INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.85.6

Annex A

(07/96)

SERIES Q: SWITCHING AND SIGNALLING

Functions and information flows for services in the ISDN – Supplementary services

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Stage 2 description for community of interest supplementary services: Global Virtual Network Service (GVNS)

Annex A: Service procedures and information flows based on Intelligent Network CS-1 capabilities

ITU-T Recommendation Q.85.6 – Annex A

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION Q.85.6 – Annex A

SERVICE PROCEDURES AND INFORMATION FLOWS BASED ON INTELLIGENT NETWORK CS-1 CAPABILITIES

Summary

Annex A to Recommendation Q.85.6: "Stage 2 description for community of interest supplementary services: Global Virtual Network Service (GVNS)" (1995) contains a Stage 2 description of GVNS modelled as an Intelligent Network Capability Set 1 service. It describes information flows and actions that conform to those of the revised IN CS-1 Recommendations. It is complementary to and consistent with all aspects of Recommendation Q.85.6. It provides information on the IN CS-1 modelling of procedures as defined for GVNS in Recommendation F.16, 1995.

The main body of text of this Annex contains descriptions of the functional requirements of GVNS for a variety of successful and unsuccessful operations. The procedures, functional entities and information flows relate in general to service provision across multiple networks. Access to and from other networks is provided by accessing data across network boundaries, in conformance with IN CS-1 capabilities.

Source

ITU-T Recommendation Q.85.6, Annex A, was revised by ITU-T Study Group 11 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 9th of July 1996.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

CONTENTS

Recommendation Q.85.6 – Annex A

SERVICE PROCEDURES AND INFORMATION FLOWS BASED ON INTELLIGENT NETWORK CS-1 CAPABILITIES

(Geneva, 1996)

A.1 Introduction

A.1.1 Scope

This Annex A to Recommendation Q.85.6 [1] defines an Intelligent Network Capability Set 1 (IN CS-1) compliant service description of Global Virtual Network Service (GVNS). Since it depends on IN CS-1, it does not in any way provide a technology independent description. It identifies the functional capabilities and information flows from IN CS-1 (revised version, 1995) needed to support GVNS as defined in Recommendation F.16 [2].

This Annex employs a methodology based on that specified in Recommendation Q.65 [3], with appropriate modifications to take account of the facts that the functional model, information flows, logic for sequencing of information flows and IN functional entity actions are defined in Recommendation Q.1214 [4], and are not defined within this Annex. In some cases, the logic for sequencing of information flows may be modified according to Recommendation Q.1218 [5]. This Annex is structured in the same way as Recommendation Q.85.6.

All GVNS procedures described in this Annex are associated with a call, as required by IN CS-1 capabilities, and are invoked by interruption of call processing.

Only the relationships related to IN service execution are addressed in this Annex.

This Annex addresses the relationship between GVNS service, basic call and IN CS-1 services. The definitions of CCAF and CCF for IN CS-1 services are described in Recommendation Q.1214 [4] and are based on corresponding Q.71 [6] ISDN definitions, but are modified for use in IN. In particular, the enhanced basic call state model of the IN defines standard Detection Points (DPs) at which IN service feature logic instances can be invoked. These DPs correspond to the Q.71 "hooks" where an ISDN supplementary service interfaces to the Q.71 basic call model. Call modelling and the SSF/CCF functional entity are described in detail in clause 3/Q.1214 and clause 4/Q.1214. In IN CS-1, the SSF/CCF functional entity is treated as indivisible, i.e. the interface between CCF and SSF is not a matter for IN CS-1 standardization.

The procedures, functional entities and information flows described in this Annex relate to service provision across multiple networks, to the level of Intelligent Network CS-1 capabilities, by allowing access to data across a network boundary. All access to such data is controlled by the SCF in the originating network, in conformance with IN CS-1 guidelines.

This Annex provides procedures to support the following aspects of GVNS, as defined in Recommendation F.16:

– Access methods – direct, switched, remote.

– GVNS calling to on-net and off-net locations.

– Call screening.

– Customer-defined numbering.

– Announcements – standardized and customized.

– User input of authorization code, with limits on retry.

– User input of accounting code, with limits on retry.

– Follow-on calls (relevant to remote access only) – after conversation or unsuccessful call set-up.

The relationship to the call processing mechanisms of Recommendation Q.85.6 is as follows:

Subclause 1.7/Q.85.6 describes three call processing mechanisms, Types A, B, and C.

Type A: Customer-specific information is stored in originating network.

Type B: Customer-specific information is stored in both originating and terminating networks but without direct interaction.

Type C: Customer-specific information is stored in both originating and terminating networks with direct interaction.

IN CS-1 supports Types A and C transparently. In this Annex, therefore, in general it is not necessary to distinguish Type C from Type A.

The Type B mechanism is modelled in IN CS-1 by the invocation of terminating network SSF to terminating network SCF interaction. This can only occur if the control relationship between the originating network SCF and the originating network SSF has ended, since it must not be possible for the originating network SCF to still influence the course of call processing. While this is an IN CS-1 restriction, it is entirely compatible with the Type B mechanisms shown in Recommendation Q.85.6.

The information flow diagrams in the IN CS-1 description are divided into access procedures and call set-up procedures. Only the information flows for call set-up have been categorized into Types A, B and C. It has been assumed that sufficient information related to user access is contained in the originating network and all access procedures are therefore Type A.

A.1.2 References

The following Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision: all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] ITU-T Recommendation Q.85.6 (1995), *Stage 2 description for community of interest supplementary services: Global Virtual Network Service (GVNS).*

[2] ITU-T Recommendation F.16 (1995), *Global Virtual Network Service.*

[3] CCITT Recommendation Q.65 (1988), *Stage 2 of the method for the characterization of services supported by an ISDN.*

[4] ITU-T Recommendation Q.1214 (1995), *Distributed functional plane for Intelligent Network CS-1.*

[5] ITU-T Recommendation Q.1218 (1995), *Interface Recommendation for Intelligent Network CS-1.*

[6] ITU-T Recommendation Q.71 (1993), ISDN *circuit mode switched bearer services.*

[7] ITU-T Recommendation Q.1213 (1995), *Global functional plane for intelligent network CS-1.*

[8] ITU-T Recommendation Q.1215 (1995), *Physical plane for Intelligent Network CS-1.*

A.1.3 Definitions

A.1.3.1 Terms defined in Recommendation F.16

The following terms are defined in Recommendation F.16 [2]:

Direct access

Switched access

Remote access

GVNS calling

Call screening

Range privilege

Customer-defined numbering

Standard announcements

Customized announcements

Authorization code

Accounting code

On-net locations

Off-net locations

GVNS user group and subgroup

Numbering plan

GVNS Participating Service Provider

A.1.3.2 Terms not defined in Recommendation F.16

The following terminology is used in this Annex:

A.1.3.2.1 originating network: The network from which any user originates a GVNS service request or outgoing call is the "originating" network. The SSF which provides access to IN functionality is assumed to be associated with an originating exchange. No difference in IN information flows will result if the SSF is associated with a transit exchange, but network signalling will be different.

