Technical Specification of the SIP (Gm) interface between the User Equipment (UE) and the NGN platform of Deutsche Telekom

1 TR 114

Version: 3.0.0

Amendment 6 (Early Media)

10. March 2016

Herausgeber / Publisher

Deutsche Telekom AG

Verantwortlich/ Responsible

Deutsche Telekom Netzproduktion GmbH

Fixed Mobile Engineering Deutschland

Abteilung FMED-321

64307 Darmstadt

Bestellangabe / Order Information

Kurztitel / Title: 1 TR 114

Ausgabe / Version: 3.0.0 Amendment 6 (March 2016)

Erweiterung für / Amendment for 1 TR 114, Ausgabe / Version 3.0.0 (June 2013)

Bezugsanschrift / Order address

Internet Download:

https://www.telekom.de/hilfe/geraete-zubehoer/telefone-und-anlagen/informationen-zu-telefonanlagen/schnittstellenbeschreibungen-fuer-hersteller?samChecked=true

Contents

1. Scope

This Amendment is an addition to 1 TR 114 V3.0.0

The description within this Amendment replaces the procedures for Early Media in 1TR114. These procedures give more detail for implementation purposes to understand how an end device (IAD) connected to Deutsche Telekom Gm interface has to behave.

Description within the text may be reflected in addition within the figures.

2. References

[26] RFC 3261 (June 2002): "SIP: Session Initiation Protocol".

[27B] RFC 3264 (June 2002): "An Offer/Answer Model with Session Description Protocol (SDP)".

[109] RFC 5009 (September 2007): "Private Header (P-Header) Extension to the Session Initiation Protocol (SIP) for Authorization of Early Media".

[142] RFC 6228 (May 2011): "Response Code for Indication of Terminated Dialog".

Note: Number in brackets is the original reference out of 1TR114 Annex B

3. Definitions

Media Authorization is related to the use of P-Early-Media Header as defined in RFC5009 [109]

Early media is authorized by the network, if and only if there is at least one early dialog for which
- SDP (answer) has been received from network and
- the last (backward) PEM header provided a value from set {sendonly, sendrecv, recvonly}.

Backward early media is authorized by the network, if and only if there is at least one early dialog for which
- SDP (answer) has been received from network and
- the last (backward) PEM header provided a value from set {sendonly, sendrecv}.

Forward early media is authorized by the network, if and only if there is at least one early dialog for which
- SDP (answer) has been received from network and
- the last (backward) PEM header provided a value from set {sendrecv, recvonly}.

In case of SDP (answer) has been received, but no PEM header has been received for the given dialog with any message an implicit PEM=sendonly shall be assumed.

PEM header shall be considered independent whether the PEM header has been received by means of a reliable or unreliable response.

The term of local ringtone used within this documentation is the same as a locally generated ringback tone (RBT). More information how to generate a local ringtone is given in ANNEX E of 1TR114 V3.0.0.

4. Additions to 1 TR 114 for early media

1TR114 describes the early media handling as follows and Section 4.2.6 shall be modified as follows:

§4.2.6 Early Media

~~*For early media RFC 5009 [109] MUST be supported. Due to the fact that not all functionalities will support RFC5009 for early media further procedures for identifying early media needs to be supported. In addition not in each case where an SDP is received within a provisional response early media apply.*~~

~~*Therefore the following procedures to identify if early media is received shall apply in the following rowing:*~~

1. ~~*If a provisional response includes a P-Early-Media Header with "sendonly" and a require header with 100rel. The procedures shall apply with 3GPP TS 24.628 [17].*~~
2. ~~*If a provisional response contains SDP and preconditions are not used.*~~
3. ~~*Identifying if an RTP stream is received by the UE.*~~

§4.2.6.1 Requirements

IAD-1	Requirement Early-Media-Control During early dialog phase the IAD provides for the user either silence or local ringtone or media received from the network.
IAD-2	Silence ... ... must be provided when neither 180 (Ringing) has been received nor backward early media is currently authorized or received from network.
IAD-3	Local ringtone ... ... must be provided when 180 (Ringing) has been received, but no backward early media is currently authorized nor received from network.
IAD-4	Network early media (received RTP) ... must be provided when backward early media is authorized from network and currently received.
IAD-5	Forward early media If forward early media is currently authorized from the network, the IAD must pass media originated by the user to the network.
IAD-6	Requirement Initial-Early-Media-Control Initially the media control is taken by the first early dialog which provides • either 18x response with PEM header with any value • or 18x response with an SDP answer (note: ensures backward compatibility, if remote side does not support PEM) • or 180 (Ringing). In advance to take over of media control by any dialog, the IAD will not render any media received from remote nor generate local media towards the user).
IAD-7	Requirement Change-of-Early-Media-Control The media control changes a to another early dialog, if this other early dialog provides PEM=sendonly or sendrecv, or

<table>
<tr><td></td><td>
b to any early dialog, if the early dialog which currently owns the media control terminates (199 (Early Dialog Terminated)). Hereby it is preferred to switch to the last dialog which provided media control, or
c to another dialog, if this other dialog provides an SDP answer for the first time and has not provided any PEM header in parallel or in any previous message (due to compatibility reasons a response, which provides initially an SDP answer but no PEM header, is treated per default as “PEM=sendonly”)
d to another early dialog, if current status is silence and 180 (Ringing) is received for this other dialog
</td></tr>
<tr><td>IAD-8</td><td>
<u>Requirement Media-Sniffing (detection of RTP) shall be supported by the IAD</u>

If the dialog which owns the media control

• is in alerting phase (180 (Ringing) received for the given dialog)
• and PEM/SDP status of the dialog result in rendering of media from the network,
• but no RTP is received
then the IAD shall provide a local ringtone.

