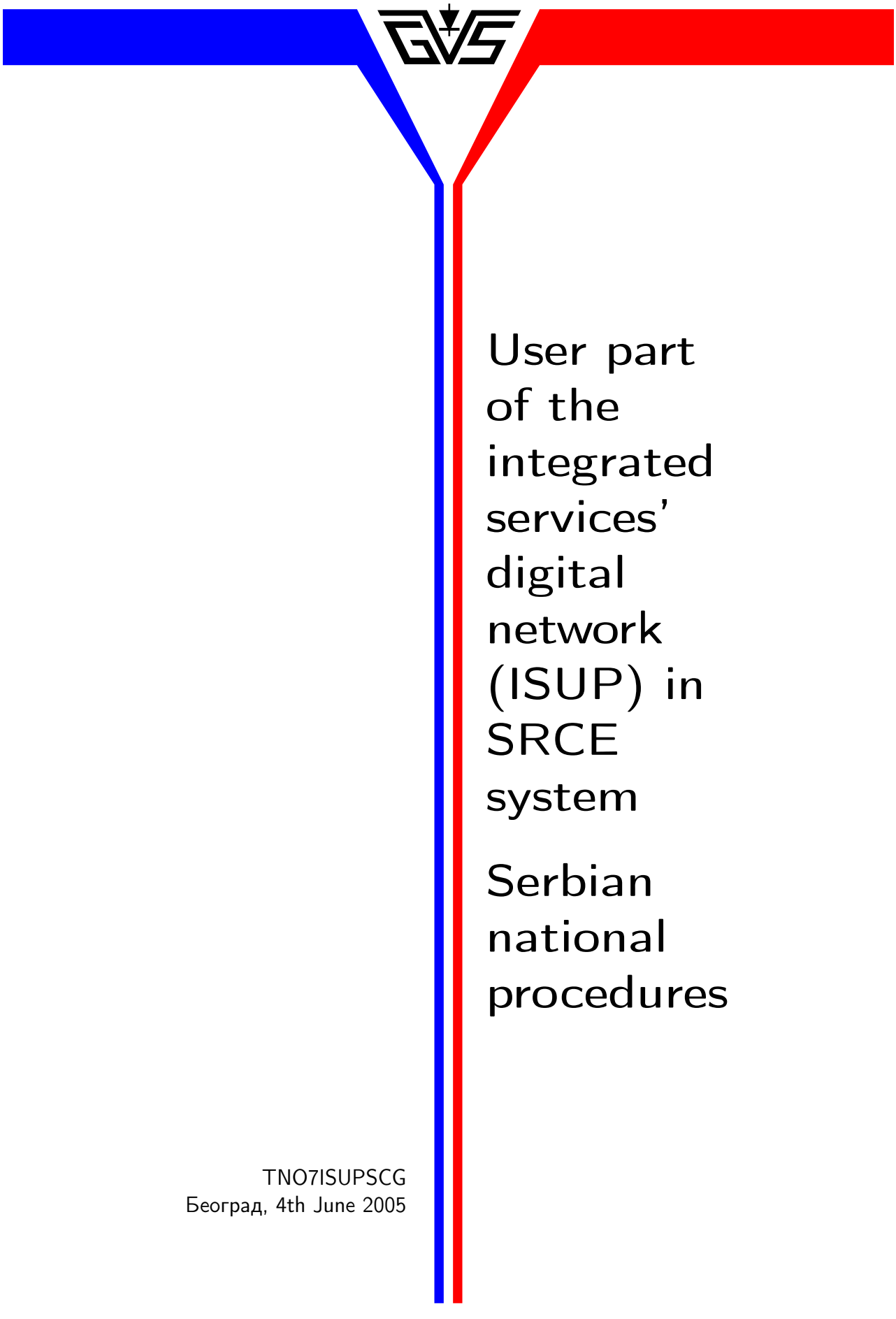

User part of the integrated services' digital network (ISUP) in SRCE system

Serbian national procedures

TNO7ISUPSCG
Београд, 4th June 2005

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1 Preliminary notes

Certain procedures were added to ISUP requirements, in accordance with *ITU-T* recommendations *Q.761-Q.764 (03/93)* in order to comply with some specific national requirements such as:

- charging,
- malicious call identification with or without call hold,
- trunk offering

that are not relevant to international interface.

Further notes will describe procedures implemented for charging, malicious call identification (with or without call hold) and trunk offering; all including definitions, formats and codes for corresponding national messages and parameters.

2 Charging

2.1 Definition

Call charging is performed mainly in originating end exchange, except in case of *Centralized Automatic Message Accounting - CAMA*. Otherwise, information concerning charging case (or tariff value) and relating to a call, may be defined in:

- originating end exchange, e.g., the one for national calls, and/or

- higher level exchange, e.g., an international exchange.

Provided that charging control was performed in a higher level exchange, applied charging case for calling subscriber charging is sent back in special ISUP messages.

According to received charging case, charging pulses may be sent in CAS connection in case there is signalling or charging conversion applied to calling line. These procedures provide individual charging pulses not to be sent over No.7 network while the exchange in charge for charging is connected over ISUP.

2.2 Coding requirements

"Charging case number" parameter

Charging case number parameter is sent in CRG message and indicates a charging information to be used for charging.

Following table introduces field format for *charging case number* parameter:

	8	7	6	5	4	3	2	1
1	Charging case number							

Table 1: *Charging case number parameter field*

Codes used in charging case number parameter field:
00000000 reserved
00000001 charging case number 1
...
11111111 charging case number 255
Parameter code of *charging case number*is 1111 1111.

"Number of charging units" parameter

Number of charging units parameter is sent in CRG message and indicates the number of charged pulses received from analogue signalling systems in the event of conversion.

Parameter format is found in the following table:

	8	7	6	5	4	3	2	1
1	Number of charging pulses							

Table 2: *Number of charging pulses parameter field*

Codes used in "number of charging units parameter field:
00000000 reserved
00000001 1 charging pulse
...
11111111 255 charging pulses
Number of charging pulses parameter code is 1111 1110.

Charge information message CRG

Message is sent in a direction opposite to that of call establishing in charging purposes.
CRG message format is shown in the following table:

Parameter	***Recommendation***	***Type***	***Length (in bytes)***
Message type	Q.763 2.1	F	1
Charging case number		O	3
Number of charging pulses		O	3
Message compatibility information	Q.763 2.1	O	3
Optional parameters end	Q.763 2.1	O	1

Table 3: *CRG message format*

CRG message code is 0011 0001.

Within order indicators in *message compatibility information* parameter, only release indicator is set to 1. Extension indicator is 1 (last byte).