The SSF, SCF and SDF in the originating network are designated SSF(o), SCF(o) and SDF(o).

A.1.3.2.2 terminating network: The called party's network is the "terminating" network.

The SSF, SCF and SDF in the terminating network are designated SSF(t), SCF(t) and SDF(t).

All interactions with SDF(t) are controlled by the SCF in the originating network, in conformance with IN CS-1 guidelines.

A.1.4 Glossary of abbreviations and acronyms

For the purposes of this Annex, the following abbreviations are used.

AD	Adjunct
BCSM	Basic Call State Model (in Recommendation Q.1214)
CCAF	Call Control Agent Function
CCF	Call Control Function
CLI	Calling Line Identification

CS-1	Capability Set 1
DP	Detection Point (in BCSM)
EDP	Event Detection Point (in BCSM)
EDP-N	Event Detection Point – notification (in BCSM)
EDP-R	Event Detection Point – report (in BCSM)
FE	Functional Entity
FEA	Functional Entity Action
GVNS	Global Virtual Network Service
IE	Information Element
IF	Information Flow
IN	Intelligent Network
IP	Intelligent Peripheral
ISDN	Integrated Services Digital Network
NAP	Network Access Point
PE	Physical Entity
PIC	Point In Call (in BCSM)
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
SCF	Service Control Function
SCF(o)	Originating network service control function
SCF(t)	Terminating network service control function
SCP	Service Control Point
SDF	Service Data Function
SDF(o)	Originating network service data function
SDF(t)	Terminating network service data function
SDP	Service Data Point
SIB	Service Independent building Block
SN	Service Node
SRF	Specialized Resource Function
SSCP	Service Switching and Control Point
SSF	Service Switching Function
SSF(o)	Originating network service switching function
SSF(t)	Terminating network service switching function
SSP	Service Switching Point
TDP	Trigger Detection Point (in BCSM)
TDP-N	Trigger Detection Point – notification (in BCSM)

TDP-R Trigger Detection Point – report (in BCSM)

A.1.5 Conventions

The following notations and styles are used in the text of this Annex:

– The names of IN CS-1 SIBs from Recommendation Q.1214 [4] are written with each component word capitalized and spaces between the words, e.g. Log Call Information.

– The names of IN CS-1 information flows from Recommendation Q.1214 are written with each component word capitalized and spaces between the words and the appropriate type descriptor is included, e.g. Call Information Report req.ind.

– The names of information elements in IN CS-1 information flows from Recommendation Q.1214 are written with each component word capitalized and spaces between the words, e.g. Requested Information.

– The abbreviation for the word identity in an IN CS-1 information element from Recommendation Q.1214 is written ID.

– The names of IN CS-1 detection points from Recommendation Q.1214 are written with each component word capitalized and underscores between the words, e.g. O_Disconnect.

– Other names defined in Recommendation Q.1214 are not capitalized, e.g. detection point.

– The names of information flows defined in Recommendation Q.71 [6] are written in upper case and the appropriate type descriptor is included, e.g. SETUP req.ind.

The following notations and styles are used in the information flow diagrams of this Annex:

– The names of the IN CS-1 information flows from Recommendation Q.1214 [4] are written with each component word capitalized and spaces between the words but the appropriate type descriptor is omitted, e.g. Call Information Report, not Call Information Report req.ind.

– The names of information flows defined in Recommendation Q.71 [6] are written in upper case italics and the appropriate type descriptor is included, e.g. *SETUP req.ind*.

– FEA numbers from Recommendation Q.1214 [4] are written in normal typeface.

– FEA numbers from Recommendation Q.71 [6] are written in italic typeface.

– SIBs are shown as dotted rectangles with the name of the SIB beside them.

A.2 Functional model for GVNS

A.2.1 Introduction

The Functional Entities (FEs) and Information Flows (IFs) defined for Intelligent Network Capability Set 1 (IN CS-1) are used in this Annex for modelling GVNS. Modelling of entities and information flows which relate to the GVNS Participating Service Provider's service management are not shown. Modelling of the assist and handoff procedures (see 5.2.12.5/Q.1214 and 5.2.12.6/Q.1214) is not included, as implementation of GVNS will require no change to the information flows and actions described there.

A.2.2 Relationship to functional model of Recommendation Q.85.6

The functional model is compatible with that of Recommendation Q.85.6 [1]. Figure 6-2/Q.85.6 shows the relationship between the GVNS functional model and a basic service and is reproduced here as Figure A.2-1.

