3GPP TSG CN Plenary Meeting #21 **NP-030330**
17th - 19th September 2003. Frankfurt, Germany.

Source: TSG CN WG3

Title: CRs on Rel-5 SCUDIF.

Agenda item: 8.7

Document for: APPROVAL

Introduction:

This document contains **3** CRs on **Rel-5 SCUDIF,** including the corresponding mirror CRs (as required).

These CRs have been agreed by TSG CN WG3 and are forwarded to TSG CN Plenary meeting for approval.

WG_tdoc	Title	Spec	CR	Rev	Cat	Rel	C_Ver
N3-030614	SCUDIF HLR Interrogation	23.172	016	2	F	Rel-5	5.1.0
N3-030662	Repeat subscription checking in MO SCUDIF call	23.172	015	4	F	Rel-5	5.1.0
N3-030644	Supplementary service interaction with SCUDIF calls	23.172	014	3	F	Rel-5	5.1.0

3GPP TSG CN WG3 Meeting #29 ***N3-030614***
Sophia Antipolis, FRANCE, 25th – 29th August 2003 *N3-030510,N3-030590*

CR-Form-v7

CHANGE REQUEST

⌘ **23.172** **CR** **016** ⌘**rev** **2** ⌘ Current version: **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	HLR Interrogation for SCUDIF calls
Source:	⌘	TSG_CN WG3 [L.M. Ericsson, NTT DoCoMo]
Work item code:	⌘	SCUDIF ***Date:*** ⌘ 1/09/2003
Category:	⌘	**F** ***Release:*** ⌘ Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	No proper checking of subscription and forwarding options are performed by the GMSC for services provided by SCUDIF (speech and multimedia) Procedures (SIFIC) for subscription checking at the terminating side do not include the second service
Summary of change:	⌘	The Send Routing Information procedure is updated to allow the subscription check of both services, and the procedures for both the HLR and GMSC are specified.
Consequences if not approved:	⌘	No check is possible in the GMSC for one of the services (speech or multimedia) requested in the codec list. The subscription and call forwarding state of the services offered by the SCUDIF feature (speech and multimedia) cannot be properly checked. The terminating side cannot query properly the VLR for both services.

Clauses affected:	⌘	2, 3.2, 4.2.2, 4.3.3

Other specs affected: ⌘

Y	N		
X		Other core specifications	⌘ 29.002-613, 23.018-133, 23.172-015.
	X	Test specifications	
	X	O&M Specifications	

Other comments:	⌘	Update (N3-030614): Basic Call Handling related procedures have been moved to a separate CR to 23.018 (N4-031025 - CR 133). This CR has been reformated to only include SCUDIF specific procedures, and refer to 23.018.

First Modified Section

2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.153: "Out of Band Transcoder Control; Stage 2".

[3] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core network protocols; Stage 3".

[4] 3GPP TS 26.103: "Speech Codec List for GSM and UMTS".

[5] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[6] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[7] 3GPP TS 29.205: "Application of Q.1900 series to bearer-independent circuit-switched core network architecture; Stage 3".

[8] 3GPP TS 22.101: "Service aspects; Service principles".

[9] 3GPP TS 33.106: "3GPP Security; Lawful Interception Requirements".

[x] 3GPP TS 23.018: "Basic Call Handling ; Technical Realization"

[y] 3GPP TS 23.003: "Numbering, adressing and identification"

Next Modified Section

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply:

~~Editor's note: To be completed.~~

BC	Bearer Capability
BC1	First Bearer Capability in a message (preferred service)
BC2	Second Bearer Capability in a message (less preferred service)
BCa	Bearer Capability of the currently selected service
BCb	Bearer Capability of the service to switch to
BCmm	Bearer Capability multimedia
BCsp	Bearer Capability speech
MMI	Man-Machine Interface
O-MSC	Originating MSC

O-UE	Originating UE
RI	Repeat Indicator
SCUDIF	Service Change and UDI/RDI Fallback
T-MSC	Terminating MSC
T-UE	Terminating UE

Next Modified Section

4.2.2 Mobile terminating side

When the terminating MSC receives a request for a multimedia call, it shall check if the called user is provisioned for the service (see subclause 4.2.2.1).

The terminating MSC shall include in the SETUP message towards the UE both BC-IEs in the same order as indicated by the incoming request together with the Repeat Indicator set to "service change and fallback in order to invoke the SCUDIF functionality in the called terminal (see figure 4.5).

The terminating UE, based on its capabilities and internal settings, may return the two BC-IEs in the same order (or no BC to indicate that it accepts the proposed settings - see figure 4.6), reversed order (see figure 4.7), or just one BC-IE (either speech or multimedia - see figure 4.8) to the terminating MSC in the CALL CONFIRMED message.

In the case the UE ignores the SETUP message due to the presence of a reserved value for the Repeat Indicator, it sends a STATUS message back to the terminating MSC (see figure 4.9), with the Cause Value set to #100, "Conditional IE error" (see 3GPP TS 24.008 [3], clause 8.7.2). The terminating MSC shall then react according to 3GPP TS 24.008 [3], clause 5.5.3.2.2 and it shall send a new SETUP message with a single BC, either the preferred service BC-IE or the speech BC-IE (fallback to speech), depending on configuration. The call setup then proceeds accordingly.

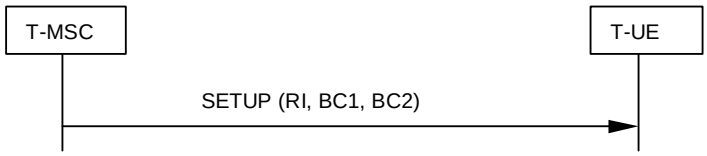
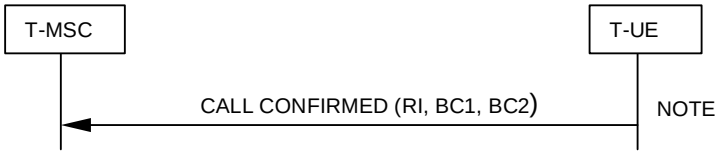


Figure 4.5: SETUP message towards the terminating UE



NOTE: The UE may send the CALL CONFIRMED message without RI and BCs to indicate that it accepts the proposed settings sent in the SETUP message.

Figure 4.6: Normal case

Figure 4.7: Reversed call setup

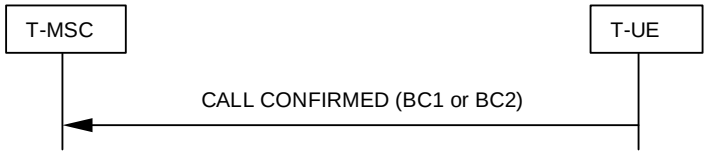
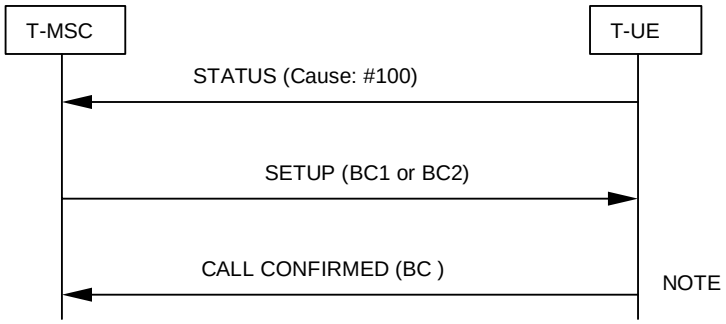


Figure 4.8: Fallback case



NOTE: The UE may send the CALL CONFIRMED message without BC to indicate that it accepts the proposed settings sent in the SETUP message.

Figure 4.9: UE not supporting the RI value

4.2.2.1 Subscription checking

The functional behaviour of the terminating MSC and VLR is specified in 3GPP TS 23.018 [x]. The procedure specific to SCUDIF calls is specified in this subclause.

For mobile terminating SCUDIF calls, the MSC shall convert the services received in the incoming request to two individual Basic Service codes, and include them in Send Info For Incoming Call. The VLR shall check the subscription for those basic services, then indicate the availability of each basic service to the MSC by Complete Call. If both services are not provisioned, the VLR shall send Send Info for Incoming Call negative response to the MSC. The MSC shall fall back to the allowed service if the availability of only one service is indicated. The MSC shall continue as a SCUDIF call if the availability of both services is indicated.

4.2.2.1.1 Send Info For Incoming Call

Send Info For Incoming Call contains the following SCUDIF specific information elements:

Information element name	Required	Description
Bearer Service 2	C	Bearer Service 2 required for the MT call, derived from the less preferred service indicated in the incoming IAM of a SCUDIF call. For a SCUDIF call, one of Bearer service 2 or Teleservice 2 shall be present.
Teleservice 2	C	Teleservice 2 required for the MT call, derived from the less preferred service indicated in the incoming IAM of a SCUDIF call. For a SCUDIF call, one of Bearer service 2 or Teleservice 2 shall be present.

4.2.2.1.2 Complete Call

The parameters described in subclause 4.2.1.1.2 "Complete Call" for the mobile originating MSC are also applicable to the mobile terminating MSC.

Next Modified Section

4.3.3 Terminating side

4.3.3.1 HLR Interrogation

The GMSC sends the Send Routing Information request with both the Network Signal Information and Network Signal Information 2 parameters. The Network Signal Information shall include the ISDN BC IE for the preferred service, and the Network Signal Information 2 includes the ISDN BC IE for the less preferred service.

The functional behaviour of the HLR is described in 3GPP TS 23.018 [x]. The procedures specific to SCUDIF calls are specified in the subclause 4.3.3.1.3 for the HLR and 4.3.3.1.4 for the GMSC. The information elements specific to SCUDIF between the GMSC and the HLR are specified in subclauses 4.3.3.1.1 and 4.3.3.1.2.

4.3.3.1.1 Send Routing Info

The following element specific to SCUDIF calls is defined for Send Routing Info:

Information element name	Required	Description
ISDN BC 2	C	ISDN bearer capability 2. Shall be present for a SCUDIF call to indicate the less preferred service.
ISDN LLC 2	C	ISDN lower layer compatibility 2. Shall be present for a SCUDIF call if necessary for the less preferred service, otherwise shall be absent.
ISDN HLC 2	C	ISDN higher layer compatibility 2. Shall be present for a SCUDIF call if necessary for the less preferred service,otherwise shall be absent.

4.3.3.1.2 Send Routing Info Ack

The following elements specific to SCUDIF calls are defined for Send Routing Info Ack:

Information element name	Required	Description
Roaming number 2	C	E.164 number required to route the call to VMSCB (see 3GPP TS 23.003 [y]) for the less preferred service of a SCUDIF call. Shall be present for a SCUDIF call if Roaming Number is present and the less preferred service is available and not forwarded, otherwise shall be absent.
Forwarded-to number 2	C	E.164 number of the C subscriber for the less preferred service of a SCUDIF call. Shall be present if the HLR has determined that the less preferred service of a SCUDIF call is to be forwarded, otherwise shall be absent.
Forwarded-to subaddress 2	C	Subaddress of the C subscriber (see 3GPP TS 23.003 [y]) for the less preferred service of a SCUDIF call. Shall be present if the HLR has determined that the less preferred service of a SCUDIF call is to be forwarded and a forwarded-to subaddress is stored in the HLR in association with the forwarded-to number 2, otherwise shall be absent.
Notification to calling party 2	C	Indication of whether the calling party is to be notified that the call has been forwarded if the less preferred service of a SCUDIF call is kept. Shall be present if the HLR has determined that the less preferred service of a SCUDIF call is to be forwarded, otherwise shall be absent.
Forwarding reason 2	C	Indication of why the call has been forwarded (unconditionally or on mobile subscriber not reachable) for the less preferred service of a SCUDIF call. Shall be present if the HLR has determined that the less preferred service of a SCUDIF call is to be forwarded, otherwise shall be absent.
Basic Service Code 2	C	Indicates the type of the basic service for the less preferred service, *i.e.* teleservice or bearer service.
Allowed Services	C	Shall be present for SCUDIF calls. Indicates which services are available for that call.
Unavailability Cause	C	Indicates the reason for which one of the services of a SCUDIF call is not available. Shall be present for SCUDIF calls if one service is not available.

4.3.3.1.3 Handling of mobile terminating calls in the HLR

The procedures specific to SCUDIF calls in the HLR are specified within this subclause:

- Procedure SCUDIF_Subscription_Check_HLR
- Procedure SCUDIF_CAMEL_CSI_Check_HLR
- Procedure SCUDIF_Set_Second_Service_when_Forwarded
- Procedure SCUDIF_Set_Correct_PLMN_BC
- Procedure SCUDIF_Check_Second_Service_before_Negative_Response
- Procedure SCUDIF_Check_Second_Service_after_PRN
- Procedure SCUDIF_Check_Second_Service_when_Forwarded

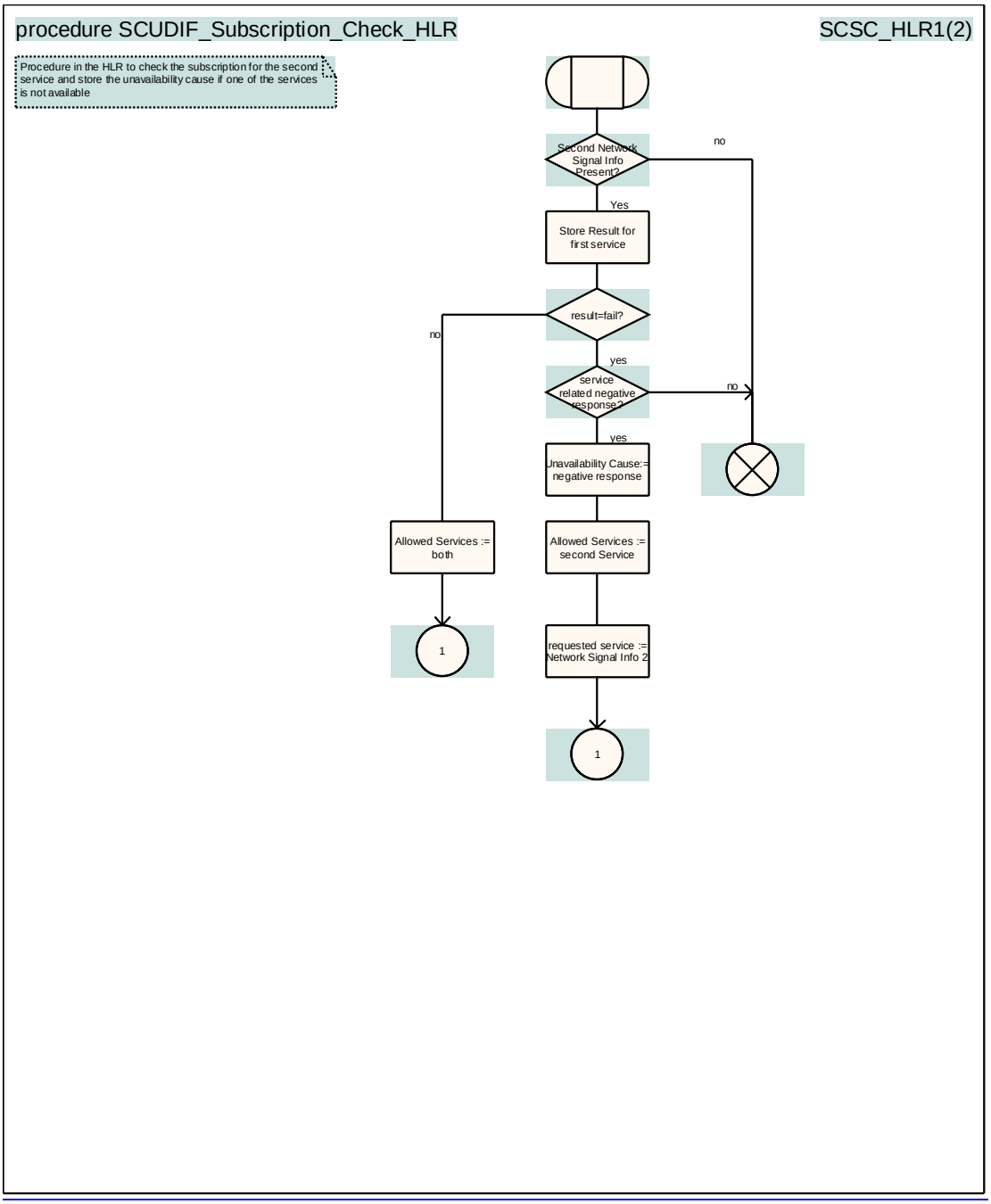


Figure 4.16A: Procedure SCUDIF_Subscription_Check_HLR (sheet 1)

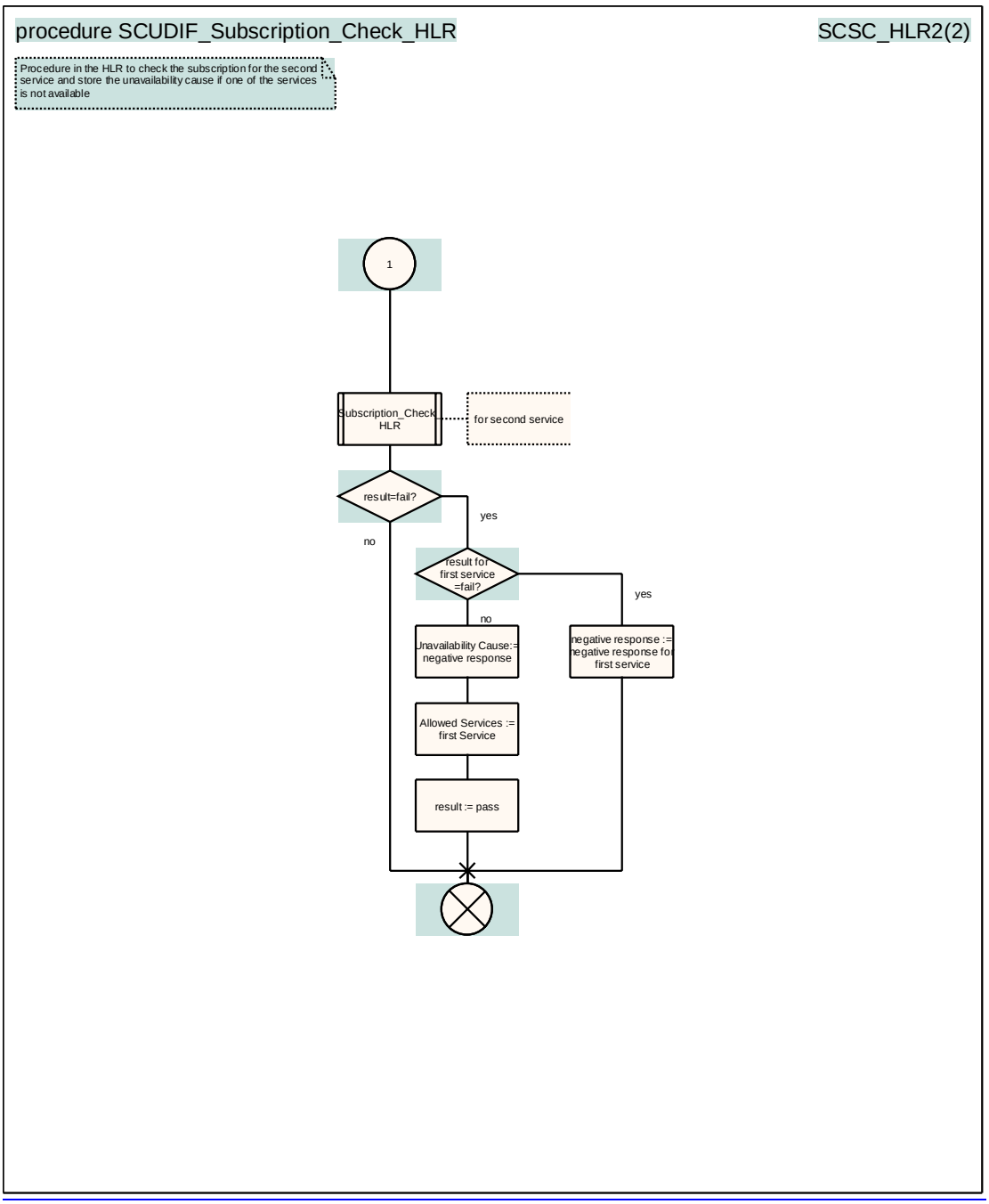


Figure 4.16B: Procedure SCUDIF_Subscription_Check_HLR (sheet 2)

