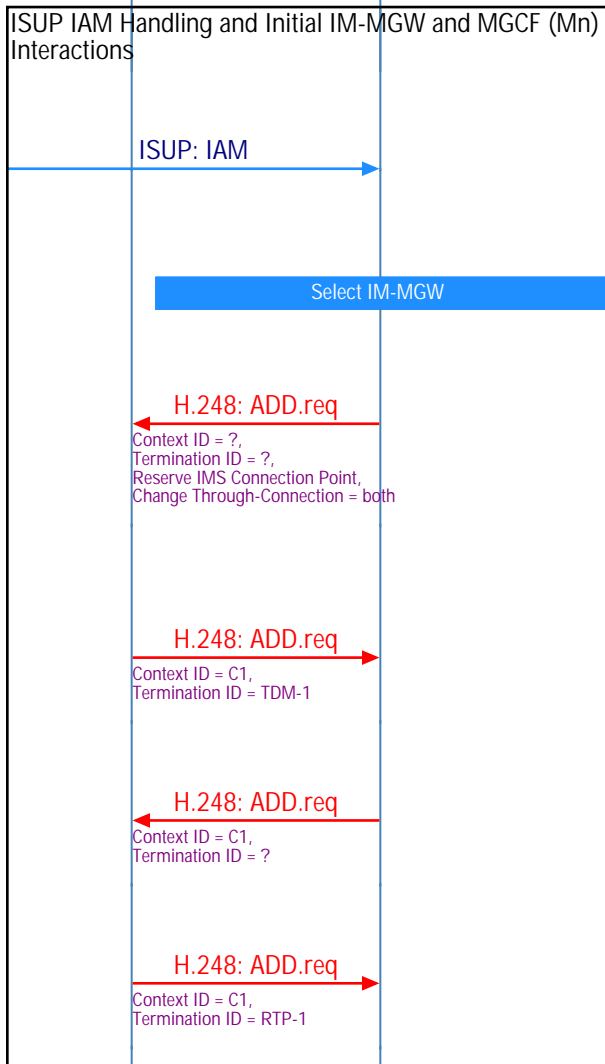


PSTN Subscriber to IMS Subscriber Call (PSTN-ISUP Originated Call; IM-MGW Megaco/H.248 Signaling; PSTN Initiated Release)						
PSTN		IMS Core Network			Called UE	
PSTN Equipment		CSCF Servers			Called User Equipment	
IM-MGW		MGCF	I-CSCF	Term S-CSCF	Term P-CSCF	Called
						Copyright © 2013 EventHelix.com
						10-Jan-13 16:23 (Page 1)

This call flow covers the handling of a CS network originated call with ISUP. In the diagram the MGCF requests seizure of the IM CN subsystem side termination and CS network side bearer termination. When the MGCF receives an answer indication, it requests the IM-MGW to both-way-through-connect the terminations.

This sequence diagram was generated with EventStudio System Designer (<http://www.EventHelix.com/EventStudio>).



The CS Network establishes a bearer path to the IM-MGW, and signals to the MGCF with a IAM message, giving the trunk identity, destination information and optionally the continuity indication. The message is routed to MGCF via the Signaling Gateway (SGW).

The MGCF selects the IM-MGW based on the received circuit identity in the IAM.

Request addition of a new context and termination. The MGCF uses the Reserve IMS Connection Point procedure. Within this procedure, the MGCF indicates the local codecs and requests a local IP address and UDP port from the IM-MGW. The local IP address and UDP port are used by the IM-MGW to receive user plane data from the IM CN subsystem.

The IM-CN responds back with Context "C1" and a TDM side termination "TDM-1".

Request addition of an RTP termination to the "C1" context. Change IMS Through Connection = backward.

The IM-MGW adds the "RTP-1" termination to the "C1" context. At this point "TDM-1" is a circuit switched termination and "RTP-1" is a RTP based IP termination for communicating with the terminating IMS subscriber.

