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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Supplementary services for multimedia

Delayed call establishment within H.323 systems

ITU-T Recommendation H.460.11

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ITU-T Recommendation H.460.11

Delayed call establishment within H.323 systems

Summary

This Recommendation defines procedures to provide for delayed call establishment (delayed ringing) functionality within the context of ITU-T Rec. H.323. Delayed call establishment may be used to place a call, query capabilities, perform testing, or perform other functions without alerting the called user. Additionally, it may be used to place a call and guarantee that some condition is satisfied, such as the establishment of bidirectional media, before alterting the called party.

Source

ITU-T Recommendation H.460.11 was approved on 15 March 2004 by ITU-T Study Group 16 (2001-2004) 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.

CONTENTS

ITU-T Recommendation H.460.11

Delayed call establishment within H.323 systems

1 Scope

This Recommendation defines the capability and procedures for delayed call establishment (DCE). Delaying the establishment of a call allows an H.323 entity to perform maintenance loops, provide network-based services (e.g., call completion on busy without the use of ITU-T Rec. H.450.9), or other functions without alerting the called user until so desired or when appropriate.

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.

[1] ITU-T Recommendation H.323 (2003), *Packet-based multimedia communications systems*.

[2] ITU-T Recommendation H.225.0 (2003), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.

[3] ITU-T Recommendation H.460.1 (2002), *Guidelines for the use of the generic extensible framework*.

[4] ITU-T Recommendation H.245 (2003), *Control protocol for multimedia communication*.

3 Terms and definitions

This Recommendation defines the following terms:

3.1 delayed call establishment (DCE): Allows a call to be initiated, but not progressed to the point where the user is alerted or the call is connected.

3.2 delay point (DP): The point in the call establishment procedures that must be reached before the call may proceed to the Alerting or Connected state.

3.3 delay point indicator (DPI): A specific point of interest to the calling entity in the call establishment process.

3.4 DP reached (DPR): The message transmitted by the called endpoint to the calling entity to indicate that the DP has been reached.

3.5 DCE release: The message transmitted by the calling entity to the called endpoint releasing the endpoint from the DCE procedures and allowing the call to proceed as normal.

4 Abbreviations

This Recommendation uses the following abbreviations:

DCE Delayed Call Establishment

DP Delay Point

DPI Delay Point Indicator

DPR Delay Point Reached

RAS Registration, Admission and Status

5 Feature description

This Recommendation defines a procedure wherein a calling entity may request that an initiated call be progressed to a specified point, but then progress delayed, without alerting the user to the presence of the call or connecting the call. This allows, for example, for media channels to be established or for other conditions to be met before the user is alerted to the presence of the call. In some cases, it is expected that the call may actually never progress to the point of alerting the user or fully connecting, such as when the called device is being probed for supported capabilities or when the called device is called for the purpose of establishing media channels to be used for testing purposes (e.g., maintenance loop functions of H.245).

Network-based devices that offer services such as Call Completion on No Answer and Call Completion on Busy may also use this feature. While supplementary services specified in the H.450-series Recommendations may be used for the aforementioned services, these services and other services may be implemented using this generic construct.

When a called endpoint receives a **Setup** message from a calling entity and when that called endpoint supports the DCE feature, the called endpoint shall not alert the user to the fact that the call has been received and shall not transmit an **Alerting** message or **Connect** message. Instead, the called endpoint shall first notify the calling endpoint when the Delay Point has been reached and proceed with call establishment only if either Implicit DCE Release parameter is signalled in the initial setup or after an explicit DCE Release message is received. This delay may make it necessary for the calling endpoint to cancel or prolong H.225.0 call control timers (e.g., T310).

The DCE procedures do not preclude the endpoint from carrying out any initial call signalling up to, but not including, alerting the user or connecting the call. That is, terminal capabilities may be exchanged, media channels may be opened, media packets may be sent and received, etc., without violating any part of this Recommendation.

Special consideration must be given to Gateway devices that perform signalling interworking between H.323 and other networks. Other networks may or may not have the ability to delay call establishment in accordance with this Recommendation. If the other network served by the Gateway supports comparable functionality, the Gateway may advertise support for this capability. Otherwise, the Gateway may elect to not advertise support or may elect to withhold presenting the call to the other network until the Delay Point is reached. Such design choices are considered an implementation matter and are outside the scope of this Recommendation.

Consideration must also be given to possible security concerns, e.g., to guard against denial-of-service attacks by tying up resources at the called endpoint. Further restrictions may result from the environment in which this service is employed, for instance charging requirements may restrict the usage of media channels before the call is in active state.

