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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Supplementary services for multimedia

Extended Fast Connect feature

Recommendation ITU-T H.460.6

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Recommendation ITU-T H.460.6

Extended Fast Connect feature

Summary

Recommendation ITU-T H.460.6 provides a method for the rapid creation or reconfiguration of media streams under the control of endpoints or third parties. It is especially useful for operations such as the redirection of a caller to an automatic voice response unit, or the initiation of new media channels, such as a modem data channel, in response to detected events, such as modem answer tone. It also supports the rapid redirection of media streams from a called party to an automatic answering device.

This revision introduces a number of corrections and clarifications by incorporating technical and editorial corrections from the ITU-T H.323-series Implementers Guide (03/2011).

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T H.460.6	2002-11-29	16
2.0	ITU-T H.460.6	2013-03-16	16

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). 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, 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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Extended Fast Connect feature

1 Scope

Seamless operation of IP telephony requires the ability to initiate, redirect and reconfigure media connections in a fast and efficient manner. The reduction of "dead time" and quick response to user actions both demand that media operations be carried out as quickly as possible. For example, a caller might be redirected from an endpoint that does not answer to a voice messaging endpoint that answers automatically. A call may suspend media transfer when a user invokes "hold", then should re-establish media transfer quickly when the user re-joins the call. Similarly, media connections should be quickly reconfigured when a user activates a conference or is switched to an automatic announcement. Such capabilities are available to the simple endpoint type (SET) as described in Annex F of [ITU-T H.323].

This Recommendation provides a method by which an endpoint may negotiate the capability to initiate, rearrange, reconfigure, or close one or more media channels as efficiently and quickly as a SET using the repeated Fast Connect procedures. The advantages of this method, relative to [ITU-T H.245] include:

– the ability of one party to initiate creation of both transmit and receive media channels (not strictly possible in [ITU-T H.245] since the **ModeRequest** cannot specify a capability, nor can it specify **replacementFor**);

– the ability of two parties to establish media channels with a single exchange of messages ([ITU-T H.245] requires a three-way to five-way exchange);

– the ability of one party to close a media channel with a single message ([ITU-T H.245] requires two or three messages);

– the ability of one party to redirect a media channel with a single message ([ITU-T H.245] requires at least three);

– optional use of tunnelled ITU-T H.245 to provide capability exchange, master/slave negotiation and non-media controls such as user input indication.

The generic extensible framework (GEF) of [ITU-T H.225.0] is used to negotiate the use of Extended Fast Connect (EFC) procedures. This negotiation may proceed in parallel with tunnelled ITU-T H.245 capability negotiation via the **parallelH245Control** tunnel and/or standard Fast Connect establishment of one or more initial media channels, as described below.

The term "party" is used herein to refer to either an endpoint or a gatekeeper actively involved in call signalling and media control with another party. The EFC feature may be invoked between endpoints (direct-routed calls or relayed via a gatekeeper), or may involve one or more active gatekeepers or call feature servers. The term "third party" is used to indicate an active party that is not the source or recipient of a media channel.

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 communications systems*.

[ITU-T H.245] Recommendation ITU-T H.245 (2011), *Control protocol for multimedia communication*.

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

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

3 Definitions and acronyms

This Recommendation uses the following terms, abbreviations and acronyms:

3.1 Abbreviations and acronyms

EFC Extended Fast Connect

OLC ITU-T H.245 **OpenLogicalChannel** element

SET Simple Endpoint Type (described in Annex F of [ITU-T H.323])

3.2 Definitions

This Recommendation defines the following terms:

3.2.1 acceptance fastStart: A **fastStart** element which represents an acceptance of a proposed media session. Each **OLC** within the acceptance **fastStart** element accepts one of the proposed channels, and is formatted as specified in clause 8.1.7 of [ITU-T H.323]. The acceptance **fastStart** may also be used to reconfigure a session. In this Recommendation, the term "**fastStart**" (in boldface) without qualification will denote an acceptance **fastStart**.

3.2.2 acceptance null-OLC: A **null-OLC** within an acceptance **fastStart**. This **OLC** is used to close (halt media transmission on) an open channel. The associated session remains available for use.

3.2.3 available session: Any media session that has been proposed, whether or not one or more channels of the session have been opened by an acceptance. A session may be cancelled, in which case it ceases to exist and may no longer be used.

3.2.4 idle channel: A channel over which media transmission has been halted via a **Null-OLC**.

3.2.5 null-OLC: **OLC** element specifying **nullData** and no transport addresses.