IAD shall observe RTP for 500ms to identify if RTP is received. If within 500 ms no RTP is received then the condition "no RTP" is fulfilled
</td></tr>
<tr><td>IAD-9</td><td>
<u>Requirement Media-Behaviour:</u>

The IAD shall provide media according to the instructions received from the dialog which owns the media control as follows:

<table>
<tr><th colspan="4">dialog with media control:</th><th rowspan="2">resulting IAD behaviour</th></tr>
<tr><th>last PEM received for given dialog</th><th>SDP already received for given dialog</th><th>180 (Ringing) already received for given dialog</th><th>RTP received</th></tr>
<tr><td>none</td><td>no</td><td>no</td><td>n/a</td><td>silence</td></tr>
<tr><td>none</td><td>no</td><td>yes</td><td>n/a</td><td>local ringtone</td></tr>
<tr><td>none</td><td>yes[1)]</td><td>no</td><td>no</td><td>silence</td></tr>
<tr><td>none</td><td>yes[1)]</td><td>no</td><td>yes</td><td>render media received from network</td></tr>
<tr><td>none</td><td>yes[1)]</td><td>yes</td><td>no</td><td>local ringtone</td></tr>
<tr><td>none</td><td>yes[1)]</td><td>yes</td><td>yes</td><td>render media received from network</td></tr>
<tr><td>sendonly, sendrecv</td><td>no</td><td>no</td><td>n/a</td><td>silence</td></tr>
<tr><td>sendonly, sendrecv</td><td>no</td><td>yes</td><td>n/a</td><td>local ringtone</td></tr>
<tr><td>sendonly, sendrecv</td><td>yes</td><td>no</td><td>no</td><td>silence</td></tr>
<tr><td>sendonly, sendrecv</td><td>yes</td><td>yes[2)]</td><td>no[2)]</td><td>local ringtone</td></tr>
<tr><td>sendonly, sendrecv</td><td>yes</td><td>no/yes</td><td>/yes[2)]</td><td>render media received from network</td></tr>
</table>
</td></tr>
</table>

	inactive, recvonly	no/yes	no	no/yes	silence
	inactive, recvonly	no/yes	yes	no/yes	local ringtone

notes:
1) receipt of SDP w/o PEM: PEM is implicitly treated as sendonly (default)
2) immediately with receipt of PEM=sendonly/sendrecv any media received from the network shall be rendered. If sniffing timer (see. IAD-8) expires and 180 (Ringing) has been received and no RTP is received, than the IAD shall change to "local ringtone" (first row).

IAD-10	Requirement PEM Support Support of P-Early-Media Header regarding RFC 5009 [109] is mandatory

§4.2.6.2 Support of Specifications

The following Specifications MUST be supported:

[109] RFC 5009 (September 2007): "Private Header (P-Header) Extension to the Session Initiation Protocol (SIP) for Authorization of Early Media".

[142] RFC 6228 (May 2011): "Response Code for Indication of Terminated Dialog".

The numbers in brackets are the original reference numbers as used in Annex B of 1TR114.

NOTE: RFC 5009 [109] describes that the P-Early-Media header field in any message within an early dialog towards the sender of the INVITE request may contain the non-direction parameter "gated" to indicate that a network entity on the path towards the UAS is already gating the early media, according to the direction parameter(s). When included in the P-Early-Media header field, the "gated" parameter will come after all direction parameters in the parameter list. This parameter has no significant relevance for the UE.

§4.2.6.3 Early media procedures

A VGW-A/IAD receiving the first provisional response received after sending INVITE shall evaluate SDP, P-Early-Media header filed and if RTP is received. The procedures shown in Figure 1 must apply.

NOTE: SDP received by a UAC during an early dialog does not serve as an indication that early media will be received. Thus an IAD MUST support the detection of RTP received for that cases where the P-Early-Media header is not supported by the entity/network providing early media.(see also IAD-8, IAD-9)

When the terminating side is providing forking or features like forwarding or parallel ringing then multiple provisional responses may be sent back on separate early dialogs. Also other messages like an upstream SIP UPDATE request can update the early media state.

Depending on the State regarding Figure 1 the succeeding received provisional responses must processed differently. Figure 2 applies when Media is rendered to the user, Figure 3 apply when further responses are needed to process the early dialog. Figure 4 apply when a local ringback tone is played to the user.

When receiving provisional responses with a P-Early-Media header set to (sendonly or sendrcv) than the related early dialog shall take precedence as described in the Figures 1-4-

All provisional responses shall be stored.

When a 199 (Early Dialog Terminated) response is received for an active early dialog then it shall be terminated. A RTP stream received associated with this particular early dialog shall no longer be rendered to the user. If the terminated dialog is the active one then the preceding early dialog stored by the IAD shall take precedence as described in Figure 1

The procedure shown in the Figures 1. to 4. shown in the Annex must apply

ANNEX A (normative)

A.1 Methodology

A.1.1 Expressions/Variables used

A.1.1.1 Dialog-ID

The Dialog-ID in this ANNEX is the dialog identifier as defined in RFC3261 [26] section 12:

```
For a UAC, the Call-ID value of the dialog ID is set to the Call-ID of the
message, the remote tag is set to the tag in the To field of the message, and
the local tag is set to the tag in the From field of the message (these rules
apply to both requests and responses)
```

A.1.1.2 Status_Change

Status_Change returns a value which indicates if the status of the early dialog "X" has been changed The Value of Status_Change is set and changed in procedure "Check_SDP_PEM_180".The value of Status_Change is either "FALSE" or "TRUE"

A.1.1.3 MEDIA_CTRL_Dialog

MEDIA_CTRL_Dialog has either the value "none" if no early dialog is established or "X" which reflects the dialog identifier (Dialog-ID) of the early dialog.

A.1.1.4 Message

Message will take the name of the current received SIP Message (e.G. 180 (Ringing), 183 (Progress), 199(Early Dialog Terminated), UPDATE...).

A.1.1.5 PEM(X)

PEM(X) will be stored and used per early dialog "X", PEM(X) can have the values "none", "sendonly", "sendrecv", "recvonly" or "inactive",In Check_SDP_PEM_180 "none" is used to initialize PEM(X) when a new dialog is in process. The values "sendonly", "sendrecv", "recvonly" or "inactive" are set accordingly to the value received within the SIP P-Early-Media Header field. The value "sendonly" is also used as default value when SDP is available and no SIP P-Early-Media Header is received.

A.1.1.6 180(X)

180 (X) will be stored and used per early dialog "X", 180 (X) can have the values "TRUE" when 180 for dialog "X" is received and "FALSE" if not

A.1.1.7 SDP(X)

SDP (X) will be stored and used per early dialog "X", SDP (X) can have the values "TRUE" when SDP for dialog "X" is received and "FALSE" if not

A.1.1.8 Timer_RTP

Timer_RTP is initialized with the start value of the timer and decreasing till zero until observing if RTP is received by the IAD.

A.1.2 Procedures used

A.1.2.1 Check_SDP_PEM_180

This procedure evaluates and/or set the values of "Status_Change", "PEM(X)", "180 (X)" and "SDP (X)"

The variable "X" refers to the Dialog-ID

The procedure "Check_SDP_PEM_180" checks the status as follows:

- if protocol elements of the SIP P-Early-Media header field regarding RFC 5009 [109] are received,
- if the response value 180 (Ringing) is received, and
- if an RFC3264 [27B] conformant SDP answer is available.