6 Capability advertisement

Endpoints capable of supporting DCE shall advertise this capability via the Generic Extensibility Framework defined in ITU-T Recs H.323 and H.460.1. Endpoints may advertise this capability through RAS or through H.225.0 Call Signalling messages as a supported, desired, or needed feature. Calling entities shall advertise this capability as a needed or desired feature in Call Signalling messages when needing or desiring DCE feature activation at the called party, respectively. Called endpoints that are capable of supporting DCE shall advertise this capability in the list of supported features when responding to the incoming call. The identifier for the delayed call establishment capability is shown in Table 1.

Table 1/H.460.11 – Indication of the delayed call establishment feature

Feature name:	Delayed call establishment
Feature description:	This feature allows an originating endpoint to request a terminating endpoint to delay establishment of a call based on some specified event
Feature identifier type:	Standard
Feature identifier value:	11

Parameters associated with the advertisement of this capability are specified in the following clauses. In consideration of backward compatibility with further revisions to this Recommendation, the recipient shall simply ignore any parameters received other than those specified in this Recommendation.

7 Requesting delayed call establishment

An endpoint may initiate a call and request delayed call establishment by including the capability shown in clause 5 in the outgoing **Setup** message. Along with the capability, the calling entity shall include a parameter or list of parameters called Delay Point Indicators (DPIs), which indicates points of interest to the calling entity in the call establishment process. The DPI parameter definition is shown in Table 2.

Table 2/H.460.11 – Delay Point Indicator (DPI) parameter

Parameter name:	Delay Point Indicator (DPI)
Parameter description:	Indicates the point of interest to which the call must progress before being delayed
Parameter identifier type:	Standard
Parameter identifier value:	1
Parameter type:	number8
Parameter cardinality:	One or more in the initial DCE request, zero or more in the DPR message, and zero in the DCE Release message

The possible values of the Delay Point Indicator (DPI) are shown in Table 3:

Table 3/H.460.11 – Delay Point Indicator (DPI) values

Value	Meaning
0	NULL
1	Terminal Capabilities are received by the called endpoint.
2	Master/Slave determination has completed.
3	Media channels are opened from the called endpoint.
4	Media channels are opened to the called endpoint.
5	Media channels are established bidirectionally.
NOTE – Additional delay point values may be added in future versions of this Recommendation and are hereby reserved.	

The DPI parameters are independent and suggest no ordering of events. For example, it is possible that the calling and called endpoints may utilize Fast Connect to establish bidirectional media before Master/Slave Determination completes. As such, the calling entity shall not assume that, simply because media is established bidirectionally that Master/Slave procedures have completed.

The calling endpoint shall not include the same DPI more than once and the called device shall ignore any duplicate DPIs received.

The "Delay Point" (DP) in the call establishment procedure is the point at which all of the DPI events have been satisfied. For example, if the calling entity provides a DPI 2 and DPI 5, the called endpoint shall perform both Master/Slave negotiation and opening bidirectional media flows before notifying the calling party that it has successfully reached the DP.

The "NULL" DPI (Indicator 0) is used to simply indicate that there are no specific conditions that must be satisfied before reaching the DP, meaning that the DP is reached immediately following the reception of the initial Setup message. This might be useful, for example, in cases where an entity simply wants to test that an endpoint is available to accept a call or to perform some testing that does not require reaching any particular DP.

Clause 8 explains that an endpoint is normally not permitted to alert the called user until it receives an explicit DCE Release message from the calling endpoint. There are cases wherein the calling endpoint may want to prevent the called endpoint from proceeding until the DP is reached, but may not need the called endpoint to wait for an explicit DCE Release. To allow the called endpoint to proceed with alerting the called user after reaching the DP and without waiting for an explicit DCE Release message, the parameter in Table 4 may be provided.

Table 4/H.460.11 – Implicit DCE Release parameter

Parameter name:	Implicit DCE Release
Parameter description:	Indicates that the called endpoint may alert the user once the DP is reached without waiting for an explicit DCE Release message. Inclusion of this parameter indicates that the calling endpoint will not transmit a DCE Release message.
Parameter identifier type:	Standard
Parameter identifier value:	2
Parameter type:	No associated type.
Parameter cardinality:	Zero or one in the initial request message, zero in all other messages

The "Implicit DCE Release" parameter has a parameter identifier, but has no associated type. As such, the **EnumeratedParameter.content** field shall not be present and shall be ignored if present, as this field is reserved for future use.