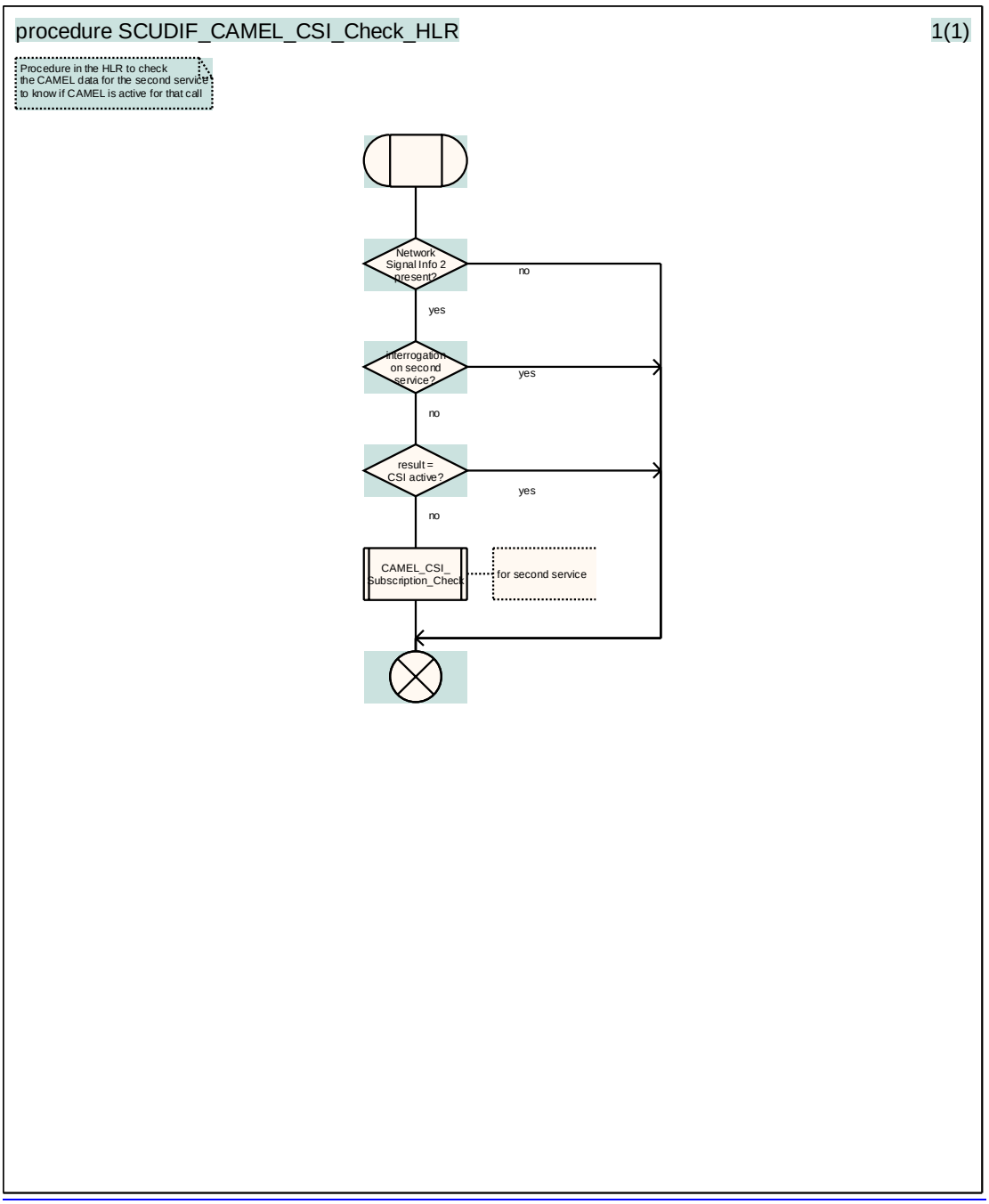


Figure 4.16C: Procedure SCUDIF_CAMEL_CSI_Check_HLR

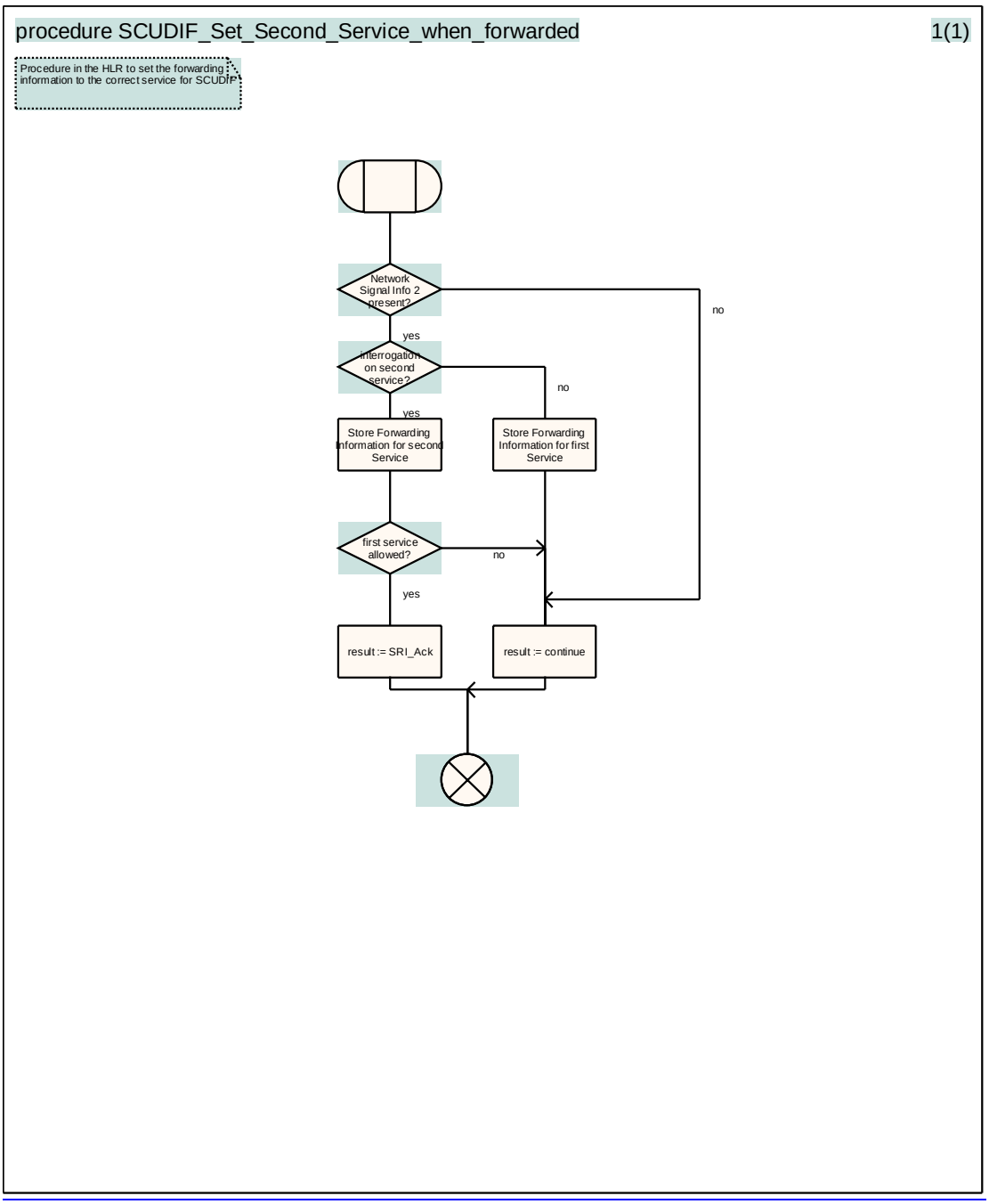


Figure 4.16D: Procedure SCUDIF_Set_Second_Service_when_Forwarded

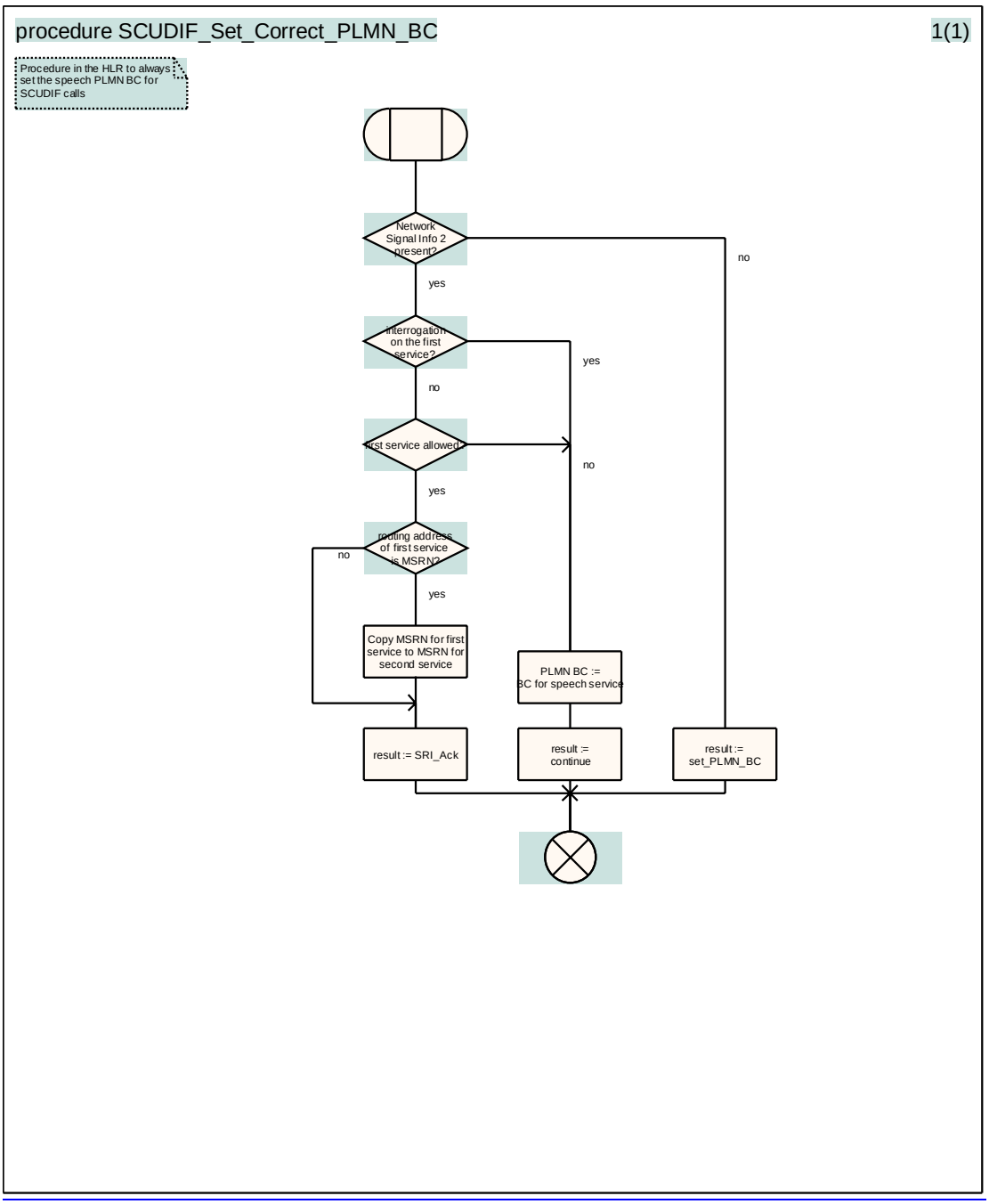


Figure 4.16E: Procedure SCUDIF_Set_Correct_PLMN_BC

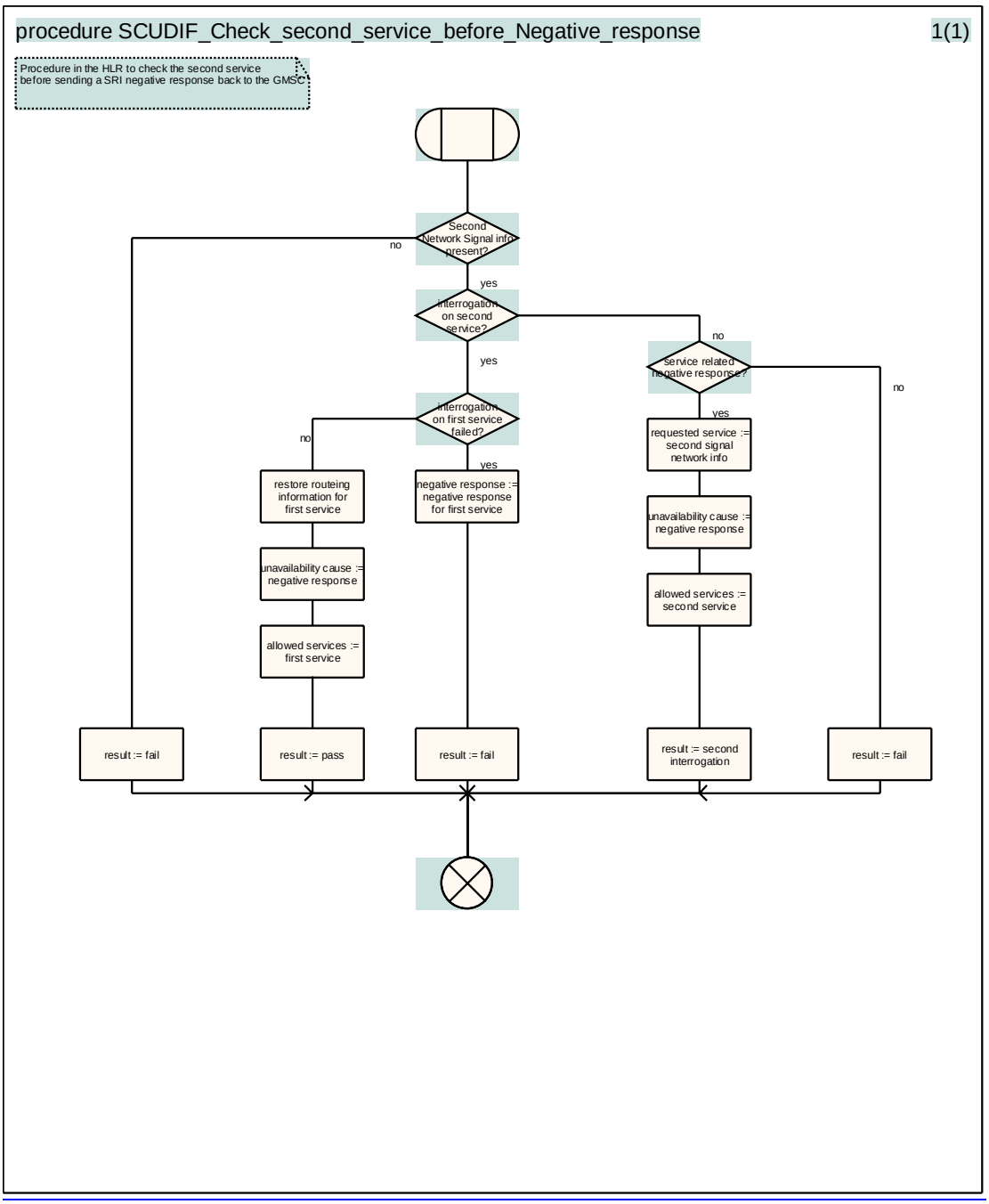


Figure 4.16F: Procedure SCUDIF_Check_Second_Service_before_Negative_Response

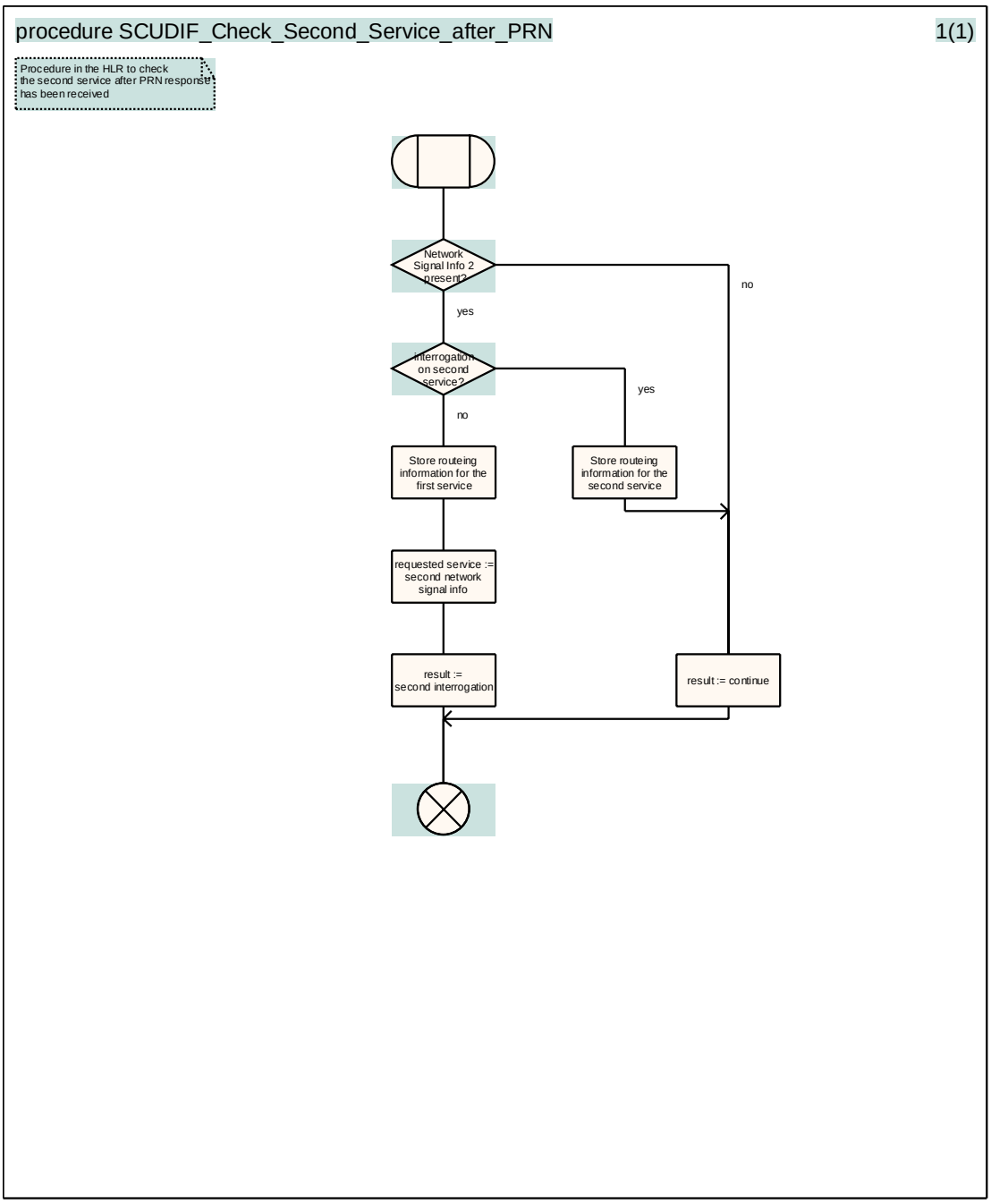


Figure 4.16G: Procedure SCUDIF_Check_Second_Service_after_PRN

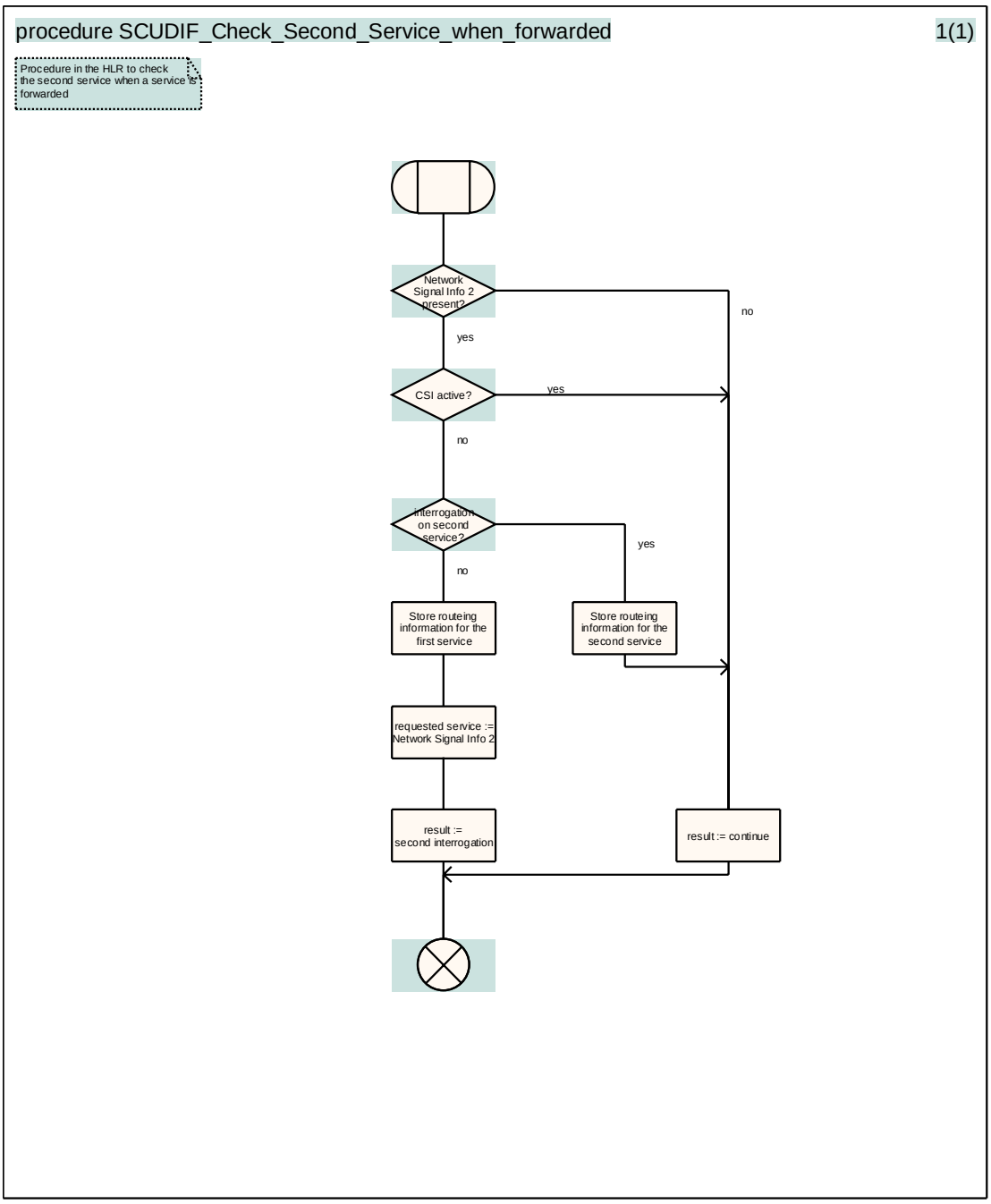


Figure 4.16H: Procedure SCUDIF_Check_Second_Service_when_Forwarded

4.3.3.1.4 Handling of mobile terminating calls in the GMSC

The procedures specific to SCUDIF calls in the GMSC are specified within this subclause:

- Procedure SCUDIF_Negative_SRI_Response_Handling
- Procedure SCUDIF_Check_Service_Availability
- Procedure SCUDIF_Check_Service_Compatibility

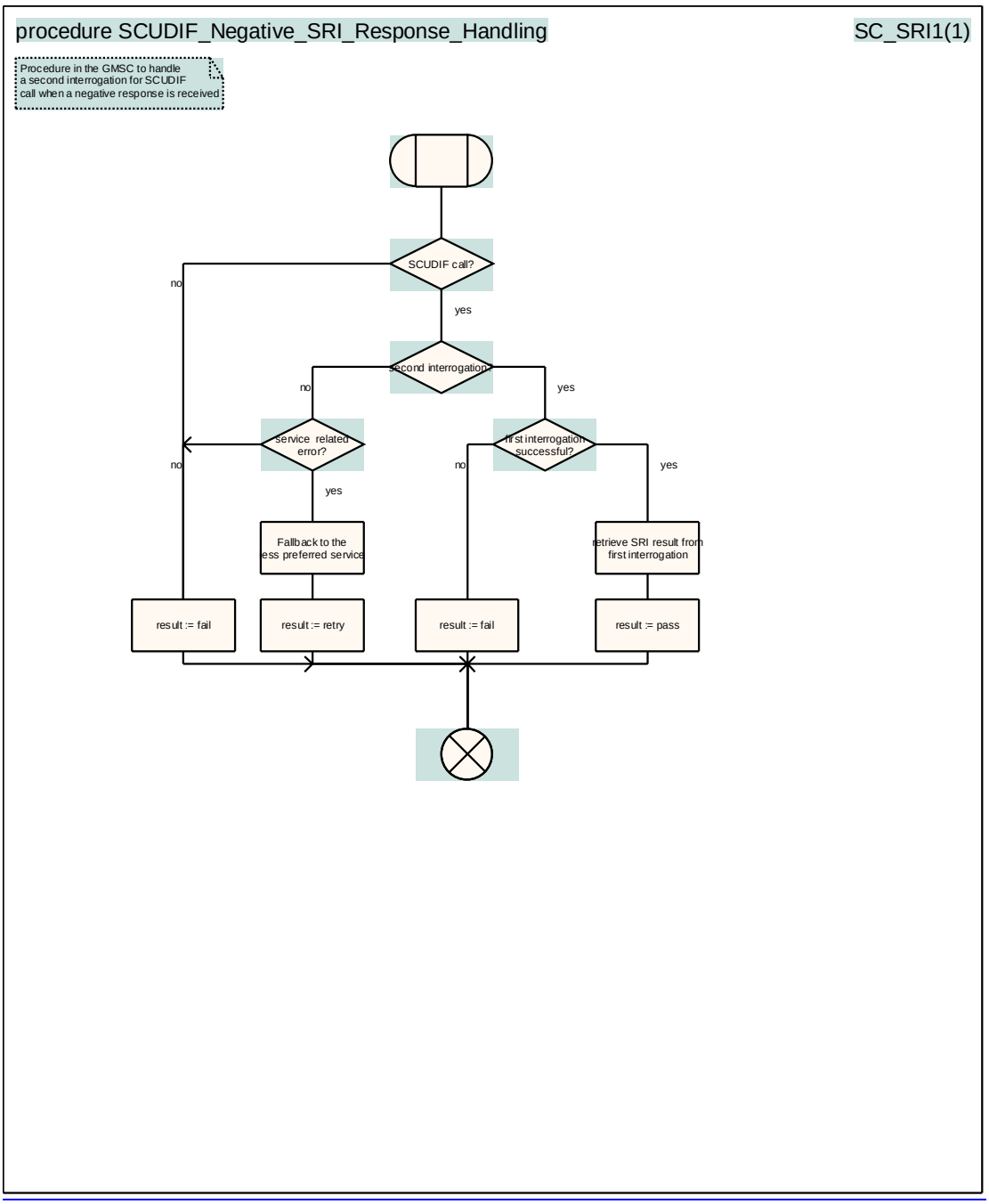


Figure 4.16I: Procedure SCUDIF_Negative_SRI_Response_Handling

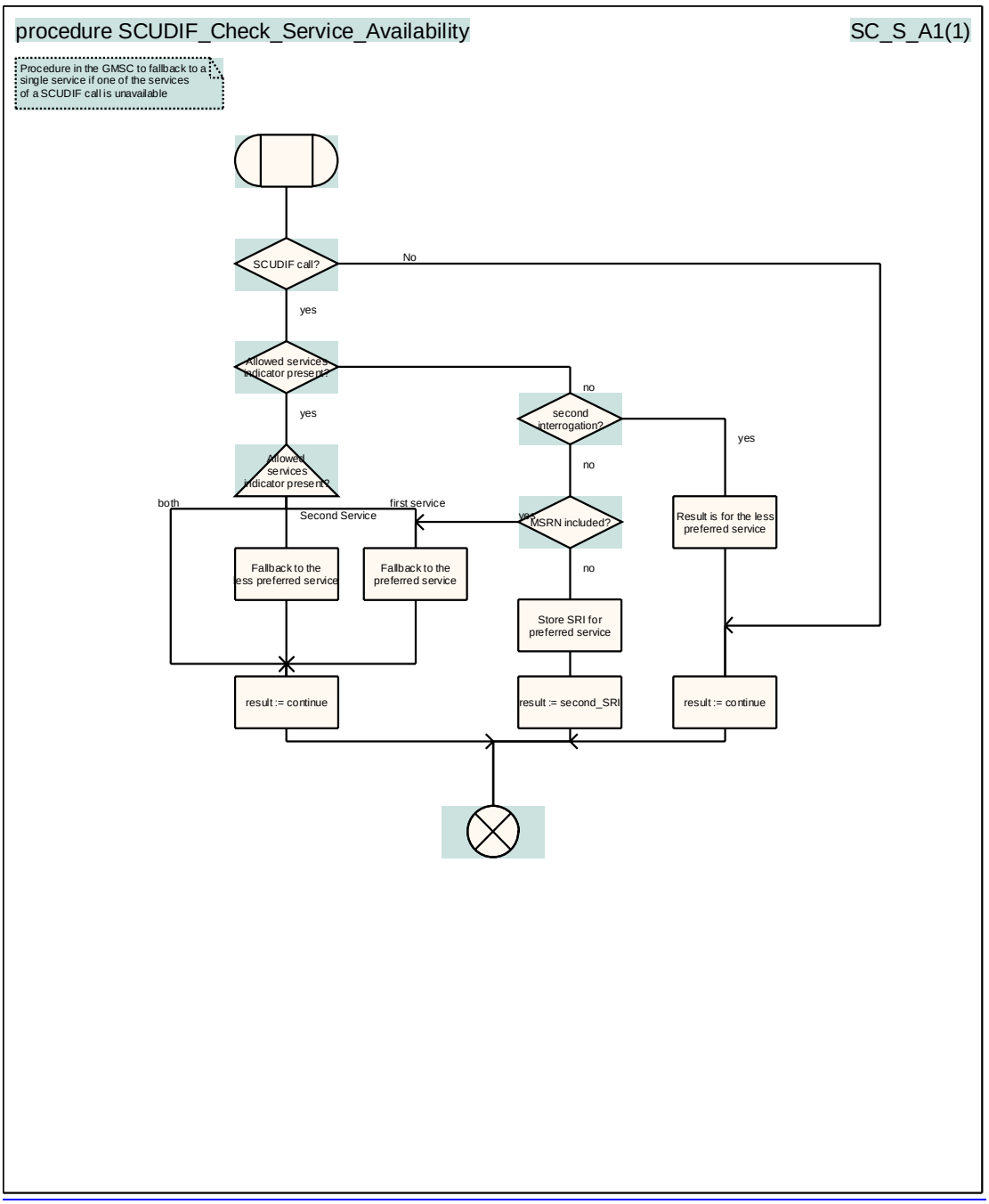


Figure 4.16J: Procedure SCUDIF_Check_Service_Availability

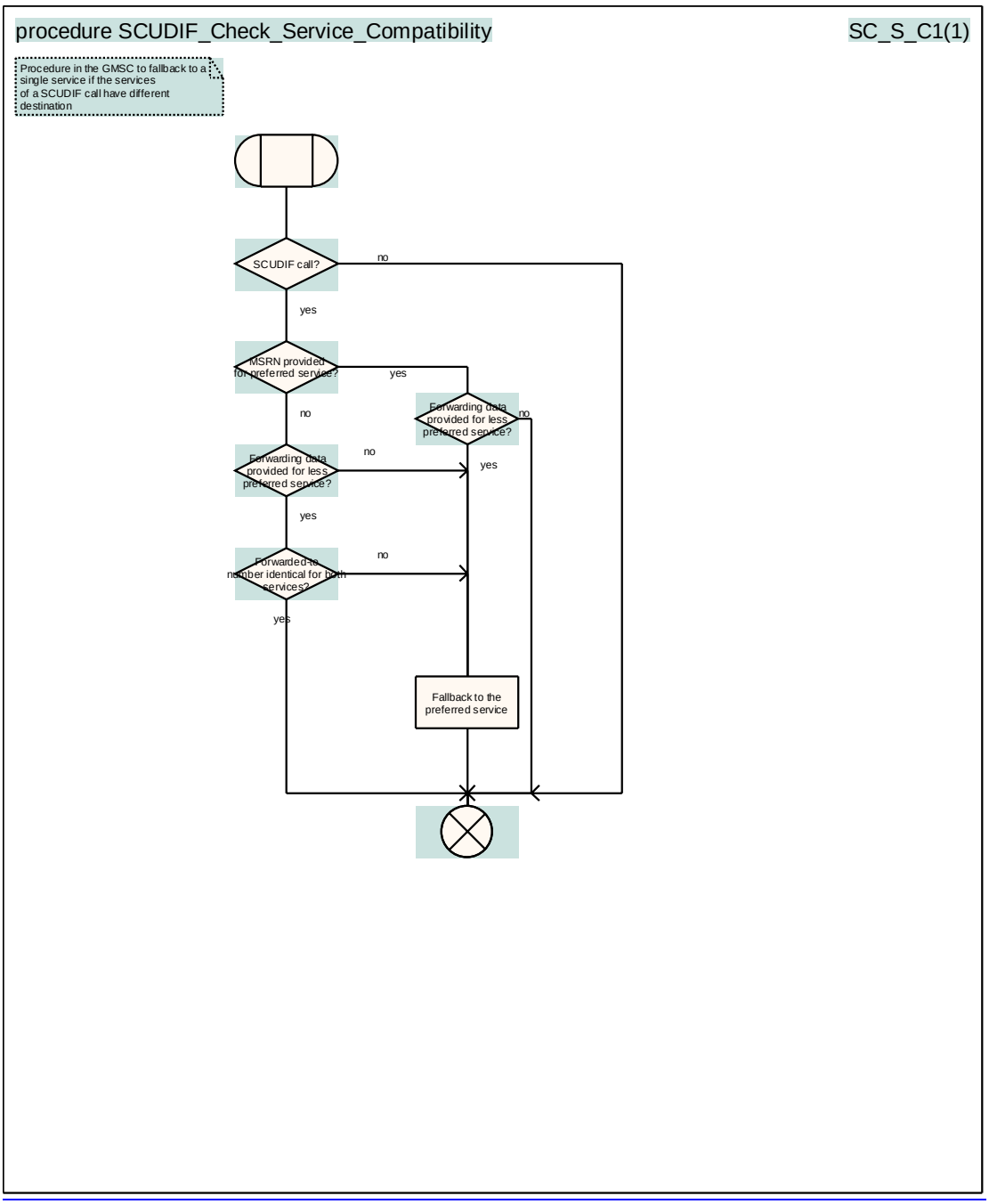


Figure 4.16K: Procedure SCUDIF_Check_Service_Compatibility

4.3.3.2 Terminating MSC Handling

The terminating MSC receives the list of supported codec types, including the 3G-324.M codec. It shall then send a SETUP message towards the terminating UE including a Repeat Indicator with the value "service change and fallback" and two BC-IEs, according to the following rule:

- if the 3G-324.M codec is the first (preferred) codec in the list of supported codecs, then the first BC-IE in the SETUP message is the multimedia BC-IE, and the second BC-IE is the speech BC-IE (see figure 4.17);