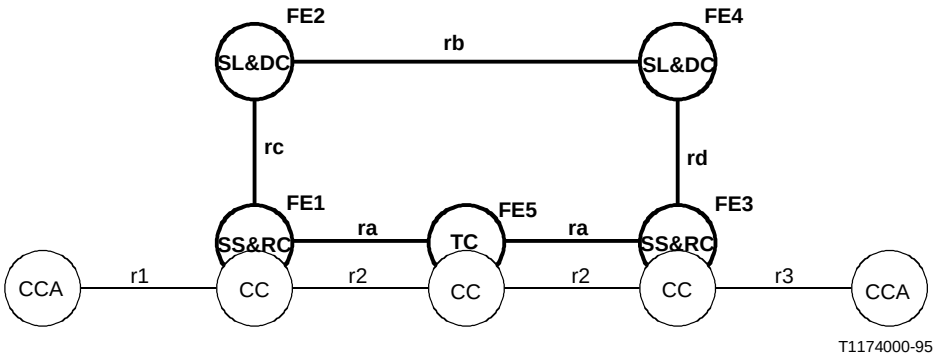
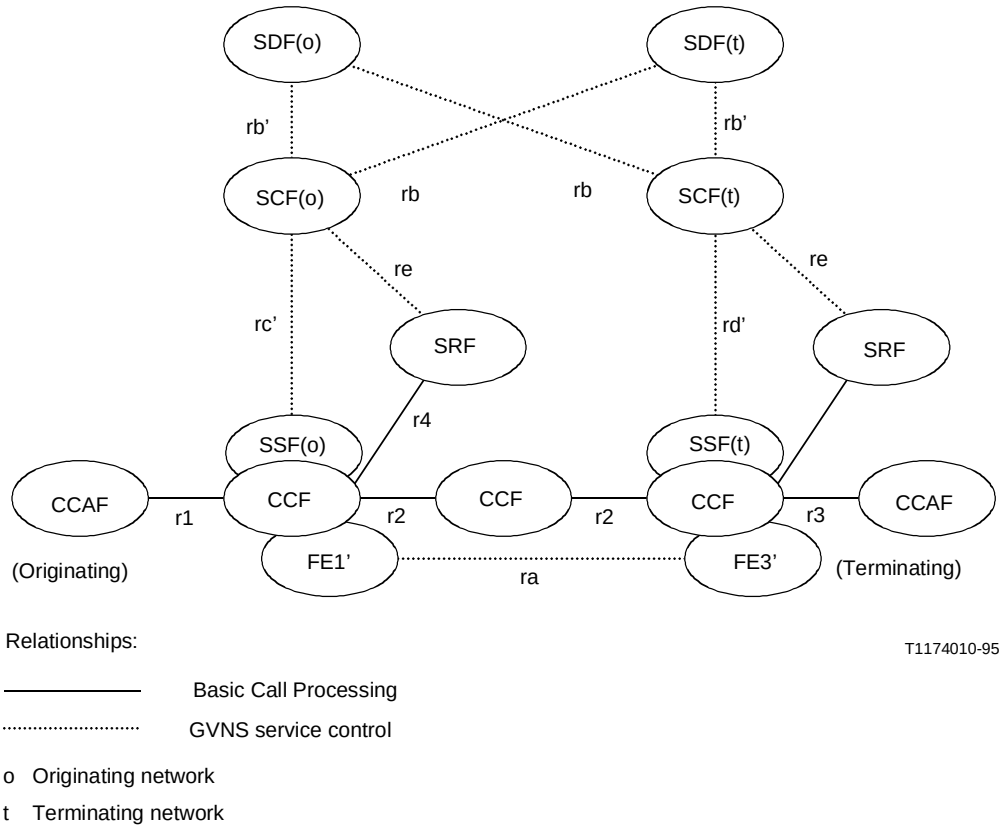


Figure A.2-1/Q.85.6 – Relationship between functional models of GVNS and a basic service (Figure 6-2/Q.85.6)

Figure A.2-2 shows the IN CS-1 functional model, based on Recommendation Q.1214 [4].



NOTE – FE1' and FE3' do not form part of the IN CS-1 modelling. These provide the subset of functionality for terminating relationship ra as defined in Recommendation Q.85.6 for FE1 and FE3 respectively.

Figure A.2-2/Q.85.6 – Functional model for IN CS-1 description

In Figure A.2-2 the relationship re between the SCF and the SRF is shown as a relationship separate from that between the SCF and SSF (rc'). In Figure A.2-1 the SCF-SRF relationship is subsumed within the single relationship rc. This is entirely consistent, as Recommendation Q.85.6 treats the details of SRF connection as a matter for physical realization. In IN CS-1 the relationship rb' between SCF(o) and SDF(o) is identical with the relationship rb between SCF(o) and SDF(t) and the relationship rc' between SSF(o) and SCF(o) is identical with the relationship rd' between SSF(t) and SCF(t). In Q.85.6 relationship rb' is not visible externally.

The correspondence between the functional models is constrained by the IN CS-1 restriction that services must be single-ended, single point-of-control, so the terminating end SCF can only be involved in call set-up if the originating end SCF has relinquished control. It is not possible to have both originating end SCF and terminating SCF involved in the same segment of call set-up. There is, however, no restriction on the access of the originating end SCF to the terminating end SDF, consistent with IN CS-1 procedures.

The comparison between the functional model of Recommendation Q.85.6 and the IN CS-1 model is shown in Figure A.2-3. Only the Q.85.6 relationships and FE reference numbers are shown. The SSF(t) and SCF(t) functional entities are required only for Type B call processing.

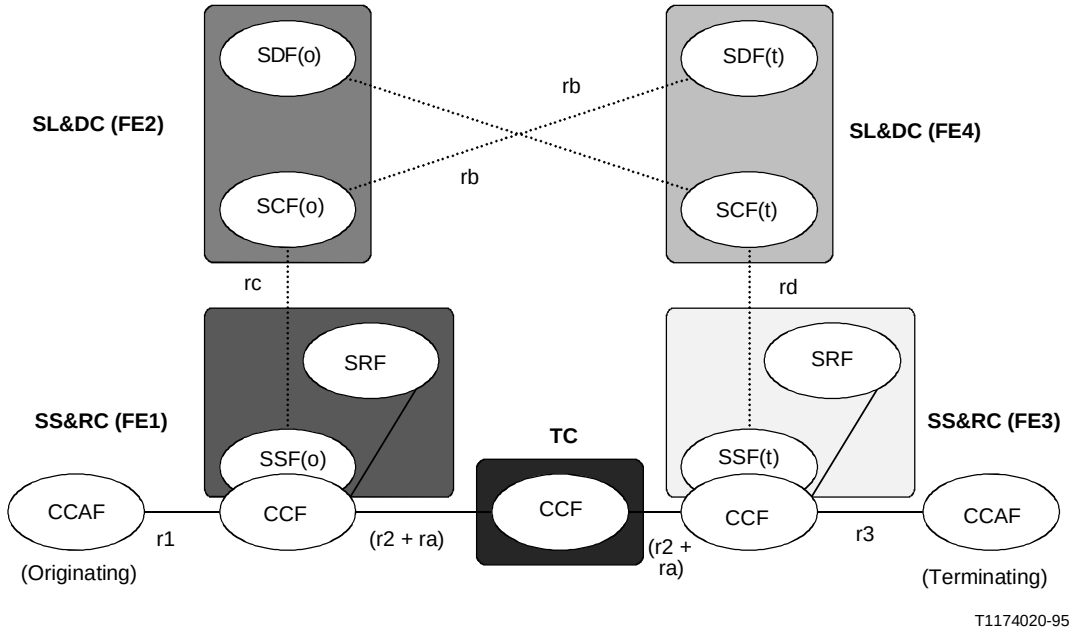


Figure A.2-3/Q.85.6 – Relationship between the functional models

A.2.3 Descriptions of the functional entities

In Figures A.2-2 and A.2-3, the IN CS-1 functional entities (FEs) have the following meanings:

SSF Service Switching Function; associated with CCF

SRF Specialized Resource Function

CCF Call Control Function

CCAF Call Control Agent Function

SCF Service Control Function

SDF Service Data Function

In IN CS-1 the SSF is assumed to have a relationship with the CCF which is not externally visible and which is therefore not a subject for standardization in IN CS-1.

