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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Supplementary services for multimedia

Message broadcast for H.323 systems

ITU-T Recommendation H.460.21

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ITU-T Recommendation H.460.21

Message broadcast for H.323 systems

Summary

This Recommendation defines a feature wherein H.323 devices may broadcast (using multicast) a message to one or more remote H.323 terminals, such as providing an "intercom" function for enterprise telephones, a "paging" service through an enterprise, or a notification system to geographically dispersed terminals. Since the method utilizes standard Internet multicast procedures, the feature may be used on a wide scale to reach any number of H.323 endpoints in a geographic region or even the entire world.

Source

ITU-T Recommendation H.460.21 was approved on 29 May 2006 by ITU-T Study Group 16 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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

NOTE

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

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words shall or some other obligatory language such as must and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, 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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Message broadcast for H.323 systems

1 Scope

This Recommendation describes the signalling and procedures to provide a message broadcast feature for H.323 systems. The message broadcast feature is one wherein a message server or H.323 endpoint in the network transmits a message to one or more endpoints in a predefined multicast group. The message may result in alerting the user or playing audio to a speaker on the phone without alerting. Messages sent to an H.323 device may interrupt active communication or may be discarded, depending on priority. Messages are not limited to audio: messages may be audio, video, or text messages, the choices of which are negotiated through the procedures described herein.

These procedures use the H.323 Generic Extensible Framework (GEF).

2 References

2.1 Normative 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.

– ITU-T Recommendation H.225.0 (2006), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.

– ITU-T Recommendation H.245 (2006), *Control protocol for multimedia communication*.

– ITU-T Recommendation H.323 (2006), *Packet-based multimedia communications systems*.

– ITU-T Recommendation H.460.1 (2002), *Guidelines for the Use of the Generic Extensible Framework*.

– ITU-T Recommendation X.680 (2002) | ISO/IEC 8824-1:2002, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.

– ITU-T Recommendation X.691 (2002) | ISO/IEC 8825-2:2002, *Information technology – ASN.1 encoding rules – Specification of Packed Encoding Rules (PER)*.

– IETF RFC 3376 (2002), *Internet Group Management Protocol, Version 3*.

– IETF RFC 3550 (2003), *RTP: A Transport Protocol for Real-Time Applications*.

– IETF RFC 3810 (2004), *Multicast Listener Discovery Version 2 (MLDv2) for IPv6*.

– IETF RFC 4103 (2005), *RTP Payload for Text Conversation*.

2.2 Informative references

– IETF RFC 3569 (2003), *An Overview of Source-Specific Multicast (SSM)*.

3 Abbreviations and acronyms

This Recommendation uses the following abbreviations:

ASM Any-Source Multicast

ASN.1 Abstract Syntax Notation One

GEF Generic Extensible Framework

GUID Globally Unique Identifier

PER Packed Encoding Rules

RAS Registration, Admission and Status

RCF Registration Confirm

RRQ Registration Request

SSM Source-Specific Multicast

4 Functional overview

Devices within an H.323 network that advertise support for the message broadcast feature do so through advertisements in the RRQ messages sent to the Gatekeeper. An endpoint may advertise that it is a receiver, a transmitter, or both. This allows a device to serve only to send out broadcast messages or perhaps provide intercom functionality as part of the other telephony functions.

Special devices in the network may serve as message broadcast servers and do not necessarily have to be H.323 entities: they only need to have the capacity to send media to multicast groups that may be properly received by H.323 entities operating in accordance with this Recommendation. Such servers are expected to share some information, such as multicast addresses and media attributes, with the Gatekeeper. How the Gatekeeper becomes aware of these servers or how information is shared with them is outside the scope of this Recommendation.

Gatekeepers have the ability to provide each endpoint with a list of multicast groups to which the endpoint may join. The list may be unique to each endpoint or a small group of endpoints, perhaps subdividing endpoints according to some logical association, such as a corporate department or geographic region. The way in which groups are defined and placed into the RCF is outside the scope of this Recommendation.

The addresses provided via the **groupAddress** field is a multicast address representing the multicast group (G). There is a second, optional, unicast address called **sourceAddress** representing the source (S) for media transmission.