- if the 3G-324.M codec is in the list of supported codec types, but not in the first position, then the first BC-IE in the SETUP message is the speech BC-IE, and the second BC-IE is the multimedia BC-IE (see figure 4.18).

The terminating UE answers according to its capabilities in the CALL CONFIRMED message. The terminating MSC shall determine the Selected Codec and construct the list of available codecs according to the following rules:

- if no Repeat Indicator is included, and only a speech BC-IE is received, the MSC shall choose a speech codec as the Selected Codec according to the normal mechanism, and no 3G-324.M codec shall be inserted in the list of available codecs (see figure 4.19);
- if no Repeat Indicator is included, and only a multimedia BC-IE is received, the MSC shall choose the 3G-324.M codec as the Selected Codec, and only the 3G-324.M codec shall be inserted in the list of available codecs (see figure 4.20);
- if the Repeat Indicator is included, and the speech BC_IE is the first BC-IE and the multimedia BC-IE is the second BC-IE, the MSC shall choose a speech codec as the Selected Codec according to the normal mechanism, and both the 3G-324.M codec and speech codecs shall be inserted in the list of available codecs (see figure 4.21);
- if the Repeat Indicator is included, and the multimedia BC-IE is the first BC-IE and the speech BC-IE is the second BC-IE, the Selected Codec shall be the 3G-324.M codec, and both the 3G-324.M codec and speech codecs shall be inserted in the list of available codecs (see figure 4.22).

NOTE: If the UE sends a CALL CONFIRMED message without Repeat Indicator and BCs, it indicates that it accepts the proposed settings sent in the SETUP message, which are then used by the MSC to select the relevant case.

The Selected Codec and the list of available codecs shall be sent back to the originating MSC according to the normal codec negotiation procedure.

