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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Supplementary services for multimedia

End-to-end session identifier for ITU-T H.323 systems

Recommendation ITU-T H.460.27

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Recommendation ITU-T H.460.27

End-to-end session identifier for ITU-T H.323 systems

Summary

Recommendation ITU-T H.460.27 describes an end-to-end session identifier for use in IP-based multimedia communication systems that enables endpoints, intermediate devices and management systems to identify a session end-to-end, to associate multiple endpoints with a given multipoint conference, to track communication sessions when they are redirected and to associate one or more media flows with a given communication session.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.460.27	2015-11-29	16	11.1002/1000/12457

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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.

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 received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Recommendation ITU-T H.460.27

End-to-end session identifier for ITU-T H.323 systems

1 Scope

This Recommendation defines the end-to-end session identifier (session ID), signalling syntax and procedures for using the identifier within ITU-T H.323 systems, including endpoints, multipoint control units and Gatekeepers.

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.

[ITU-T H.225.0] Recommendation ITU-T H.225.0 (2009), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.

[ITU-T H.323] Recommendation ITU-T H.323 (2009), *Packet-based multimedia communications systems*.

[ITU-T H.460.1] Recommendation ITU-T H.460.1 (2013), *Guidelines for the use of the generic extensible framework.*

[IETF RFC 3261] IETF RFC 3261 (2002), *SIP: Session Initiation Protocol*.

[IETF RFC 4122] IETF RFC 4122 (2005), *A Universally Unique IDentifier (UUID) URN Namespace*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 call [ITU-T H.323]: Point-to-point multimedia communication between two ITU-T H.323 endpoints. The call begins with the call set-up procedure and ends with the call termination procedure. The call consists of the collection of reliable and unreliable channels between the endpoints. A call may be directly between two endpoints or may include other ITU-T H.323 entities such as a Gatekeeper or an MCU. In case of interworking with some SCN endpoints via a Gateway, all the channels terminate at the Gateway where they are converted to the appropriate representation for the SCN end system. Typically, a call is between two users for the purpose of communication, but may include signalling-only calls. An endpoint may be capable of supporting multiple simultaneous calls.

3.1.2 call identifier [ITU-T H.323]: A globally unique non-zero value created by the calling endpoint and passed in various ITU-T H.225.0 messages.

3.1.3 global call identification [ITU-T H.323]: A value assigned to an end-to-end call to uniquely identify that call from end-to-end.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 communication session: A communication session, or simply "session", refers to a call or series of calls initiated or received by an endpoint for which the endpoint utilizes the same universally unique identifier (UUID) value in call signalling messages. From a calling user's perspective, this would be all call signalling messages from the time the user initiates a call until the time the call is terminated. From the called user's perspective, this would be all call signalling messages from first message received by the user's terminal until the call is terminated.

3.2.2 Session Identifier: (Also referred to as a Session ID) A globally unique identifier used to identify a session from the point of origin, passing through any number of intermediaries, to the ultimate point of termination.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

GEF Generic Extensible Framework

IP Internet Protocol

MAC Media Access Control

MCU Multipoint Control Unit

SCN Switched Circuit Network

SIP Session Initiation Protocol

UUID Universally Unique Identifier

5 Conventions

None.

6 Overview

The Session Identifier (Session ID) identifies a communication session from the point of origin, passing through any number of intermediaries, to the ultimate point of termination. The primary motivation for introducing the Session ID into ITU-T H.323 [ITU-T H.323] systems is to assist with troubleshooting network deployments. This includes the ability for network administrators to look at log files on a plurality of devices as well as to make use of a common or related set of identifiers conveyed in signalling messages. However, the Session ID might be used for other purposes, including correlating participants in a multipoint conference, especially one that involves participants using a mixture of [ITU-T H.323] and session initiation protocol (SIP) [IETF RFC 3261] devices, or an association of call signalling messages and media flows. This Recommendation does not prescribe how entities might use the Session ID. Rather, this Recommendation merely describes the syntax and signalling procedures.

It should be appreciated that, while [ITU-T H.323] defines the concept of a call, which begins with the call setup procedure and ends with the termination procedure, the user’s perception of a call and what [ITU-T H.323] defines as a call are not the same. When a user initiates a call, a globally unique identifier, referred to as the call identifier, is assigned to that call. If the call is transferred or forwarded, the endpoint will initiate a new call and assign a new identifier. While this is intended behaviour, from the user's perspective this is a single call. Likewise, any network administrator trying to troubleshoot a network will also view the subsequent call as part of the same overall communication session.