Descriptions of the FEs are to be found in 3.3/Q.1214. For the purposes of this Annex, the CCAF is identical with the CCA of Recommendation Q.71 [6]. The CCF is based on the corresponding Q.71 [6] ISDN definition but is modified for use in IN. The enhanced basic call state model of the IN defines standard Detection Points (DPs) at which IN service feature logic instances can be invoked. These DPs correspond to the Q.71 "hooks" where an ISDN supplementary service interfaces to the

Q.71 basic call model. For the purposes of this Annex, relationships r1, r2 and r3 of Figure A.2-2 are outside the scope of this Annex and are identical with those defined in Recommendation Q.71 [6]. For the purposes of this Annex, relationship r4 is identical with relationship r2 of Recommendation Q.71, since it involves the control of a connection between CCF and SRF in order to provide specialized resources such as tones and announcements.

In a single service example, one CCAF originates the call and the other CCAF terminates the call. The functions and relationships involved are not symmetric. This asymmetry is reflected in the different relationship designations between CCAFs and CCFs (r1 and r3).

The various scenarios for connecting the SCF to the SRF are described in 3.1.3.5/Q.1218. The information flows across the interface SCF-SRF which are involved in GVNS service interactions with the GVNS user are not affected by the physical realization of the SRF connection. For illustrative purposes, the information flows used in this Annex are based only on Case (ii) from Q.1218, in which the IP is directly attached to the SSP that is interacting with the SCP, but the SCP's operations to the IP are sent directly to the IP without SSP relaying being involved. The IP must indicate to the SCP that it is ready to receive operations. SCF-initiated disconnection of SRF is assumed, except following call abandon or disconnect. No examples of SRF-initiated disconnection are shown.

A.3 Information flows for GVNS

The Information Flows (IFs) and their contents (Information Elements, IEs) are those developed by Study Group 11 for the IN architecture, as described in clause 5/Q.1214 and clause 6/Q.1214. Only the use of generic information flows is illustrated in this Annex. For each generic IF there is an equivalent DP-specific information flow, as explained in 5.3/Q.1214. In all cases the generic IF can be replaced by the corresponding DP-specific IF. Subclause A.3.2 contains a comparison of the IN CS-1 IFs used in this Annex with the IFs in Recommendation Q.85.6.

The method used to initiate a GVNS call depends on the type of access, direct, switched or remote, and on whether the attributes applying to the access location need to be changed. For direct and switched (on-net) access, a code may need to be dialled to indicate that a GVNS call is required. If the user wishes to change the default attributes of the access location (e.g. change the accounting code which applies for the requested call), then the user will have to initiate an exchange of information with GVNS. It is assumed here that this exchange of information will be initiated by dialling a special code which precedes the dialled number. Where a GVNS call is being made from a remote access (off-net), it is assumed entry of an authorization code will always be required, following the access procedure used to initiate the interaction with GVNS.

The GVNS user may send information to the GVNS-providing network either in a prompted exchange of information or in one or a small number of messages (e.g. by using some form of ancillary device such as a DTMF tone sender). Only the prompt and response method is considered in this Annex. Interaction from the user to the GVNS-providing network is assumed to be by DTMF in-band signalling and from the network to the user by the voice announcement facility of the SRF. Other mechanisms may apply when the access is within a private network; this is not considered here. The wording of the announcements shown in the information flow diagrams is to show intent only, not specific content. In-band DTMF signalling flows and voice announcements are shown on the diagrams by dotted lines.

The order in which the information is sent from the GVNS user to the network (specifically, to the SRF) may be defined by subscription option, and hence the expected order will be known by the network. For remote access, this order is assumed here to be:

a) access procedure (e.g. a special dialled code);

b) authorization code of GVNS user;

c) accounting code (optional);

d) destination number;

e) optional follow-on procedure after successful or unsuccessful call [followed by d)].

It is assumed that sufficient data for access of the calling user is contained in the originating network in SDF(o). Data relating to routing and number translation may be contained in the terminating network, in SDF(t).

The authorization procedure has been assumed to require input of a single authorization code only. For improved security, it might be necessary to input additional information, e.g. a personal user identification code as well as the authorization code. This would add another sequence of data input to the information flows but has no significant effect on the logic of the procedure. Other forms of authentication of the user are possible.

It is assumed that the network may apply limits on the number of retries that a GVNS user may make if authorization, for example, is unsuccessful. For security reasons, different retry limits may be applied to the input of authorization information and the input of other information. For the purposes of this Annex, it is assumed that the values of the retry counters to be applied are those of the originating network. If consistency of feature availability and functionality is supported, then all GVNS Participating Service Providers should enforce the same values for retry limits. It is assumed that the values applying to such limits will be stored in SDF(o), but the counter logic will reside in the originating SCF, in conformity with IN CS-1 guidelines (see Recommendation Q.1213 [7] and 5.2.3/Q.1214, Compare SIB).

Four charging methods are described in 5.2.2/Q.1214 and can apply to GVNS service. For illustrative purposes, only the use of IF Furnish Charging Information req.ind. is shown. The form in which the charging (or billing) information is transferred from one network to another is outside the scope of this Annex.

Where the SSF/CCF is required to send and react to both Q.71 (bearer and non-IN call control) and IN call control IFs, the sequencing of the two classes of IF bears no relationship to each other, except that synchronization of the termination of sequences is assumed. For example, it has been assumed that the SSF/CCF will wait until all resources are released and the call is terminated before sending a Call Information Report to the SCF. The Q.71 IFs are SETUP, RELEASE and DISCONNECT.

The information flow diagrams do not show any IFs relating to timer control of interactions between functional entities. Not all error paths are considered; notes describe those error paths which are considered.

The SCF must establish an authorized relationship with an SDF on behalf of the user before any access to the SDF is allowed. It is assumed that once this relationship is established (by use of the Authenticate req.ind and Authenticate Result resp.conf IFs) it will remain valid while call processing is suspended at a detection point, but will be cancelled once call processing restarts. The IFs Authenticate req.ind and Authenticate Result resp.conf are therefore shown in the information flow diagrams only when it is necessary to establish an authorized relationship.