2.3 Procedures

CRG message is sent by the exchange that defines the charging case number. According to charging case, tariff to be applied in the previous exchange is determined. CRG is sent to originating end exchange backwards or, if this is impossible for the reasons of conversion with analogue signalling systems, to the exchange that signalling conversion is performed in. These exchanges perform either charging or generating of charging pulses.

Within charging center, CRG message containing *charging case number* parameter is sent backwards during call establishing.

In case that CRG message is received in the end exchange or the one that signalling conversion is performed in, *charging case number*is saved to the end of conversation. Only one CRG message relating to one call is sent, all during call establishing (figure 1).

If *charging case number* is not recognized during ANM message reception, call is cleared.

On ANM message received, charging based on received *charging case number* is started by originating end exchange. Charging pulses in the exchange performing signalling conversion are sent towards analogue signalling system depending on the number of charging case (figure 2).

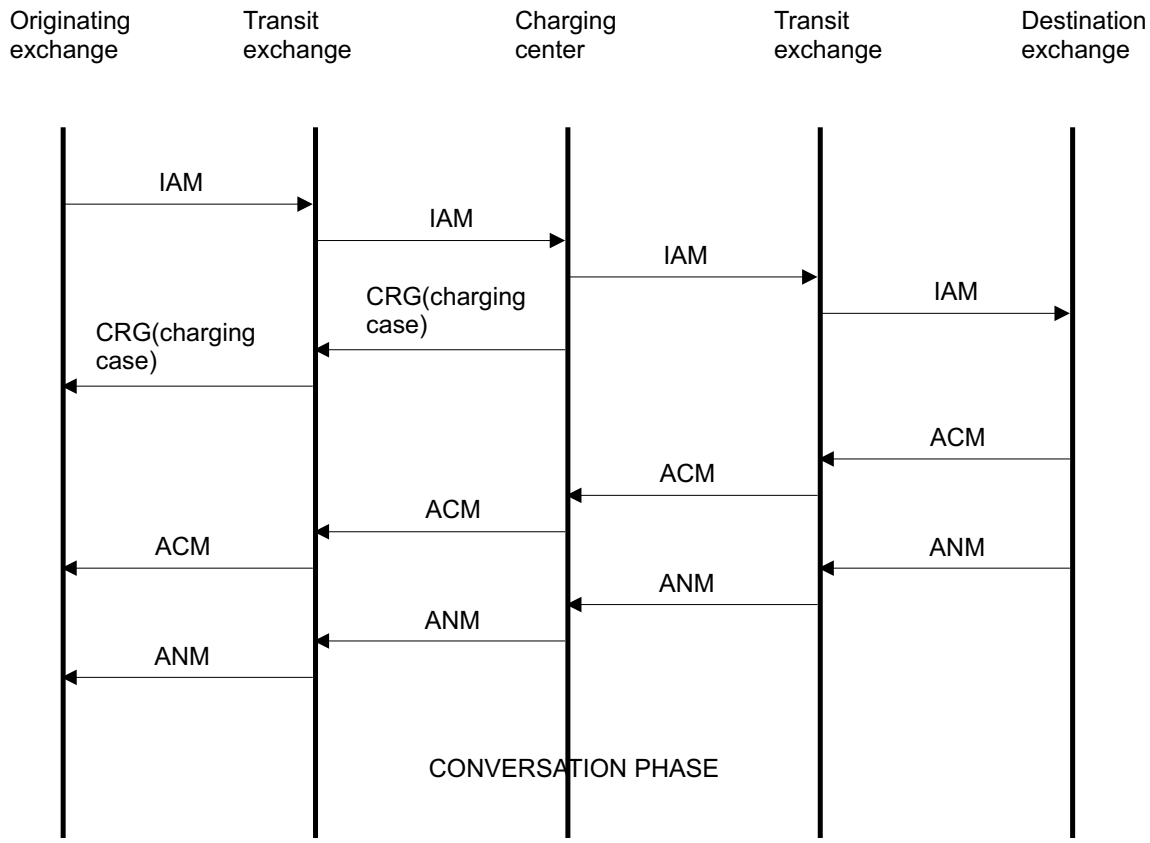

Figure 1: *Charging case defined within charging center*

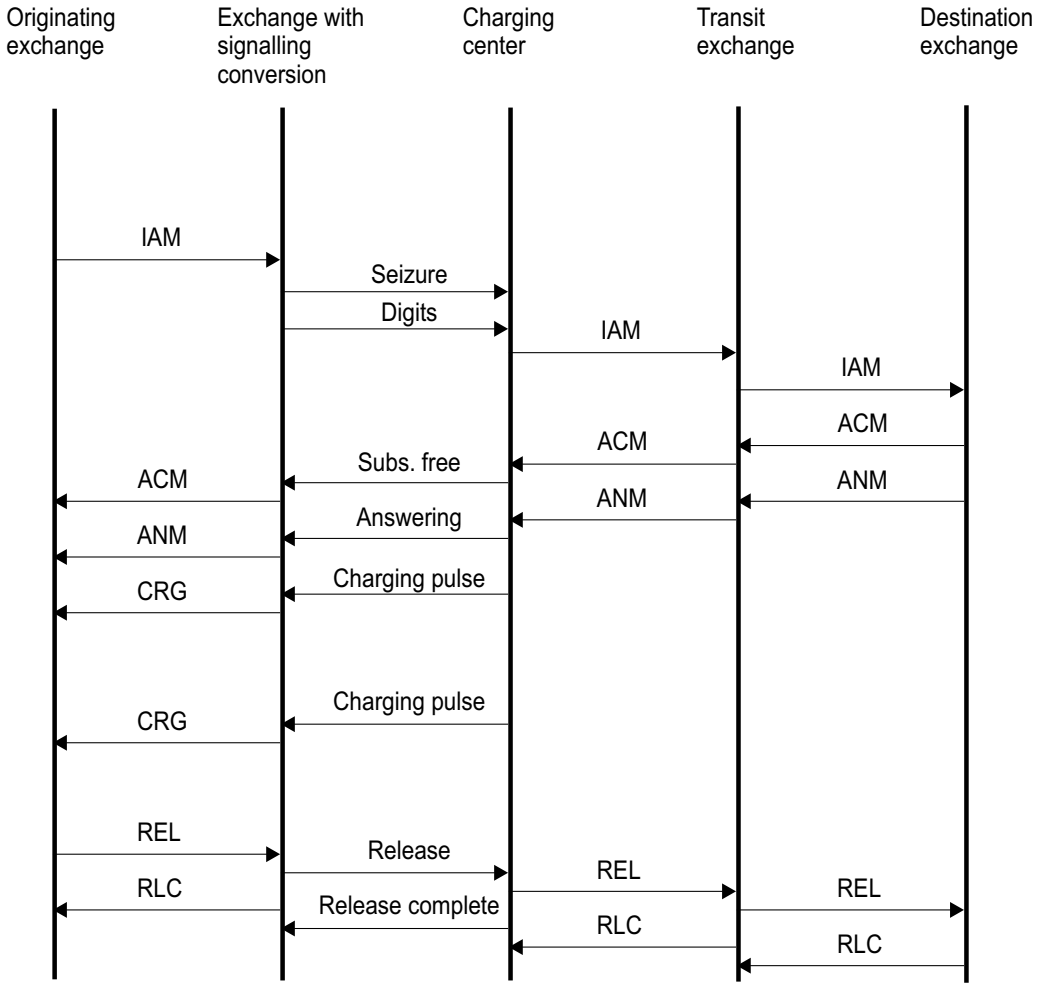

Figure 2: *Charging based on charging pulses*

3 Malicious call identification (MCID)

3.1 Identification request IDR

Message is sent as a request to the action provided for the additional service of malicious call identification. It contains only optional parameters.

3.2 Identification response IRS)

Message is a response to IDR message. It contains the information necessary for malicious call tracing, within optional parameters only.

3.3 Malicious call tracing request indicators

Parameter may be contained only in IDR message. It contains one byte with only two lowest bits used:

- One bit for malicious call tracing request,
- Second bit for call hold request.

3.4 Response indicators of malicious call tracing request

Parameter may be contained only in IRS message. As in case of previous parameter, only two bits are used:

- One bit for the information whether malicious call identification is allowed or not,
- Second bit for the information of call hold being allowed or not.

3.5 Malicious call tracing procedure

Malicious call identification MCID) is basically about sending calling subscriber identity to that destination end exchange, that is, called subscriber exchange.

MCID function may be started in two ways depending on called subscriber request:

- always on called party answer, for particular services such as police, emergency (figure 8).
- controlled by the called party during conversation (figure 3 and 4).

Function is activated by:

- short loop interruption for analogue users

- appropriate action within terminal for ISDN users.

In any case of malicious call tracing, destination exchange informs the operator appropriately (of date, time and identity of calling and called party) independently from the identification restriction state on these priorities.

In case calling party hangs up before the called party does (figure 5), called party has a possibility to start MCID service during time out Tmcid (15 to 30 sec). Tmcid is started on calling party release and is stopped in the moment of activation of tracing by a called party. On Tmcid expiry, *call is released sending REL backwards.*

Calling party number is contained in IAM message, when available.

In case of signalling conversion CAS<–>ISUP, calling party identity may be requested preliminary for each call (figure 6).

If calling party number is not included within IAM message, it is possible to request A number from signalling originating point using INR/INF cycle.

SRCE never sends IDR message as a request for IZP, but only INR. However, if IDR message is received, IRS will be sent as a response.

"A" bit is necessarily used for an identification request in INR message (H bit comes as an option). When available, calling subscriber identification is included in INF return message (bits BA = 11). If the identification is not available, BA bits in INF message are set to 01.

Call hold applies for certain circuit categories: it is enabled only for local trunks and disabled for long-distance trunks. Had call hold been disabled for the input circuit, request received for call hold is ignored and won't be forwarded to the same circuit again.

When call hold is applied, ACM message is sent with L bit of *call back indicators* parameter set to 1. Call hold request in ACM is obligatory, while call hold requests in INR/INF or IDR/IRS messages are optional.

When applying call hold, originating exchange never starts or forwards REL message and particular connection may be cleared only by the operator acting within end exchange using return REL message (figure 7). Called party is released after hanging up the phone and it is than capable of establishing and receiving the calls.

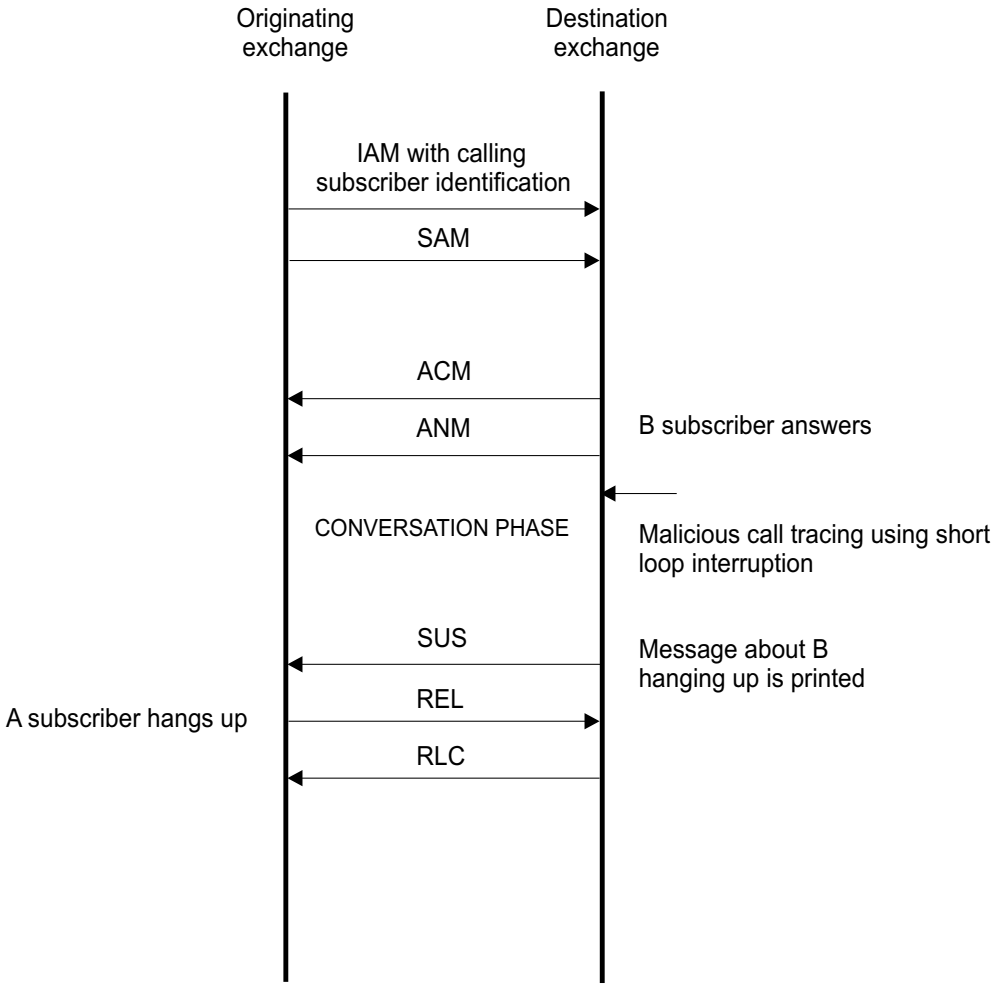

Figure 3: *Call with malicious call tracing controlled by called party (calling subscriber identification available, calling party hangs up after malicious call tracing performed and called party hook on*