3.2.6 open channel: A media channel that is established for media transmission.

3.2.7 party: Endpoint or gatekeeper involved in call signalling and media control.

3.2.8 proposal fastStart: A **fastStart** element proposing new media channels for a session. The form of each offer **OLC** within the **fastStart** is specified in clause 8.1.7 (Fast Connect Procedures) of [ITU-T H.323]. EFC provides an explicit indication that a **fastStart** element represents a session proposal, and the **OLC**s therein should be interpreted as channel proposals.

3.2.9 proposal null-OLC: A **null-OLC** within a proposal **fastStart**. This **OLC** is used to cancel an available session. The session ceases to exit.

4 Overview

This feature is based on repeated use of Fast Connect procedures using **fastStart** elements in ITU-T H.225.0 messages in the manner similar to that described for simple endpoint types in Annex F of [ITU-T H.323], but extends those capabilities to other endpoints and gatekeepers, and other media types, including encrypted media. If a party wishes to open one or more media channels at any time during a call, it may request them by sending any valid message with a **fastStart** element describing the channel(s). The other party may accept (or reject) the proposals by returning a corresponding **fastStart** element. Simple mechanisms are provided to permit a party to close channels or redirect them. The efficiency and compactness of the messaging can be enhanced through use of the ITU-T H.245 signalling tunnel to exchange media capabilities beyond those included in the initial fast connect proposal.

4.1 Negotiation of Extended Fast Connect

Extended Fast Connect (EFC) will be negotiated as a generic extensible feature (GEF) as described in [ITU-T H.323]. The **FeatureDescriptor** for Extended Fast Connect in Table 1 will be a **GenericData** element with a standard **GenericIdentifier** of value "6":

Table 1 – Extended Fast Connect feature

Feature name:	Extended Fast Connect (EFC)
Feature description:	This feature permits the use of **fastStart** elements to establish and reconfigure media channels in the manner established for SETs in Annex F of [ITU-T H.323].
Feature identifier type:	Standard
Feature identifier value:	6

The following sub-feature parameters are defined for EFC. The EFC Proposal sub-feature of clause 4.1.1 shall be supported as part of EFC; support for the others is optional and shall be negotiated by listing the feature identifiers as parameters to the EFC entry or entries in the appropriate generic extensibility feature negotiation fields. The parameters are used within a **genericData** list in ITU-T H.225.0 call signalling messages in order to indicate or invoke the corresponding feature/request.

4.1.1 Media channel proposals

This parameter is defined in Table 2 and shall be used by an endpoint or a third party to indicate that the **fastStart** element within the present message contains channel proposals for one or more new media sessions. Support for this parameter is required for EFC and need not be included during negotiation of EFC support.

Table 2 – EFC Proposal parameter

Parameter name:	EFC Proposal
Parameter description:	The presence of this parameter indicates that the accompanying **fastStart** element contains proposals for one or more media channels. (Absence of this parameter from a message implies that any **fastStart** element in the message represents an acceptance of an earlier proposal, or a reconfiguration order.)
Parameter identifier type:	Standard
Parameter identifier value:	1
Parameter type:	no content
Parameter cardinality:	zero or once

4.1.2 Close all channels

This parameter is defined in Table 3. It may be used by a party to request that the receiving endpoint close all open media channels and cancel all available sessions. Support for this parameter is optional, and shall be negotiated during EFC feature negotiation.

Table 3 – EFC Close All Media Channels parameter

Parameter name:	EFC Close All Media Channels
Parameter description:	This feature permits one party to request the closure of all open media channels and the cancellation of all available sessions.
Parameter identifier type:	Standard
Parameter identifier value:	2
Parameter type:	no content
Parameter cardinality:	zero or once

4.1.3 Request new channel proposals

This parameter is defined in Table 4 and may be used by a party to request that an endpoint issue a new set of media channel proposals. Support for this feature is optional, and shall be negotiated during EFC negotiation.

Table 4 – EFC Request New Proposals parameter

Parameter name:	EFC Request New Proposals
Parameter description:	This feature permits a party to request that an endpoint propose new media channels.
Parameter identifier type:	Standard
Parameter identifier value:	3
Parameter type:	no content
Parameter cardinality:	zero or once

4.1.4 Request symmetric channel operation

This parameter is defined in Table 5 and may be used in any message in which the EFC Proposal parameter is present. The parameter specifies that the sending party requires symmetric channel operation; i.e., the sending party requires the receiving party to select the same capability for transmit and receive media channels within a given session. Support for this parameter is optional, and shall be negotiated during EFC negotiation. Note that the initial **fastStart** will be accompanied by the **setup-UUIE.symmetricOperationRequired** element when the originator requires symmetric audio operation. As per Annex F of [ITU-T H.323], symmetric operation shall be assumed for audio operation with a SET.