Initial Handshake between MGCF and IMS CSCF Servers

PSTN Subscriber to IMS Subscriber Call (PSTN-ISUP Originated Call; IM-MGW Megaco/H.248 Signaling; PSTN Initiated Release)						
PSTN	IMS Core Network				Called UE	Copyright © 2013 EventHelix.com
PSTN Equipment	PSTN Interface	CSCF Servers			Called User Equipment	
IM-MGW	MGCF	I-CSCF	Term S-CSCF	Term P-CSCF	Called	10-Jan-13 16:23 (Page 2)

INVITE

```
INVITE tel:1-811-CALLED SIP/2.0,
Via: <MGCF>;branch,
Route: <I-CSCF;lr>,
P-Asserted-Identity:
<tel:+1-811-CALLER>,
Contact: <sip:MGCF>,
m=audio 3456 RTP/AVP 97 96,
a=curr:qos local none,
a=curr:qos remote none,
a=des:qos mandatory local sendrecv,
a=des:qos none remote sendrecv
```

100 Trying

Query HSS to identify the S-CSCF for this SIP Dialog

INVITE

```
INVITE tel:1-811-CALLED SIP/2.0,
...
```

INVITE

```
INVITE tel:1-811-CALLED SIP/2.0,
...
```

INVITE

```
INVITE tel:1-811-CALLED SIP/2.0,
...
```

100 Trying

100 Trying

Prepare a list of Codecs common between the Caller and the Called subscriber

183 Session Progress

183 Session Progress

183 Session Progress

The MGCF initiates an INVITE request, containing an initial SDP, as per the proper S-CSCF to S-CSCF procedure. The INVITE is first sent to the I-CSCF to identify the S-CSCF serving the called user.

The I-CSCF acknowledges the INVITE that was received from P-CSCF.

Query the HSS to obtain the S-CSCF for the user.

The public URI in the SIP INVITE is replaced with the called subscriber's registered IP address and port number. The message is routed to the P-CSCF IP address that was recorded at the time of registration. The Via and Record-Route headers are updated.

The P-CSCF updates the Via and Route-Record headers and forwards the request to the Called UE. Note that the secure port is included in the Via address specification.

The Caller examines the SDP list of available codec. It prunes the list by excluding codecs that are not supported by the called subscriber. This list will be included in the 183 message sent to the caller.

PSTN Subscriber to IMS Subscriber Call (PSTN-ISUP Originated Call; IM-MGW Megaco/H.248 Signaling; PSTN Initiated Release)						
PSTN	IMS Core Network				Called UE	
PSTN Equipment	PSTN Interface	CSCF Servers			Called User Equipment	
IM-MGW	MGCF	I-CSCF	Term S-CSCF	Term P-CSCF	Called	

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183 Session Progress

```
Via: <MGCF>,
Record-Route: <Term
S-CSCF> <MGCF>,
Contact: <Calling UE IP>
:Port,
m=audio 6544 RTP/AVP 97
96,
a=curr:qos local none,
a=curr:qos remote none,
a=des:qos mandatory local
sendrecv,
a=des:qos mandatory
remote sendrecv
```

The UE replies indicating that the session is in progress. The contact address is set its own IP address. The Via and the Record-Route headers are copied from the received INVITE.

Mn Interactions for Codec selection

H.248: MOD.req

Context ID = C1,
Termination ID = RTP-1

Select Codec

H.248: MOD.resp

Context ID = C1,
Termination ID = RTP-1

PRACK

```
a=curr:qos local sendrecv,
a=curr:qos remote none,
a=des:qos mandatory local
sendrecv,
a=des:qos mandatory remote
sendrecv
```

200 OK (PRACK)

begin
Called PDP Context Activation

end
Called PDP Context Activation

The MGCF indicates the remote IP address and UDP port, i.e. the destination IP address and UDP port for RTP messages sent towards the terminating IMS UE. It also identifies the codec to be used in the IM-MGW to Terminating UE RTP communication.

Reply to MGCF. The final codec selection is indicated.

The Caller now sends a PRACK to inform the called subscriber about the selected Codec. The message also indicates that currently the resources needed for meeting the quality of service requirements of the session are already available ("a=curr:qos local sendrecv").

This "200 OK" just acknowledges PRACK.