As it is desirable to be able to associate related calls, [ITU-T H.323] introduced the notion of call linkage (see clause 10.3 of [ITU-T H.323]). This concept is useful in allowing intermediaries, management systems, or other entities to know that a call is in some way related to a different call. However, due to complex service interaction, it is possible that the global call identifier is fully replaced, thus making it challenging to see a complete call history.

The Session ID aims to solve the problem of identification of a session end-to-end. The syntax and procedures are also defined so that they are compatible with SIP systems (see [b-IETF RFC SIP]).

7 Identifying a communication session

A session is identified using two universally unique identifier (UUID) values, with each endpoint in a session allocating one of the UUID values. In the interest of brevity, the set of values is written in a set notation such as {A, B}, where "A" refers to the UUID allocated by one endpoint and "B" refers to the UUID allocated by the second endpoint. While directionality information is associated with the conveyance of the Session ID in signalling messages, the Session ID itself does not indicate whether "A" or "B" is the sender or recipient of a message.

The reason for using two distinct UUID values to identify a communication session is to effectively deal with various complex service interactions and allow for associating one call with another call during such service interactions. As a simple example, if endpoint "Alice" calls endpoint "Bob", Alice will allocate a UUID "A" for that call. Likewise, Bob will allocate a UUID "B". The Session ID for the call between Alice and Bob is {A, B}. If Bob transfers that call to Carol, the call between Alice and Bob is terminated. From the user's perspective, however, the call is merely transferred. Indeed, the "Alice" endpoint will initiate a new call (using a new call ID) to Carol. However, the UUID allocated for the Session ID will remain the same. Carol will allocate a UUID for her contribution to the Session ID. The Session ID between Alice and Carol is, therefore, {A, C}.

It is important to note that, while the Session ID will change during service interactions, the UUID contributed by an endpoint in a call will remain fixed. In the above example, the value "A" is used in both the calls between Alice and Bob and between Alice and Carol. This property allows a network operator to immediately recognize that these two calls are part of the same communication session, with Alice and Bob being the first two endpoints in that session and Alice and Carol being the second two endpoints in that session. Observation of signalling messages would show that these calls ran serially.

8 Session ID components

Each endpoint creates a UUID (see [IETF RFC 4122]) for insertion into signalling messages.

The version number in the UUID indicates the manner in which the UUID is generated, which might contain random values or a MAC address of the endpoint. To ensure confidentiality, endpoints should not use version 1 UUIDs consisting of the MAC address, but should instead generate version 4 (random) UUIDs to address relevant privacy concerns.

Once an endpoint generates a UUID for a session, the UUID never changes over the life of that session.

9 Conveying the Session ID

The sender of an ITU-T H.225.0 [ITU-T H.225.0] message shall insert its UUID value into each transmitted message using the generic extensible framework (GEF) [ITU-T H.460.1]. Specifically, the UUID of the sender of the message and the UUID of the intended recipient of the message, if known, shall be inserted into the genericData field of each ITU-T H.225.0 call signalling message.

The Session ID feature identifier to be utilized is described in Table 1.

Table 1 – SessionID feature indication

Feature name:	Session Identifier
Feature description:	A means of sending the end-to-end Session Identifier, comprising one or two UUID values, each of which is created by the two endpoints in a communication session
Feature identifier type:	Standard
Feature identifier value:	27

The associated parameter used to hold the sender's UUID is described in Table 2.

Table 2 – Sender's UUID

Parameter name:	Sender-UUID
Parameter description:	This parameter holds the UUID value of the sender of the message. The UUID shall be presented as a text string using lower-case hexadecimal digits with the most significant octet of the UUID appearing first. Note that while the cardinality allows for this parameter to be absent, only intermediaries sending response messages (e.g., CALL PROCEEDING) prior to learning the remote endpoint's UUID may leave this parameter absent.
Parameter identifier type:	Standard
Parameter identifier value:	1
Parameter type:	Text
Parameter cardinality:	Zero or one

The associated parameter used to hold the recipient's UUID is described in Table 3.