Table 5 – EFC Require Symmetric Operation parameter

Parameter name:	EFC Require Symmetric Operation
Parameter description:	This feature permits a party to require that the same capability be used for both transmit and receive media channels of each session proposed by the accompanying **fastStart** element.
Parameter identifier type:	Standard
Parameter identifier value:	4
Parameter type:	no content
Parameter cardinality:	zero or once

4.2 Invocation of Extended Fast Connect

An originating party shall indicate its desire to use EFC when it issues a SETUP message. The SETUP shall contain a request for EFC support in the **desiredFeatures** element, or a requirement for EFC support in the **neededFeatures** element. The EFC feature is symmetric, hence requestor support for the feature may be inferred from a request for EFC and the **supportedFeatures** element need not be included to indicate support for EFC. In addition, the SETUP message shall include a **genericData** element specifying EFC Proposal (parameter 1) and a **fastStart** element containing one or more proposals. That is, EFC procedures shall include the standard Fast Connect procedures.

The receiving party may acknowledge the acceptance of EFC by returning a Generic Capability set with EFC Supported in any message up to and including a CONNECT message. If no such acceptance is received by the caller, it must presume that the called party cannot support EFC, and it must decide whether to proceed with the call (using [ITU-T H.245]), or to abandon the call via a RELEASE COMPLETE. If the called party is unable to support EFC as a needed feature, it must return a RELEASE COMPLETE message with reason code **neededFeatureNotSupported**.

The calling party shall be prepared to revert to ITU-T H.245 media control procedures if the EFC feature is not accepted and Fast Connect is refused. All EFC feature signalling shall take place in the call signalling channel; the RAS channel shall not be used for EFC negotiation.

Extended Fast Connect employs two types of **fastStart** elements. One type, called a proposal, is used to offer a choice of options for a new media session or sessions; it is formatted just as in the initial **fastStart** of conventional Fast Connect. Note that each **sessionID** value is chosen by the issuer of the proposal, and not by the master. The other type, referred to as an acceptance, is used to select and accept one or more of the offers received in a proposal. In both types of **fastStart** elements, the channel number of each **OLC** is chosen by the media source for that channel, just as it is done for conventional Fast Connect. Unlike conventional Fast Connect, **fastStart** proposal elements may appear in any call signalling message during the life of a call, hence it is necessary to explicitly indicate when the **fastStart** within the current message is to be interpreted as a proposal rather than as an acceptance.

Extended Fast Connect requires that [ITU-T H.245], if used, shall be tunnelled in the ITU-T H.225.0 signalling channel. If a calling party offers Extended Fast Connect support in SETUP, and the called party returns a message including **h245Address** before returning an EFC response, the calling party shall presume that EFC is not supported and may proceed with establishment of the requested connection. Including **h245address** in messages does not by itself terminate EFC, but establishing a connection to an ITU-T H.245 address will cause termination of EFC.

Figure 1 illustrates the initial operation as an extension of Fast Connect. Brackets ([]) indicate optional elements. Note that the called party may use EFC to indicate its preference for symmetric operation.

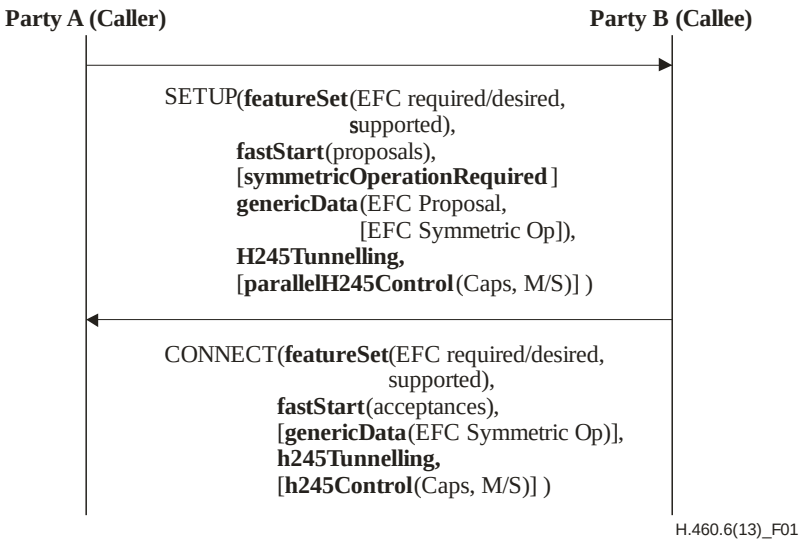

Figure 1 – Initial Extended Fast Connect exchange

Note that the EFC acceptance and **fastStart** acceptance can be returned in any message up to and including the CONNECT message, but the identical acceptance should not be repeated in any subsequent message.