The functional entity actions (FEAs) used in this Annex are those of clause 5/Q.1214 [4]. Subclause A.5 identifies the SIBs and clauses of Recommendation Q.1214 in which the FEAs are described.

A.3.1 GVNS procedures

An outline of the sequence of information flow diagrams describing GVNS is shown in Figures A.3-1 and A.3-2.

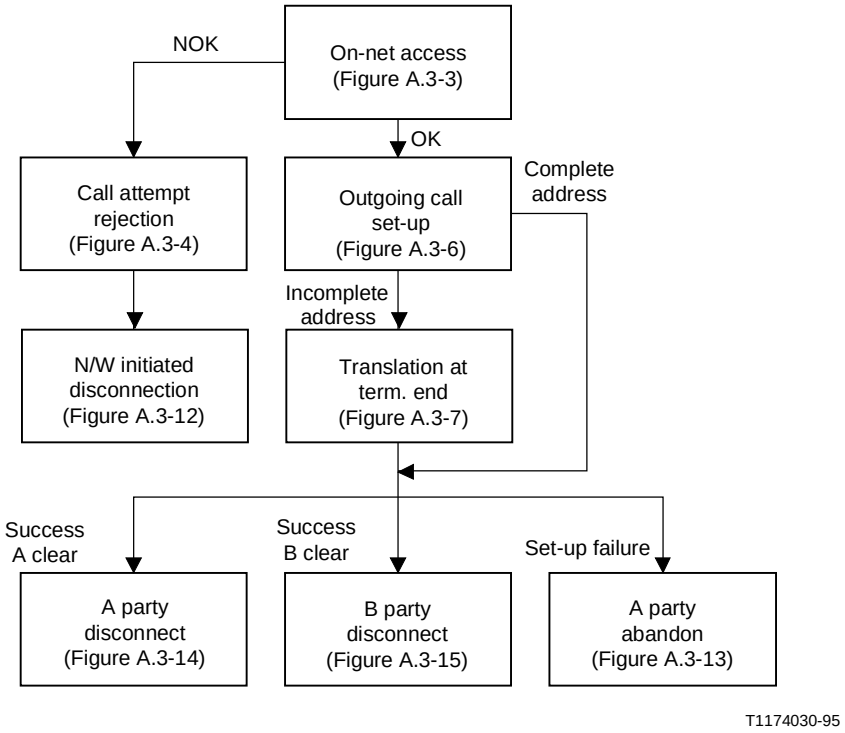


Figure A.3-1/Q.85.6 – Sequencing of diagrams for direct and switched (on-net) access

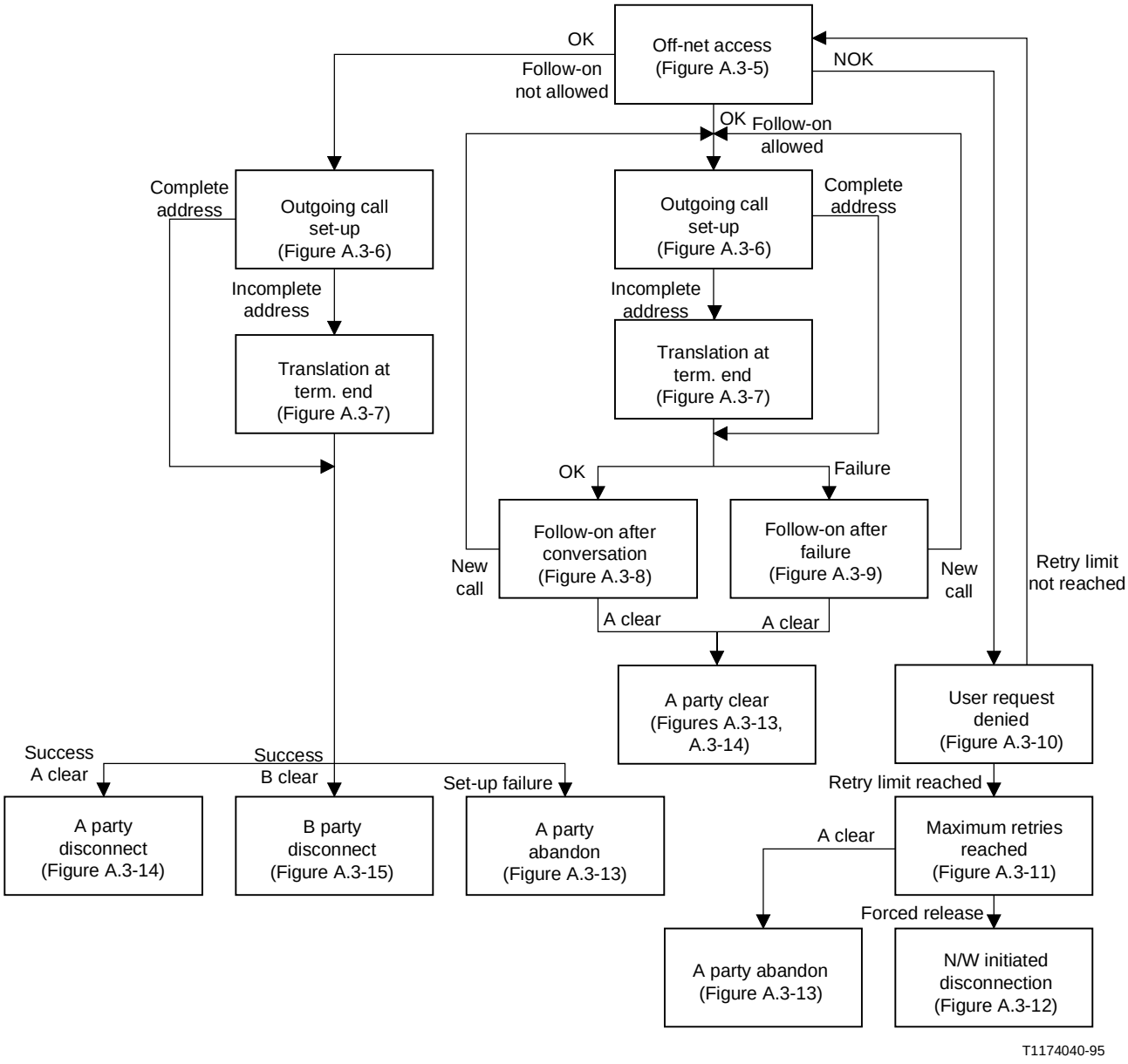


Figure A.3-2/Q.85.6 – Sequencing of diagrams for remote (off-net) access

A.3.1.1 Assumptions

This subclause provides a summary of all assumptions and definitions specific to GVNS which have been made in this Annex. It repeats some material contained elsewhere, as well as presenting information not stated elsewhere. Assumptions required for IN CS-1 implementation are not repeated here.