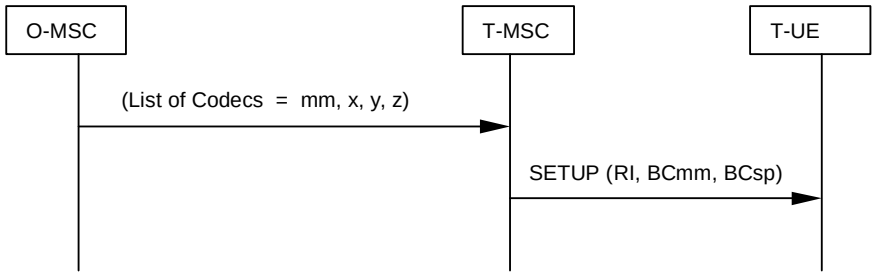


Figure 4.17: 3G-324M codec first

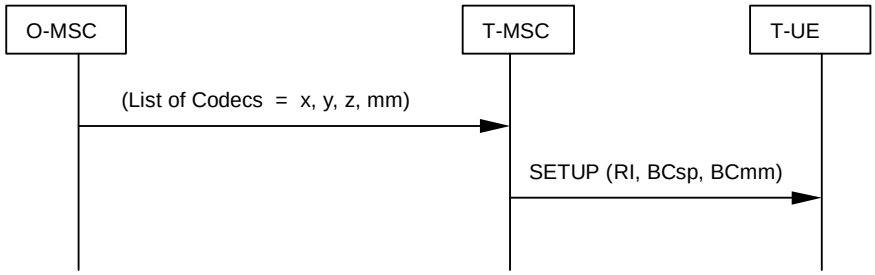
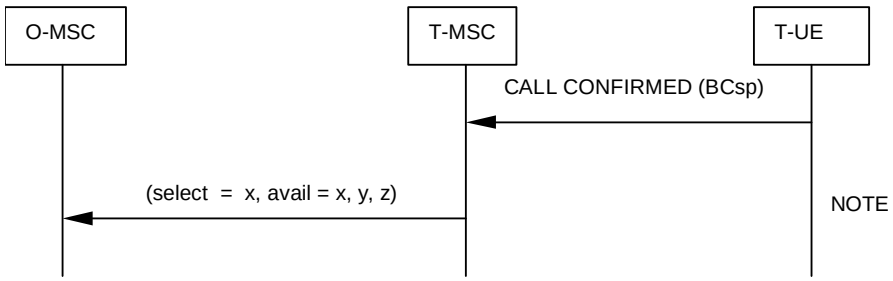


Figure 4.18: Speech codec first



NOTE: The actual speech codec is selected according to OoBTC procedures.

Figure 4.19: Speech only

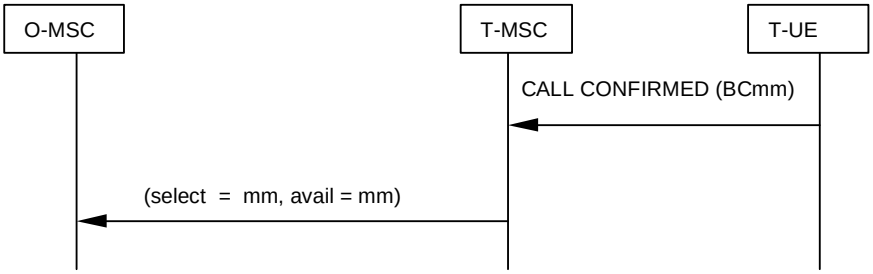
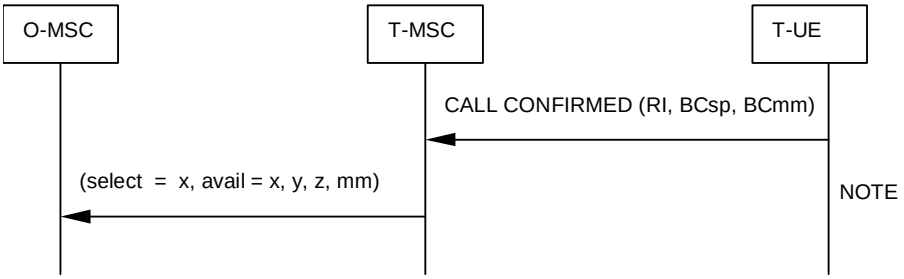
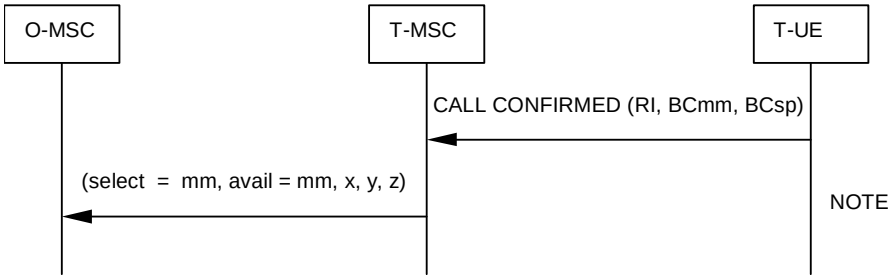


Figure 4.20: Multimedia only



NOTE: The actual speech codec is selected according to OoBTC procedures.

Figure 4.21: Speech preferred



NOTE: The actual list of speech codecs is built according to OoBTC procedures.

Figure 4.22: Multimedia preferred

End of the document

3GPP TSG-CN WG3 Meeting #29
3GPP TSG-CN WG4 Meeting #20 ***N3-030644***
Sophia Antipolis, France. 25th - 29th August 2003.

CR-Form-v7

CHANGE REQUEST

⌘ **23.172** **CR** **014** ⌘ **rev** **3** ⌘ Current version: **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Interaction with supplementary services in case of SCUDIF calls
Source:	⌘	TSG_CN WG3 [NTT DoCoMo, LM Ericsson]
Work item code:	⌘	SCUDIF ***Date:*** ⌘ 25/08/2003
Category:	⌘	**F** ***Release:*** ⌘ Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Interaction between SCUDIF calls and supplementary services are not clarified. And that should be described seperately with the normal procedures which has no interaction.
Summary of change:	⌘	A new section is added to descibe the interaction with supplementary services, which are on basic service group basis.
Consequences if not approved:	⌘	The action remains unclear when a SCUDIF call which has two bearer information interacts with supplementary services.

Clauses affected:	⌘	4.3

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	23.079, 29.002
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<<First Modified Section>>

4.3 Core Network procedures

In order to provide the capability in the network to transmit the request for service change and fallback both at call setup and during the active state of a call, the normal Out-of-Band Transcoder Control procedures, described in 3GPP TS 23.153 [2] shall be used. The following text describes the codec to be used, the mapping between the terminal interface described above, and the different IEs to be used for the codec negotiation procedures at both the originating and the terminating MSC.

4.3.1 Multimedia codec

The codec negotiation procedures transmit an ordered list of preferred codecs from the originating to the terminating MSC. A node that requires interaction with the user plane will remove the codecs it does not support. The terminating MSC shall select the codec to use ("selected codec") from the list of available codecs for the call. This selection shall be based on the received list of codecs and on the information given by the terminating UE in the CALL CONFIRMED message.

A dummy codec (defined in 3GPP TS 26.103 [4]) is included in the codec list to indicate that a multimedia call is requested. This codec is in the present document referred to as the 3G-324.M codec.

This codec is only used by the Core Network and shall not be sent from the terminal in the Supported Codec List IE.

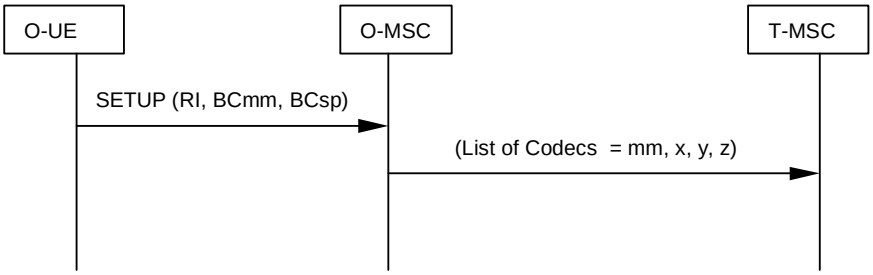
4.3.2 Originating side - initiation of call setup

The originating MSC has a list of supported codec types, listed in order of preference.

If the SETUP message received from the UE contains a Repeat Indicator with a value of "service change and fallback", in addition to a multimedia BC-IE and a speech BC-IE, the MSC shall include a 3G-324.M codec in the list of supported codec types according to the following rule:

- if the multimedia BC-IE is listed first, then the 3G-324.M codec shall be the first codec in the list (see figure 4.15);
- if the speech BC-IE is listed first, then the 3G-324.M codec shall be the last codec in the list (see figure 4.16). In the case that the maximum number of codecs is already reached before insertion of the 3G-324M codec, the optional speech codec with the least preference shall be replaced by the 3G-324.M codec.

The list shall then be sent according to the Out-of-Band Transcoder Control codec negotiation procedures. The TMR field, although mandatory BICC/ISUP parameter, has no meaning when using OoBTC/BICC codec negotiation (the link characteristics and QoS are determined from the codec type and signalled to any intermediate switches via the bearer control protocol) and thus shall be set arbitrarily to "speech". A transit node that requires interaction with the user plane will remove from the list the codecs it does not support. If the 3G-324.M codec is not supported, and thus removed, the call shall be turned into a normal speech call (fallback to speech) and follow the normal call setup procedures.



x, y, z: speech codecs.
mm: dummy multimedia codec.

Figure 4.15: Multimedia BC as first BC

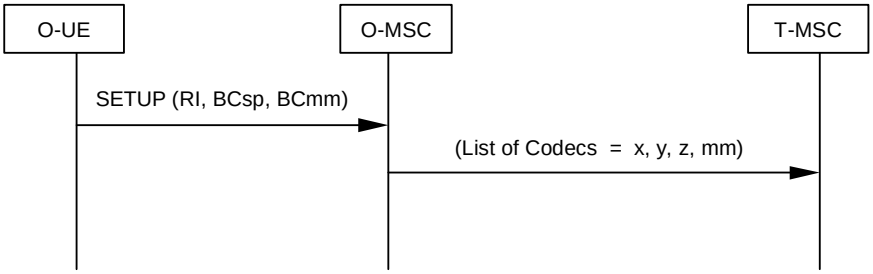


Figure 4.16: Speech BC as first BC

4.3.3 Terminating side

The terminating MSC receives the list of supported codec types, including the 3G-324.M codec. It shall then send a SETUP message towards the terminating UE including a Repeat Indicator with the value "service change and fallback" and two BC-IEs, according to the following rule:

- if the 3G-324.M codec is the first (preferred) codec in the list of supported codecs, then the first BC-IE in the SETUP message is the multimedia BC-IE, and the second BC-IE is the speech BC-IE (see figure 4.17);
- if the 3G-324.M codec is in the list of supported codec types, but not in the first position, then the first BC-IE in the SETUP message is the speech BC-IE, and the second BC-IE is the multimedia BC-IE (see figure 4.18).

The terminating UE answers according to its capabilities in the CALL CONFIRMED message. The terminating MSC shall determine the Selected Codec and construct the list of available codecs according to the following rules:

- if no Repeat Indicator is included, and only a speech BC-IE is received, the MSC shall choose a speech codec as the Selected Codec according to the normal mechanism, and no 3G-324.M codec shall be inserted in the list of available codecs (see figure 4.19);
- if no Repeat Indicator is included, and only a multimedia BC-IE is received, the MSC shall choose the 3G-324.M codec as the Selected Codec, and only the 3G-324.M codec shall be inserted in the list of available codecs (see figure 4.20);
- if the Repeat Indicator is included, and the speech BC_IE is the first BC-IE and the multimedia BC-IE is the second BC-IE, the MSC shall choose a speech codec as the Selected Codec according to the normal mechanism, and both the 3G-324.M codec and speech codecs shall be inserted in the list of available codecs (see figure 4.21);
- if the Repeat Indicator is included, and the multimedia BC-IE is the first BC-IE and the speech BC-IE is the second BC-IE, the Selected Codec shall be the 3G-324.M codec, and both the 3G-324.M codec and speech codecs shall be inserted in the list of available codecs (see figure 4.22).

NOTE: If the UE sends a CALL CONFIRMED message without Repeat Indicator and BCs, it indicates that it accepts the proposed settings sent in the SETUP message, which are then used by the MSC to select the relevant case.

The Selected Codec and the list of available codecs shall be sent back to the originating MSC according to the normal codec negotiation procedure.

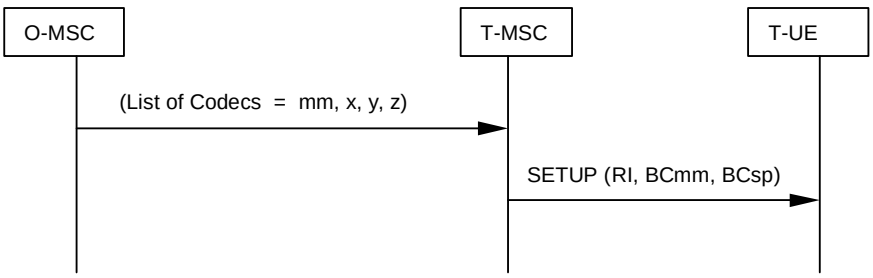


Figure 4.17: 3G-324M codec first

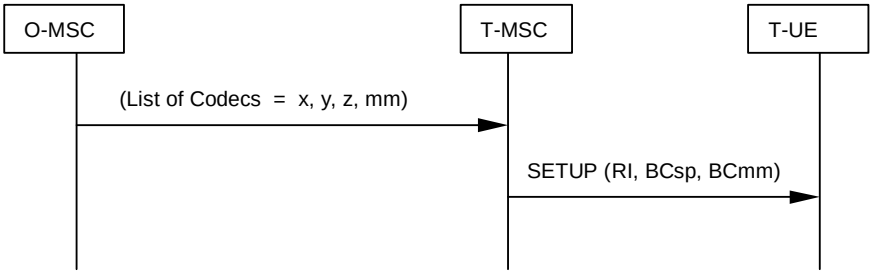
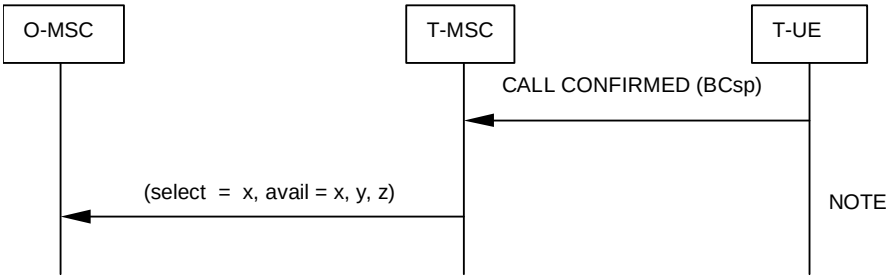


Figure 4.18: Speech codec first



NOTE: The actual speech codec is selected according to OoBTC procedures.

Figure 4.19: Speech only

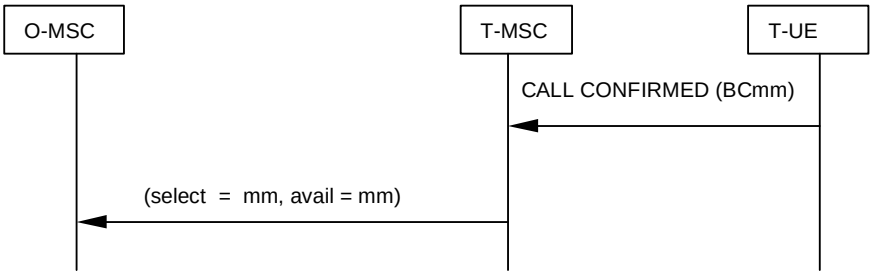
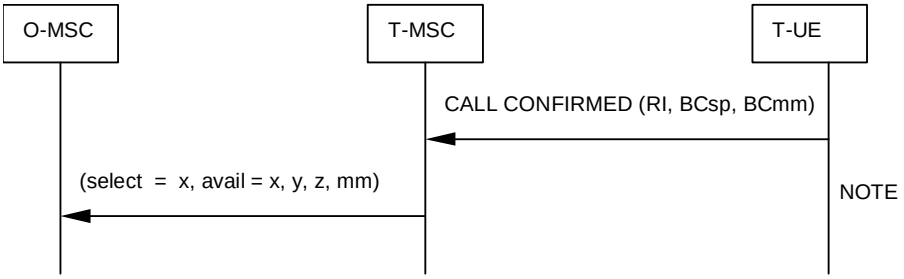
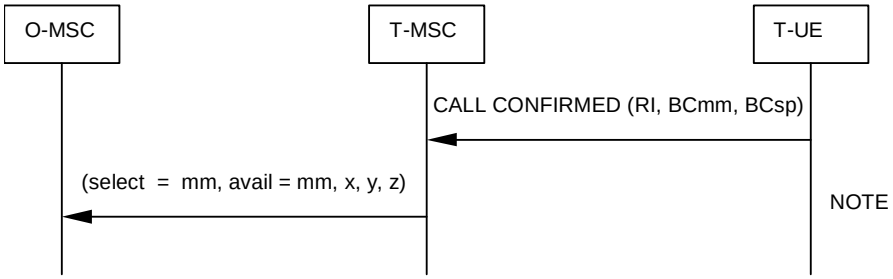


Figure 4.20: Multimedia only



NOTE: The actual speech codec is selected according to OoBTC procedures.

Figure 4.21: Speech preferred



NOTE: The actual list of speech codecs is built according to OoBTC procedures.

Figure 4.22: Multimedia preferred

4.3.4 Originating side - completion of call setup

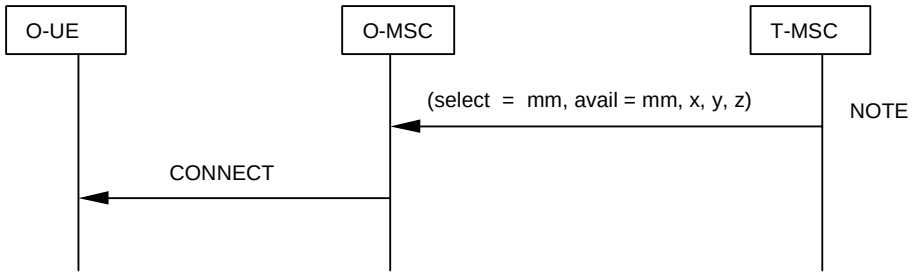
The originating MSC receives the Selected Codec and the list of available codecs, and, depending on the active mode, shall do the following:

The call was set up with a multimedia BC-IE first:

- if the Selected Codec is the 3G-324.M codec, no In-Call Modification procedure is necessary (see figure 4.23). If no speech codecs are included in the list of available codecs, all In-Call Modification procedures initiated by the UE using the speech BC-IE shall be rejected with a MODIFY REJECT message;
- if the Selected Codec is a speech codec, an In-Call Modification procedure to change to speech mode shall take place (see figure 4.24). If the 3G-324.M codec is not included in the list of available codecs, all In-Call Modification procedures initiated by the UE using the multimedia BC-IE shall be rejected with a MODIFY REJECT message.

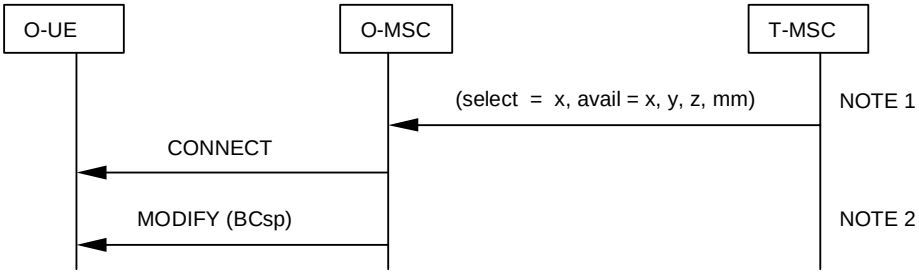
The call was set up with a speech BC-IE first:

- if the Selected Codec is the 3G-324.M codec, an In-Call Modification procedure to change to multimedia mode shall take place (see figure 4.25). If no speech codecs are included in the list of available codecs, all In-Call Modification procedures initiated by the UE using the speech BC-IE shall be rejected with a MODIFY REJECT message;
- if the Selected Codec is a speech codec, no In-Call Modification procedure is necessary (see figure 4.26). If the 3G-324.M codec is not included in the list of available codecs, all In-Call Modification procedures initiated by the UE using the multimedia BC-IE shall be rejected with a MODIFY REJECT message.