4.2.1 Master/slave determination

Parties supporting Extended Fast Connect should use the ITU-T H.245 tunnel to carry out master/slave negotiation. For the initial Fast Connect exchange, the caller (sender of the SETUP with proposals) shall be considered the slave, and the called party (acceptor of proposals) shall act as the master. Although this convention will suffice for simple A-to-B calls, it can lead to complications in more complex call scenarios.

Different implementations may process **fastStart** elements and tunnelled ITU-T H.245 messages in different orders. EFC proposals or acceptances shall not be included in any ITU-T H.225.0 message that carries an ITU-T H.245 **MasterSlaveDeterminationAck** message that conveys a change in master/slave status. Doing so could lead to temporary confusion about which party is master and how to respond to the EFC elements.

4.2.2 Capabilities exchange

The efficiency of Extended Fast Connect may be enhanced and improved if the participating endpoints or gatekeepers exchange capability sets via tunnelled ITU-T H.245 during call establishment. Prior to, or in concert with, capability exchange, one party shall propose a choice of media channels in the **fastStart** element to maximize the possibility of finding a compatible capability supported by the receiver. Following capability exchange, either party need propose only a specific capability which is known to be supported by the other party. Nevertheless, this Recommendation does not require this operation: completion of ITU-T H.245 capabilities exchange is entirely optional.

4.2.3 Delayed channel open

If EFC is supported, it is permissible that the called party accept EFC, but not return an acceptance **fastStart** in any signalling message up to and including a CONNECT. The original **fastStart** proposals remain available until cancelled. This technique may be used to delay the opening of media channels until later in the call on a session-by-session basis.

4.2.4 Initial H.245 negotiations

The entity requesting EFC may use ITU-T H.245 tunnelling (**parallelH245Control**, **h245Control**) to exchange capabilities, conduct ITU-T H.245 master/slave negotiations, and enable user input indication via ITU-T H.245. ITU-T H.245 logical channel signalling procedures (Open Logical Channel, Request Mode, Encryption Sync, etc.) shall not be invoked until and unless EFC feature support is denied during initial negotiation, or later removed during a generic feature update. If the called party does not recognize generic data features in general, or EFC in particular, and does not support Fast Connect, it might send Open Logical Channel requests upon completion of the initial ITU-T H.245 master/slave negotiation. If this occurs, the caller should presume that EFC and Fast Connect are refused.

4.3 Opening new sessions

Opening new media sessions proceeds just like standard Fast Connect, except that either party may invoke EFC at any time to propose new media sessions by sending a message (e.g., FACILITY) containing a proposal **fastStart** element with one or more **OLC**s for one or more **sessionID**s, along with a **genericData** element indicating "EFC Proposal". As for standard Fast Connect, multiple **OLC**s with the same **sessionID** are considered to be alternative proposals for a single media stream. The other party may reply with a **fastStart** element containing **OLC**s for the accepted channels and sessions. A slave party will supply a non-zero **sessionID** for any media channels it proposes. Parties may use EFC to propose and open any number of sessions. Session IDs may take any valid value and need not be limited to the "well-known" values of 1, 2, or 3.

For each logical channel, the EFC proposal establishes the orientation of the forward and reverse logical channels: the forward logical channel carries media from the proposer to the acceptor, and the reverse logical channel carries media from the acceptor to the proposer; the order is not determined from the direction of the call as a whole.

As in standard Fast Connect, once a proposed alternative is selected by another party, the issuing endpoint may suspend any reception of media on the other alternatives. Nevertheless, it shall be prepared for the other party to replace the initially-selected alternative with another (see clause 4.7).

EFC proposals remain available until cancelled (via a proposal **Null-OLC**, see clause 4.5.1), or EFC is disabled or refused. If EFC is refused (CONNECT received without any acceptance of EFC), all unaccepted EFC proposals are cancelled, as for normal Fast Connect.