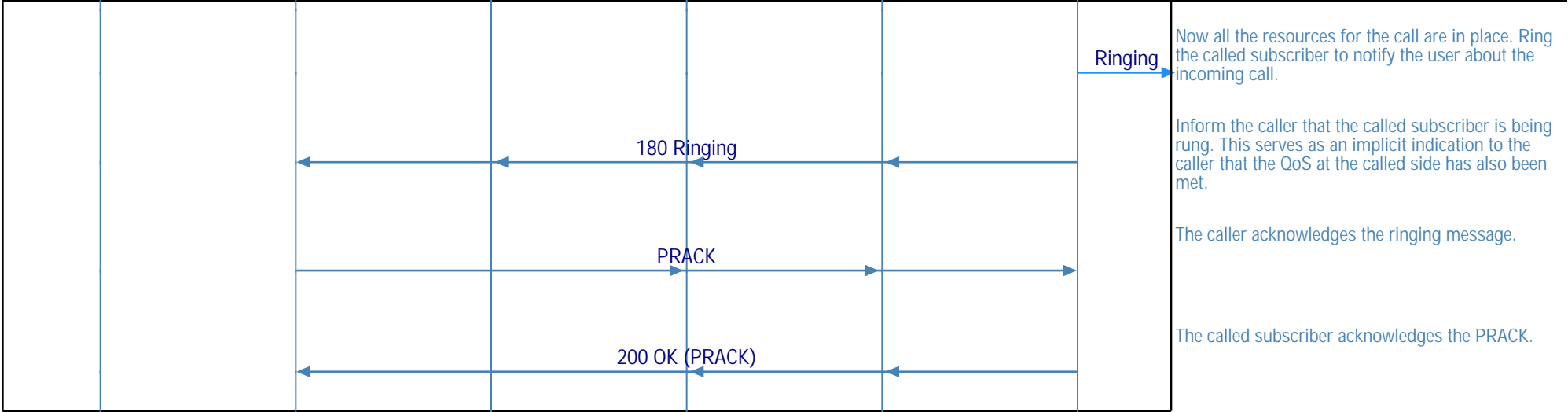
The final codec at the called side is decided. So initiate the PDP context activation to allocate resources for meeting the QoS of the terminating leg of the call.

The called PDP context activation has been completed. At this point, the caller and the called PDP contexts are both active. The QoS for the call can now be met.

PSTN Subscriber to IMS Subscriber Call (PSTN-ISUP Originated Call; IM-MGW Megaco/H.248 Signaling; PSTN Initiated Release)						
PSTN	IMS Core Network				Called UE	
PSTN Equipment	PSTN Interface	CSCF Servers			Called User Equipment	
IM-MGW	MGCF	I-CSCF	Term S-CSCF	Term P-CSCF	Called	

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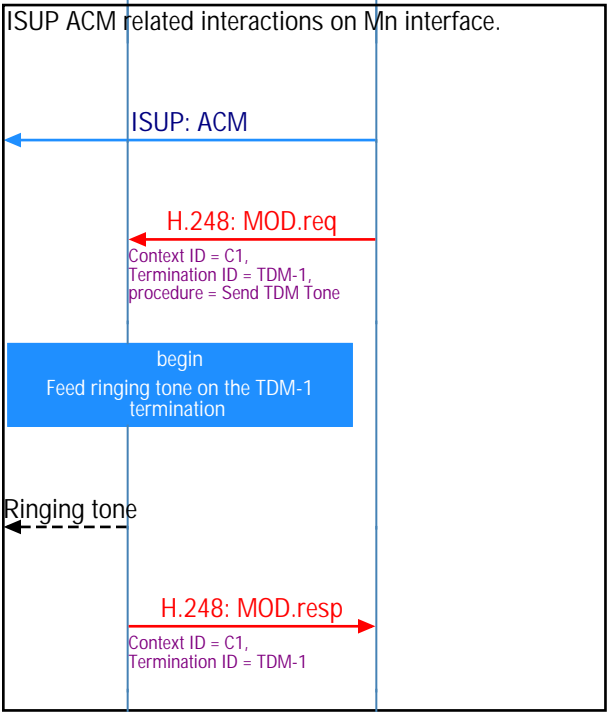


Now all the resources for the call are in place. Ring the called subscriber to notify the user about the incoming call.