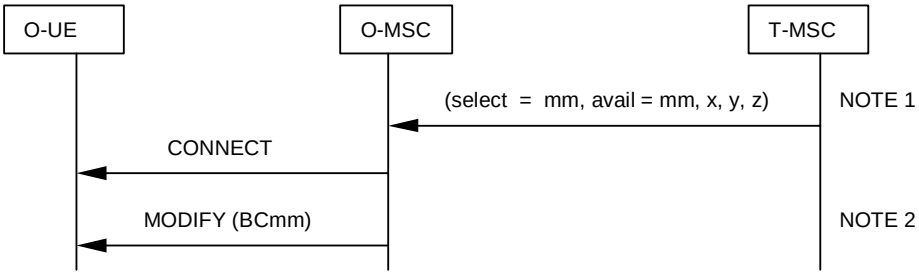
NOTE: Speech codecs (x, y, z) may or may not be present. If they are not present, subsequent MODIFY requests from the UE are rejected.

Figure 4.23: Multimedia preferred, selected



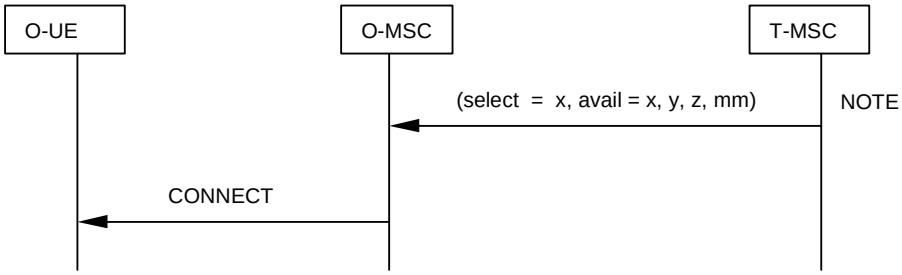
NOTE 1: The multimedia codec (mm) may or may not be present. If it is not present, subsequent MODIFY requests from the UE are rejected.
NOTE 2: see clause 4.2.3 for the In-Call Modification signalling.

Figure 4.24: Multimedia preferred, speech selected



NOTE 1: Speech codecs (x, y, z) may or may not be present. If they are not present, subsequent MODIFY requests from the UE are rejected.
NOTE 2: see clause 4.2.3 for the In-Call Modification signalling.

Figure 4.25: Speech preferred, multimedia selected



NOTE: The multimedia codec (mm) may or may not be present. If it is not present, subsequent MODIFY requests from the UE are rejected.

Figure 4.26: Speech preferred, selected

4.3.5 Service change during the active state

Whenever an In-Call Modification procedure is invoked by a terminal, unless it is not allowed as determined at call setup, the following shall take place:

- if the current mode is the speech mode and the MODIFY message contains a multimedia BC-IE, the normal Out-of-Band Transcoder Control procedures shall be invoked in order to change the Selected Codec to the 3G-324.M codec;

- if the current mode is the multimedia mode and the MODIFY message contains a speech BC-IE, the normal Out-of-Band Transcoder Control procedures shall be invoked in order to change the Selected Codec to the preferred speech codec.

The Codec Modification procedure shall be supported for service change. The use of mid-call codec negotiation procedure is optional for service change.

When a MSC detects through an Out-of-Band Transcoder Control procedure that the selected codec has changed from a speech codec to the 3G-324.M codec, or vice-versa, it shall initiate an In-Call Modification procedure towards the UE with a MODIFY message containing the multimedia BC-IE (or the speech BC-IE), unless the new mode has been denied at call setup (see clause 4.2.4).

4.3.5.1 Mid-Call Codec Modification Procedure For Service Change

The Codec Modification procedures as defined in [2] shall be applied with the following specific additional rules for the Service Change procedure.

In order to prevent the MGW generating an error or seizing resources during the interim period when its terminations are being altered and it may have a speech codec on one side of the context and the 3G-324M codec on the other side the Server shall modify the Stream–mode of the affected terminations to inactive during the Service change and shall restore the stream mode to active – (send/receive – bothway) on completion of the service change procedure.

If the affected termination's stream mode is inactive a MGW shall not reject a "Modify Bearer Characteristics" or a "Reserve Bearer Characteristics" procedure because the multimedia codec and a speech codec are interconnected simultaneously in the same context.

4.3.5.2 Unsuccessful Service Change

In the case the service change is denied by the UE at the terminating side, the procedures for the unsuccessful Codec Modification as defined in [2] shall be applied to revert to the old medium (speech or multimedia).

4.3.6 Interaction with supplementary services

4.3.6.1 Call forwarding and Call deflection

If a SCUDIF call interacts with CFB(UDUB), CFNRy, or Call Deflection, and both basic services are provisioned, the handling of the call should continue with the active service negotiated between the UE and the network.

If a SCUDIF call interacts with call forwarding except CFB(UDUB) and CFNRy and both basic services are provisioned, the service state shall be checked for both the preferred service and the less preferred service.

Then, the SCUDIF call interacting with call forwarding shall be handled according to the following rules:

- If call forwarding is applied only for the less preferred service, the preferred service shall be selected and the call setup shall continue with a single service without invoking call forwarding.
- If call forwarding is applied only for the preferred service, the preferred service shall be selected and call forwarding shall continue with a single service to the destination indicated by the forwarded to number.
- If call forwarding is applied for both services and the forwarded to number for the preferred service is same as for the less preferred service, the call shall continue as a SCUDIF call to the destination indicated by the forwarded to number.
- If call forwarding is applied for both services and the forwarded to number for the preferred service is different from that for the less preferred service, the preferred service shall be selected and call forwarding shall continue with a single service to the destination indicated by the forwarded to number for the preferred service.
- If call forwarding is applied for both services and CF type for the preferred service is different from that of less preferred service, the call shall continue as a SCUDIF call to the destination indicated by the forwarded to number, and the forwarding reason for the preferred service shall be indicated.

NOTE: For Late call forwarding with Optimal Routing, the second basic service group code shall be generated in VMSC and sent in Resume Call Handling and may be sent in the following Send Routing Information. The preferred service is set as basic service group IE, and the less preferred service is set as basic service group 2 IE.

4.3.6.2 Closed User Group (CUG)

If a SCUDIF call interacts with CUG and both basic services are provisioned, the service state shall be checked for both the preferred service and the less preferred service. If one service is not allowed, then the call shall fall back to the allowed service.

4.3.6.3 Call barring

If a SCUDIF call interacts with call barring and both basic services are provisioned, the service state shall be checked for both the preferred service and the less preferred service. If one service is barred, then the call shall fall back to the allowed service.

4.3.7~~6~~ Interworking with external networks

If the 3G-324.M codec is included in the list of supported codec types received by a Gateway MSC, and the external network does not support BICC or does not support Codec Negotiation, the Gateway MSC shall terminate the codec negotiation and fallback to a single service.

NOTE 1: If the route is known not to support the SCUDIF functionality, the Gateway MSC may decide by configuration to terminate the codec negotiation and follow the procedure described in this clause.

In the case where the 3G-324.M codec is the first in the list, the network decides by configuration to fallback either to a UDI multimedia-only call or to speech. In the case where the 3G-324.M codec is not the first on the list, the call shall fallback to speech only.

If fallback to multimedia occurs, the call control parameters sent towards the external network shall be set according to the setting for multimedia calls, and TMR is set to "64 kbit/s unrestricted". The 3G-324.M codec shall be returned to the originating MSC server as the selected codec and be the only member of the available codec list.

NOTE 2: For multimedia calls, 3GPP TS 27.001 [5], annex B, and 3GPP TS 29.007 [6], table 7A, describe the setting and validity of the PLMN BC-IE as well as the comparable settings of parameters in the PLMN and ISDN BC-IEs. As the ISDN BC-IE parameter values used for UDI/RDI multimedia calls are identical to the BICC USI IE parameter values (see 3GPP TS 29.205 [7]), the setting of call control parameters sent towards the external network in case of fallback to multimedia can be derived straightforward.

If fallback to speech occurs, the call control parameters shall be set according to the setting for speech calls, and TMR is set to "speech". The 3G-324.M codec shall be removed from the available codec list. Speech codec selection shall be made according to normal OoBTC procedures for interworking to external networks, and the selected codec and available codec list returned to the originating MSC server.

3GPP TSG-CN WG3 Meeting #29 ***N3-030662***
3GPP TSG-CN WG4 Meeting #20
Sophia Antipolis, France. 25th - 29th August 2003.

CR-Form-v7

CHANGE REQUEST

⌘ **23.172** **CR** **015** ⌘ **rev** **4** ⌘ Current versi **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Repeat subscription checking in MO SCUDIF call
Source:	⌘	TSG_CN WG3 [NTT DoCoMo]
Work item code:	⌘	SCUDIF
Date:	⌘	25/08/2003
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The exsiting Basic Call Handling procedure doesn't have a consideration of the case when there are two basic services. TS23.172 is needed to update in order to represent the MO subscription checking in case of SCUDIF.
Summary of change:	⌘	Information Elements which are transferred between MSC and VLR are specified for SCUDIF calls.
Consequences if not approved:	⌘	The action remains unclear when MSC and VLR handles two basic services subscribed.
Clauses affected:	⌘	2, 4.2.1

	Y	N		
Other specs Affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<<Fisrt Modified Section>>

2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.153: "Out of Band Transcoder Control; Stage 2".

[3] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core network protocols; Stage 3".

[4] 3GPP TS 26.103: "Speech Codec List for GSM and UMTS".

[5] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[6] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[7] 3GPP TS 29.205: "Application of Q.1900 series to bearer-independent circuit-switched core network architecture; Stage 3".

[8] 3GPP TS 22.101: "Service aspects; Service principles".

[9] 3GPP TS 33.106: "3GPP Security; Lawful Interception Requirements".

[x] 3GPP TS 23.018: "Basic Call Handling; Technical realization".

<<Next Modified Section>>

4.2 Access Call Control Signalling

Using the repeat indicator value "support of service change and fallback", as described in 3GPP TS 24.008 [3], clause 5.3.6, together with two BC-IEs, a multimedia and a speech, it is possible to request a service change and fallback functionality, while still maintaining the backwards compatibility with non-supporting terminals.

4.2.1 Mobile originating side - initiation of call setup

By sending a SETUP message with a Repeat Indicator set to "support of service change and fallback", a multimedia BC-IE, and a speech BC-IE (see figure 4.1), a terminal may request a call to be set with the capability to fallback to either a speech only, a multimedia only call or to use service change later during the active state of the call (the first BC-IE indicates the preferred service).

After checking the provisioning (see subclause 4.2.1.1), and verifying that the functionality is supported, the MSC replies in the CALL PROCEEDING message with either the two BCs in the same order (or no BC to indicate that it accepts the proposed settings - see figure 4.2), or with a single BC (multimedia or speech - see figure 4.3) unless the

CALL PROCEEDING is delayed until the response from the terminating user and then it may also be sent with the BCs in reverse order (see clause 4.2.3).

In the case the MSC ignores the SETUP message if the presence of a reserved value for the Repeat Indicator is set, it sends a STATUS message back to the UE (see figure 4.4), with the Cause Value set to #100, "Conditional IE error" (see 3GPP TS 24.008 [3], clause 8.7.2). The UE then reacts as described in 3GPP TS 24.008 [3], clause 5.5.3.2.2, and may resend a new SETUP message with a single BC, or perform any appropriate action according to its implementation. This also applies in case the MSC returns instead a RELEASE COMPLETE message.

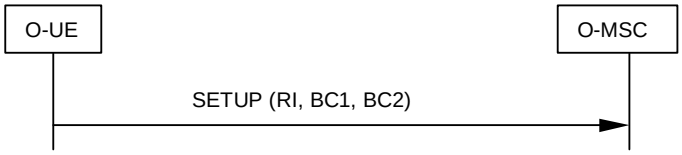
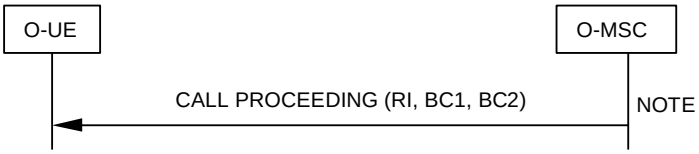


Figure 4.1: SETUP message towards the originating MSC



NOTE: The MSC may send CALL PROCEEDING without RI and BCs to indicate that it accepts the proposed settings sent in the SETUP message.

Figure 4.2: Normal case

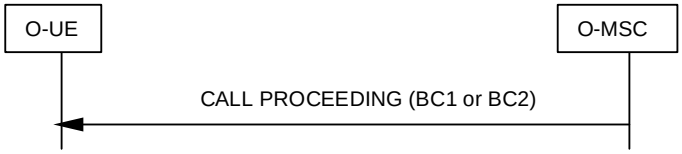
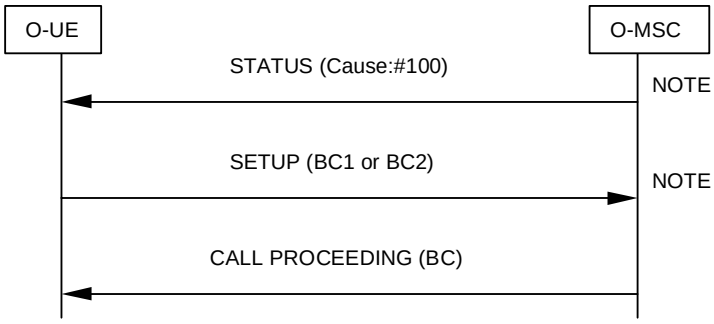


Figure 4.3: Fallback case



NOTE: The sending of the STATUS message from the MSC and the second SETUP message from the UE are implementation dependent.

Figure 4.4: MSC not supporting the RI value

4.2.1.1 Subscription checking

The functional behaviour of the originating MSC and VLR is specified in 3GPP TS 23.018 [x]. The procedure specific to SCUDIF is specified in this subclause:

For mobile originated SCUDIF calls, the MSC shall convert both PLMN bearer capability 1 and PLMN bearer capability 2 to two individual Basic Service codes and send them in Send Info For Outgoing Call. The VLR shall check the subscription for those basic services, then indicates the availability of each basic service to the MSC by Complete

Call. If both services are not provisioned, the VLR shall send Send Info For Outgoing Call negative response to the MSC. The MSC shall fall back to the allowed service if the availability of only one service is indicated. The MSC shall continue as a SCUDIF call if the availability of both services is indicated.

4.2.1.1.1 Send Info For Outgoing Call

Send Info For Outgoing Call contains the following SCUDIF specific information elements:

Information element name	Status	Description
Bearer service2	C	Bearer service 2 required for the MO call, derived from the PLMN bearer capability 2 information received in the set-up request from the MS. For a SCUDIF call, one of bearer service 2 or teleservice 2 shall be present.
Teleservice2	C	Teleservice 2 required for the MO call, derived from the PLMN bearer capability 2 information received in the set-up request from the MS. For a SCUDIF call, one of bearer service 2 or teleservice 2 shall be present.

4.2.1.1.2 Complete Call

Complete Call contains the following SCUDIF specific information elements:

Information element name	Status	Description
First service availability	C	Shall be present for a MO SCUDIF call if the Bearer service or Teleservice is allowed; otherwise shall be absent.
Second service availability	C	Shall be present for a MO SCUDIF call if the Bearer service 2 or Teleservice 2 is allowed; otherwise shall be absent.

3GPP TSG CN WG3 Meeting #29 ***N3-030614***
Sophia Antipolis, FRANCE, 25th – 29th August 2003 *N3-030510,N3-030590*

CR-Form-v7

CHANGE REQUEST

⌘ **23.172** **CR** **016** ⌘**rev** **2** ⌘ Current version: **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	HLR Interrogation for SCUDIF calls
Source:	⌘	TSG_CN WG3 [L.M. Ericsson, NTT DoCoMo]
Work item code:	⌘	SCUDIF ***Date:*** ⌘ 1/09/2003
Category:	⌘	**F** ***Release:*** ⌘ Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	No proper checking of subscription and forwarding options are performed by the GMSC for services provided by SCUDIF (speech and multimedia) Procedures (SIFIC) for subscription checking at the terminating side do not include the second service
Summary of change:	⌘	The Send Routing Information procedure is updated to allow the subscription check of both services, and the procedures for both the HLR and GMSC are specified.
Consequences if not approved:	⌘	No check is possible in the GMSC for one of the services (speech or multimedia) requested in the codec list. The subscription and call forwarding state of the services offered by the SCUDIF feature (speech and multimedia) cannot be properly checked. The terminating side cannot query properly the VLR for both services.

Clauses affected:	⌘	2, 3.2, 4.2.2, 4.3.3

Other specs affected: ⌘

Y	N		
X		Other core specifications	⌘ 29.002-613, 23.018-133, 23.172-015.
	X	Test specifications	
	X	O&M Specifications	

Other comments:	⌘	Update (N3-030614): Basic Call Handling related procedures have been moved to a separate CR to 23.018 (N4-031025 - CR 133). This CR has been reformated to only include SCUDIF specific procedures, and refer to 23.018.

First Modified Section

2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.153: "Out of Band Transcoder Control; Stage 2".

[3] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core network protocols; Stage 3".

[4] 3GPP TS 26.103: "Speech Codec List for GSM and UMTS".

[5] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[6] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[7] 3GPP TS 29.205: "Application of Q.1900 series to bearer-independent circuit-switched core network architecture; Stage 3".

[8] 3GPP TS 22.101: "Service aspects; Service principles".

[9] 3GPP TS 33.106: "3GPP Security; Lawful Interception Requirements".

[x] 3GPP TS 23.018: "Basic Call Handling ; Technical Realization"

[y] 3GPP TS 23.003: "Numbering, adressing and identification"

Next Modified Section

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply:

~~Editor's note: To be completed.~~

BC	Bearer Capability
BC1	First Bearer Capability in a message (preferred service)
BC2	Second Bearer Capability in a message (less preferred service)
BCa	Bearer Capability of the currently selected service
BCb	Bearer Capability of the service to switch to
BCmm	Bearer Capability multimedia
BCsp	Bearer Capability speech
MMI	Man-Machine Interface
O-MSC	Originating MSC

O-UE	Originating UE
RI	Repeat Indicator
SCUDIF	Service Change and UDI/RDI Fallback
T-MSC	Terminating MSC
T-UE	Terminating UE

Next Modified Section

4.2.2 Mobile terminating side

When the terminating MSC receives a request for a multimedia call, it shall check if the called user is provisioned for the service (see subclause 4.2.2.1).

The terminating MSC shall include in the SETUP message towards the UE both BC-IEs in the same order as indicated by the incoming request together with the Repeat Indicator set to "service change and fallback in order to invoke the SCUDIF functionality in the called terminal (see figure 4.5).

The terminating UE, based on its capabilities and internal settings, may return the two BC-IEs in the same order (or no BC to indicate that it accepts the proposed settings - see figure 4.6), reversed order (see figure 4.7), or just one BC-IE (either speech or multimedia - see figure 4.8) to the terminating MSC in the CALL CONFIRMED message.

