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H.332

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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Systems and
terminal equipment for audiovisual services

H.323 extended for loosely coupled conferences

ITU-T Recommendation H.332

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION H.332

H.323 EXTENDED FOR LOOSELY COUPLED CONFERENCES

Summary

This Recommendation describes terminals, equipment, and services for multimedia communication over packet-based networks. H.332 terminals and equipment may carry real-time voice, data, and video in any combination. The goal is to work within the framework of Recommendation H.323, yet provide scalability well beyond the limits of Recommendation H.323 to enable applications involving hundreds and thousands of participants.

H.332 terminals may be integrated into personal computers or implemented in stand-alone devices such as videotelephones. Support for voice is mandatory, while data and video are optional, but if supported, the ability to use a specified common mode of operation is required, so that all terminals supporting that media type can interwork. Like Recommendation H.323, this Recommendation allows more than one channel of each type to be in use. Other Recommendations in the H.332 series include H.323 visual telephone equipment for Local Area Networks, H.225.0 packet and synchronization, H.245 control, H.261 and H.263 video codecs, G.711, G.722, G.728, G.729, and G.723.1 audio codecs, and the T.120 series of multimedia communications protocols.

H.332 terminals are based on Recommendation H.323; therefore, they interwork via gateways with H.310 terminals on B-ISDN, H.320 terminals on N-ISDN, H.321 terminals on B-ISDN, H.322 terminals on Guaranteed Quality of Service LANs, H.324 terminals on GSTN and wireless networks, and V.70 terminals on GSTN.

Source

ITU-T Recommendation H.332 was prepared by ITU-T Study Group 16 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 25th of September 1998.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the 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.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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Recommendation H.332

H.323 EXTENDED FOR LOOSELY COUPLED CONFERENCES

(Geneva, 1998)

1 Scope

This Recommendation covers highly scalable conferencing on packet-based networks involving hundreds and thousands of participants. This type of conference is defined in Recommendation H.323 as broadcast and broadcast-panel conferences. This Recommendation is based on Recommendation H.323, thus providing interoperability with circuit-switched endpoints (H.320, H.321, H.324) via Gateways as shown in Figure 1. Use of data, as opposed to real-time streams like audio and video, is for further study.