When no particular source is specified for the multicast group (referred to as Any-Source Multicast or ASM), a receiving endpoint will accept message content from any device that transmits to that multicast group. No two entities should broadcast messages to the multicast group simultaneously, as that would induce some confusion. Nonetheless, such an event can occur and when it does, the message received from the highest priority group should be played, or from the first group to deliver a message in the case that the group priorities are the same. How the endpoint handles lower priority messages is implementation dependent; the device may choose to play the contents of the higher priority message, record and play the lower priority message after playing the higher priority message, discard the lower priority message, or take some other action.

When a source address is specified for the multicast group (referred to as Source-Specific Multicast or SSM), the endpoint accepts message content only from the source IP address specified. IGMPv3 and MLDv2 both provide mechanisms to allow the endpoint to signal to the network its desire to join the multicast group (S, G). By using SSM, a network administrator can better control the transmission of broadcast messages by restricting transmission to a small set of broadcast servers.

Endpoints may serve as receivers (most common), transmitters, or both.

Figure 1 depicts a network with a server transmitting a media flow to a multiplicity of H.323 terminals and gateways.

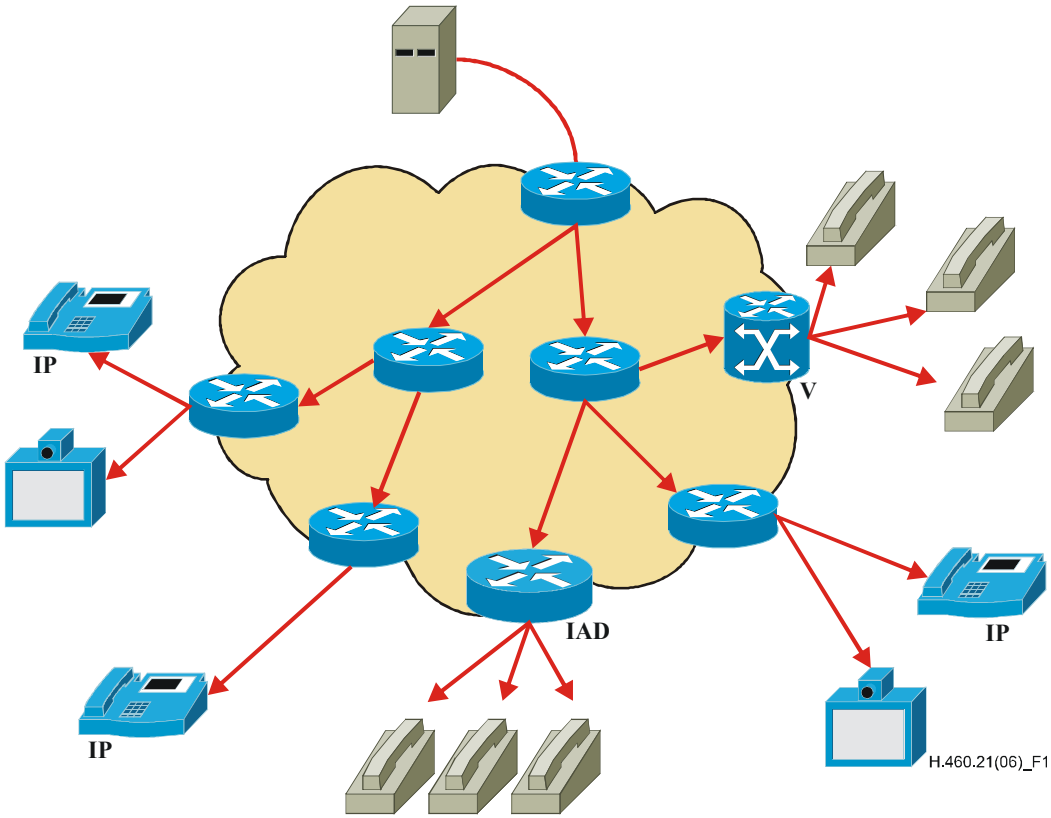

Figure 1/H.460.21 – Multicast message delivered to endpoints

5 Message content

Since there may be dozens, hundreds, or tens of thousands of devices that join a multicast group in order to receive broadcast messages, it is impractical to attempt to negotiate media capabilities with all of these devices in order to discover a common subset. As such, all devices that adhere to this Recommendation shall support, at a minimum, G.711 A-law and G.711 μ-law and shall be prepared to receive messages in either encoding with up to 240 samples (30 ms) of audio per packet. Devices should support RFC 4103 in order to receive broadcast text messages at a rate up to 30 characters per second.