– The originating network database SDF(o) will be accessed for any query on or update of the calling GVNS user's data. The terminating network database SDF(t) may be accessed for routing or number translation information.

– The identification of GVNS calls from direct or switched access may require the user to dial a special code. In the case of direct access, this code identifies the call as a GVNS call. For switched access, the code identifies the call as "GVNS provided by a designated GVNS Participating Service Provider". The code may be either an access code or a prefix to the dialled number. It is assumed here that the code precedes the dialled number.

– The order in which the information is sent from the GVNS user to the network (specifically, to the SRF) for remote access or when changing attributes on direct or switched access is assumed to be:
  a) access procedure (e.g. a special dialled code) (optional, depending on access type);
  b) authorization code of GVNS user;
  c) accounting code (optional);
  d) destination number;
  e) optional follow-on procedure after successful or unsuccessful call [followed by d)].
– The authorization procedure only requires input of a single authorization code only. For improved security, it might be necessary to input additional information, e.g. a personal user identification code as well as the authorization code. This would add another sequence of data input to the information flows but has no significant effect on the logic of the procedure. Other forms of authentication of the user are possible.
– A user on any access can indicate the wish to enter an authorization code by use of a special dialled code.
– A user on any access can indicate the wish to enter an accounting code by use of a special dialled code.
– Where a physical entity is defined as multiple on-net locations for different GVNS user groups, the user will be required to identify in some way which GVNS user group applies.
– On-net status for remotely accessed locations persists only for the duration of the call or calls.
– For remote access only, follow-on calls are allowed, i.e. a new destination number can be dialled by invoking a follow-on procedure, and the previous user authorization and account codes will be associated with the follow-on call.
– The network may apply limits on the number of retries that a GVNS user may make if authorization, for example, is unsuccessful. For security reasons, different retry limits may be applied to the input of authorization information and the input of other information. The values of the retry counters to be applied are those of the originating network. The values applying to such limits will be stored in SDF(o), but the counter logic will reside in the originating SCF, in conformity with IN CS-1 guidelines (see Recommendation Q.1213 [7] and 5.2.3/Q.1214, Compare SIB).
– CLI is available on switched access calls.
– There is no difference in the information flows and procedures if the access is located within a private network.

A.3.1.2 Direct and switched (on-net) access

A.3.1.2.1 Outline description

The following is a high-level description of the network actions required when a GVNS user requests access to GVNS from direct or switched (on-net) access:

1) GVNS access request by GVNS user (e.g. dialling of GVNS access code) and dialling of destination number by user (assumed to be one digit string).
2) Recognition of GVNS request, suspension of call processing in CCF, information flow from SSF to SCF advising initiation of GVNS request.
3) GVNS Participating Service Provider applies call screening if required (e.g. checks that destination number is allowed); since this is the first access by the SCF to the originating

network SDF, the SCF must first establish an authorized relationship with the SDF on behalf of the access.

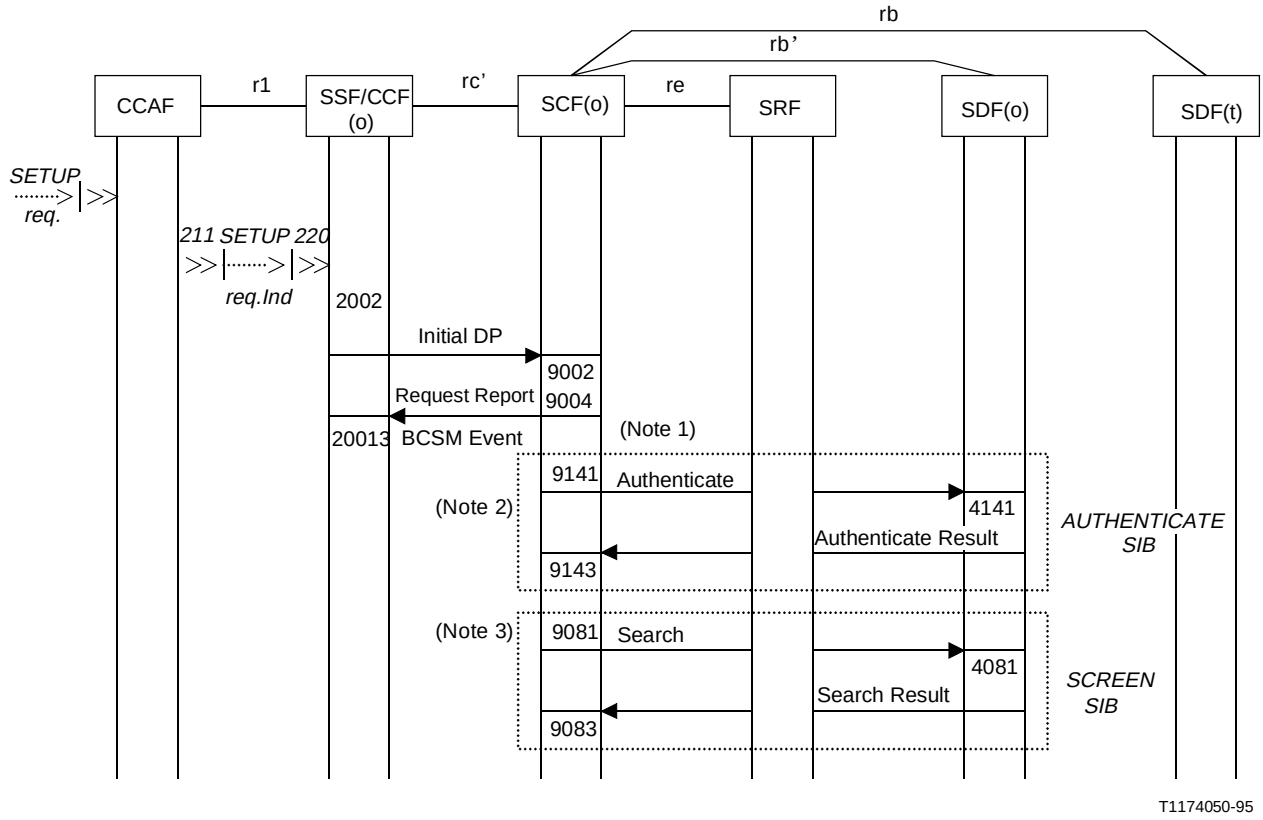
4) Decision:
   - if successful, continue to outgoing call set-up;
   - if unsuccessful, advise user of reason and release call.