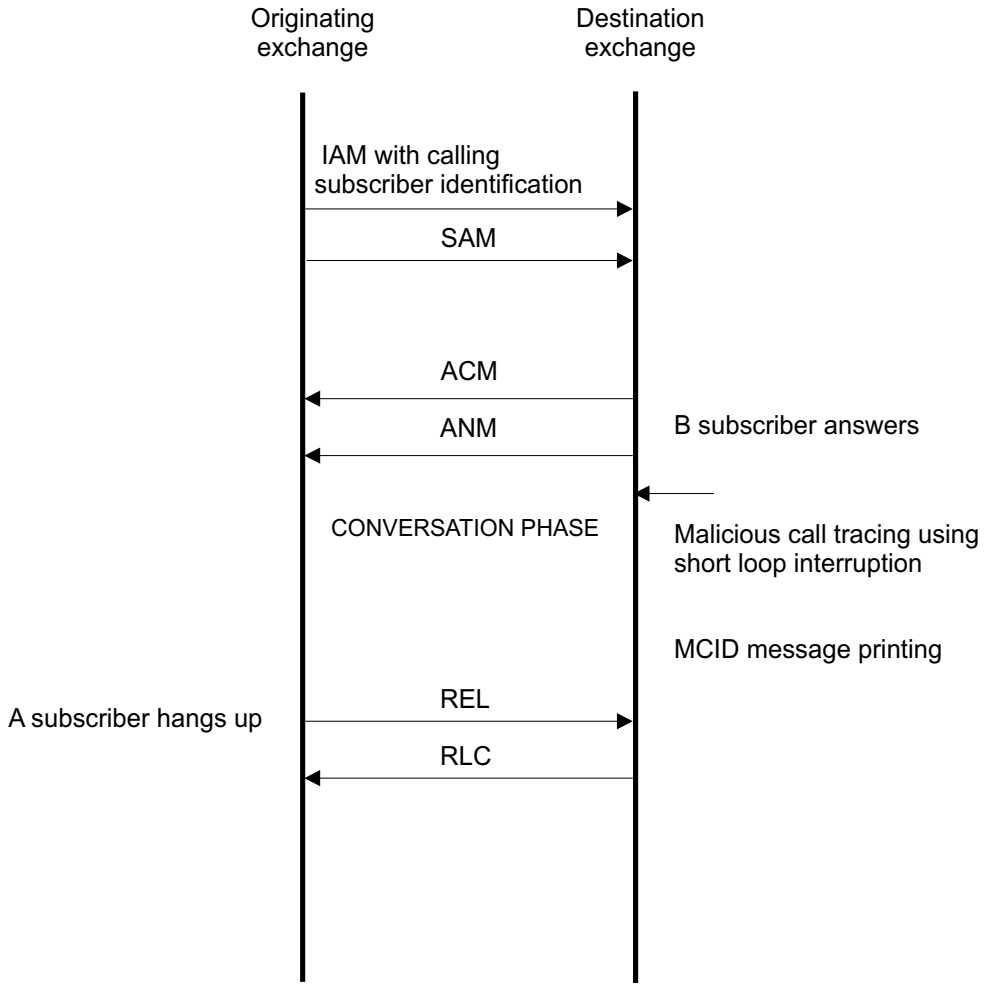

Figure 4: *Call with malicious call tracing service controlled by called party (calling subscriber identification available, calling subscriber hangs up the phone on tracing service activation by called party*

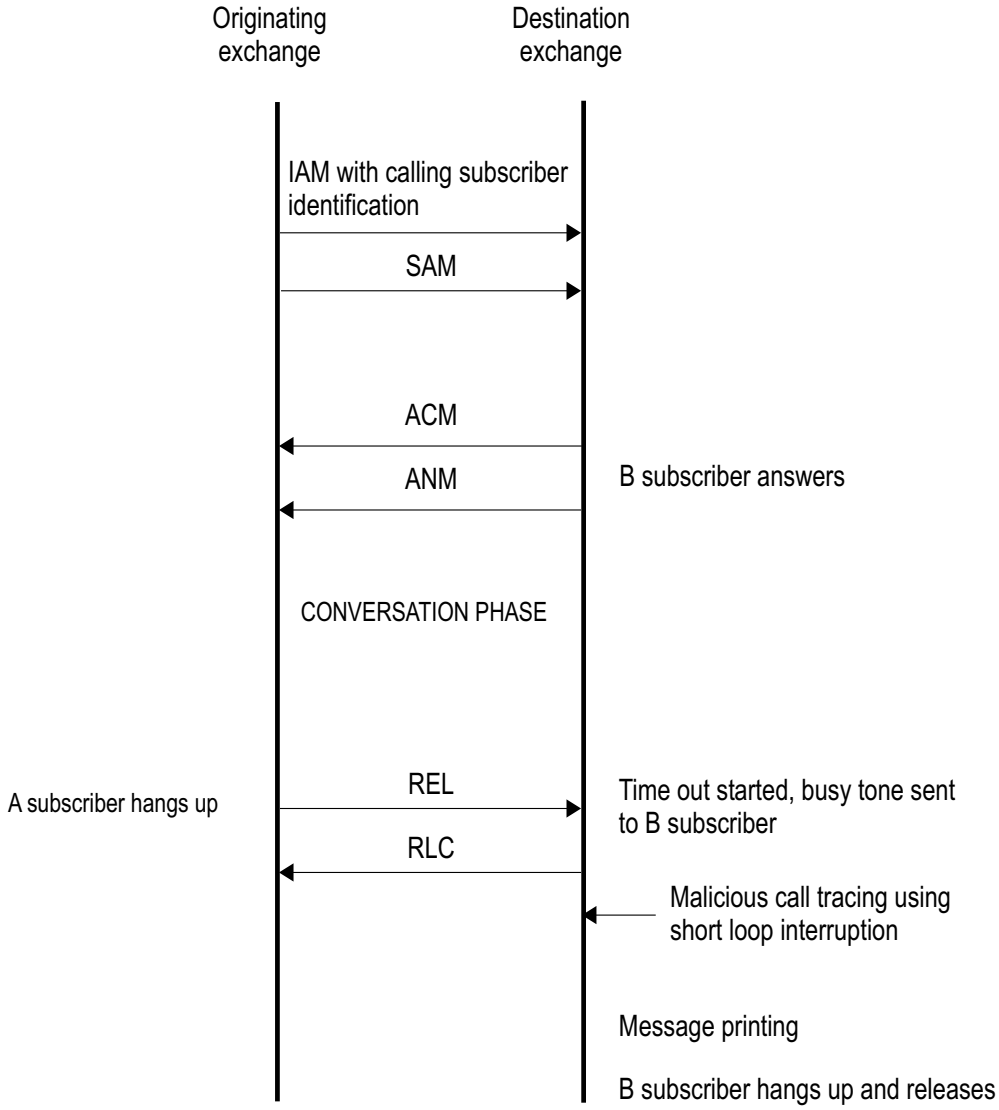

Figure 5: *Call with malicious call tracing controlled by called party (calling subscriber identification available, calling subscriber hangs up before malicious call tracing is done*