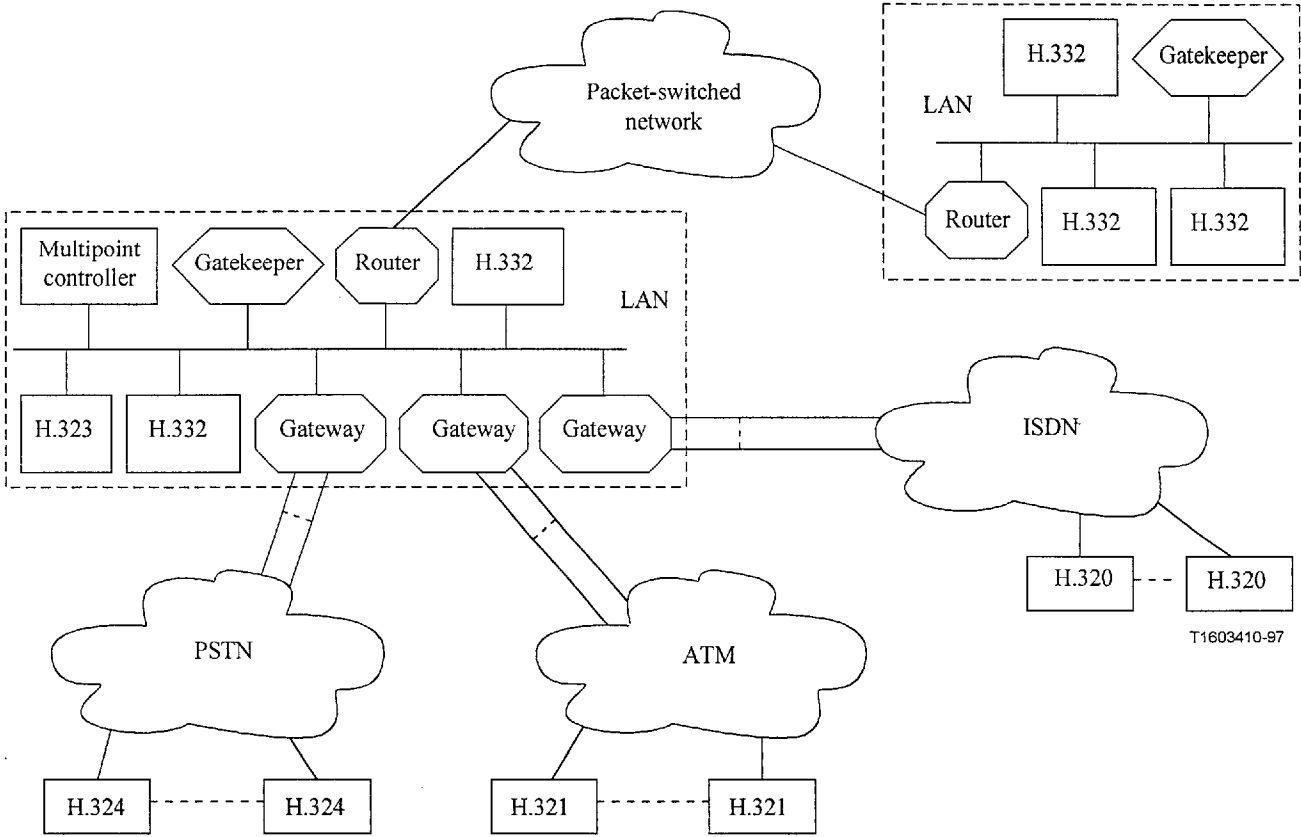


Figure 1/H.332 – Scope of H.332 conference

2 Conference model

The goal of this Recommendation is to provide scalability of the number of terminals in a conference well beyond the limits of Recommendation H.323. Recommendation H.323 is limited in scalability due to the requirements for tightly coupled conferencing. It requires all participants of the conference to be known and a set of procedures for conference setup, capability negotiation, creation and control of audio/video/data streams, and conference tear down. Such a procedure for conference setup and capability negotiation at the start of the conference, though essential for tightly coupled conferences,

is cumbersome and impractical for conferences involving an arbitrarily large number of participants. Information required to setup a large conference must be disseminated well before the start of the conference.

Small conferences, like telephone calls, are usually ad hoc in nature. In comparison, large conferences are usually planned and pre-announced. Examples include presentation to a large geographically dispersed audience, distance learning, etc. When a conference is pre-announced, conference capabilities can also be pre-announced. Some form of capability negotiation is also desirable to accommodate users at different network bandwidth and endpoint resources (Processor power, display resolution, etc.). Network bandwidth may span from low-speed modem links of 14.4 kbit/s to high speed B-ISDN links of 622 Mbit/s. Layered video can be used to accommodate participants at different bandwidth links and their need for varying picture quality.

Loosely coupled conferencing is already part of RTP/RTCP. It is designed to scale to thousands of participants. Over a period of time, the identity of each participant is known through the RTCP messages. Floor control is provided through human or social control. Human control works well for small conferences or in a setting where everybody participating can see each other. But when conferences consist of hundreds of participants, some form of automatic chair-control mechanism is desirable. RTCP is constrained to occupy a small percentage of the total conference bandwidth and any chair-control mechanism implemented in RTCP will not provide service in a timely manner. Therefore, the concept of an H.323 panel is introduced here.

The basic model of this Recommendation is shown in Figure 2. The panel consists of a small H.323 conference connected to a large number of RTP receiving terminals via RTP/RTCP. These RTP receiving terminals may be H.323 terminals, or other RTP/RTCP capable terminals that have external means to understand how to connect to the conference. Within the panel, full interaction is allowed. Interaction could be through social- or chair- control. Outside the panel, the participants are passive; they are essentially receivers who are, by default, not allowed to interact. If they wish to interact, they have to join the panel or get invited by the panel. Inside the panel, any H.323 model – centralized, decentralized, or hybrid – can be used. However, outside the panel multicast is used in order to provide the scalability required for the H.323 conference. This can be achieved either by using the H.323 decentralized model, or, when the centralized model is used, by using a Multipoint Processor (MP) to multicast media streams to the RTP receiving terminals.

The panel consists of permanent and temporary members and is limited in size only by the amount of resources available at the Multipoint Controller (MC) for the conference. The permanent members consist of those who are essential to the conference such as the teacher in a distance-learning virtual class or the presenter in a virtual auditorium full of people. The temporary members come from the RTP receiving terminals who want to participate with questions, discussions, etc. Temporary members change with time as new members join and old members leave voluntarily or are requested to leave to make room for new ones.

The panel employs social or automatic control. If social control is used, then all in the panel can potentially talk and send their video on the audio and video RTP sessions. But, in practice, through social control, one participant usually talks at a time. Automatic control, on the other hand, is through H.323 chair-control. H.323 chair-control gives special privileges to the chair. Any panel member who wants to talk and send video must first request the floor from the chair. When the floor is granted by the chair, the participant can use the audio and video RTP sessions.

The sequence of events in an H.323 conference is as follows:

- 1) The conference is pre-announced with sufficient information to enable discovery and participation. The IETF Session Description Protocol (SDP) shall be used to encode the conference announcement. Any mechanism can be used to carry the announcement. Some suggested mechanisms are: email (SMTP) and web (HTTP).