A.1.2.2 Process_Message

This procedure is the normal call processing regarding the procedures described in 1TR114 except handling of early-media & local ring-tone which is described within this Amendment.

A.1.3 States

A.1.3.1 ED_NoMedia

Is the state where media is neither received nor generated and rendered to the user.

A.1.3.2 ED_LocalRingtone

Is the state where a local ringback tone is generated and rendered to the user.

A.1.3.3 ED_EarlyMedia

Is the state where the early dialog indicates that early media is received and is rendered to the user.
Due to some use cases this state may change to ED_LocalRingtone when RTP is not received and a 180 (Ringing) was received.
In other cases the user will not hear anything where no RTP is available and no 180 (Ringing) was received.

A.1.3.4 Wait_EM

This state waits for any SIP message received by the IAD.

A.2 SDL Diagrams for Early Media Handling

A.2.1 State Idle & State Wait_EarlyMedia

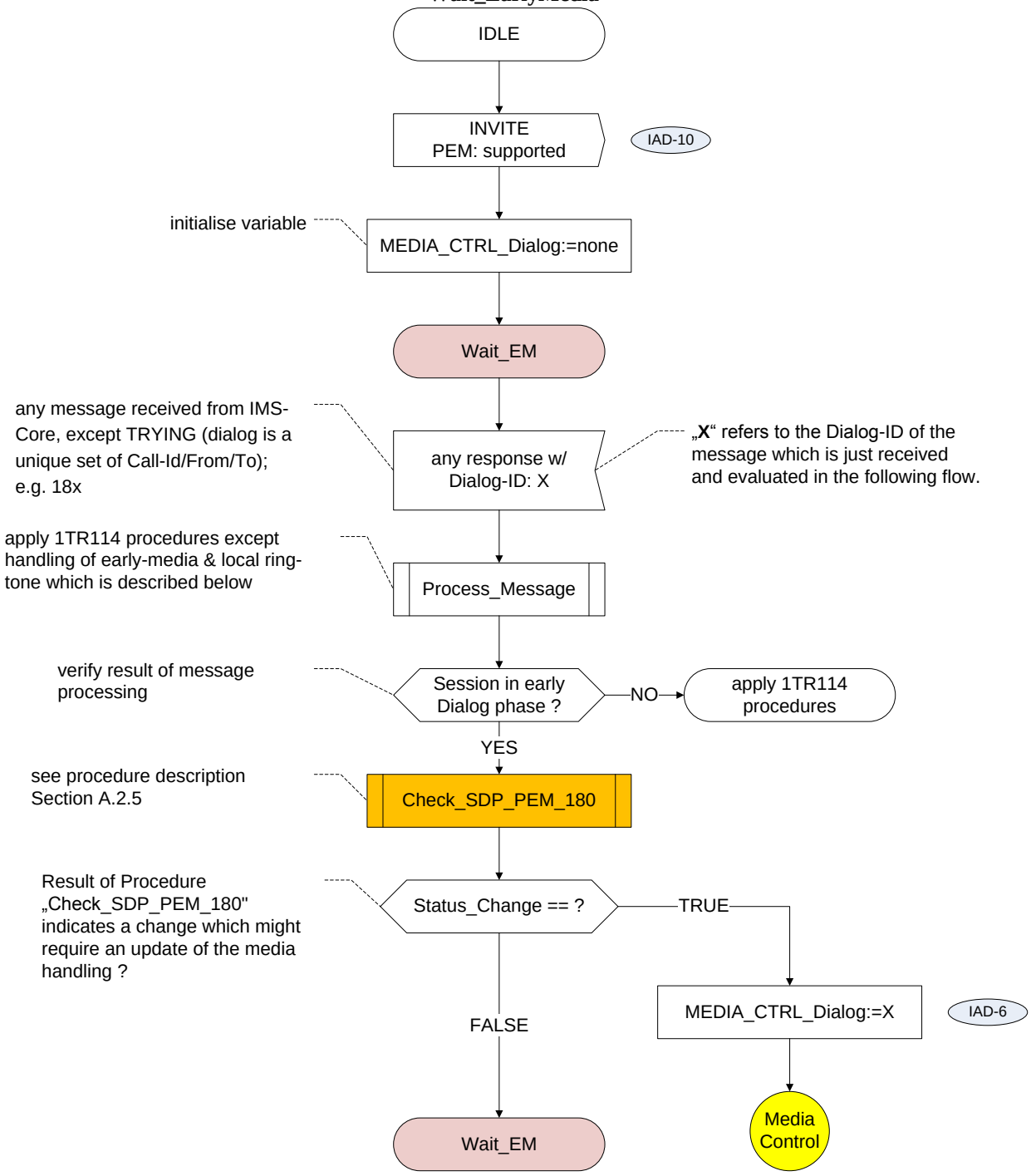


Figure A.2.1.1: State Idle & State Wait_EarlyMedia

A.2.2 Media Control

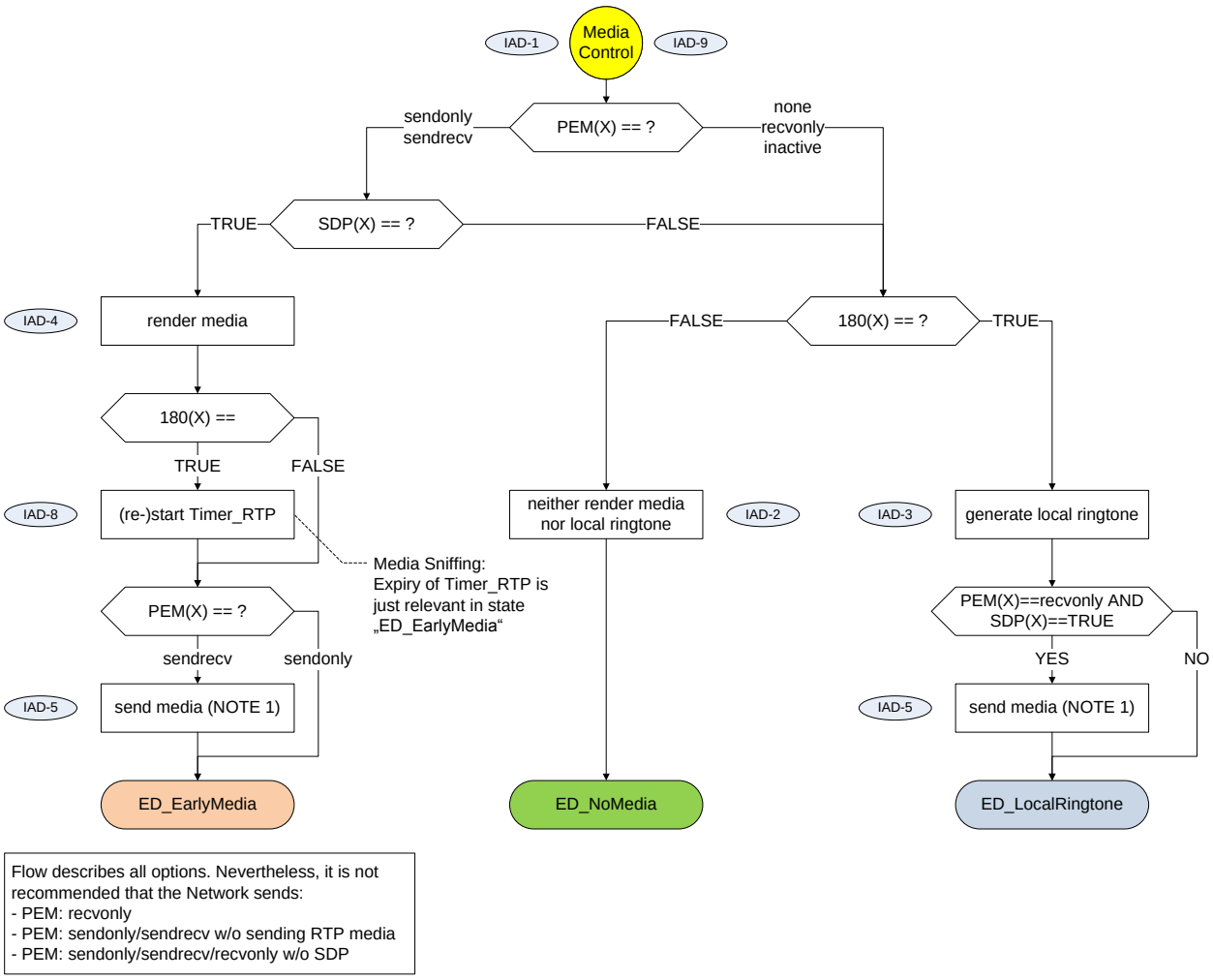


Figure A.2.

2.1: Media Control

A.2.3 State EarlyDialog_NoMedia (ED_NoMedia)

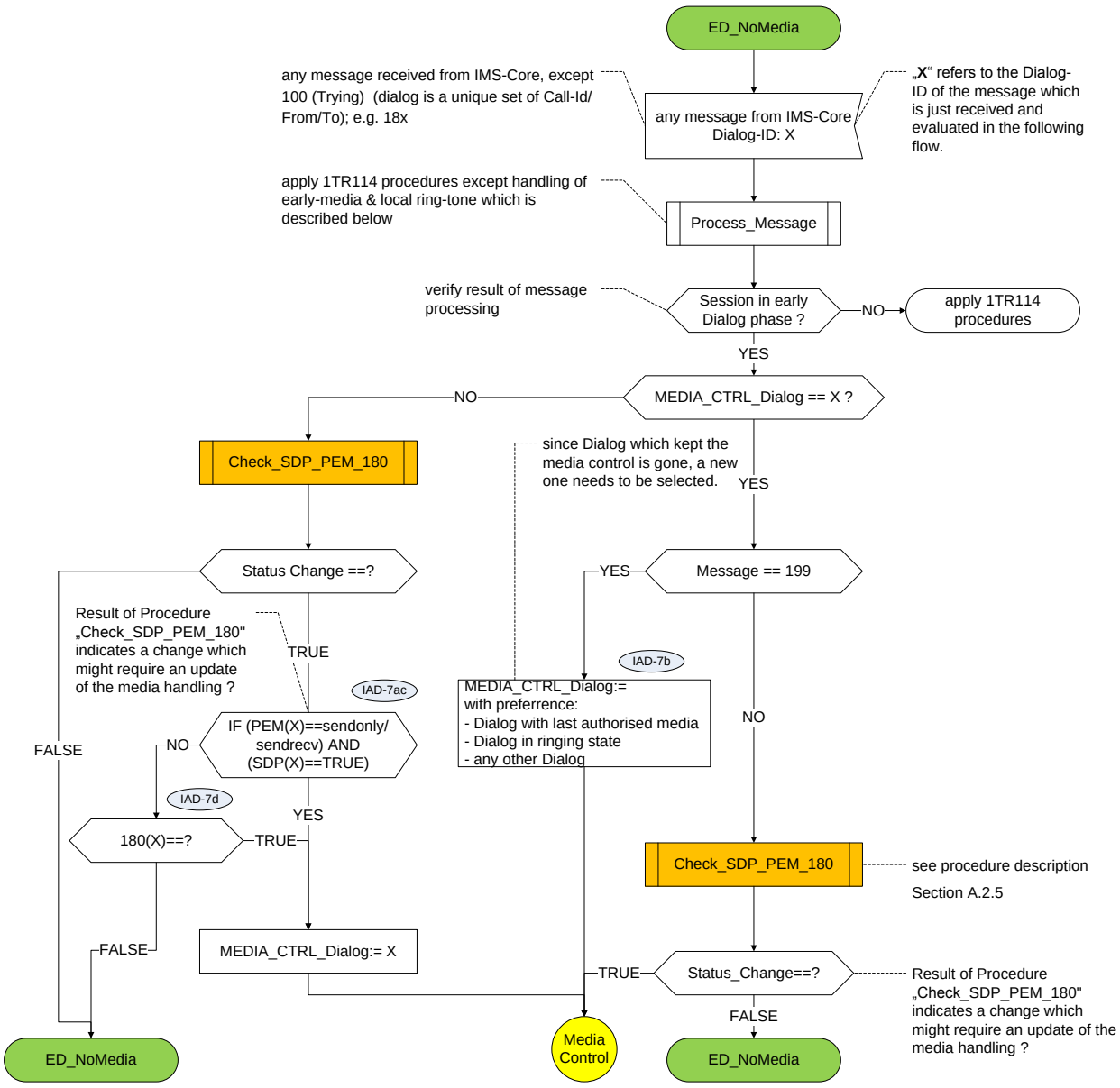


Figure A.2.3.1:State EarlyDialog_NoMedia

A.2.4 State EarlyDialog_EarlyMedia (ED_EarlyMedia) & State EarlyDialog_LocalRingtone (ED_LocalRingtone)

Process as shown in Figure A.2.4.1 is running in parallel when the state ED_EarlyMedia is applying. In cases the state changes due to other procedures to another state then the timer expiry is ignored.