8 Responding to a Delayed Call Establishment Request

When an endpoint receives a request in the **Setup** message to delay the establishment until the specified DP is reached, the called endpoint shall respond to that request in its initial and subsequent messages indicating support or no support for the capability. Calling devices should be aware that initial messages received when placing a call might be those from an intermediate call signalling entity, rather than the called endpoint, such as a Gatekeeper routing call signalling, and may not contain the DCE capability advertisement. The initial messages from the called endpoint shall contain the capability advertisement without parameters to indicate support and acceptance of the DCE request and to indicate that the DP has not been reached.

Upon accepting the request to delay call establishment, the called endpoint shall progress the call state machine to the specified DP and then notify the calling entity that said point has been reached. For example, if the calling entity requests that the call be delayed until Master/Slave procedures (DPI 2) and bidirectional media channel opening (DPI 5) complete, the called endpoint shall initiate or respond to H.245 messages, exchange capabilities, negotiate Master/Slave, open and accept logical channels and then notify the calling entity that the DP has been reached. As noted in clause 7, there is no assumed order as to when these DPI events may be satisfied. When using Fast Connect, for example, DPI 5 may be satisfied before DPI 2.

Upon reaching the DP and irrespective of the presence of the "Implicit DCE Release" parameter in the initial request, the called endpoint shall transmit a **Facility** or other appropriate message to the calling entity with the DCE capability advertised and containing the parameter from Table 5. This message is referred to as the Delay Point Reached (DPR) message.

Table 5/H.460.11 – Delay Point Reached parameter

Parameter name:	Delay Point Reached (DPR)
Parameter description:	Indicates to the calling entity that the Delay Point has been reached
Parameter identifier type:	Standard
Parameter identifier value:	3
Parameter type:	No associated type
Parameter cardinality:	One when sending a DPR message, zero for any other message

The DPR parameter has a parameter identifier, but has no associated type. As such, the **EnumeratedParameter.content** field shall not be present and shall be ignored if present, as this field is reserved for future use.

After the DP has been reached and the DPR message has been transmitted, the call establishment shall proceed as normal, except that the called endpoint may not alert the user, transmit an **Alerting** message, or transmit a **Connect** message until instructed by the calling entity or unless the "Implicit DCE Release" parameter was provided in the initial call establishment message. For example, if the calling entity signalled DPI 5, the called endpoint may still continue H.245, exchanging terminal capabilities and performing Master/Slave negotiation, even if media channels were opened as part of Fast Connect. If the "Implicit DCE Release" parameter was provided in the initial request from the calling endpoint, the called endpoint must still return a DPR message, but may proceed with alerting the user without waiting for a DCE Release message.

In the event that the called device cannot reach the requested DP, such as when the calling entity requests the opening of bidirectional channels (DPI 5), but the called endpoint is a receive-only endpoint, or in the case that an unrecognized DPI is received, the called device shall transmit the DPR message after satisfying all of the DPIs that it can satisfy and include in that message all of the DPIs that it could not satisfy, including unrecognized DPIs. It shall not include DPIs that were satisfied. The DPR parameter shall precede the DPI parameters and be part of a single DCE capability parameter in that message.

9 Delayed Call Establishment Release

Upon receiving the DPR message from the called endpoint and not having provided the "Implicit DCE Release" parameter in the original call establishment message, the calling entity may then send a **Facility** or other appropriate message to the called endpoint to instruct it to proceed with call establishment. To do so, the calling entity shall advertise the DCE capability with the parameter specified in Table 6. This message is referred to as the "DCE Release" message.

An endpoint shall not transmit nor expect a DCE Release message in the case that the Implicit DCE Release parameter was included in the original Setup message. The text in this clause, therefore, only applies to the signalling scenario wherein an Implicit DCE Release parameter was not provided.

Table 6/H.460.11 – DCE Release Parameter

Parameter name:	DCE Release
Parameter description:	Indicates to the called entity that the call may proceed to a fully established state (i.e., the calling endpoint is releasing the called endpoint from the DCE state)
Parameter identifier type:	Standard
Parameter identifier value:	4
Parameter type:	No associated type
Parameter cardinality:	One for the DCE Release message, zero for any other message

The DCE Release parameter has a parameter identifier, but has no associated type. As such, the **EnumeratedParameter.content** field shall not be present and shall be ignored if present, as this field is reserved for future use.

The calling device is not required to wait until the DPR message is received before sending a DCE Release message. The calling endpoint may elect, for whatever reason, to progress the call in spite of the fact that the DP has not been reached (i.e., the DPR message is not received). The called endpoint shall treat the early reception of the DCE Release parameter as a cancellation of the original DCE request and proceed with the call normally.