Table 3 – Recipient's UUID

Parameter name:	Recipient-UUID
Parameter description:	This parameter holds the UUID value of the recipient of the message. The UUID shall be presented as a text string using lowercase hexadecimal digits with the most significant octet of the UUID appearing first.
Parameter identifier type:	Standard
Parameter identifier value:	2
Parameter type:	Text
Parameter cardinality:	Zero or one
NOTE – [b-IETF RFC SIP] defines a "null" UUID value to use as the recipient UUID when the sender of a message does not know the UUID of the recipient. The "null" UUID was introduced primarily for backward-compatibility with a legacy SIP implementation of the session Identifier and is used in certain provisional responses, but is not used in ITU-T H.323 systems.	

10 Endpoint behaviour

Endpoints compliant with this Recommendation shall insert the session Identifier UUIDs into every ITU-T H.225.0 call signalling message transmitted, even if it is determined that the remote endpoint does not support this feature. In the case that the remote endpoint does not support this feature, the Recipient-UUID parameter would be absent.

For every new communication session, an endpoint shall generate a new, unique UUID that shall persist unchanged for the entire duration of the communication session, including when the call is forwarded, transferred, or put on hold, etc. For any new call placed, the endpoint will not have knowledge of the Recipient-UUID value and therefore would not include that Recipient-UUID value in signalling, as shown in Figure 1.

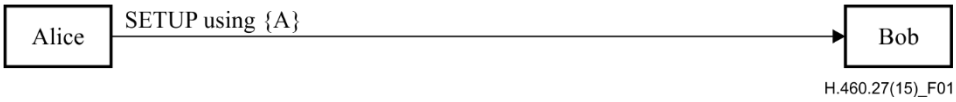

Figure 1 – SETUP contains only {A}

The called endpoint will include both its UUID and the UUID of the calling endpoint, as shown in Figure 2.

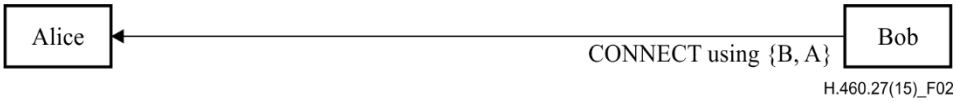

Figure 2 – CONNECT contains both {B, A}

Once an endpoint learns the UUID of the remote endpoint, it shall include that UUID value in all subsequent call signalling messages as the Recipient-UUID parameter as shown in Figure 3. Since service interactions can take place in the network, in some cases without the knowledge of the endpoint, the endpoint must inspect every message received to see if the remote endpoint's UUID value has changed. If it has, the endpoint must update the UUID value it has stored internally for the remote endpoint and use that updated value in subsequent messages.

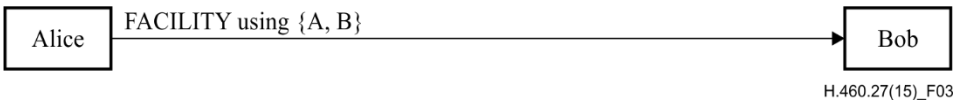

Figure 3 – CONNECT contains both {B, A}

It should be noted that messages received by an endpoint may contain a UUID value as the Recipient-UUID that does not match the endpoint's UUID value for the session. This can happen due to various service interactions in the network and shall not be treated as an error. The endpoint will update the remote endpoint with the correct UUID value when sending a subsequent message to the remote endpoint. If the endpoint encounters this situation and has no other need to send an ITU-T H.225.0 call signalling message, the endpoint shall send a FACILITY message to the remote endpoint with forwardedElements as the reason. This is to ensure that all intermediaries along the path and the remote endpoint are aware of the correct UUID for the endpoint.

11 Processing by intermediaries

In consideration of the fact that the Session Identifier is constructed in such a way as to not reveal any personal, device, or domain identifying information and in order to ensure the integrity of the end-to-end session identifier, intermediaries, including Gatekeepers and gateways, shall forward any received UUIDs and shall not alter the UUID values received in ITU-T H.225.0 call signalling messages, except as outlined in this clause. A UUID value being forwarded by a gatekeeper intermediary is shown in Figure 4.

Figure 4 – UUIDs forwarded by intermediaries

Intermediary devices that transfer a call, such as by joining together two different "call legs", shall properly convey the correct UUID values to the two endpoints that are joined. While endpoints might be able to recover from having received the wrong UUID value, not taking care to ensure that the right values are sent in call signalling messages will make it more difficult to properly troubleshoot networks.