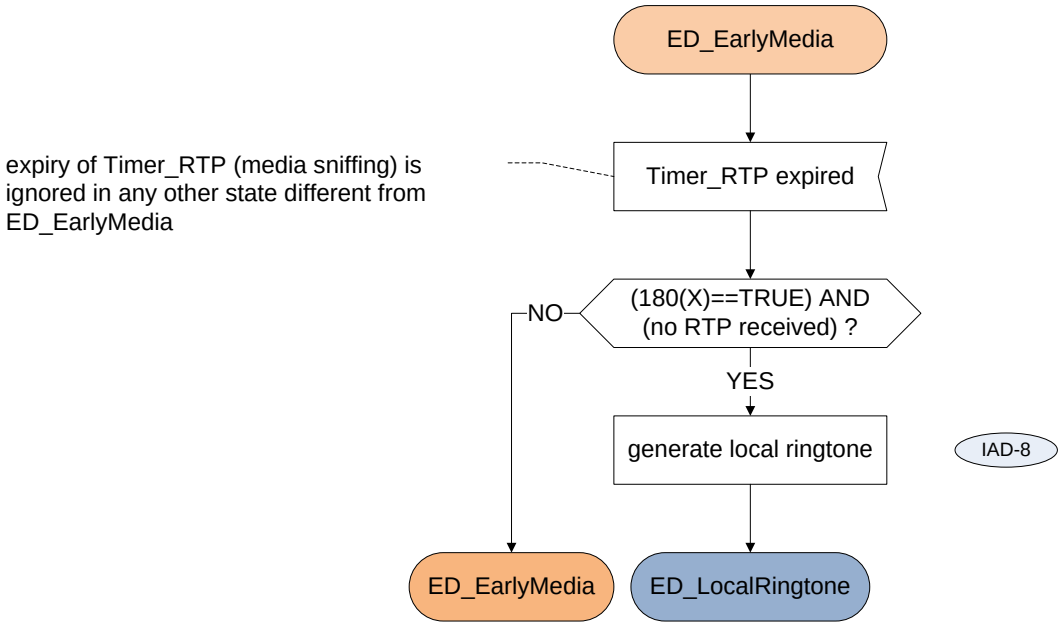


Figure A.2.4.1: Timer Check during state ED_EarlyMedia

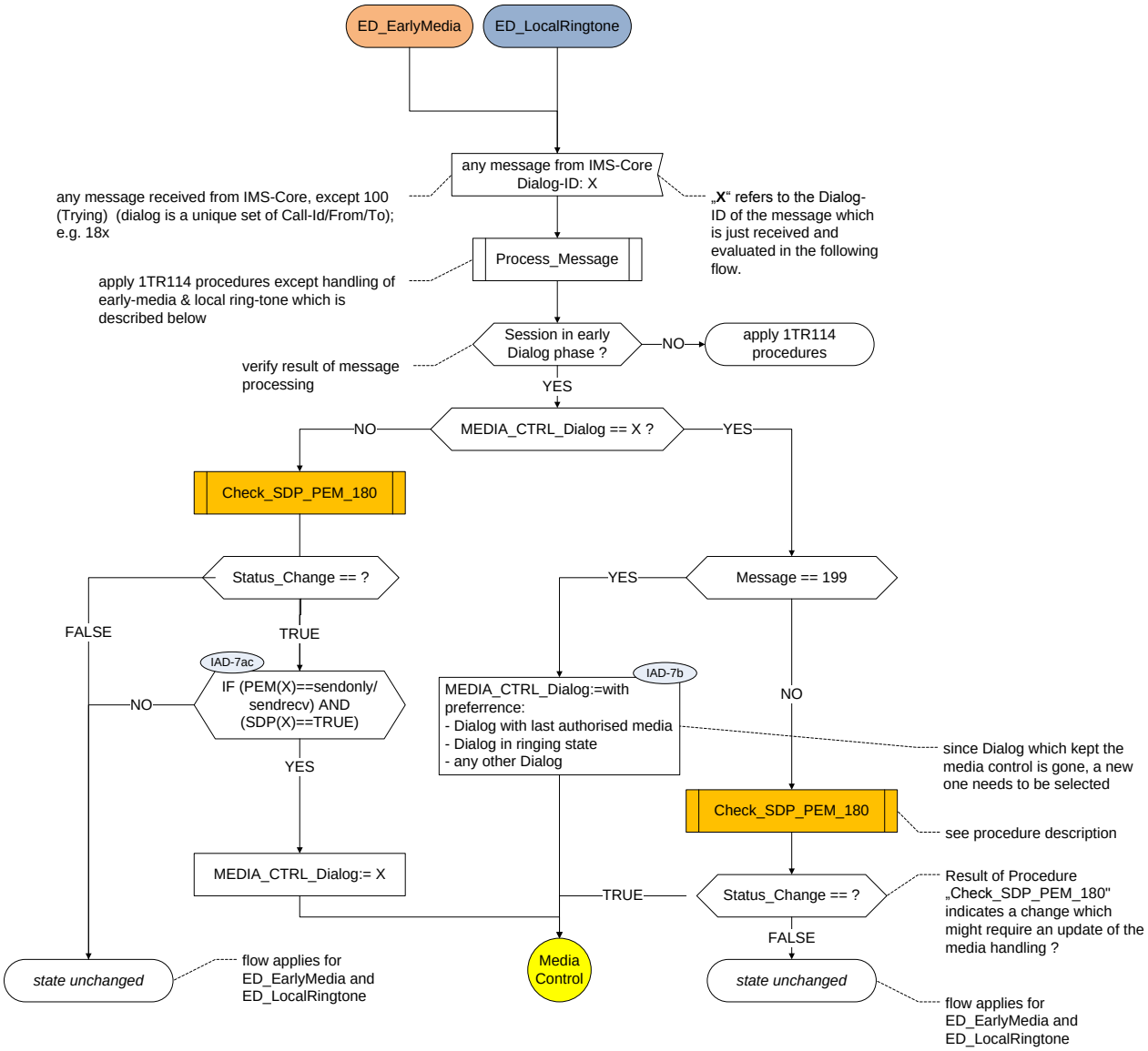