4.4 Closing open channels

Either party may close an open media channel (transmit, receive, or bidirectional) by sending an acceptance **fastStart** with the proper **OLC** (see clause 8.1.7 of [ITU-T H.323]) for the corresponding **sessionID** and media direction, with the corresponding **dataType** set to **nullData**, and all other fields set as they would be for a normal response. This type of OLC will be referred to as a **Null-OLC**, and is similar to the **Null-OLC** described in Annex F of [ITU-T H.323] for third-party pause and rerouting. The receiver of the **Null-OLC** is obliged to suspend transmission and/or reception on the indicated channel. Any **Null-OLC** received for a non-existent session shall be ignored. The party that initiated the suspension of a channel may reopen the idle channel by issuing a **fastStart** element with an acceptance **OLC** containing the desired **dataType** and appropriate transport addresses, as illustrated in Figure 2.

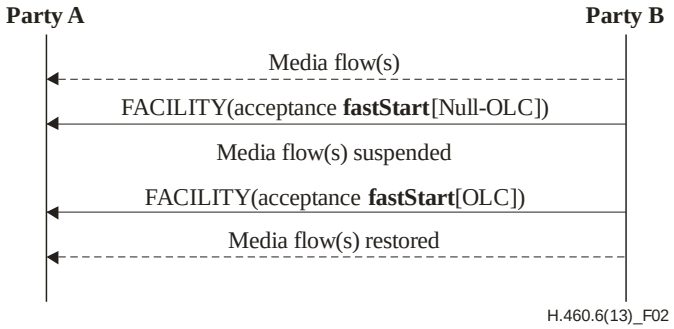

Figure 2 – Media stream idle and restore

If the party which closed a channel receives an acceptance **OLC** for that channel, it shall be interpreted as a reconfiguration and shall be processed without reactivation of media flow. If both parties to a channel suspend the channel, both parties must reactivate the channel before media can flow.

4.5 Terminating available sessions

EFC provides mechanisms for terminating a specific session or all sessions. In either case, the session(s) is(are) closed by the message recipient without need for a response.

4.5.1 Null-OLC proposal

A party may cancel an available session by sending a proposal **fastStart** containing a **Null-OLC** for the session with all optional fields absent. The receiver of the "proposal" shall cease operation of any channel or channels open on the specified session and shall delete the session immediately. The **Null-OLC** proposal may be used to refuse or cancel a proposal.

4.5.2 Requesting close-all-channels

An endpoint or a third party may request that the other endpoint close all open media channels and cancel all available sessions by sending a **genericData** element with the EFC featureID and parameter 2 present in any convenient call signalling message (e.g., FACILITY). The receiving endpoint is expected to silently close all open channels without any response (e.g., without issuing any **Null-OLC**s.)

4.6 Conflict resolution

If two parties issue proposals at the same time, it is possible to create a collision of different **fastStart** proposals for the same **sessionID**(s). Such a collision shall be resolved in favour of the master by ignoring the conflicting proposal(s) from the slave. A collision of proposals for the same media type with different **sessionID**s shall be resolved by the master by either proceeding with both sessions, or by cancelling the session proposed by the slave (by sending a proposal **Null-OLC**), as illustrated in Figure 3.

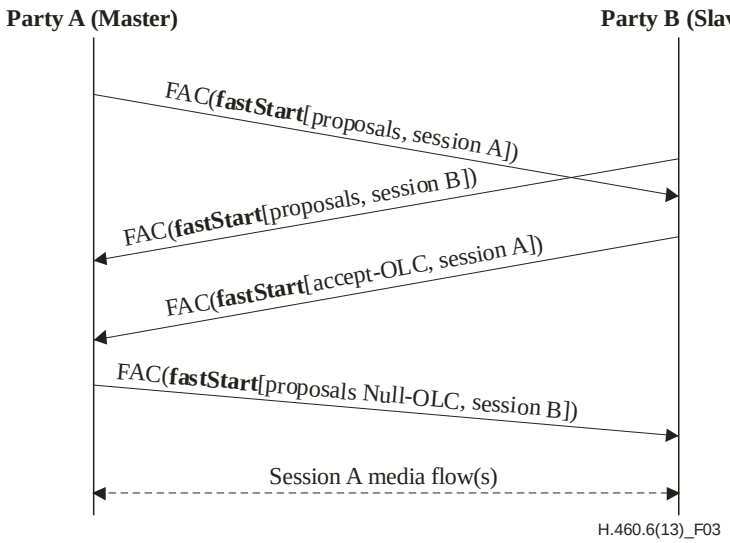

Figure 3 – Conflict resolution

Each EFC party shall attempt to avoid conflicts by always choosing a session ID for each new set of proposals that, to the best of its knowledge, has not been used during the call. The only exception to this rule is the use of the **Null-OLC** "proposal" to cancel or permanently refuse an outstanding proposal. The session ID of a cancelled proposal should not be reused.