Only after receiving the DCE Release message shall the called endpoint progress the call by alerting the user and transmitting an **Alerting** message. It should be understood that, as **Alerting** is an optional message, the called endpoint might elect to skip the transmission of an **Alerting** message and transmit a **Connect** message instead. This is valid and this Recommendation does not attempt to change the rules set forth within ITU-T Rec. H.323 as to the normal call establishment procedures, except to introduce a delay just before the point where the called user would be alerted or the call would be connected.

The calling endpoint is also not obligated to release the called endpoint from the DCE state. As outlined in clause 5, the calling endpoint may simply desire to call the endpoint to probe for capabilities, perform tests, etc. The called endpoint shall not treat the lack of a DCE Release message as an error. If the calling device does not transmit a DCE Release in a timely manner and there is no other activity to indicate that the call is active, the called device may send a Status Inquiry and wait for a Status message from time to time to ensure that the calling device has not failed. The timing of such messages is up to implementation, but should not be transmitted more frequently than 30 s.

Appendix I

Sample call flows

This appendix shows sample call flows of applications that might be made possible through the use of this Recommendation.

The first call flow demonstrates how a network operator might perform maintenance loop operations on deployed H.323 devices. This flow assumes that the endpoint properly supports the H.245 **MaintenanceLoop** request message

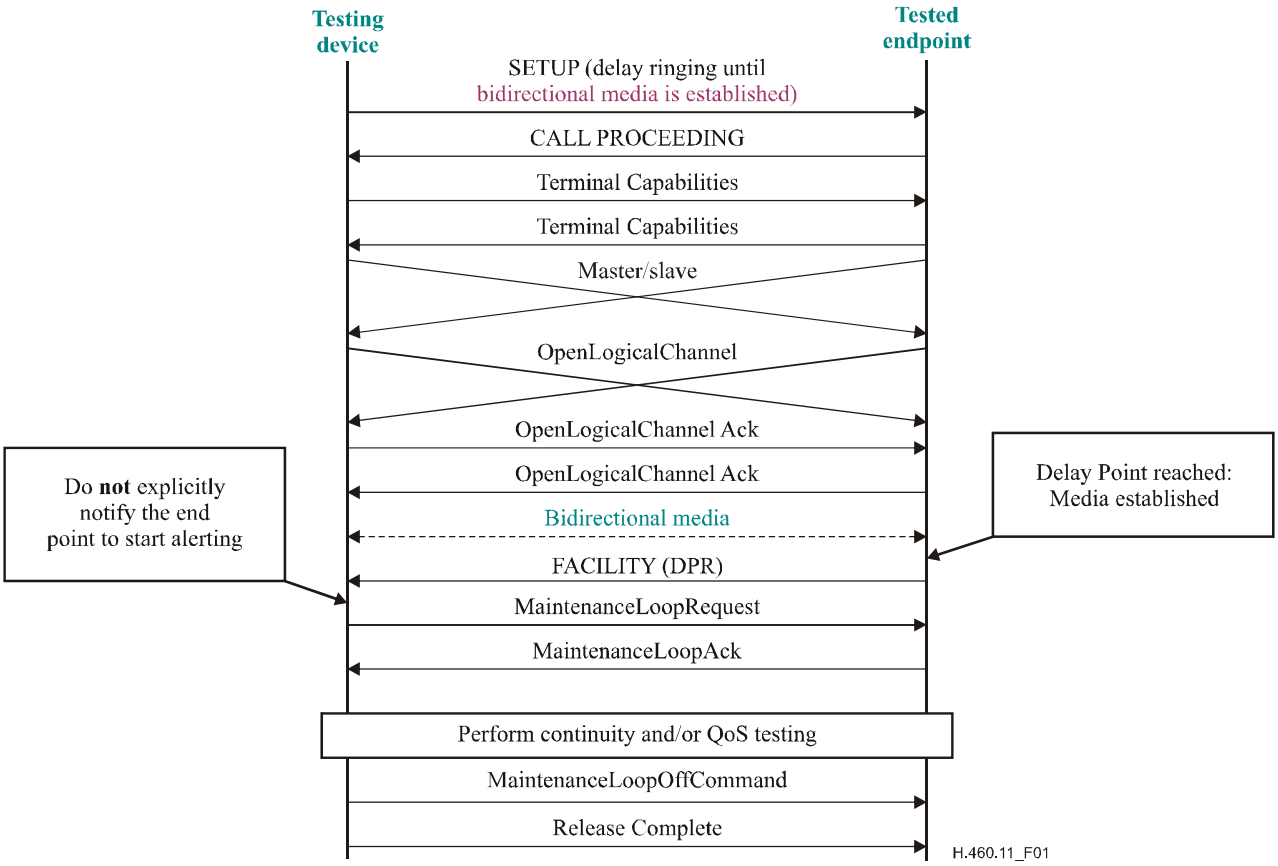

Figure I.1/H.460.11 – Continuity and/or QoS testing

The next call flow demonstrates how an intermediate signalling entity might provide call completion on busy subscriber service.