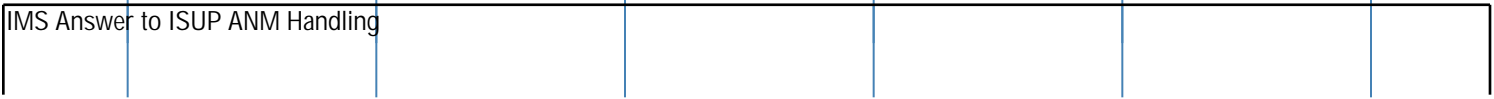
Inform the caller that the called subscriber is being rung. This serves as an implicit indication to the caller that the QoS at the called side has also been met.

The caller acknowledges the ringing message.

The called subscriber acknowledges the PRACK.

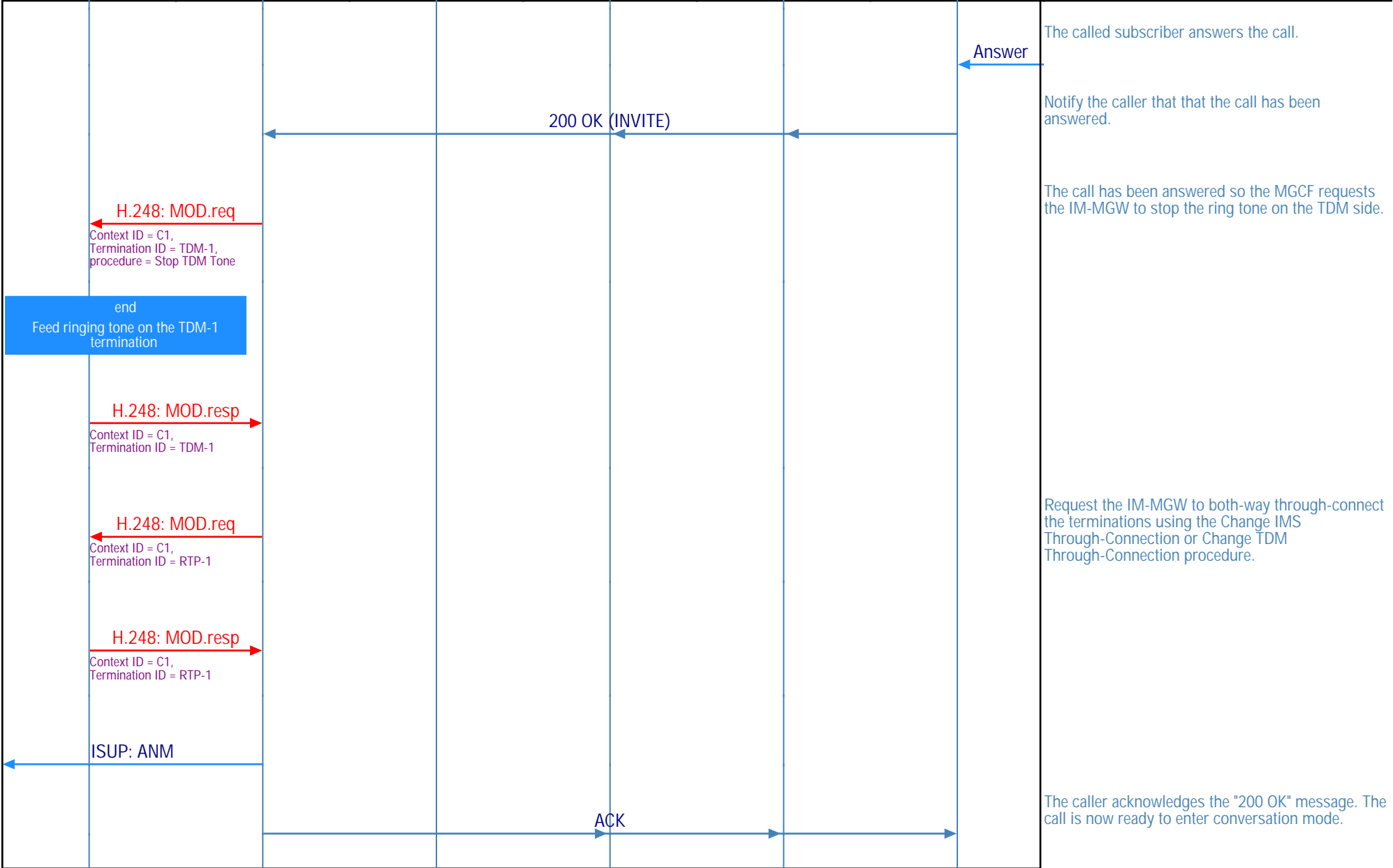


The MGCF requests the IM-MGW to provide a ringing tone to the calling party using the Send TDM Tone procedure.