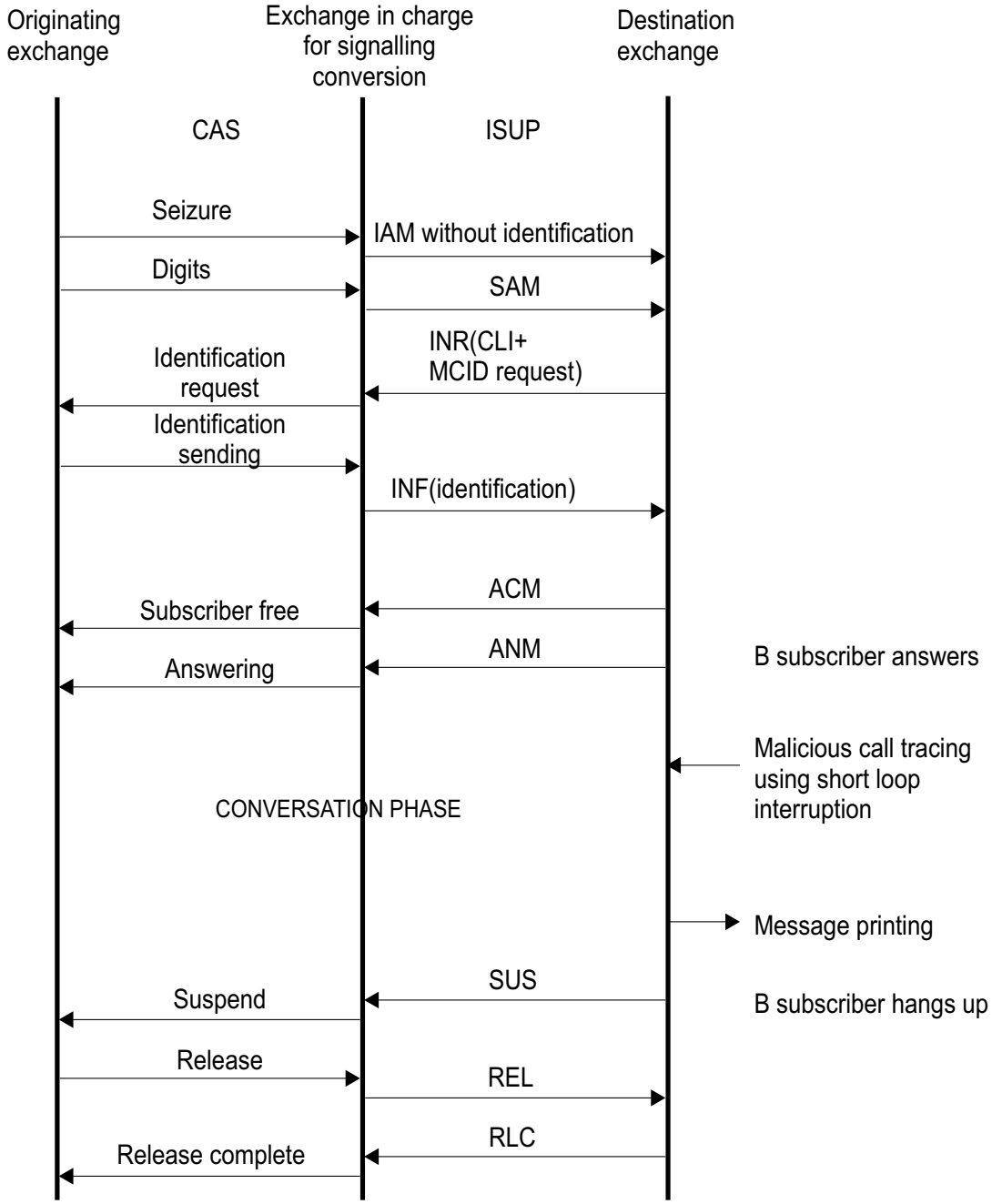

Figure 6: *Call with malicious call tracing controlled by called party (calling party identification available on request*