The message content shall be streamed to the endpoint via RTP. However, since messages are intended to be relatively short and transmitted infrequently, the use of RTCP is not considered useful and shall not be employed with this feature.

NOTE – H.323 endpoints may indicate a language preference for broadcast messages it receives by including an ordered list of language preferences in the RRQ message transmitted to the Gatekeeper.

6 Message priority

In some cases, messages should not disrupt users on a call and there are other cases when users should be alerted. The **alertUser** field serves to provide guidance.

When the **alertUser** field is set to TRUE, the receiving H.323 device shall alert the user to the message as if it were an incoming call (e.g., ring the phone). If the H.323 device is engaged in a

call, the message shall be delivered to the user, perhaps replacing one media stream for another. If the **alertUser** field is FALSE, the message should either be discarded or, if possible, played to the user interface (speaker or display) without alerting the user. In the case that the H.323 device is actively engaged in a call and the **alertUser** field is FALSE, the message should be discarded or recorded for later playback. The choice in behaviour is left to the implementer.

The **priority** field is used to provide guidance in dealing with multiple messages that may arrive at the same time or overlap in time. Once an endpoint starts delivering a message, the message should not be interrupted by another message unless that other message has a higher priority value. The lower the numeric value of the **priority**, the higher the priority (i.e., 0 is the highest priority).

User actions may disrupt message delivery. For example, if a departmental page is being delivered to the phone's speaker and the user lifts the handset on the phone to place a call, the message should stop playing unless the **alertUser** field is set to TRUE. In that case, it should continue delivery unless deliberately stopped. Methods for control of delivery and termination of delivery through the user interface are outside the scope of this Recommendation.

7 Gateway considerations

A gateway is a special device in that it has the capacity to reach a multiplicity of users, though presenting itself as a single H.323 entity to the Gatekeeper. The behaviour a gateway takes when it receives a message should be parallel to that of other H.323 devices. For example, if it receives a message for a group for which the user should be alerted, the gateway should attempt to alert users connected to the Gateway. For small gateway devices with ports that connect directly to analog phones, for example, alerting all of the phones is straightforward. However, for larger gateways that are connected to the PSTN without a well-defined set of "users", alerting this ambiguous group of users is impossible. In such a case, the Gateway may be provisioned with certain actions to take, such as calling phone numbers in a certain locality. In any case, the procedures that are followed by such Gateways are outside the scope of this Recommendation.

8 Capability advertisement

The message broadcast feature shall be advertising using the Generic Extensible Framework with the following feature identifier (see Table 1):

Table 1/H.460.21 – Message broadcast feature

Feature name:	Message Broadcast
Feature description:	This feature allows an H.323 endpoint to receive broadcast messages sent to groups of H.323 devices from another device on the network.
Feature identifier type:	Standard
Feature identifier value:	21

There is only one parameter defined for the message broadcast feature, as shown in Table 2. The specific SEQUENCEs to be sent in the RRQ and RCF messages are defined in the ASN.1 in Annex A.

Table 2/H.460.21 – Message broadcast feature parameter

Parameter name:	MessageBroadcastParameter
Parameter description:	This parameter holds the aligned variant PER encoding of ASN.1 definition found in Annex A.
Parameter identifier type:	Standard
Parameter identifier value:	1
Parameter type:	Raw
Parameter cardinality:	Once and only once

8.1 Endpoint advertisement

Endpoints capable of supporting the message broadcast feature shall advertise that capability in the **featureSet.supportedFeatures** field of the RRQ message sent to the Gatekeeper. The MessageBroadcastParameter parameter shall contain a **CapabilityAdvertisement** SEQUENCE. Support for the message broadcast feature shall not be advertised in lightweight RRQ messages.

The endpoint shall advertise its receive capabilities and indicate the maximum number of multicast groups to which it can join via the **receiveCapabilities** field. The endpoint may include **receiveVideoCapability**, **receiveAudioCapability**, and **receiveDataApplicationCapability** capabilities as elements of **receiveCapability**. The use of other capability types is for further study. Gatekeepers in receipt of a capability other than these types or for a specific media type it does not support shall ignore the capability.

Different endpoint may advertise, for example, that they can receive G.711 A-law with a different number of samples per packet than another endpoint. However, if an endpoint advertises that it can receive G.711 A-law with 60 ms of audio per packet, the media stream may still contain only 30 ms (as indicated in clause 5) in order to accommodate all endpoints in the group.