PSTN Subscriber to IMS Subscriber Call (PSTN-ISUP Originated Call; IM-MGW Megaco/H.248 Signaling; PSTN Initiated Release)

PSTN		IMS Core Network			Called UE	Copyright © 2013 EventHelix.com 10-Jan-13 16:23 (Page 5)
PSTN Equipment	PSTN Interface	CSCF Servers			Called User Equipment	
IM-MGW	MGCF	I-CSCF	Term S-CSCF	Term P-CSCF	Called	



Conversation Mode

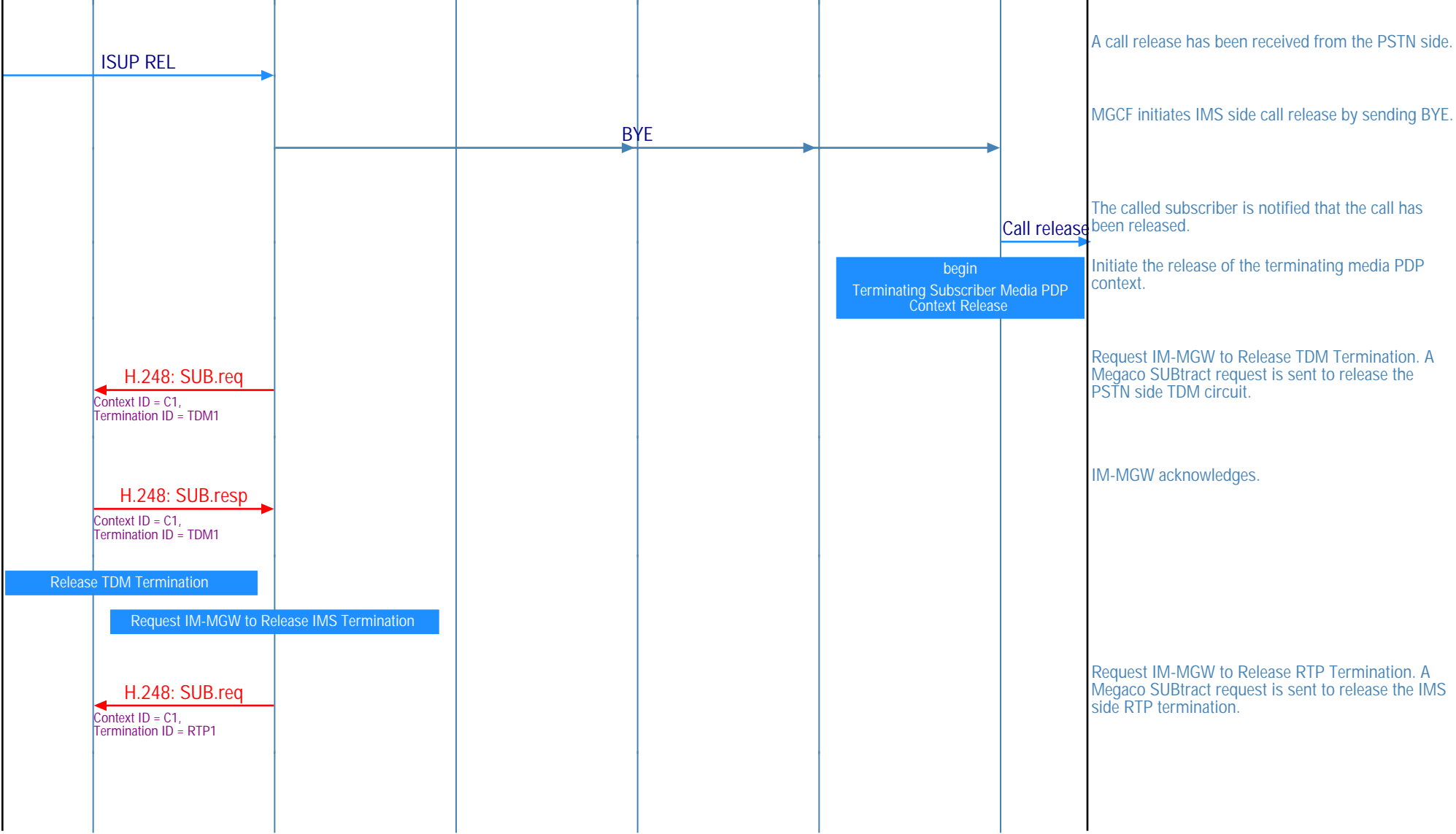
PSTN Subscriber to IMS Subscriber Call (PSTN-ISUP Originated Call; IM-MGW Megaco/H.248 Signaling; PSTN Initiated Release)