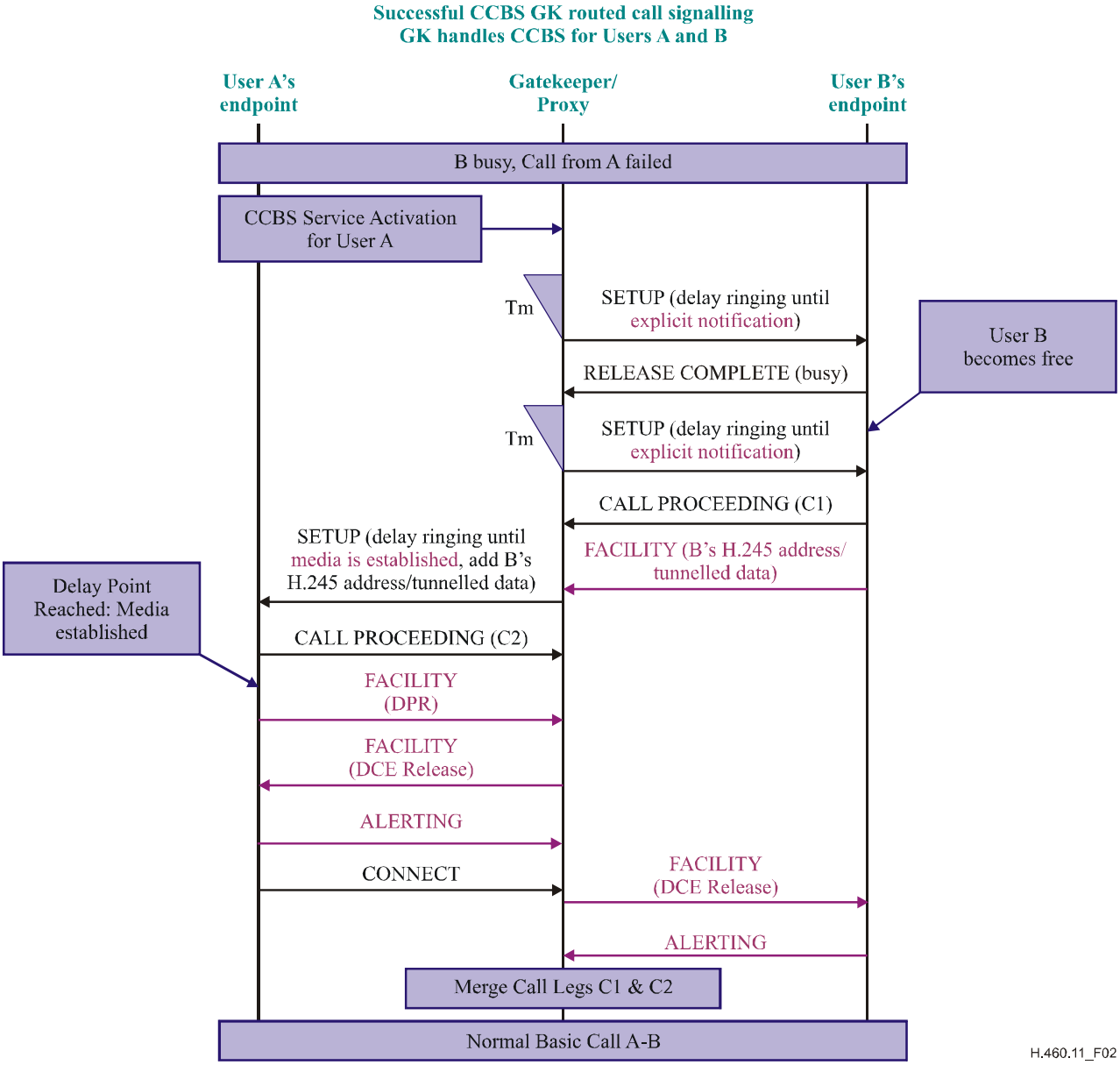

Figure I.2/H.460.11 – Network-based Call Completion on Busy Subscriber Service

NOTE – This example uses a polling method that requires more signalling than ITU-T Rec. H.450.9 and may have billing implications that are addressed in ITU-T Rec. H.450.9. Implementers are advised to give careful consideration to the means used to provide this service.

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