In the case the UE ignores the SETUP message due to the presence of a reserved value for the Repeat Indicator, it sends a STATUS message back to the terminating MSC (see figure 4.9), with the Cause Value set to #100, "Conditional IE error" (see 3GPP TS 24.008 [3], clause 8.7.2). The terminating MSC shall then react according to 3GPP TS 24.008 [3], clause 5.5.3.2.2 and it shall send a new SETUP message with a single BC, either the preferred service BC-IE or the speech BC-IE (fallback to speech), depending on configuration. The call setup then proceeds accordingly.

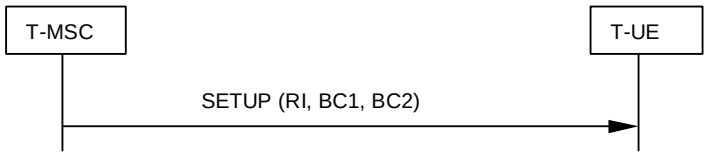
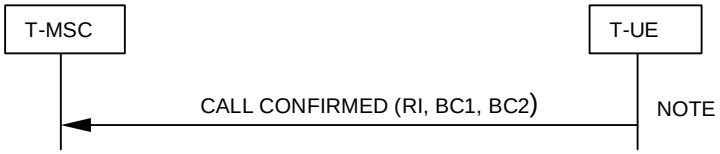


Figure 4.5: SETUP message towards the terminating UE



NOTE: The UE may send the CALL CONFIRMED message without RI and BCs to indicate that it accepts the proposed settings sent in the SETUP message.

Figure 4.6: Normal case

Figure 4.7: Reversed call setup

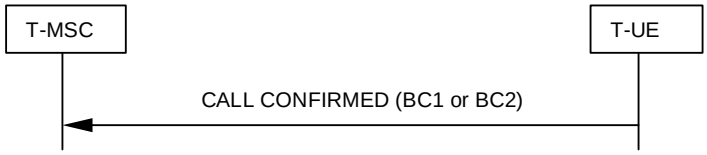
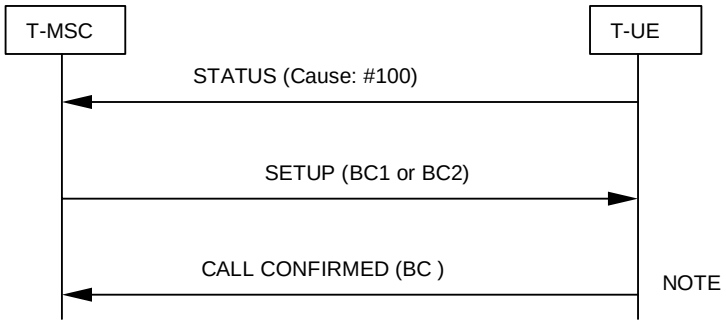


Figure 4.8: Fallback case



NOTE: The UE may send the CALL CONFIRMED message without BC to indicate that it accepts the proposed settings sent in the SETUP message.

Figure 4.9: UE not supporting the RI value

4.2.2.1 Subscription checking

The functional behaviour of the terminating MSC and VLR is specified in 3GPP TS 23.018 [x]. The procedure specific to SCUDIF calls is specified in this subclause.

For mobile terminating SCUDIF calls, the MSC shall convert the services received in the incoming request to two individual Basic Service codes, and include them in Send Info For Incoming Call. The VLR shall check the subscription for those basic services, then indicate the availability of each basic service to the MSC by Complete Call. If both services are not provisioned, the VLR shall send Send Info for Incoming Call negative response to the MSC. The MSC shall fall back to the allowed service if the availability of only one service is indicated. The MSC shall continue as a SCUDIF call if the availability of both services is indicated.

4.2.2.1.1 Send Info For Incoming Call

Send Info For Incoming Call contains the following SCUDIF specific information elements:

Information element name	Required	Description
Bearer Service 2	C	Bearer Service 2 required for the MT call, derived from the less preferred service indicated in the incoming IAM of a SCUDIF call. For a SCUDIF call, one of Bearer service 2 or Teleservice 2 shall be present.
Teleservice 2	C	Teleservice 2 required for the MT call, derived from the less preferred service indicated in the incoming IAM of a SCUDIF call. For a SCUDIF call, one of Bearer service 2 or Teleservice 2 shall be present.

4.2.2.1.2 Complete Call

The parameters described in subclause 4.2.1.1.2 "Complete Call" for the mobile originating MSC are also applicable to the mobile terminating MSC.

Next Modified Section

4.3.3 Terminating side

4.3.3.1 HLR Interrogation

The GMSC sends the Send Routing Information request with both the Network Signal Information and Network Signal Information 2 parameters. The Network Signal Information shall include the ISDN BC IE for the preferred service, and the Network Signal Information 2 includes the ISDN BC IE for the less preferred service.

The functional behaviour of the HLR is described in 3GPP TS 23.018 [x]. The procedures specific to SCUDIF calls are specified in the subclause 4.3.3.1.3 for the HLR and 4.3.3.1.4 for the GMSC. The information elements specific to SCUDIF between the GMSC and the HLR are specified in subclauses 4.3.3.1.1 and 4.3.3.1.2.

4.3.3.1.1 Send Routing Info

The following element specific to SCUDIF calls is defined for Send Routing Info:

Information element name	Required	Description
ISDN BC 2	C	ISDN bearer capability 2. Shall be present for a SCUDIF call to indicate the less preferred service.
ISDN LLC 2	C	ISDN lower layer compatibility 2. Shall be present for a SCUDIF call if necessary for the less preferred service, otherwise shall be absent.
ISDN HLC 2	C	ISDN higher layer compatibility 2. Shall be present for a SCUDIF call if necessary for the less preferred service,otherwise shall be absent.

4.3.3.1.2 Send Routing Info Ack

The following elements specific to SCUDIF calls are defined for Send Routing Info Ack:

Information element name	Required	Description
Roaming number 2	C	E.164 number required to route the call to VMSCB (see 3GPP TS 23.003 [y]) for the less preferred service of a SCUDIF call. Shall be present for a SCUDIF call if Roaming Number is present and the less preferred service is available and not forwarded, otherwise shall be absent.
Forwarded-to number 2	C	E.164 number of the C subscriber for the less preferred service of a SCUDIF call. Shall be present if the HLR has determined that the less preferred service of a SCUDIF call is to be forwarded, otherwise shall be absent.
Forwarded-to subaddress 2	C	Subaddress of the C subscriber (see 3GPP TS 23.003 [y]) for the less preferred service of a SCUDIF call. Shall be present if the HLR has determined that the less preferred service of a SCUDIF call is to be forwarded and a forwarded-to subaddress is stored in the HLR in association with the forwarded-to number 2, otherwise shall be absent.
Notification to calling party 2	C	Indication of whether the calling party is to be notified that the call has been forwarded if the less preferred service of a SCUDIF call is kept. Shall be present if the HLR has determined that the less preferred service of a SCUDIF call is to be forwarded, otherwise shall be absent.
Forwarding reason 2	C	Indication of why the call has been forwarded (unconditionally or on mobile subscriber not reachable) for the less preferred service of a SCUDIF call. Shall be present if the HLR has determined that the less preferred service of a SCUDIF call is to be forwarded, otherwise shall be absent.
Basic Service Code 2	C	Indicates the type of the basic service for the less preferred service, *i.e.* teleservice or bearer service.
Allowed Services	C	Shall be present for SCUDIF calls. Indicates which services are available for that call.
Unavailability Cause	C	Indicates the reason for which one of the services of a SCUDIF call is not available. Shall be present for SCUDIF calls if one service is not available.

4.3.3.1.3 Handling of mobile terminating calls in the HLR

The procedures specific to SCUDIF calls in the HLR are specified within this subclause:

- Procedure SCUDIF_Subscription_Check_HLR
- Procedure SCUDIF_CAMEL_CSI_Check_HLR
- Procedure SCUDIF_Set_Second_Service_when_Forwarded
- Procedure SCUDIF_Set_Correct_PLMN_BC
- Procedure SCUDIF_Check_Second_Service_before_Negative_Response
- Procedure SCUDIF_Check_Second_Service_after_PRN
- Procedure SCUDIF_Check_Second_Service_when_Forwarded

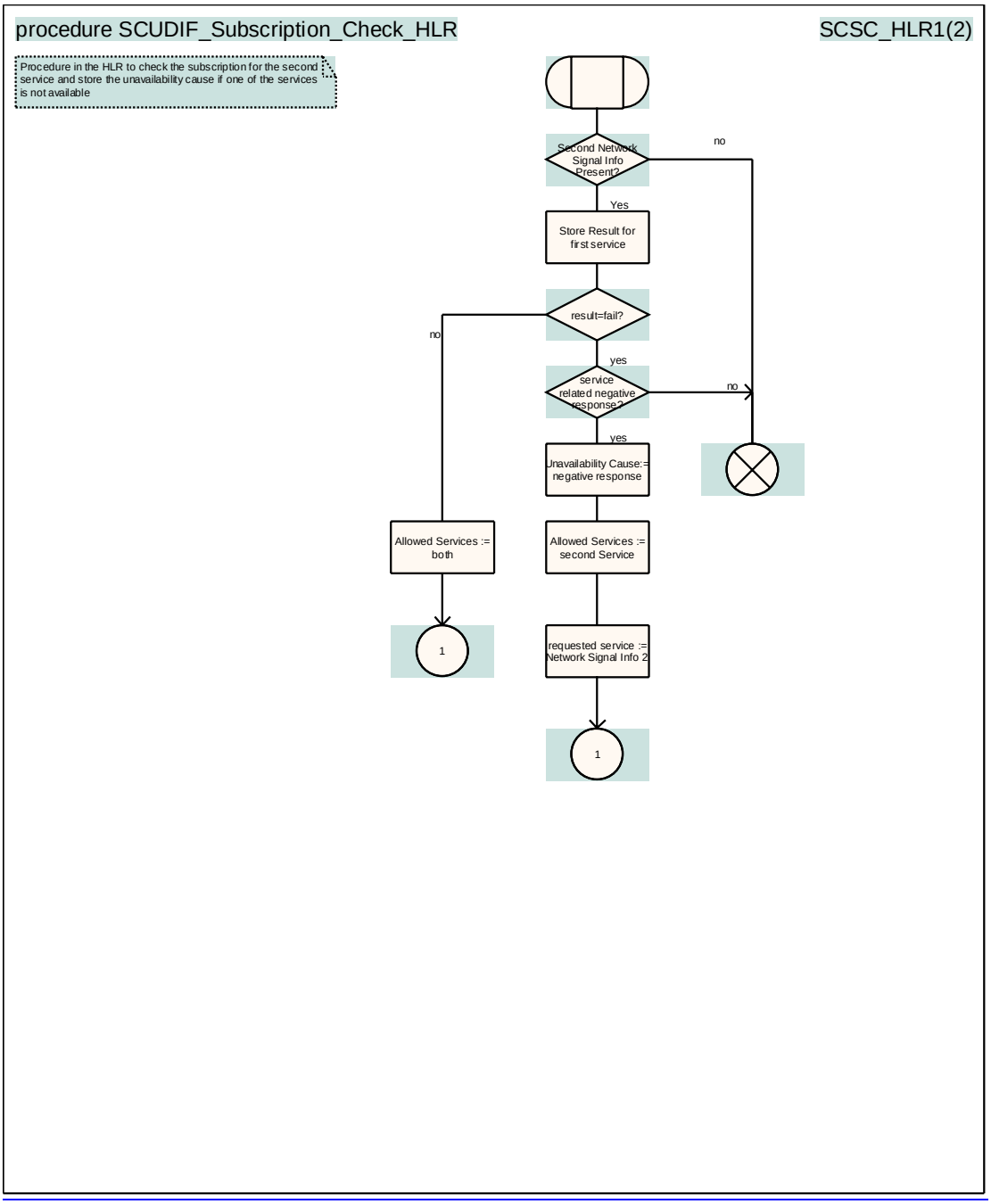


Figure 4.16A: Procedure SCUDIF_Subscription_Check_HLR (sheet 1)

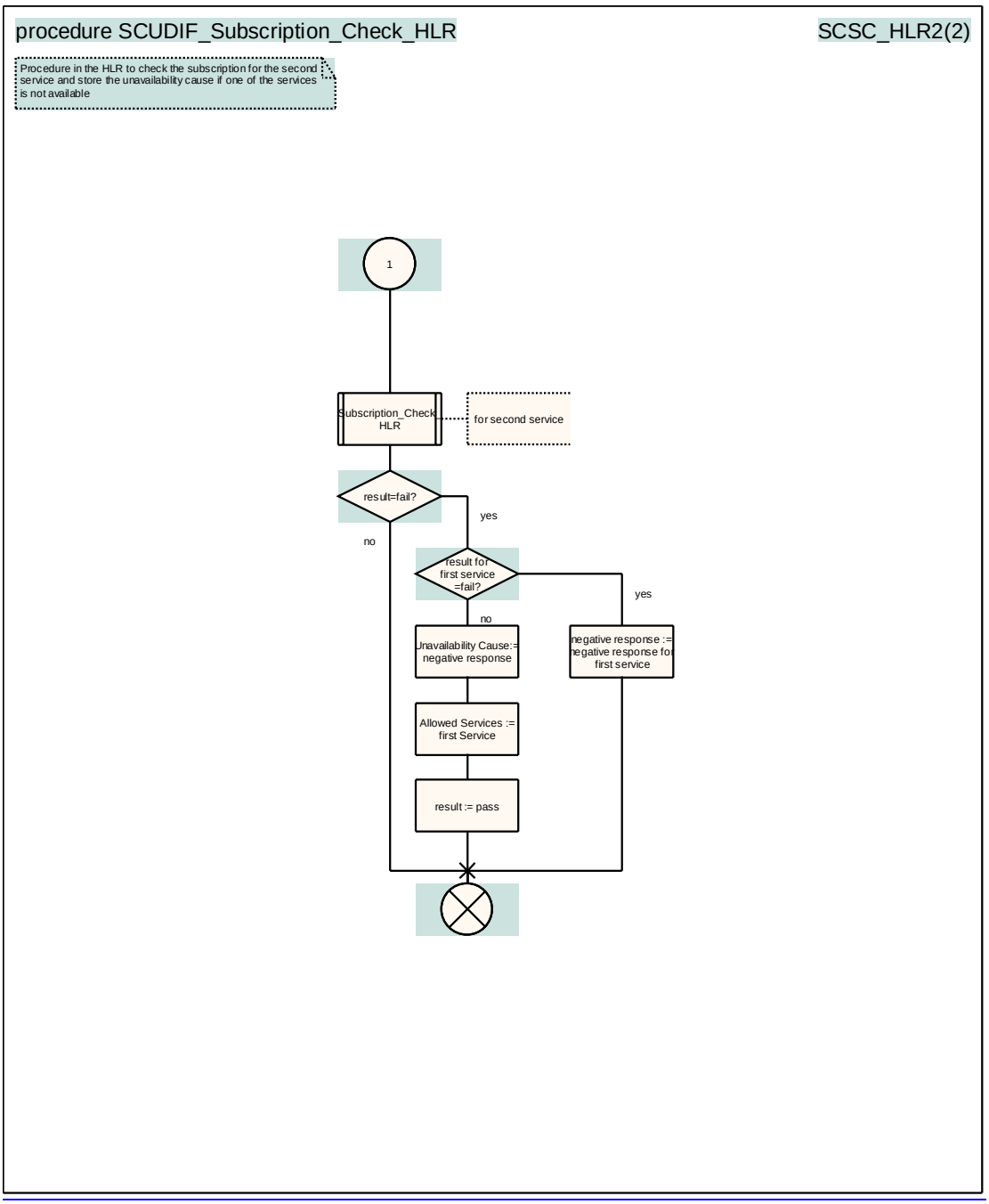


Figure 4.16B: Procedure SCUDIF_Subscription_Check_HLR (sheet 2)