If two parties attempt to simultaneously reconfigure a session in incompatible ways (e.g., by choosing different codecs and channels for the same media direction), the conflict shall be resolved by the master by reissuing its reconfiguration request. An acceptance **Null-OLC** from one party shall always be considered compatible with any reconfiguration request from the other party, and will result in an idle, but reconfigured, channel.

4.7 Channel redirection and media session reconfiguration

Redirection and/or reconfiguration of a media session may be accomplished rapidly through the use of an acceptance **fastStart** element carried in any convenient message (such as FACILITY).

The transmit channel of an endpoint may be redirected by sending the endpoint an acceptance **fastStart** element containing an **OLC** for the transmit channel containing new **mediaChannel** and **mediaControlChannel** values; a receive channel may be redirected by sending an **OLC** for the receive channel with a new **mediaControlChannel** value.

If a party wishes to reconfigure a session to use a different codec, for example, it may do so by sending the other party a new acceptance **fastStart** element with the **replacementFor** flag set. The **fastStart** element should have a new channel number, the desired **dataType**, and the appropriate media addresses of the initiating party. The **replacementFor** flag acts to force closure of the replaced channel prior to the opening of the new channel, and insures that the local transport addresses of the replaced channel are reused for the new channel. If desired, the initiator may also "relocate" its end of the session by supplying new media addresses. Reconfiguration **dataType** values should be limited to the announced capabilities of the target endpoint; the target always has the option of rejecting the reconfiguration by terminating the session.

An example is contained in Figure 5.

4.8 Media encryption

In Extended Fast Connect, as in ITU-T H.245, the **encryptionSync** element of an **OLC** shall be supplied by the master, with the understanding that the called party is the implicit master for the initial Fast Connect exchange and until explicit master/slave negotiations are completed. This implies that a slave endpoint may not perform single-message redirection of an encrypted channel; it shall expect a response from the master containing a new **encryptionSync** element. As a simple example, assume an unencrypted media session has been established using gatekeeper routing, and one endpoint decides to reconfigure the session to run encrypted (under a previously-negotiated capability). The gatekeeper can supply the media session key(s) and encryption sync by the exchange shown in Figure 4.

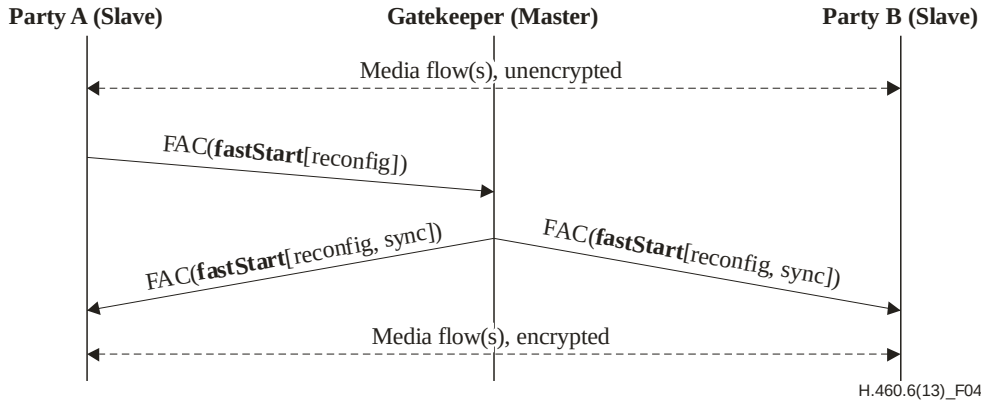

Figure 4 – Rekeying by the master

The "reconfiguration" **fastStart** returned to Party A does not change any addresses or actual codec(s); it is used to supply **encryptionSync**, which carries the dynamic payload type and, depending on the security profile, the new session key(s), etc.

4.9 Requesting new channel proposals

An endpoint or a third party may request that an endpoint issue a new set of EFC proposals by sending a **genericData** element with the EFC featureID and parameter 3 present in any convenient call signalling message (e.g., FACILITY). The endpoint should respond by sending a message (e.g., FACILITY), with a new proposal **fastStart** element describing the session(s) and channels that the endpoint is presently willing to open.

