit real-time interaction with the displays at all locations having the same image content at all times.

The terminal display may have a "window" for local viewing (including an image preview mode) provided that it is obvious to the user that the window is local only. A multi-window system with the capability to present two or more sources of graphic information at any given time may be an optional feature of the AGC service.

It is desirable that any image operation being performed on the network active image by other terminals shall also be performed on the local terminal in the same manner even though the local window may be active.

7 Quality of Service

7.1 *Voice quality*

By the design of the room and/or the equipment, participants should be allowed to listen and speak simultaneously with a nominal voice quality equivalent to speech transmission with a bandwidth of 7 kHz.

In those instances when the requirement for graphic information transfer competes for the bandwidth required to achieve 7 kHz operation, the speech objective may be relaxed as long as there is no significant difference in speech quality from that available in the 64 kbit/s ISDN telephony service based on a bandwidth of 3.1 kHz.

7.2 *Graphic quality*

A combination of dynamic channel allocation, receive terminal storage capacity and "transmit ahead" capabilities shall be provided to ensure that images are available in the image space when required, and competition with the 7 kHz voice objective is reduced to a minimum.

Image manipulations and other processing activities should be accomplished within the nominal response time associated with the related face-to-face activity.

To ensure conference call integrity, error protection shall be provided by the AGC control procedures for the primary mode of operation.

7.3 *Maintenance*

Terminal to terminal and terminal to MCU quality shall be checked by various measurements as appropriate for comparable component services.

8 Intercommunications with other services

Provision shall be made for attaching to the following services for audio operation only:

- 7 kHz telephony;
- 3.1 kHz ISDN telephony;
- 3.1 kHz PSTN telephony;
- other audiovisual services.

The AGC service may also be used, in whole or in part, to support a videoconference when required to augment the videoconference service features.

9 Reservation of service

General procedures for the reservation of an international audiographic conference are as summarized in Recommendation F.701. Specific procedures are detailed in Recommendation AV.410.

The national and international facilities required for the establishment of an audiographic conference call shall be open continuously.