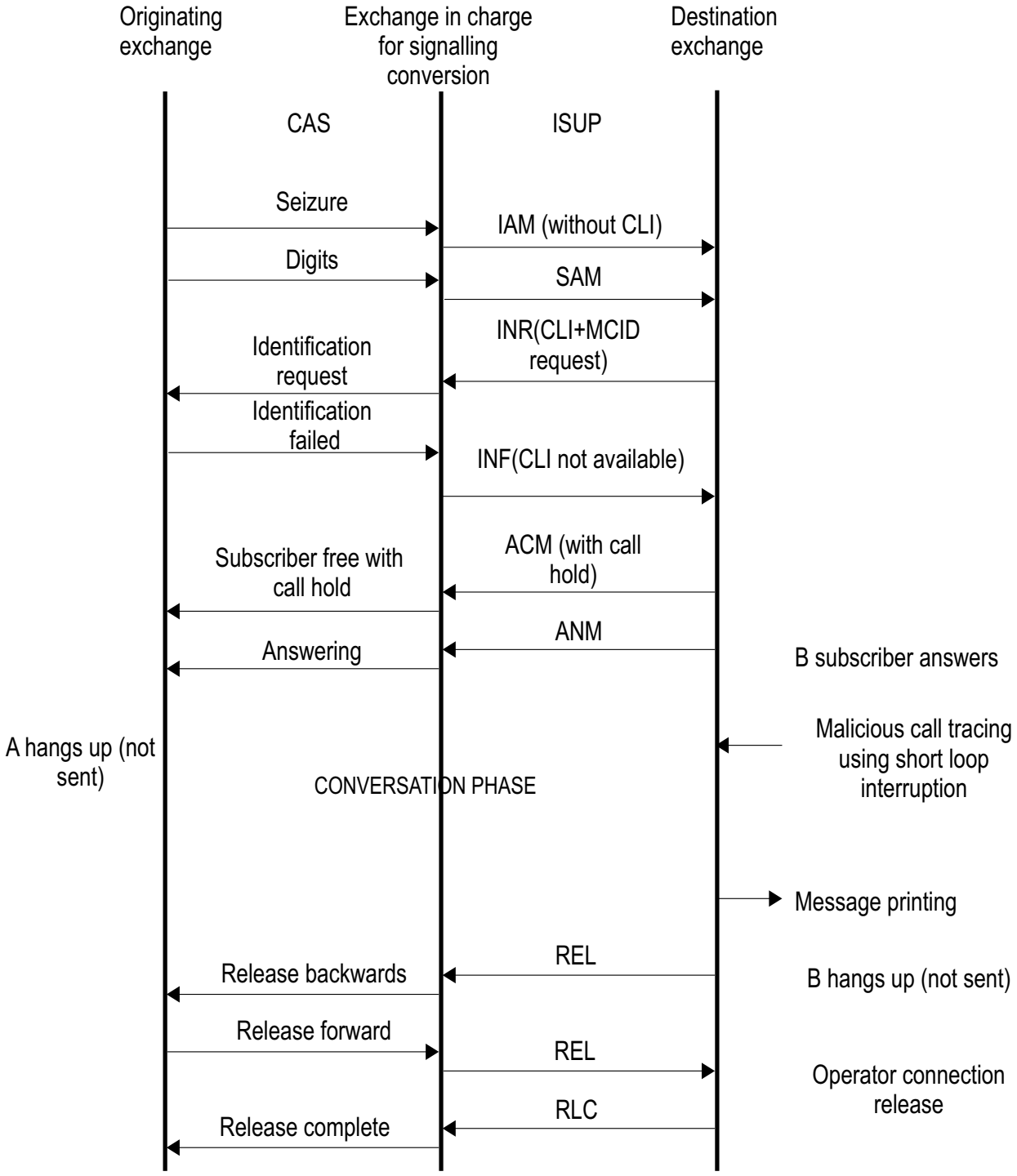

Figure 7: *Call with call hold (identification not available, tracing activation, operator connection clearing*

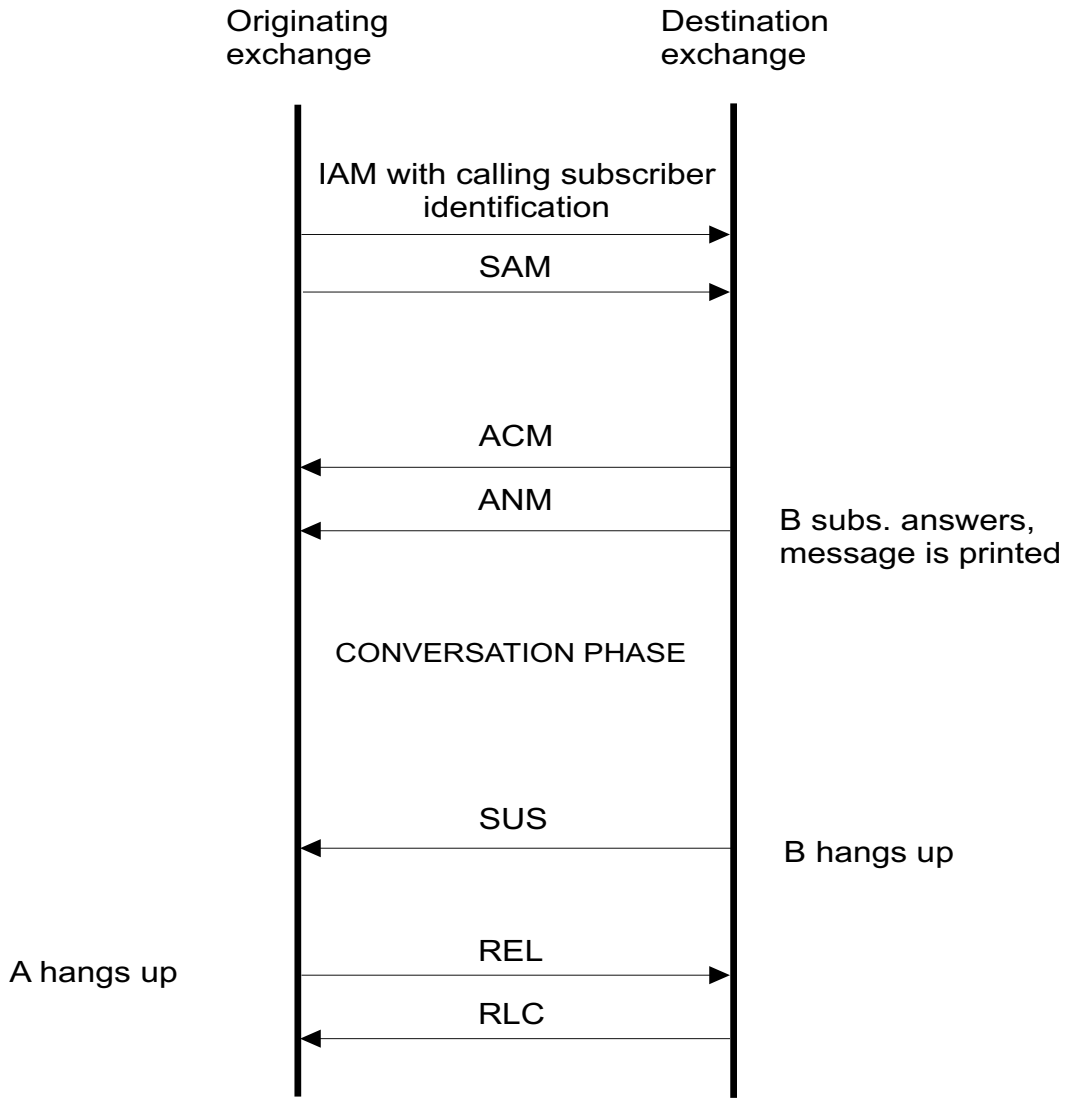

Figure 8: *Call with malicious call tracing always on called party answer*

4 Trunk offering procedure

TrunK Offering facility - TKO is for a national operator to offer new calls to busy analogue subscribers.

4.1 Coding requests

Calling subscriber category parameter value

Code used in *calling party category* parameter field is: 0000 1001 (national operator).

This category is sent in IAM message:

- transit connection code, provided that previous exchange is the operator exchange,
- outgoing call code, in case calling subscriber category is "operator"'.

Cause description

Description of the cause used in parameter *Cause value* in ACM message is: 001 0001 (user busy). Cause value is sent in ACM message after IAM is received with operator category and called subscriber busy.

TRunk offering message

Trunk offering message sent in direction of call establishing denotes: operator request to start trunk offering, trunk offering canceled, ringing request or reringing.