4.10 EFC request sequencing

Each ITU-T H.225.0 message contains only a single **fastStart** element, hence all **OLC**s within that message shall be interpreted in only one way (as proposals or as responses/reconfigurations.) If an endpoint wishes to send, for example, a response to a proposal and an additional proposal, it shall do so in separate messages.

When an endpoint receives a series of EFC requests, it shall insure that the requests are performed and completed in the order in which they are received. For example, if an endpoint receives a request to close all channels, followed by a request to issue new proposals, it shall complete the closure of all open channels before it issues the new proposals.

4.11 EFC counter proposals

EFC operation permits a counter-proposal mechanism for the rapid negotiation of compatible media channels if the ITU-T H.245 tunnel is used for capability exchange. The sequence is as follows:

1) The calling endpoint sends a proposal **fastStart** element in a SETUP message, along with its set of capabilities in the **parallelH245Control** tunnel.

2) The called endpoint examines the proposal **fastStart** and the received capability set, and decides that an option exists that is better than those offered in the proposal. The endpoint then replies to the initiator with a message (e.g., CONNECT) carrying a proposal **fastStart** element containing the "counter-proposal" **OLC**s for a new session ID, along with the called endpoint's capabilities in the **h245Control** element. The proposal **fastStart** may also contain a **Null-OLC** for the original session ID to cancel that proposal.

3) The calling endpoint receives the reply and processes the counter-proposal **OLC**s as new proposals. If one or more new proposals are acceptable (as they should be), then the caller should respond with a message carrying an acceptance **fastStart** element for the new session ID to complete the establishment of the "counter-proposed" channels.

Under the presumption that the caller only proposes a subset of its total capabilities in the initial **fastStart**, this type of operation might be useful in several cases:

1) The caller proposes only clear channels, but the called party wishes to use encryption.

2) The caller proposes only simple channels (e.g., audio only), but the called party prefers to establish a Modem over IP capable channel.

3) The calling party proposes "popular" codecs, but the called party can only support some other codec.

4.12 Moving to ITU-T H.245 logical channel procedures

An endpoint may initiate a switch to ITU-T H.245 logical channel signalling procedures (**OpenLogicalChannel**, **Mode Request**, **CloseLogicalChannel**, etc.) at any time by sending a FACILITY or other convenient message containing a **featureSet** element specifying **replacementFeatureSet** with Extended Fast Connect absent from **supportedFeatures**. The requesting party shall refrain from initiating either EFC or ITU-T H.245 logical channel signalling procedures until a response is received from the other party. The requested party shall respond by sending a FACILITY or other convenient message with EFC removed from the **featureSet.supportedFeatures** element to accept the request. If the requested endpoint is unwilling or unable to move to ITU-T H.245 procedures, it shall clear the call. All outstanding EFC requests shall be completed (including the transmission and action of any responses) before the requested party may accept the no-EFC request. Once the request to remove EFC is accepted, either party may initiate ITU-T H.245 media control procedures; EFC procedures may no longer be employed.

Any party may request a return to EFS procedures by issuing a message (e.g., FACILITY with reason **featureSetUpdate**) containing a new **featureSet** element specifying **replacementFeatureSet** with Extended Fast Connect present in **supportedFeatures**. The requested party shall, at its convenience, return a corresponding **featureSet** element identified as a **replacementFeatureSet** with Extended Fast Connect present (to accept the switch back to EFC), or with Extended Fast Connect absent (to refuse the request). The requesting party shall refrain from initiating any ITU-T H.245 or EFC media channel procedures until it receives a response from the requested party. It shall, however, complete any ITU-T H.245 procedures initiated by the other party. The requested party shall complete any procedures in progress before it responds, positively or negatively, to the request. If the requestor receives a positive response, then ITU-T H.245 logical channel control procedures are suspended and EFC operation may commence.

Established media channels and sessions shall remain stable through the switch to/from EFC from/to ITU-T H.245 procedures. These established channels/sessions may then be manipulated by the procedures in force.

4.13 Failure conditions

If a party receives a **fastStart** requesting the addition of a new channel, the replacement of an old channel by a new one (reconfiguration), or the redirection of an existing channel and it is unable or unwilling to comply, it shall return a **fastStart** containing a **Null-OLC** for the rejected **sessionID** and direction.