It is assumed here that only Type A call processing is involved, i.e. sufficient information needed for setting up the access is in the originating network SDF.

A detection point must be armed to recognize the GVNS request. It is assumed that DP 3 will be statically armed as TDP-R for this purpose, since this DP can detect GVNS requests from any type of access.

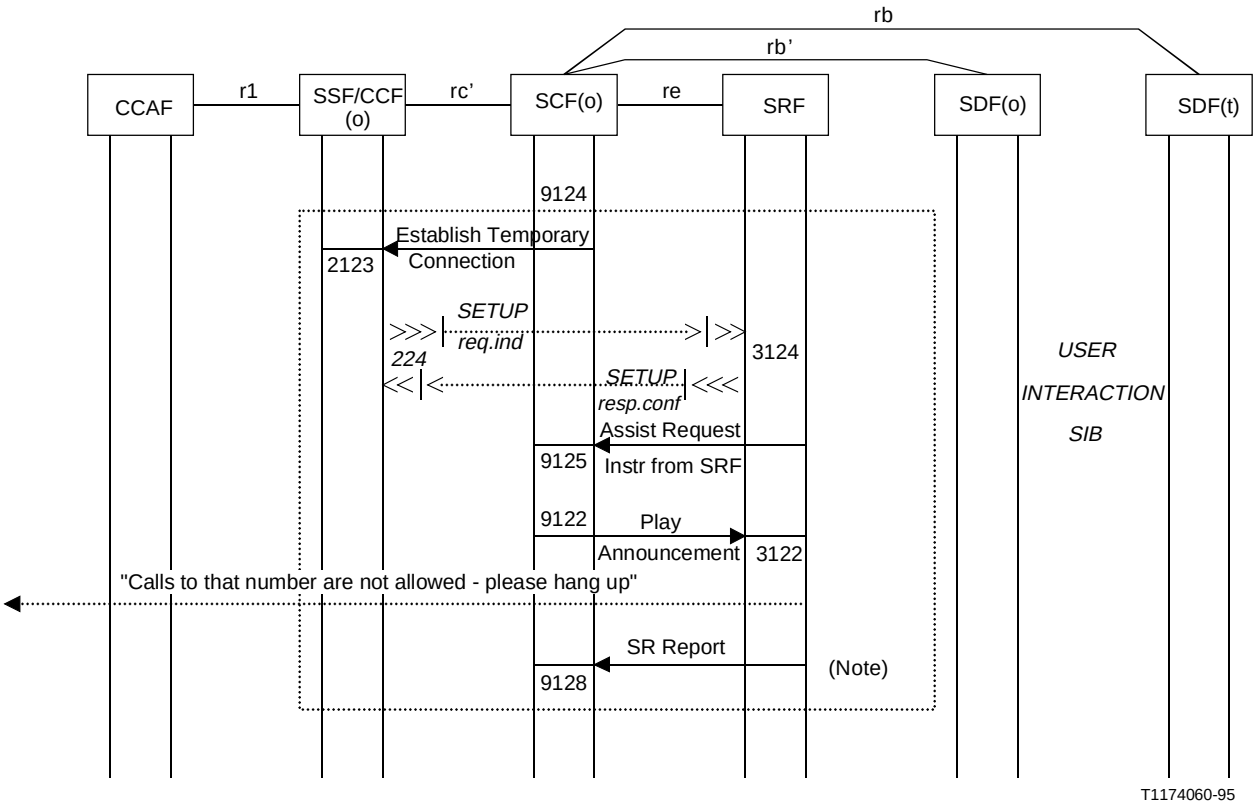
A.3.1.2.2 Information flow diagram

See Figures A.3-3 and A.3-4.



NOTES
1 – DP 9 (user disconnect) and DP 10 (user abandon) are armed as EDP-N to report user release.
2 – Since this is the first access by the SCF to the originating network SDF, the SCF must first establish an authorized relationship with the SDF on behalf of the access.
3 – This query on SDF(o) is to screen the destination number to determine if the call to the dialled number is allowed. If allowed, control passes to call set-up (Figure A.3-6). If not, go to Figure A.3-4 to connect the SRF to advise the user of the reason for rejection.

Figure A.3-3/Q.85.6 – Direct and switched (on-net) access



NOTE – On receipt of advice of end of announcement, the network initiates disconnection (Figure A.3-12).

Figure A.3-4/Q.85.6 – Direct and switched access – rejection of call attempt

A.3.1.3 Remote (off-net) access

A.3.1.3.1 Outline description

The following is a high-level description of the actions required for remote (off-net) access to GVNS. This procedure is also used for on-net access where there is a need to change some attribute.

1) GVNS access request by GVNS user (e.g. dialling of GVNS access code);
2) recognition of GVNS request, suspension of call processing in CCF, information flow from SSF to SCF advising initiation of GVNS request, connection of SRF;
3) prompt and response for user authorization;
4) GVNS Participating Service Provider applies call screening if required (e.g. checks that destination number is allowed); since this is the first access by the SCF to the originating network SDF, the SCF must first establish an authorized relationship with the SDF on behalf of the user;
5) Decision:
   - if successful, continue at 6);
   - if unsuccessful and retry allowed, advise user and restart at 3);
   - if unsuccessful and retry not allowed, advise user and release call;
6) prompt and response for account code (if required); if not required, go to 8);
7) Decision:
   - if successful, continue at 8);

– if unsuccessful and retry allowed, advise user and restart at 6);
– if unsuccessful and retry not allowed, advise user and release call;

8) prompt and response for destination number;

9) apply call screening if required (e.g. check that destination number is allowed);

10) Decision:
– if successful, continue to outgoing call set-up;
– if unsuccessful and retry allowed, advise user and restart at 8);
– if unsuccessful and retry not allowed, advise user and release call.