Following table describes trunk offering message format:

Parameter	***Recommendation***	***Type***	***Length in bytes***
Message type	Q.763 2.1	F	1
Message compatibility information	Q.763 3.33	O	3
Optional parameters' end	Q.763 3.20	O	1

Table 4: *Trunk offering message format*

Trunk offering message code is 1111 1111.

Within order indicators in *message compatibility information* parameter, only release indicator is set to 1. Extension indicator is 1 (last byte).

4.2 Trunk offering procedure description

Initial Address Message - IAM is sent from the operator exchange and contains category parameter of the calling party set to "*national operator*". If the analogue subscriber is busy, *Address Complete Message - ACM*, including *Cause Value (17)*"User busy", is sent back from destination end exchange.

When the operator wants to perform trunk offering, operator message *OPR* - "trunk offering" is sent from the operator exchange to destination end exchange and conference call is established with three parties participating and tone signal on operator approach. Operator informs called subscriber about new incoming call.

If called subscriber wants to proceed with current call, operator withdraws the offered call and operator message (OPR - "trunk offering canceled") is sent in order to terminate conference call with three parties in destination end exchange.

After called subscriber hangs up and releases the current call, *Answer Message - ANM* followed with (*Suspend message - SUS* is sent to operator exchange as a false answer indication. On operator call reactivation operator message (OPR - "ringing") is sent to destination end exchange and analogue subscriber telephone rings. When called subscriber lifts up the receiver, *Resume – RES* message is sent towards operator exchange (figure 9).

If called subscriber refuses the offered call, operator releases the call (figure 10).

Sequence of messages 'trunk offering" – "trunk offering canceled" may be repeated for several times.

Same ISUP message (OPR) is used for 'trunk offering", "trunk offering canceled" and "ringing". Actual meaning depends on the moment of sending (that is, call processing state in that moment).

After called subscriber hangs up the phone, operator is enabled to send reringing in OPR message. This is another chance for subscriber to answer. Repeated ringing and answering is separately shown on figure 11.

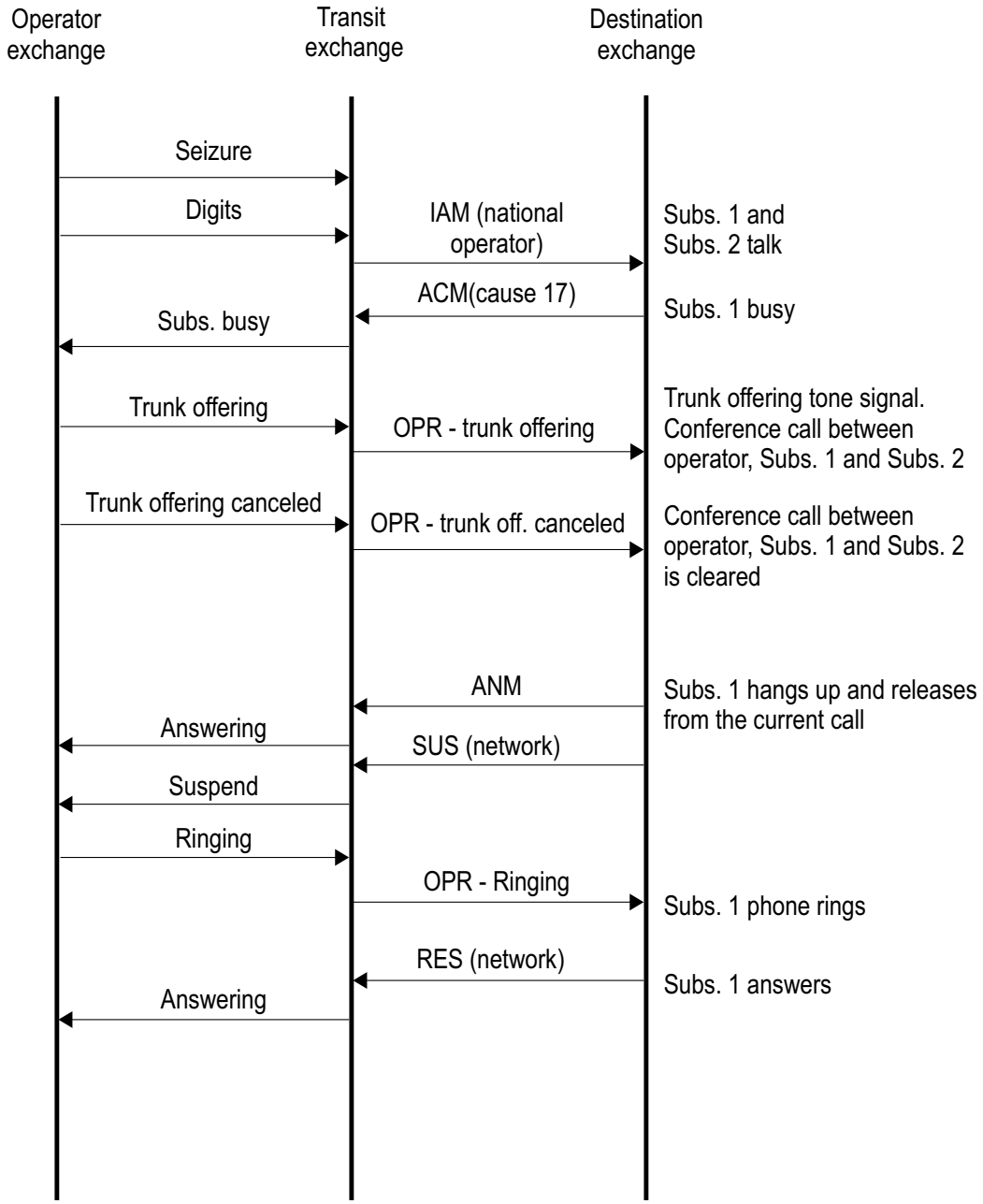

Figure 9: *Trunk offering procedure, subscriber wants to proceed with current call*