If an intermediary receives an ITU-T H.225.0 call signalling message that does not contain a Session ID, the intermediary may assign a Sender-UUID for use in that and all subsequent messages. If the intermediary is aware of the recipient's UUID, it shall insert the recipient's UUID into the Recipient-UUID parameter. It is important that an intermediary providing this feature on behalf of the endpoint takes note if a subsequent message received by the intermediary from the originating endpoint does contain a UUID value. In such a case, the intermediary shall use that UUID value for all subsequent message exchanges. Likewise, if the sending endpoint stops sending a Sender-UUID value, the intermediary may once again provide a new UUID value; this new UUID value shall not be the same as any previously used UUID value.

Intermediaries that generate Session ID UUID values on behalf of an endpoint that does not implement this Recommendation shall take steps to ensure that the same UUID value is used for all signalling messages conveyed on behalf of the endpoint.

Some intermediary devices have the capability of initiating two separate calls to endpoints and then "joining" those two calls together. For example, Alice might have a gatekeeper that is configured to establish a call between her and Bob. The gatekeeper will send a SETUP message to Alice and to Bob, perhaps simultaneously or serially. For any communication session that such an intermediary initiates, it shall fabricate a UUID for use as the Sender-UUID. However, this UUID will only be used temporarily. Once the UUID of the second endpoint is known, the intermediary shall cease using its fabricated UUID and use the now known UUID of the actual endpoint.

If an intermediary sends a response message to a calling endpoint (e.g., CALL PROCEEDING) prior to learning the other endpoint's UUID value, the intermediary shall send the message to the endpoint with the known UUID in the Recipient-UUID parameter and shall either omit the Sender-UUID parameter or fabricate a temporary UUID value.

12 Multipoint control unit behaviour

A reason for introducing the Session ID is to allow for easy association of endpoints engaged in a communication session. This applies equally to the participants in a conference. While [ITU-T H.323] has a conference identifier that can be used to identify all participants in a conference, it is desirable to also use the Session ID for two reasons: Perhaps foremost is the fact that, more often than not, endpoints are completely unaware of the conference identifier for a conference and are directed into a conference via a menu system of some kind. Secondly, it is desirable to have a solution that works equally well with both ITU-T H.323 and SIP endpoints.

Therefore, multipoint control units (MCUs), including cascaded MCUs, shall use a single UUID value in all signalling messages sent to participants in the same conference as shown in Figure 5. This UUID value may be taken from the ITU-T H.323 conference identifier. Different conferences on the MCU, of course, shall use different UUID values.

In this way, all participants in a multipoint conference will have a unique UUID value allocated by the endpoint, but will all share one UUID value that helps to establish the association in a conference.

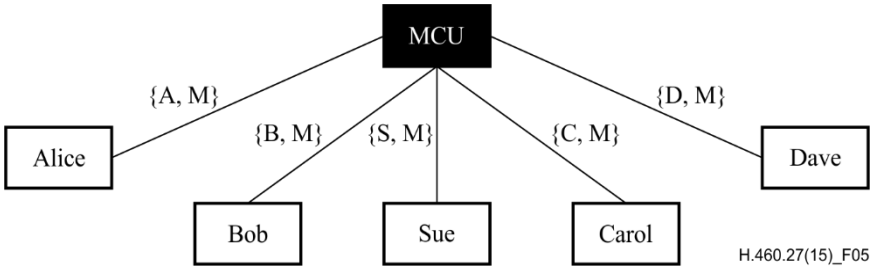

Figure 5 – MCU UUID usage for a conference

NOTE – It should not be assumed that if two or more calls utilize the same UUID value that the call(s) are a conference call on an MCU. In call transfer scenarios, for example, it is possible that two separate calls exist at the same time where the transferred endpoint, while working to carry out the call transfer, is using the same UUID on two separate calls simultaneously. Such instances are only temporary, but they do exist. It should only be assumed that the use of the same UUID value merely indicates some kind of association.

Bibliography

[b-IETF RFC SIP] IETF draft-ietf-insipid-session-id-14 (2015), *End-to-End Session Identification in IP-Based Multimedia Communication Networks*. <https://datatracker.ietf.org/doc/draft-ietf-insipid-session-id/>

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