PSTN	IMS Core Network				Called UE	Copyright © 2013 EventHelix.com
PSTN Equipment	PSTN Interface	CSCF Servers			Called User Equipment	
IM-MGW	MGCF	I-CSCF	Term S-CSCF	Term P-CSCF	Called	10-Jan-13 16:23 (Page 6)



Conversation is now in progress. The voice is carried as PCM between the PSTN and IM-MGW. The IM-MGW converts the speech into RTP packets and back. The RTP communication takes place directly between the IM-MGW and Called IMS subscriber.

PSTN Initiated Call Release



A call release has been received from the PSTN side.

MGCF initiates IMS side call release by sending BYE.

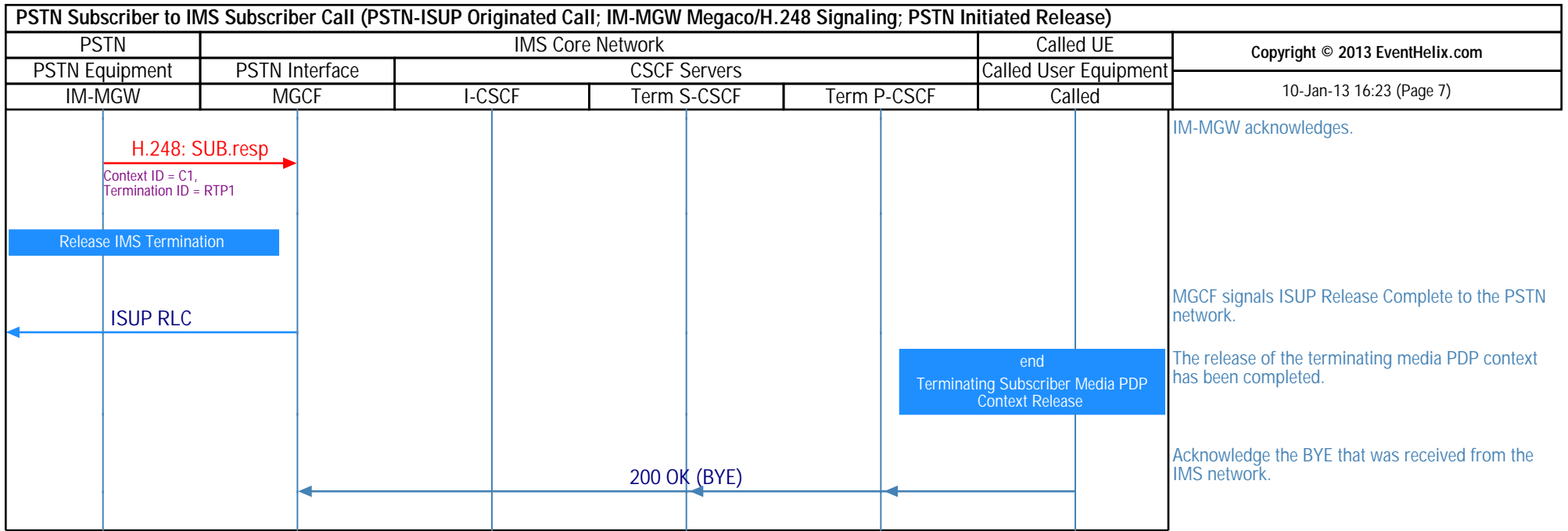
The called subscriber is notified that the call has been released.

Initiate the release of the terminating media PDP context.

Request IM-MGW to Release TDM Termination. A Megaco SUBtract request is sent to release the PSTN side TDM circuit.

IM-MGW acknowledges.