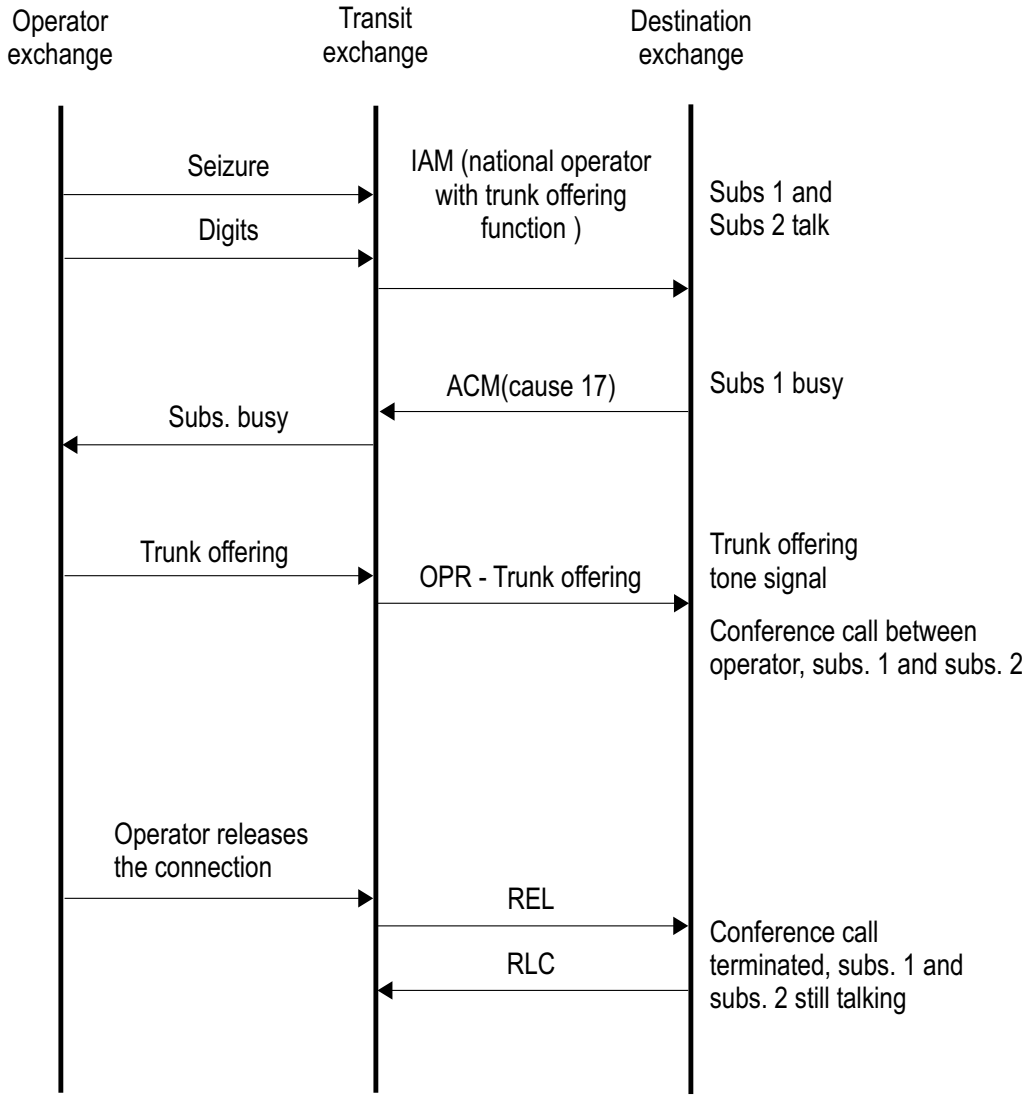

Figure 10: *Trunk offering procedure, subs. rejects offered call*

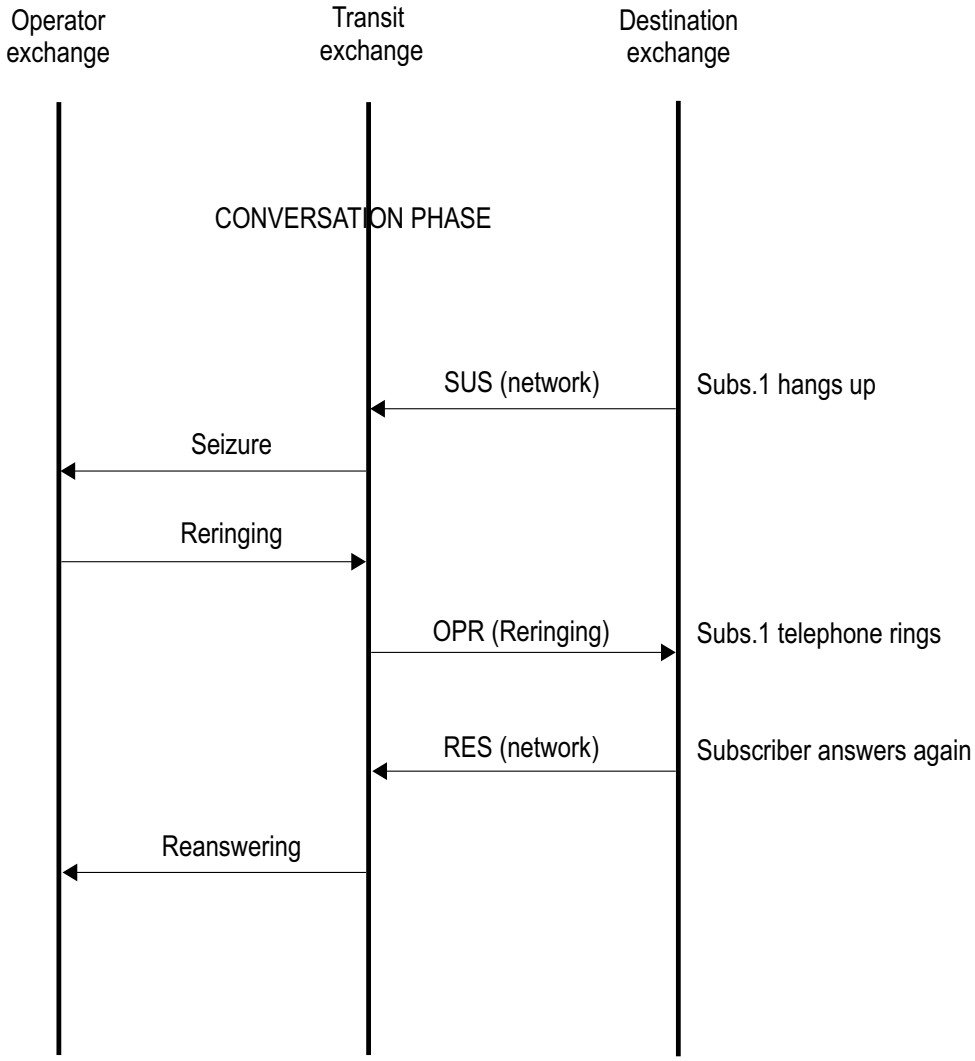

Figure 11: *Reringing procedure*

5 Abbreviations

ACM – Address Complete
ANM – Answer
CRG – Charge information
IDR – Identification request
IRS – Identification response
INF – Information
INR – Information request
ISDN – Integrated Services Digital Network
ISUP – ISDN User Part
IAM – Initial address message
MTP – Message Transfer Part
OPR – Operator message
REL – Release
RLC – Release complete
RES – Resume
SAM – Subsequent address message
SUS – Suspend