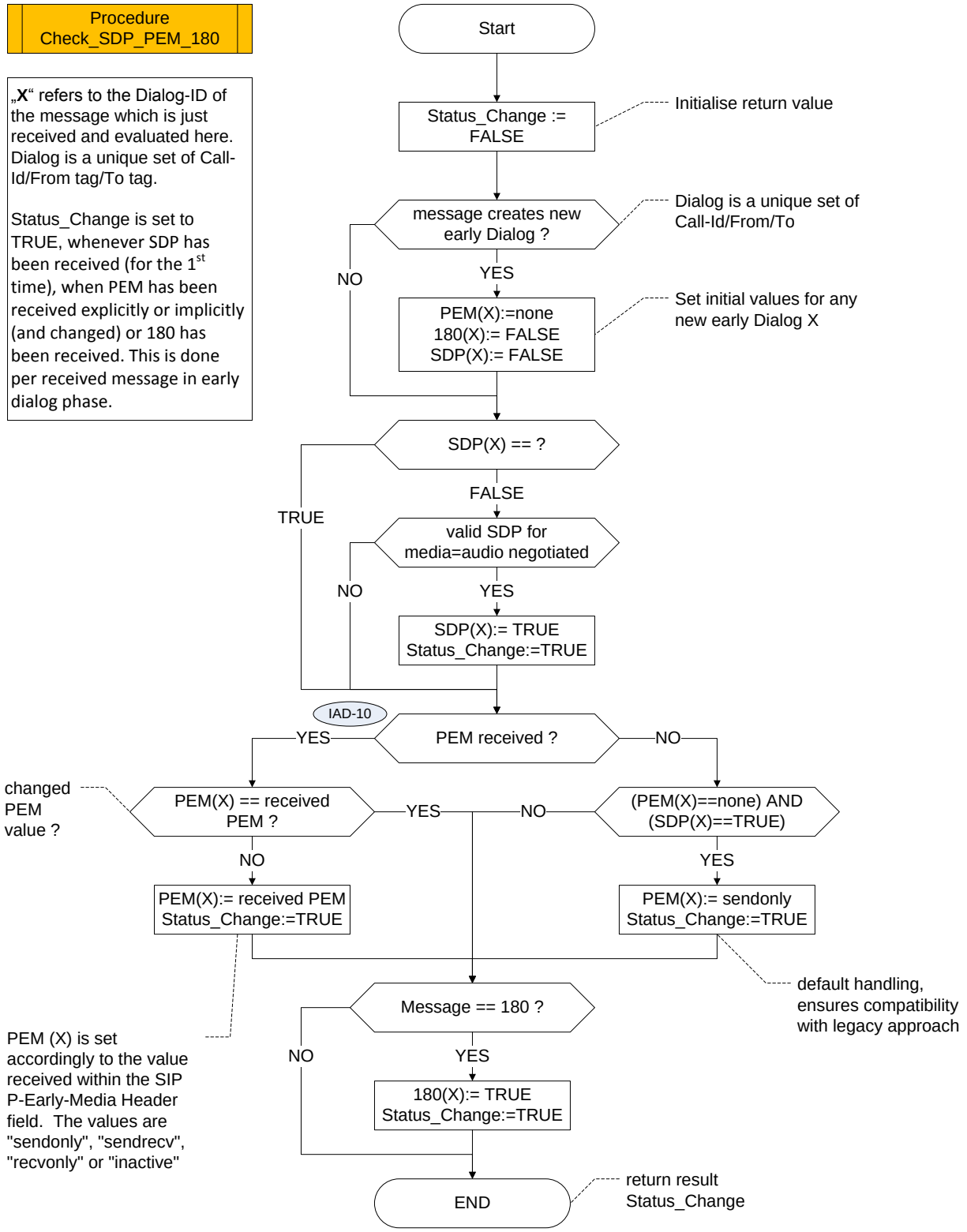


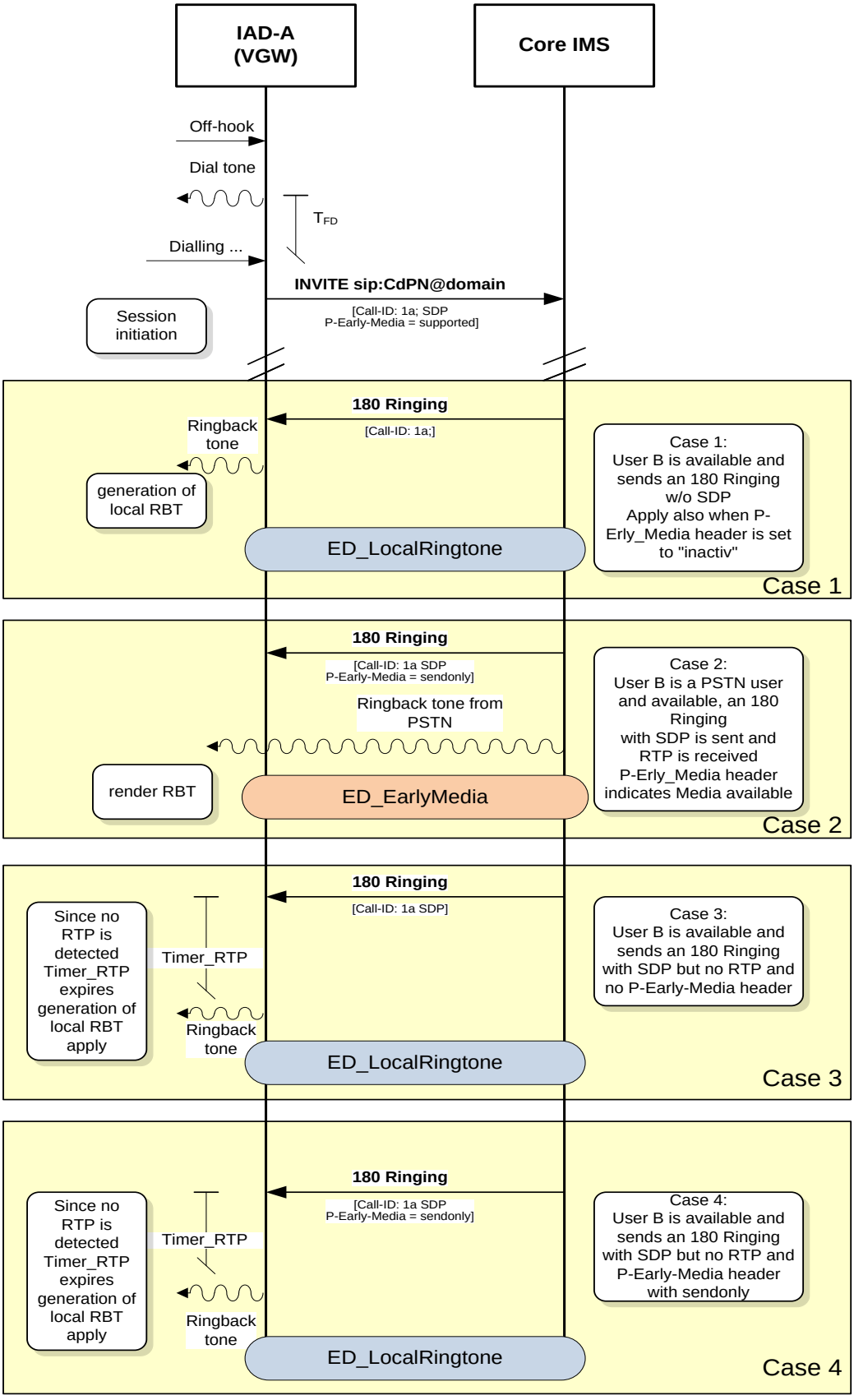
Figure A.2.4.2: State EarlyDialog_EarlyMedia & State EarlyDialog_LocalRingtone