Transmitters include the **transmitCapabilities** in the capability advertisement found in the RRQ. Each multicast group is identified by a Globally Unique Identifier (GUID), the assignment of which is outside the scope of this Recommendation and is intended to be assigned by administrators or operators. The transmitter indicates the capability that it will use to transmit to that group and the source address it will use for the transmission. The Gatekeeper will take this into account when it compiles the list of **MessageBroadcastGroups** it sends to the endpoints, setting the capability according to the information supplied by the transmitter. In the event that two devices claim to be the transmitter and when using ASM, the Gatekeeper may choose to use the capabilities of the first transmitter for the group associated with a particular GUID. There cannot be two transmitters for any group when using SSM.

8.2 Gatekeeper acknowledgement

Gatekeepers supporting the message broadcast feature and in receipt of an RRQ from an endpoint may return an RCF message with a **genericData** field element populated with a **MessageBroadcastGroups** SEQUENCE that allow the endpoint to then join the indicated multicast groups.

This list may be common to all endpoints or unique to each endpoint. Since the **MessageBroadcastParameter** allows multiple multicast groups to be specified, it is possible to indicate an enterprise paging group, for example, and one or more departmental groups within the RCF.

The endpoints which act as receiving devices shall then join the multicast groups and be prepared to receive messages. If an endpoint cannot join a particular group due to lack of support for a particular media capability, for example, the endpoint shall ignore the group.

Message groups shall be ordered in priority order in order to guide the endpoint in determining which media stream to join without sorting the list of groups locally by the **priority** field. The **priority** field shall be used to determine which media stream takes precedence over another when playing one message when another is received. (Refer to clause 6.)

A Gatekeeper may provide a list with more broadcast message groups than the endpoint can join. In that case, the order shall determine which groups are joined.

When sending the **MessageBroadcastGroups** list to endpoints, it is generally unnecessary to include the **groupIdentifier** field since this is only useful for the transmitter. The transmitter, on the other hand, needs this information to discover the multicast address to which it may transmit messages and what capability shall be used to transmit to the group. While the sender proposed a media type in the RRQ, the Gatekeeper may override that capability based on capabilities of devices in the network or administrative policies.

The Gatekeeper shall also indicate whether ASM or SSM is used for any particular multicast group. This decision is a matter of provisioning and is outside the scope of this Recommendation.

The Gatekeeper may change the list of multicast groups from time to time via the RCF message sent in response to a normal RRQ or a lightweight RRQ. Endpoints should be prepared to leave and join multicast groups with each RCF message. However, the RCF should not contain a list of groups unless the list changes. To force the endpoint to leave all multicast groups, the RCF shall contain the message broadcast feature advertisement in **genericData**, but shall not include the **MessageBroadcastParameter** parameter.

Annex A

ASN.1 definitions

```
MESSAGE-BROADCAST DEFINITIONS AUTOMATIC TAGS ::=
BEGIN

IMPORTS
     MulticastAddress,
     UnicastAddress,
     Capability
          FROM MULTIMEDIA-SYSTEM-CONTROL;

CapabilityAdvertisement ::= SEQUENCE
{
     receiveCapabilities     ReceiveCapabilities OPTIONAL,
     transmitCapabilities    SEQUENCE SIZE (1..256) OF TransmitCapabilities
                             OPTIONAL,
     ...
}

ReceiveCapabilities ::= SEQUENCE
{
     capabilities       SEQUENCE SIZE (1..256) OF Capability,
     maxGroups          INTEGER(1..65535),
     ...
}

GloballyUniqueID ::= OCTET STRING(SIZE (16))

TransmitCapabilities ::= SEQUENCE
{
     groupIdentifer     GloballyUniqueID,
     capability         Capability,
     sourceAddress      UnicastAddress,
     ...
}

MessageBroadcastGroups ::= SEQUENCE SIZE (1..256) OF GroupAttributes

GroupAttributes ::= SEQUENCE
{
     priority           INTEGER(0..255),   -- 0 = high, 255 = low
     groupIdentifer     GloballyUniqueID OPTIONAL,
     capability         Capability,
     groupAddress       MulticastAddress,
     sourceAddress      UnicastAddress OPTIONAL,
     alertUser          BOOLEAN,
     ...
}

END
```

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