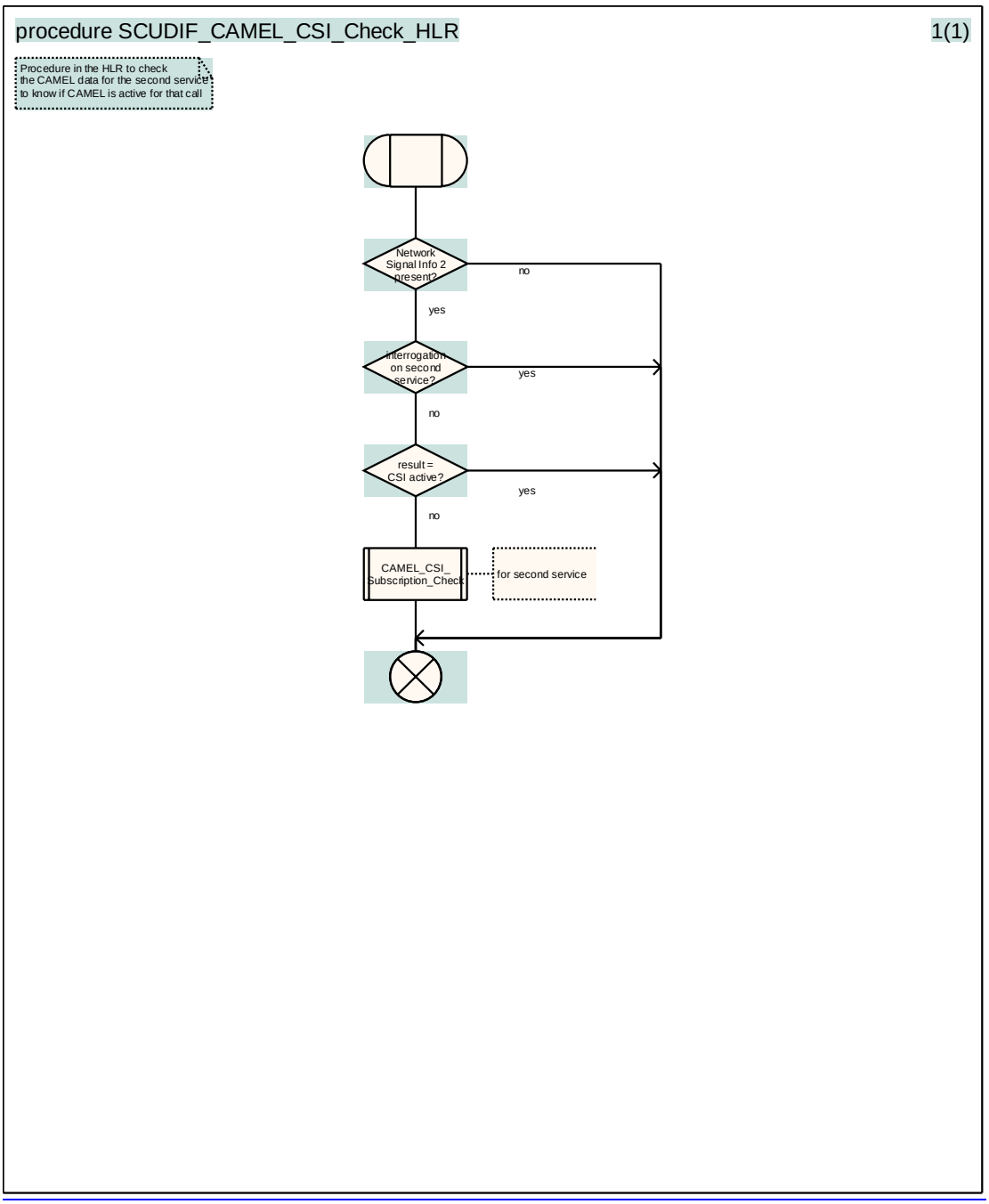


Figure 4.16C: Procedure SCUDIF_CAMEL_CSI_Check_HLR

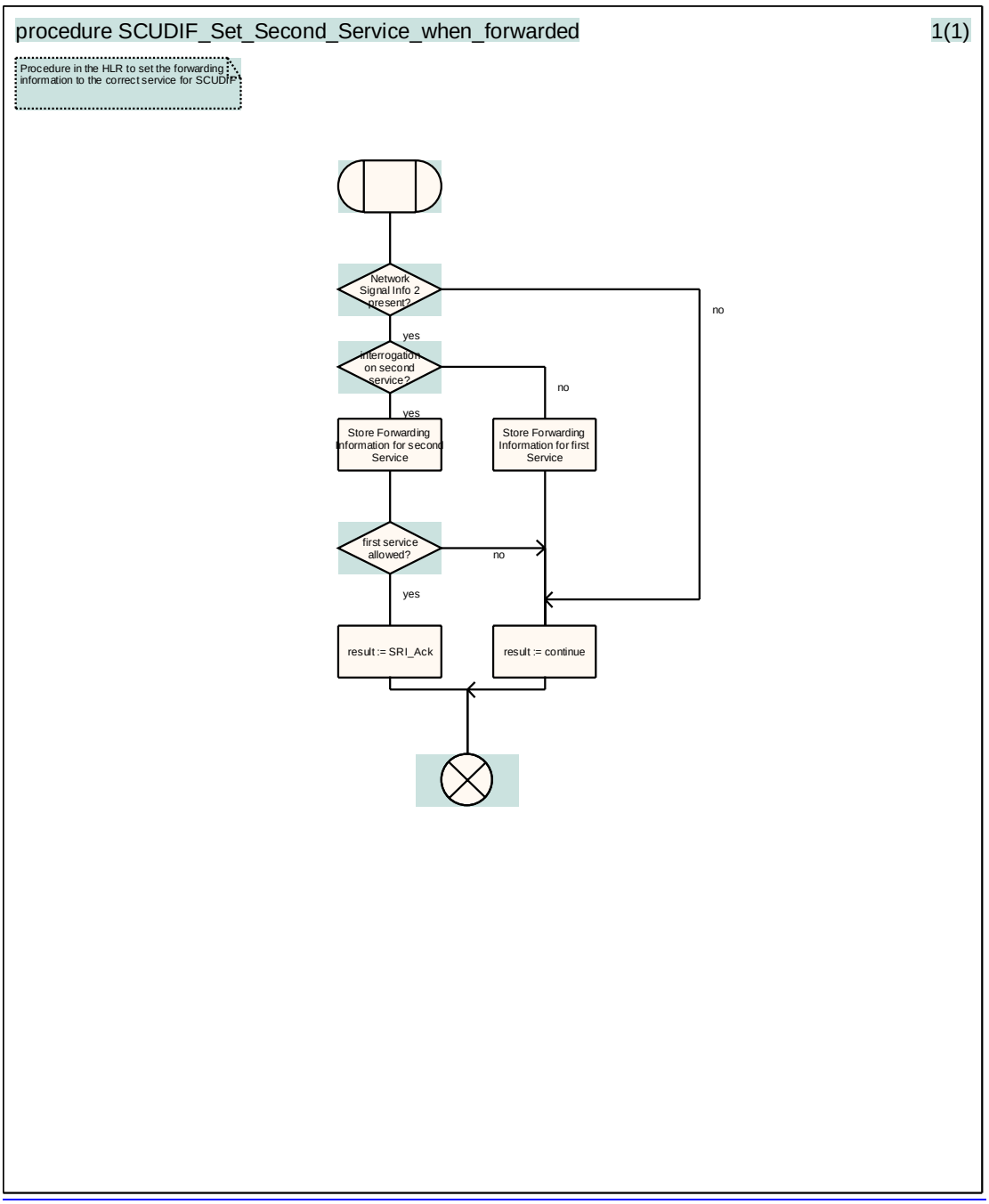


Figure 4.16D: Procedure SCUDIF_Set_Second_Service_when_Forwarded

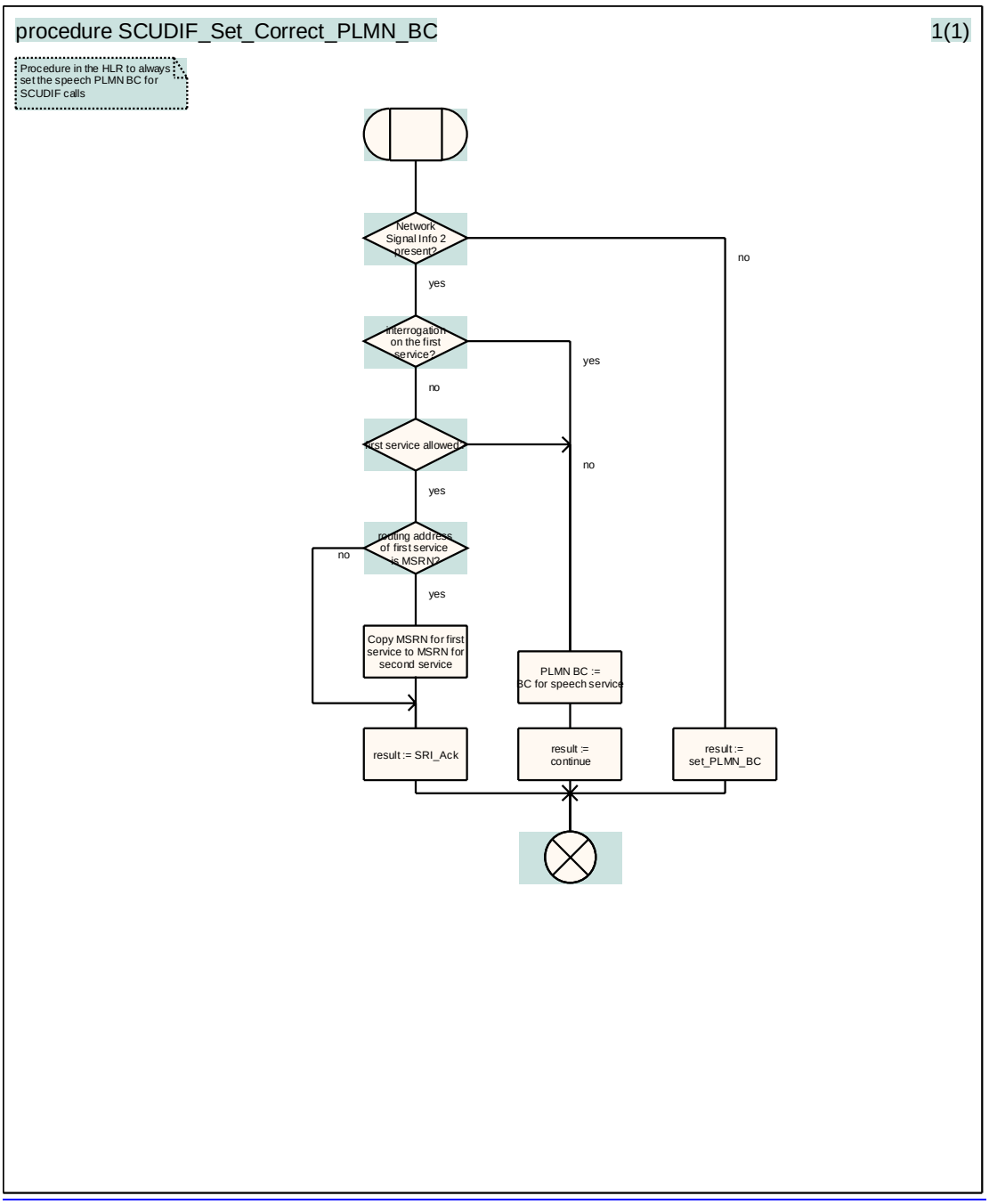


Figure 4.16E: Procedure SCUDIF_Set_Correct_PLMN_BC

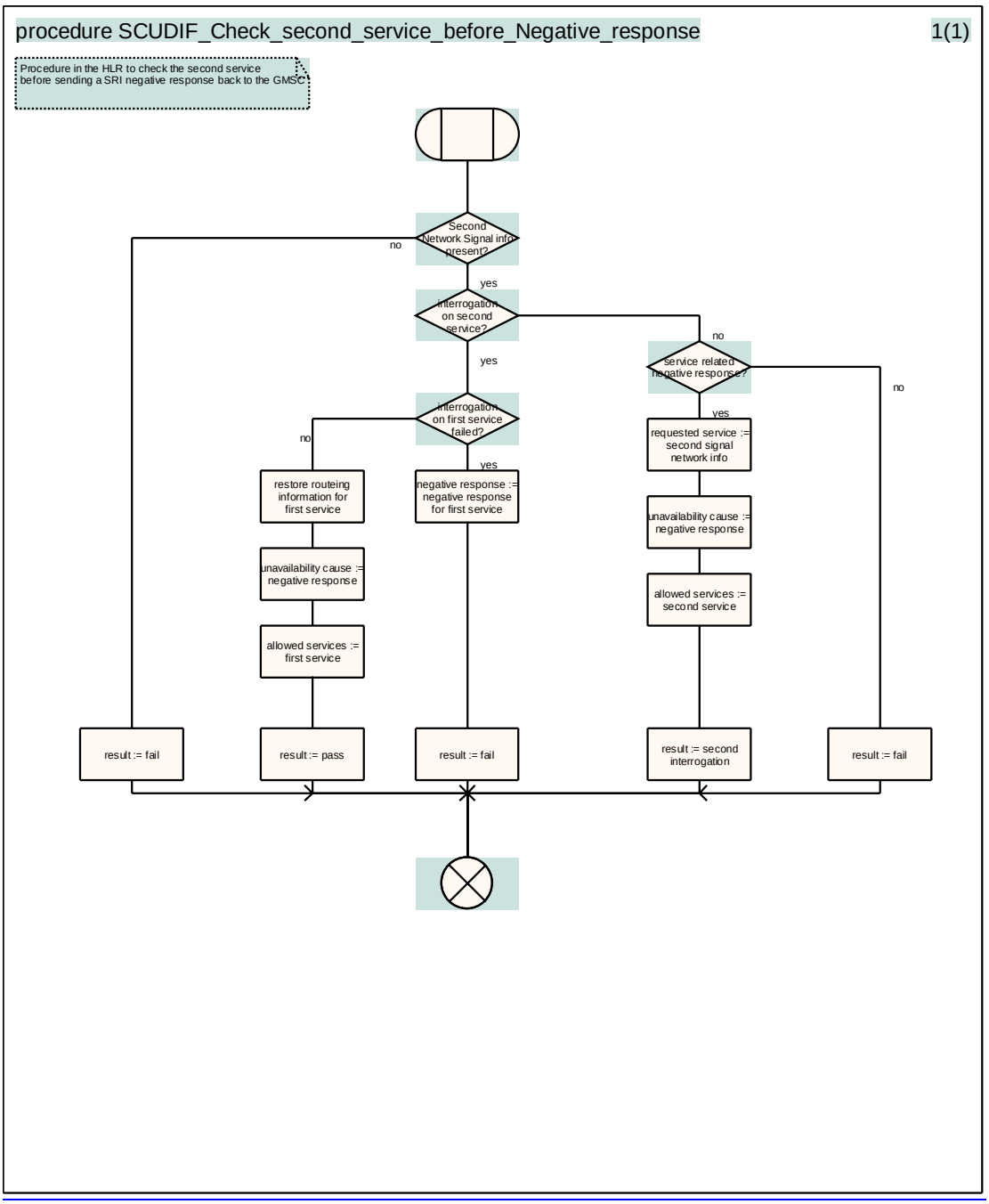


Figure 4.16F: Procedure SCUDIF_Check_Second_Service_before_Negative_Response

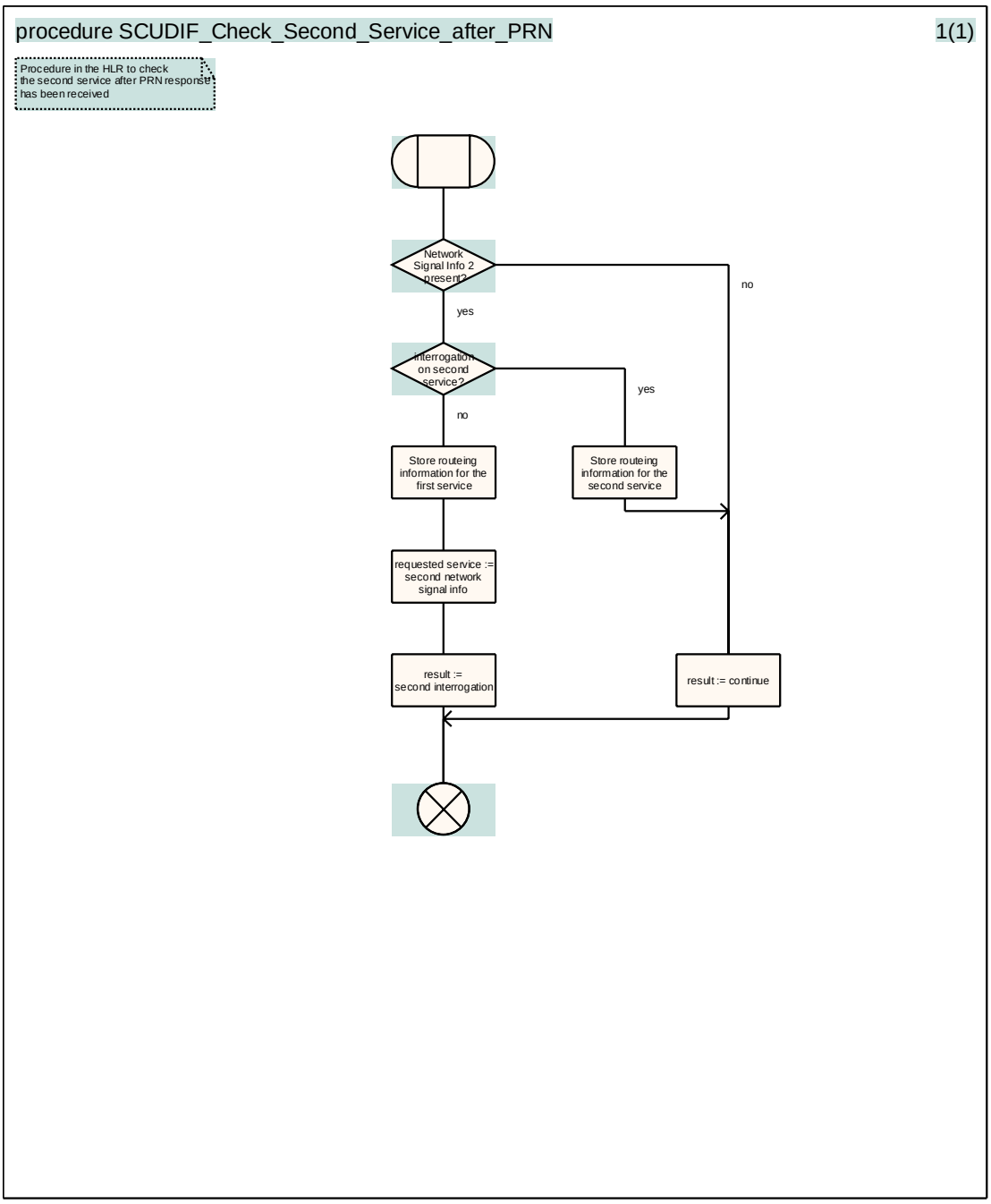


Figure 4.16G: Procedure SCUDIF_Check_Second_Service_after_PRN

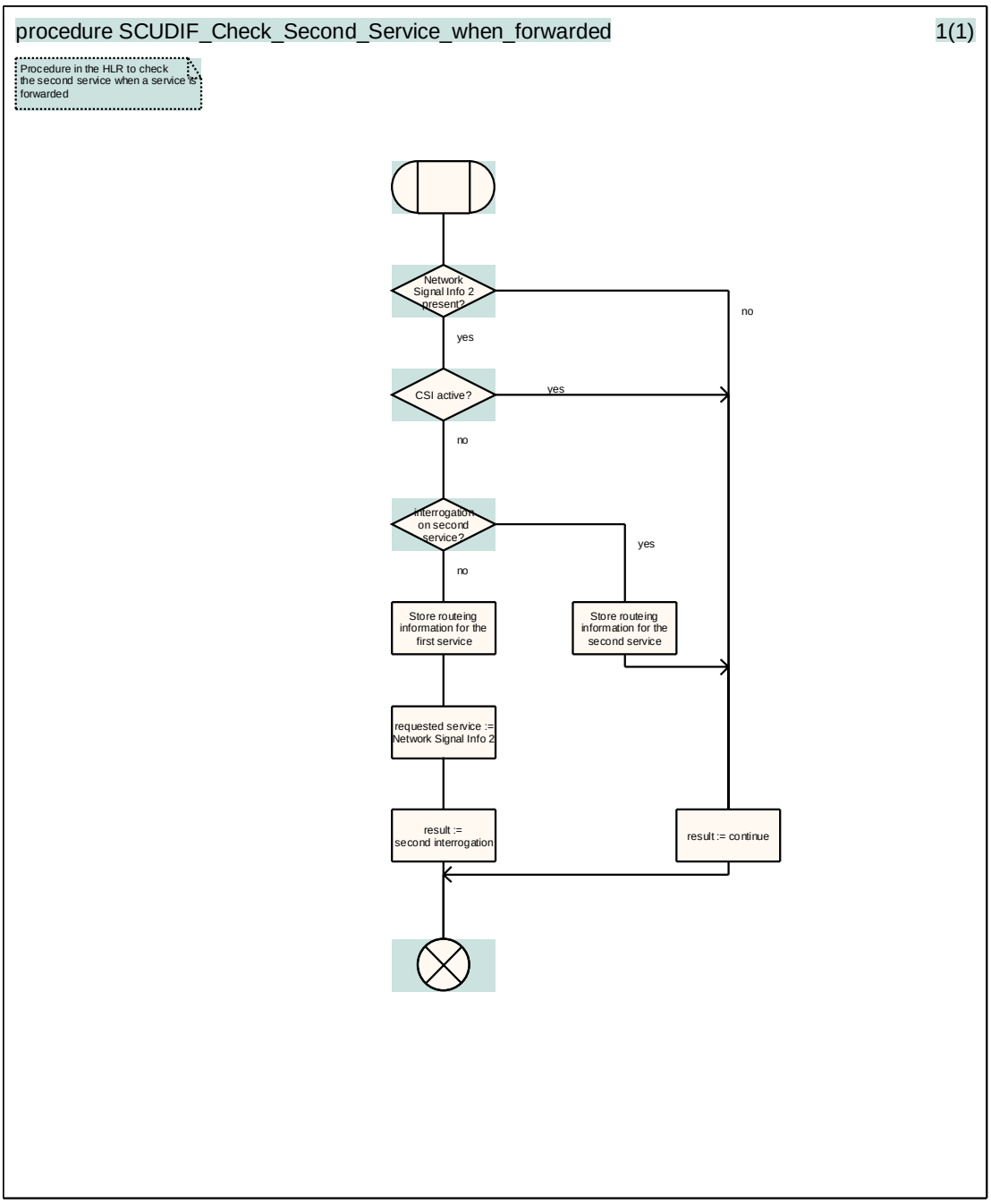


Figure 4.16H: Procedure SCUDIF_Check_Second_Service_when_Forwarded

4.3.3.1.4 Handling of mobile terminating calls in the GMSC

The procedures specific to SCUDIF calls in the GMSC are specified within this subclause:

- Procedure SCUDIF_Negative_SRI_Response_Handling
- Procedure SCUDIF_Check_Service_Availability
- Procedure SCUDIF_Check_Service_Compatibility

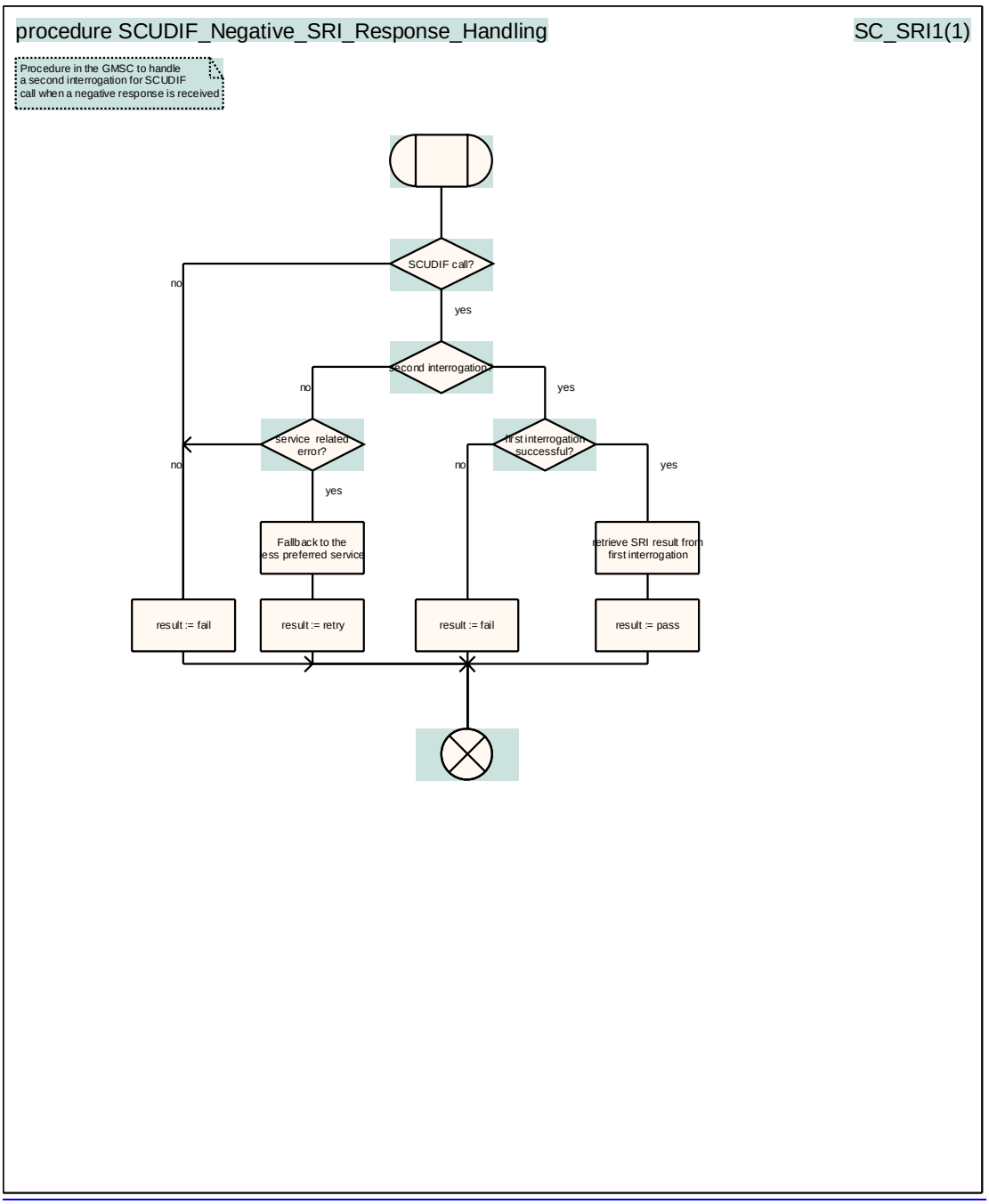


Figure 4.16I: Procedure SCUDIF_Negative_SRI_Response_Handling

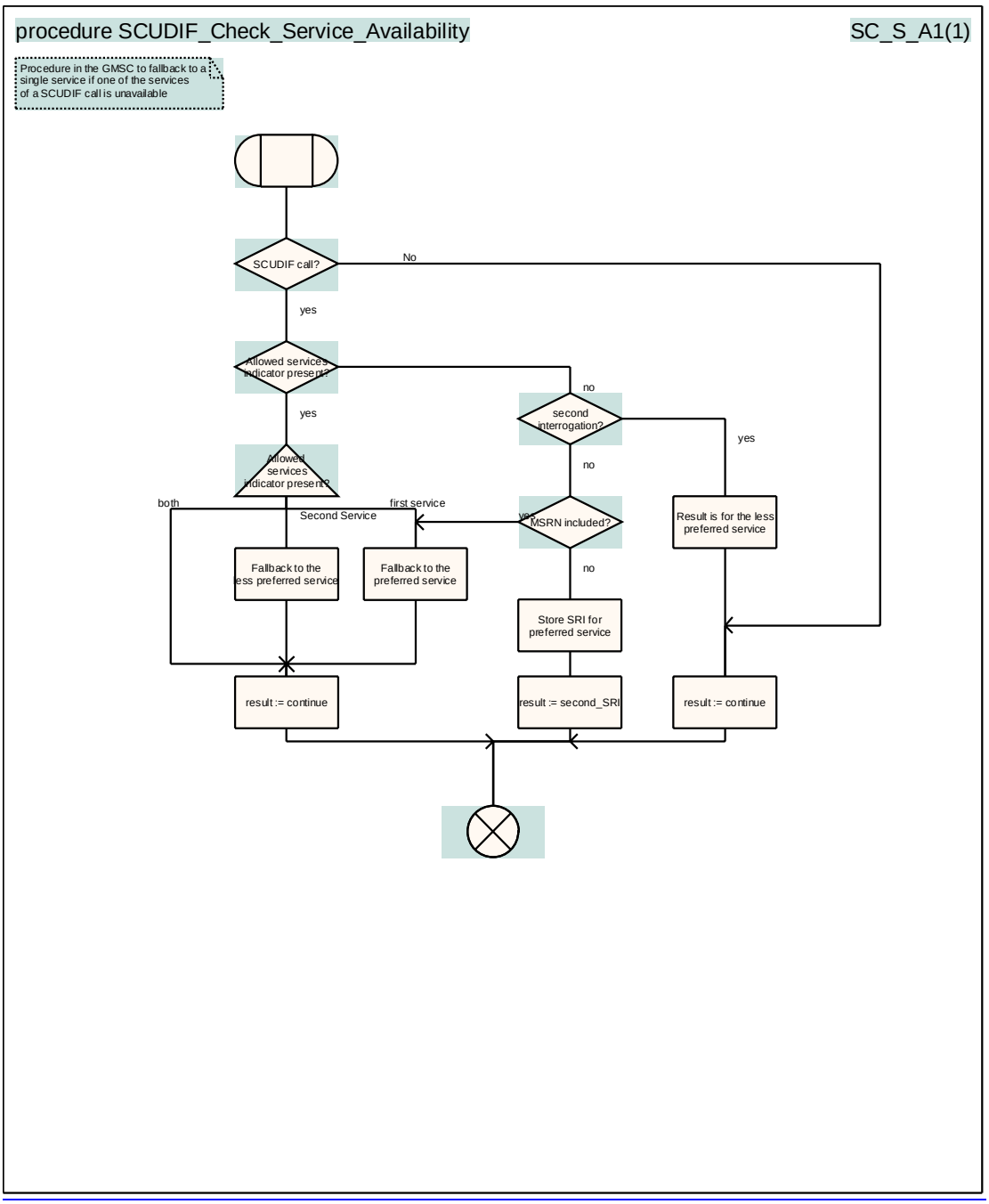


Figure 4.16J: Procedure SCUDIF_Check_Service_Availability

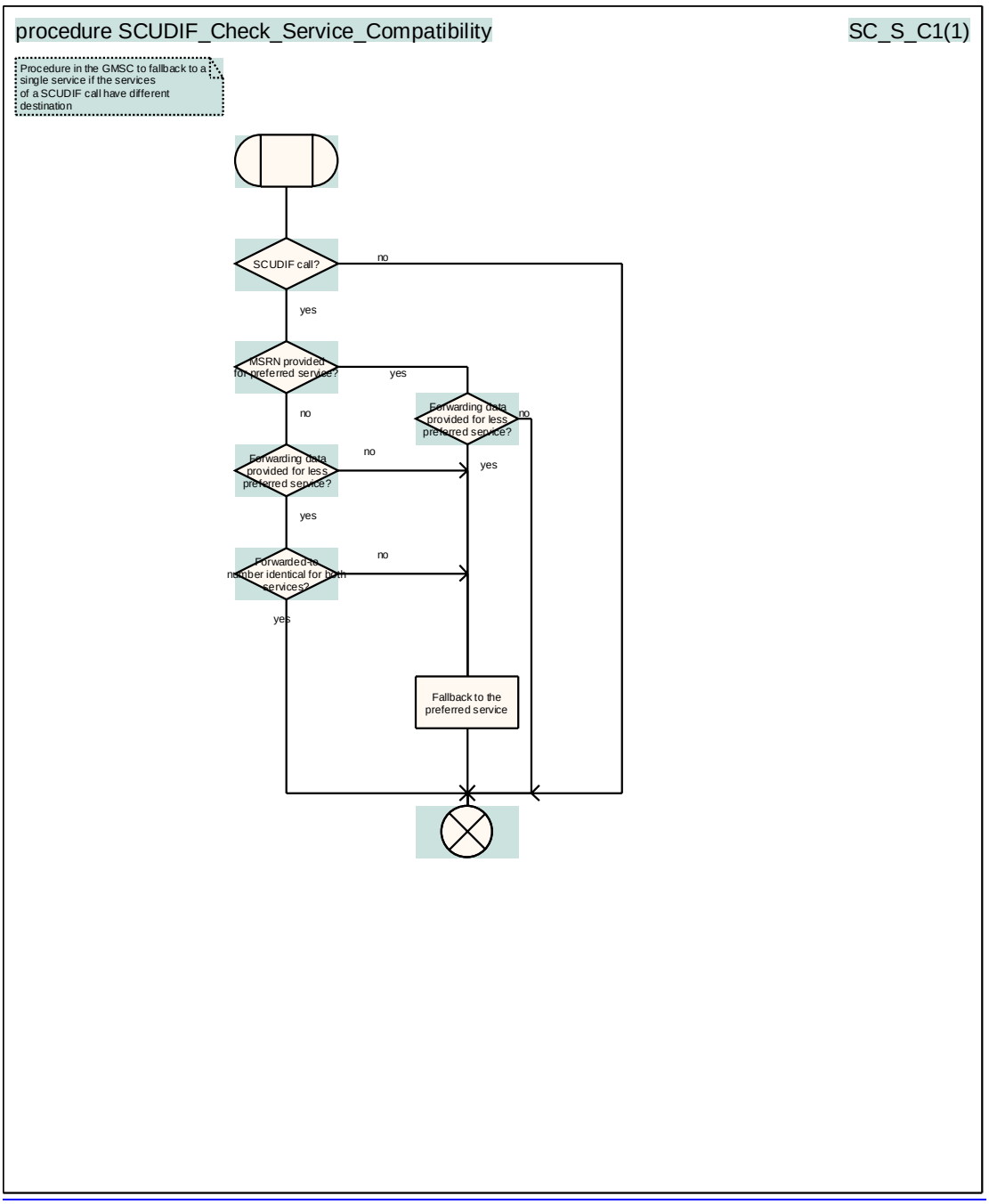


Figure 4.16K: Procedure SCUDIF_Check_Service_Compatibility

4.3.3.2 Terminating MSC Handling

The terminating MSC receives the list of supported codec types, including the 3G-324.M codec. It shall then send a SETUP message towards the terminating UE including a Repeat Indicator with the value "service change and fallback" and two BC-IEs, according to the following rule:

- if the 3G-324.M codec is the first (preferred) codec in the list of supported codecs, then the first BC-IE in the SETUP message is the multimedia BC-IE, and the second BC-IE is the speech BC-IE (see figure 4.17);
- if the 3G-324.M codec is in the list of supported codec types, but not in the first position, then the first BC-IE in the SETUP message is the speech BC-IE, and the second BC-IE is the multimedia BC-IE (see figure 4.18).

The terminating UE answers according to its capabilities in the CALL CONFIRMED message. The terminating MSC shall determine the Selected Codec and construct the list of available codecs according to the following rules:

- if no Repeat Indicator is included, and only a speech BC-IE is received, the MSC shall choose a speech codec as the Selected Codec according to the normal mechanism, and no 3G-324.M codec shall be inserted in the list of available codecs (see figure 4.19);
- if no Repeat Indicator is included, and only a multimedia BC-IE is received, the MSC shall choose the 3G-324.M codec as the Selected Codec, and only the 3G-324.M codec shall be inserted in the list of available codecs (see figure 4.20);
- if the Repeat Indicator is included, and the speech BC_IE is the first BC-IE and the multimedia BC-IE is the second BC-IE, the MSC shall choose a speech codec as the Selected Codec according to the normal mechanism, and both the 3G-324.M codec and speech codecs shall be inserted in the list of available codecs (see figure 4.21);
- if the Repeat Indicator is included, and the multimedia BC-IE is the first BC-IE and the speech BC-IE is the second BC-IE, the Selected Codec shall be the 3G-324.M codec, and both the 3G-324.M codec and speech codecs shall be inserted in the list of available codecs (see figure 4.22).

NOTE: If the UE sends a CALL CONFIRMED message without Repeat Indicator and BCs, it indicates that it accepts the proposed settings sent in the SETUP message, which are then used by the MSC to select the relevant case.

The Selected Codec and the list of available codecs shall be sent back to the originating MSC according to the normal codec negotiation procedure.

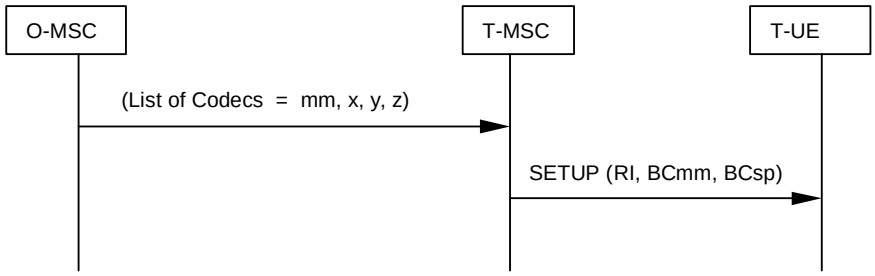


Figure 4.17: 3G-324M codec first

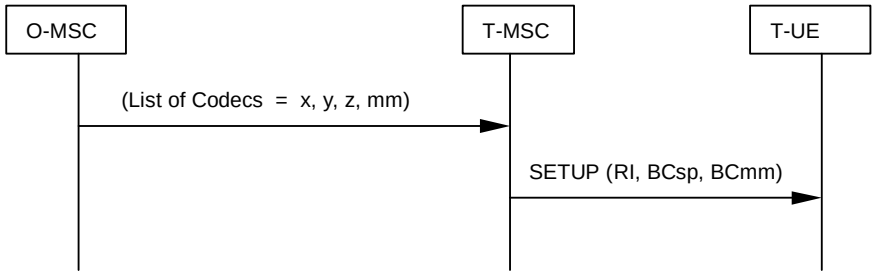
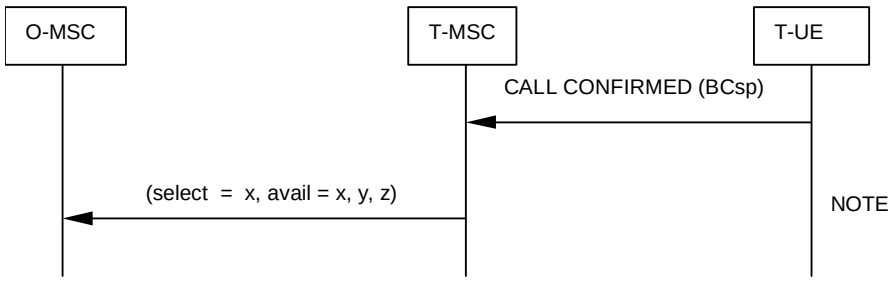


Figure 4.18: Speech codec first



NOTE: The actual speech codec is selected according to OoBTC procedures.

Figure 4.19: Speech only

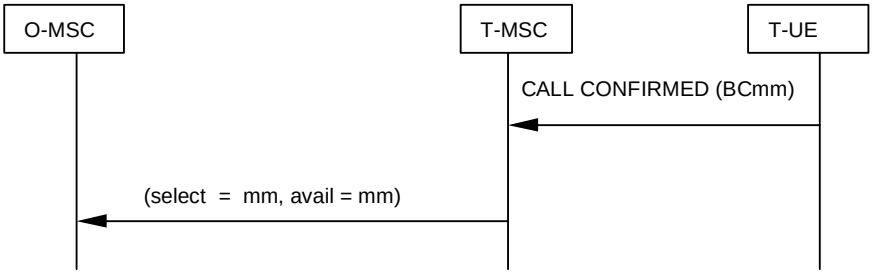
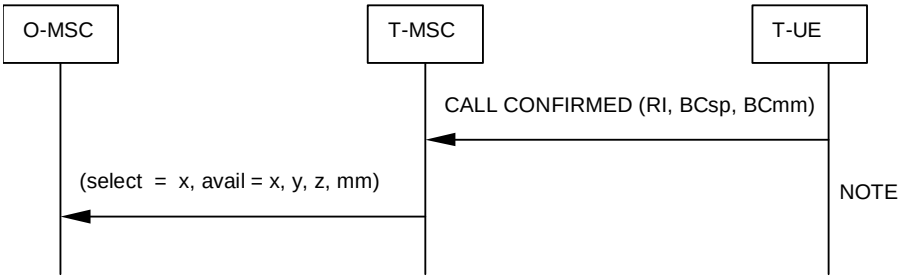
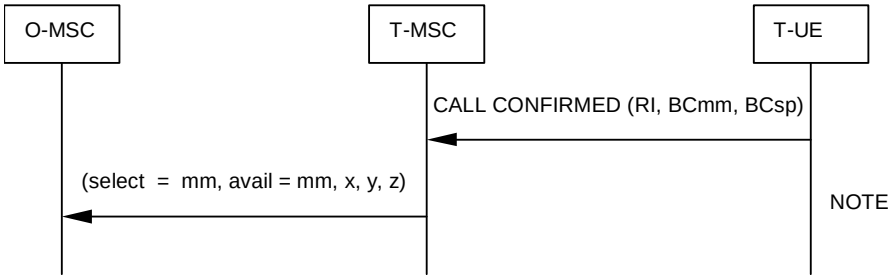


Figure 4.20: Multimedia only



NOTE: The actual speech codec is selected according to OoBTC procedures.

Figure 4.21: Speech preferred



NOTE: The actual list of speech codecs is built according to OoBTC procedures.

Figure 4.22: Multimedia preferred

End of the document