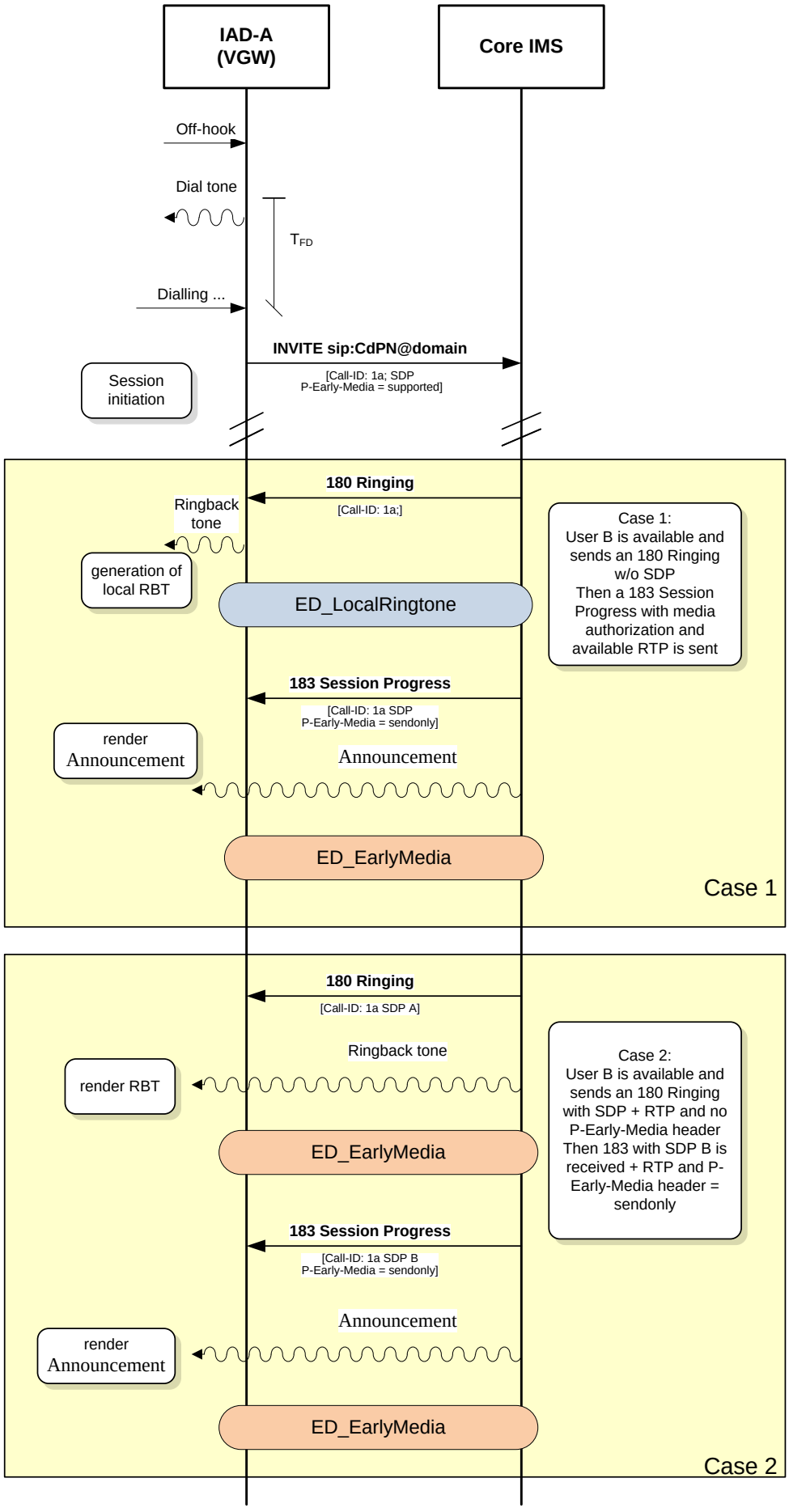
A.2.4 Procedure Check_SDP_PEM_180

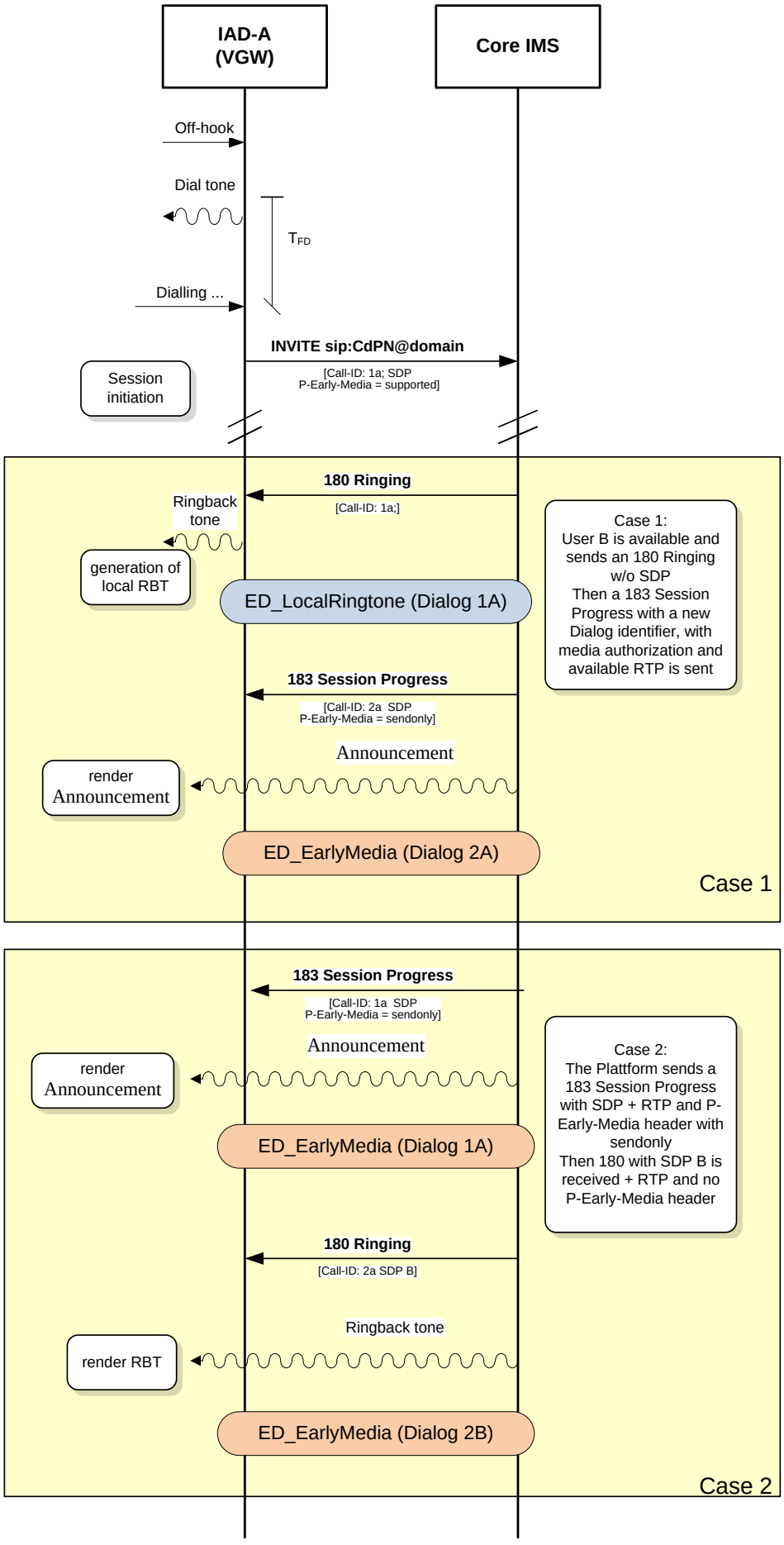


FigureA.2.5.1: Procedure Check_SDP_PEM_180

ANNEX B (informative) Call Flows




IAD-A
(VGW)
Core IMS
Off-hook
Dial tone
T_{FD}
Dialling ...
INVITE sip:CdPN@domain
[Call-ID: 1a; SDP
P-Early-Media = supported]
Session initiation
180 Ringing
[Call-ID: 1a;]
Ringback tone
generation of local RBT
ED_LocalRingtone
Case 1:
User B is available and sends an 180 Ringing w/o SDP
Then a 183 Session Progress with media authorization and available RTP is sent
183 Session Progress
[Call-ID: 1a SDP
P-Early-Media = sendonly]
render Announcement
Announcement
ED_EarlyMedia
Case 1
180 Ringing
[Call-ID: 1a SDP A]
Ringback tone
render RBT
ED_EarlyMedia
Case 2:
User B is available and sends an 180 Ringing with SDP + RTP and no P-Early-Media header
Then 183 with SDP B is received + RTP and P-Early-Media header = sendonly
183 Session Progress
[Call-ID: 1a SDP B
P-Early-Media = sendonly]
Announcement
render Announcement
ED_EarlyMedia
Case 2


IAD-A
(VGW)
Core IMS
Off-hook
Dial tone
T_{FD}
Dialling ...
INVITE sip:CdPN@domain
[Call-ID: 1a; SDP
P-Early-Media = supported]
Session initiation
180 Ringing
[Call-ID: 1a;]
Ringback tone
generation of local RBT
ED_LocalRingtone (Dialog 1A)
Case 1:
User B is available and sends an 180 Ringing w/o SDP
Then a 183 Session Progress with a new Dialog identifier, with media authorization and available RTP is sent
183 Session Progress
[Call-ID: 2a SDP
P-Early-Media = sendonly]
Announcement
render Announcement
ED_EarlyMedia (Dialog 2A)
Case 1