As described in clause 4.6, conflicting proposals (same session) created by both parties shall be resolved by keeping the proposal(s) provided by the master, and ignoring the conflicting proposal(s) provided by the slave.

5 Interaction with existing procedures

5.1 Fast Connect

Any party that supports Extended Fast Connect shall also support conventional Fast Connect procedures. Therefore, it shall include a **fastStart** element in any SETUP message it sends with an announcement of EFC support.

5.2 UserInputIndication

User input indication via [ITU-T H.245] may be used if the required capability has been negotiated, independent of the use of Extended Fast Connect.

5.3 EndSession command

If the ITU-T H.245 tunnel has been used (even if only for capability exchange), then it should be closed in accordance with clause 8.5 of [ITU-T H.323].

5.4 Simple Endpoint Type (SET)

The SET of Annex F of [ITU-T H.323] can make use of the base Extended Fast Connect procedures because they are compatible with the repeated fast start procedures specified for the SET. The SET may use the ITU-T H.245 tunnel for capabilities exchange or user input indications. It is not necessary for the SET to explicitly indicate support for Extended Fast Connect; it shall be inferred from the SET **EndpointType** indication. The initial **fastStart** element issued by the SET (in a SETUP message) shall be interpreted as a proposal, even if the SET cannot/does not include the EFC Proposal indicator. The SET shall, however, explicitly announce support for the Request-New-Proposals feature and/or the Request-Channel-Close feature if it desires to issue or respond to such requests.

EFC parties should be aware that SETs recognize a **fastStart** element with a channel number different from an open channel as a request for an additional channel, not a redirection or reconfiguration of the session. This may be avoided in either of two ways: first, always use the same channel number when redirecting or reconfiguring a media session; or, second, always close the open channel (with a **Null-OLC**, as described in Annex F of [ITU-T H.323]) before opening a new one with another **fastStart** message.

5.5 EFC third-party pause and rerouting

EFC supports third-party pause and rerouting, as described in Annex F of [ITU-T H.323] for SETs, when used by a routing gatekeeper. The third party (the gatekeeper in the example in Figure 5) may idle the caller's transmit and/or receive channels via **Null-OLC**s, then supply the caller's proposal **fastStart** to a new party (e.g., in a SETUP). The acceptance **fastStart** will appear to the caller as a redirection or reconfiguration, as illustrated in Figure 5.

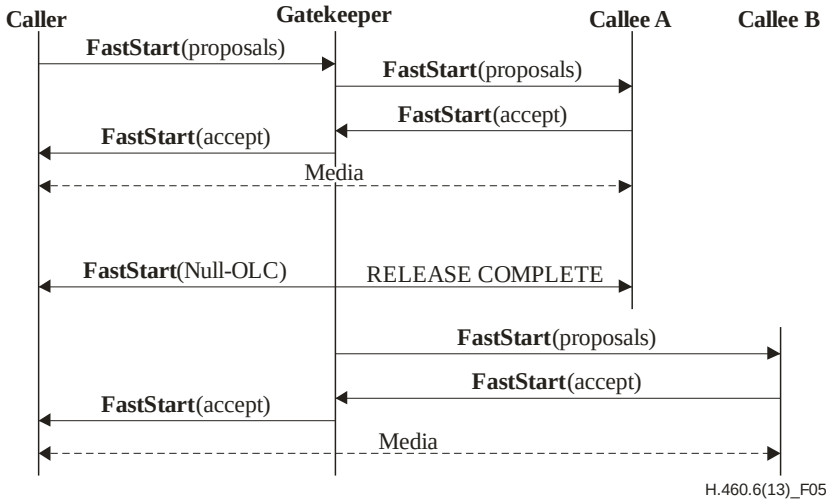

Figure 5 – Third-party redirection

In Figure 5, the gatekeeper, or the entity that re-routes a call should send a Facility message containing the **destinationInfo** field upon completion of the re-routing to the entity that gets re-routed, i.e., Caller. An endpoint should examine this message for the ITU-T H.225.0 version information at any point that a Facility message is received containing this field.

After coming out of the "paused" state an endpoint should examine the version-id fields in TCS messages to determine the ITU-T H.245 version supported by the remote endpoint.

In addition, an endpoint interested in knowing the version of the remote endpoint should send a Status Inquiry message and wait for the receipt of the Status message to determine the version of [ITU-T H.225.0] in use when it exits the paused state when the above Facility message is not received within a reasonable amount of time. The length of this time is left to the implementation.

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