Request IM-MGW to Release RTP Termination. A Megaco SUBtract request is sent to release the IMS side RTP termination.



This sequence diagram was generated with EventStudio System Designer (<http://www.EventHelix.com/EventStudio>).

PSTN Subscriber to IMS Subscriber Call (Alternate Scenario: Called IMS Subscriber Initiated Call Release)							
PSTN		IMS Core Network			Called UE		Copyright © 2013 EventHelix.com
PSTN Equipment	PSTN Interface	CSCF Servers			Called User Equipment		
IM-MGW	MGCF	I-CSCF	Term S-CSCF	Term P-CSCF	Called		10-Jan-13 16:23 (Page 8)

This call flow covers the handling of a CS network originated call with ISUP. In the diagram the MGCF requests seizure of the IM CN subsystem side termination and CS network side bearer termination. When the MGCF receives an answer indication, it requests the IM-MGW to both-way-through-connect the terminations.

This sequence diagram was generated with EventStudio System Designer (<http://www.EventHelix.com/EventStudio>).

ISUP IAM Handling and Initial IM-MGW and MGCF (Mn) Interactions

Initial Handshake between MGCF and IMS CSCF Servers

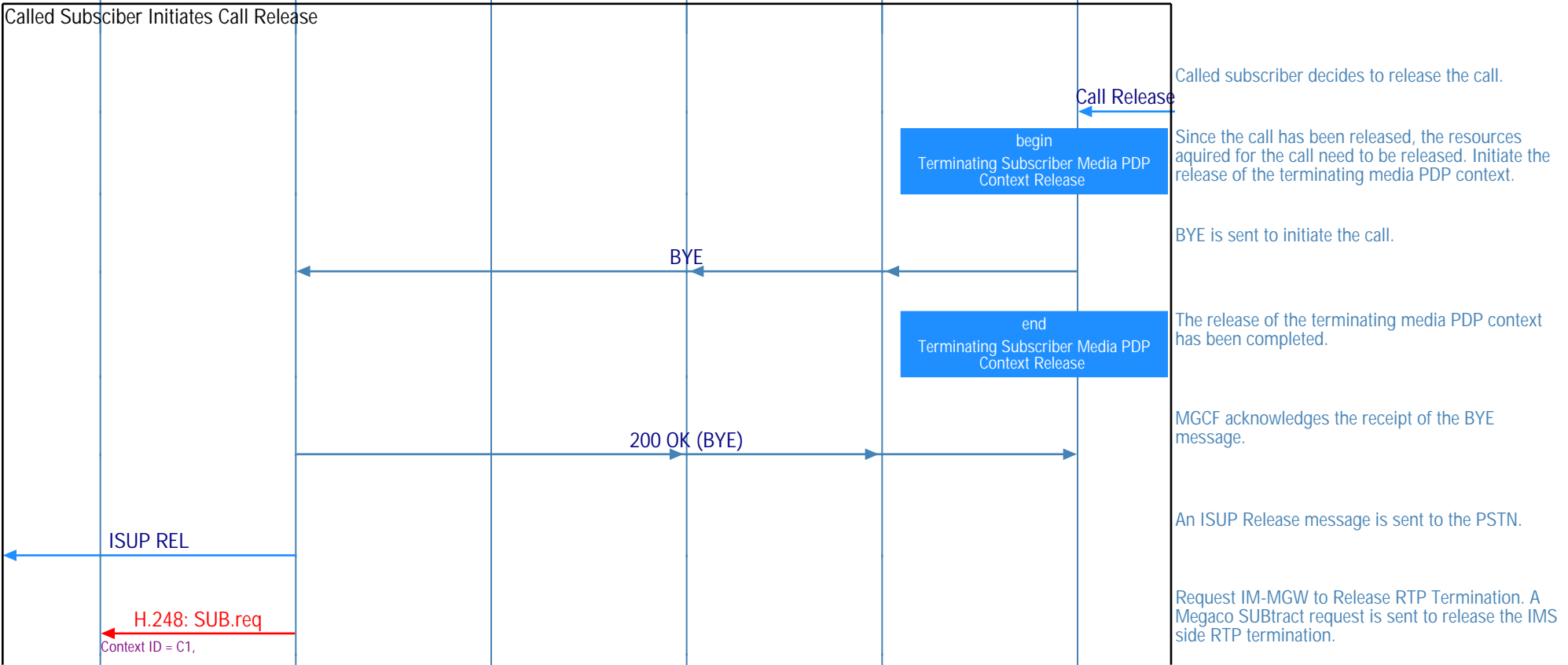
Mn Interactions for Codec selection

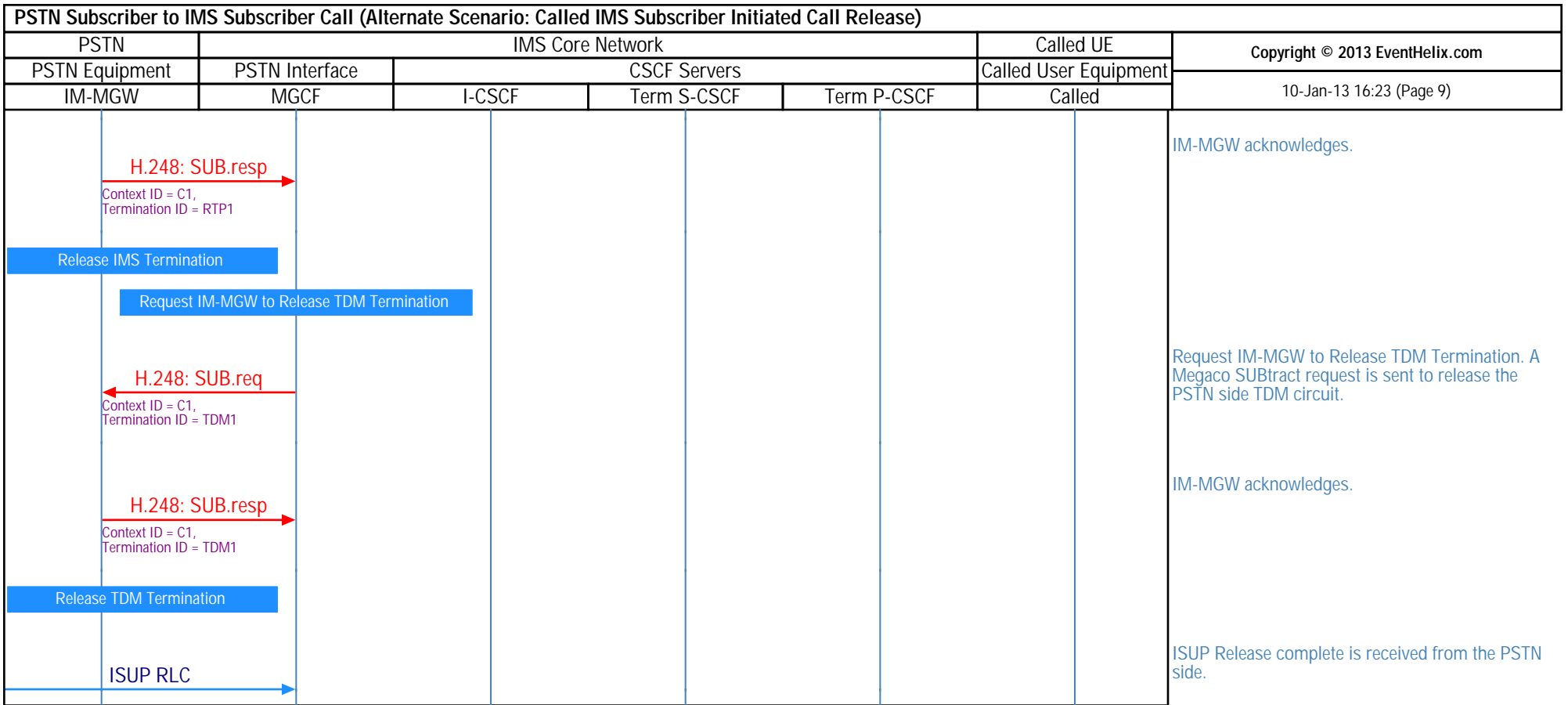
ISUP ACM related interactions on Mn interface.

IMS Answer to ISUP ANM Handling

Conversation Mode

Called Subscriber Initiates Call Release





This sequence diagram was generated with EventStudio System Designer (<http://www.EventHelix.com/EventStudio>).