183 Session Progress
[Call-ID: 1a SDP
P-Early-Media = sendonly]
Announcement
render Announcement
ED_EarlyMedia (Dialog 1A)
Case 2:
The Plattform sends a 183 Session Progress with SDP + RTP and P-Early-Media header with sendonly
Then 180 with SDP B is received + RTP and no P-Early-Media header
180 Ringing
[Call-ID: 2a SDP B]
Ringback tone
render RBT
ED_EarlyMedia (Dialog 2B)
Case 2

ANNEX C History

Version	Published	Remarks
3.0.0		-locating P-CSCF and correct prioritization of P-CSCF in case of registration including maintenance procedures. -Preconditions support "passive" better described -Early-Media Header and indication of early media described to avoid misinterpretation. And allow handling of calls initiated by mobile devices. - use of from-change. No default setting - deletion of Annex A - SIP UPDATE of Annex B - Deletion of TS 124.503 - SIP UPDATE to 3GPP Release 11 documents -Correction of *# Procedures using PIN (ECT, OCB, Kick Out, Black List, White List, ACR, CB, ICB) - CLIR 3 included in D.2.0 - Documentation SIP UPDATE TIP/TIR and OIP/OIR -MWI voided - Documentation SIP UPDATE of " 8.6 Support of NAT traversal by the UE" -MIME Type SIP UPDATE Table 7-5 -SIP UPDATE Table 7-4 SIP Headers - add references TR-069, TR-104 and TR-181 - add reference 3GPP TS 23.003 - C.2.8 allow implementations acting on "application/vnd.3gpp.cw+xml" All changes are backward compatible with the procedures described within 1TR114 Version 2.4.0
Amendment 6	10.03.2016	Detailed description for use of P-Early-Media header as described in RFC5009 and procedures if this header is missing.