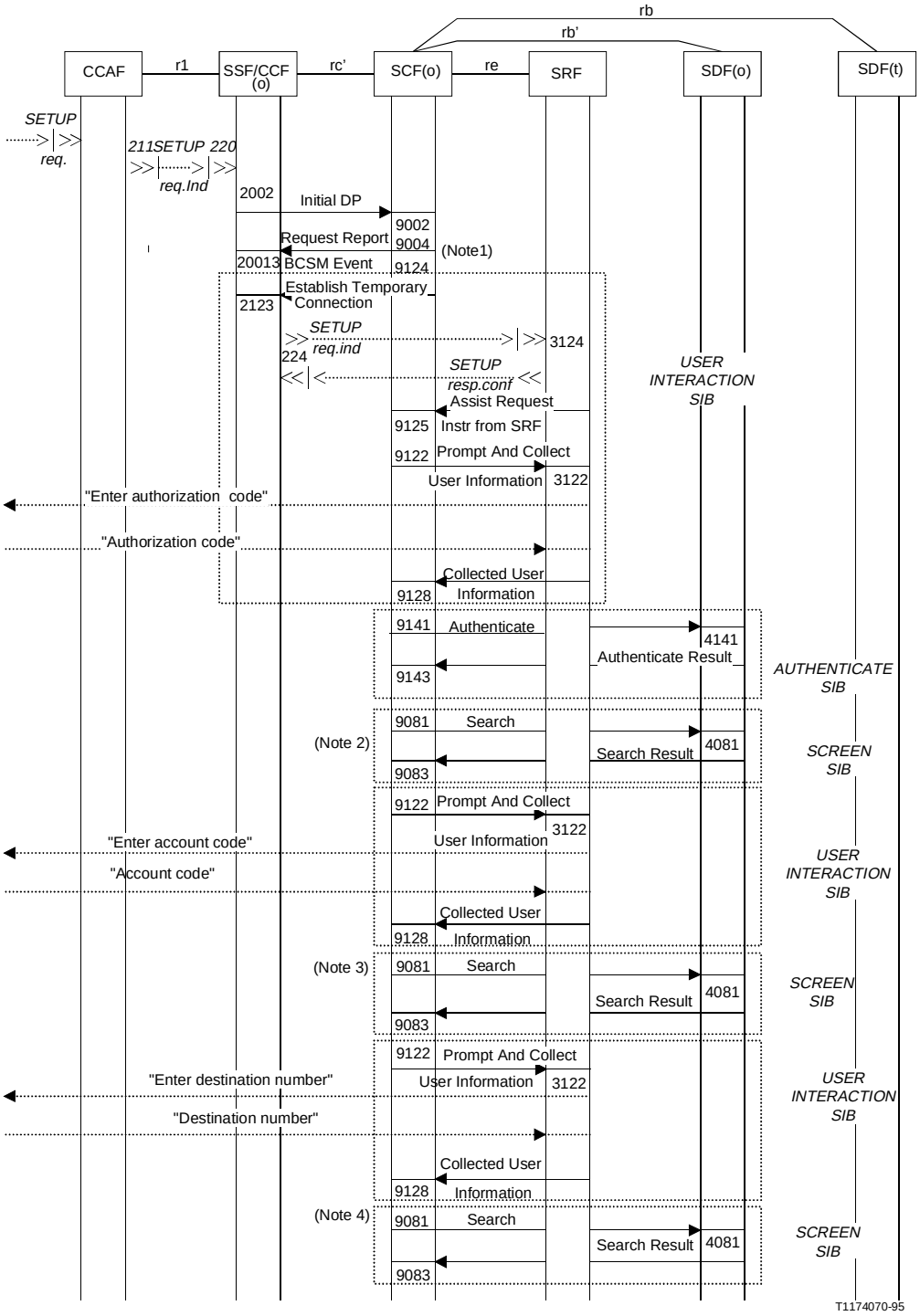
The order in which the information is input may be varied by subscription option. The order is not significant, but the network must know the order when user prompting is required. The user may also be required to input information to identify which GVNS user group applies.

It is assumed here that only Type A call processing is involved, i.e. sufficient information needed for setting up the access is in the originating network SDF.

A detection point must be armed to recognize the GVNS request. It is assumed that DP 3 will be statically armed as TDP-R for this purpose, since this DP can detect GVNS requests from any type of access.

A.3.1.3.2 Information flow diagram

See Figure A.3-5.



NOTES

1 – DP 9 (user disconnect) and DP 10 (user abandon) are armed as EDP-N to report user release.

2 – The entered authorization code is screened against a list of allowed codes. If the authorization code is accepted, the user may or may not be required to enter an account code, or may have indicated in the initial access request an intention to enter an account code. If so, the user is prompted to input the code. If no account code change is required, processing control passes directly to entry of the destination number. If the authorization code is not accepted, control passes to Figure A.3-10 for user entry.

3 – The entered account code is screened against a list of allowed codes. If the account code is not accepted, control passes to Figure A.3-10 for user retry.

4 – The entered destination number is screened against a list of allowed destinations for the calling access or user. If the destination number is accepted, control passes to call set-up (Figure A.3-6). If the destination number is not accepted, control passes to Figure A.3-10 for user retry.

Figure A.3-5/Q.85.6 – Remote (off-net) access

A.3.1.4 Call set-up sequences

Calls from a GVNS user may be single calls, in which the procedure terminates at the end of the call, or, for remote access only, may allow follow-on. Follow-on will be offered to the remote-access GVNS user after the B party disconnects at the end of a conversation, or following call set-up failure due to route congestion, B party busy or B party no answer. The procedure for follow-on is described in A.3.1.5.

It is assumed that the SCF can recognize private (customer-defined) numbers from the dialled digits. If the destination number is a private number it is translated by the SCF [involving a query on the originating SDF (Type A call processing) and possibly also the terminating SDF (Type C processing)]. If the terminating SDF cannot be accessed, the routing address returned to the SCF may not be the address of the called party but an address to which the call must be routed for a further stage of translation. In this case further translation is required at the terminating end (Type B call processing). The originating end has no knowledge of the status of the address and simply restarts processing in the CCF to route the call according to the routing address passed to it.

The SRF is disconnected and processing is restarted using the Connect IF which contains the destination number (even if it were the dialled number and no translation has been required).

A.3.1.4.1 Outline description

The following are high-level descriptions of the actions required for the network to set up a call, with or without follow-on, for the following cases:

Type A: Translation completed in the originating network using originating SDF only.

Type B: Translation may commence in the originating network, call routed to terminating end for further translation.

Type C: Translation completed in the originating network using originating and terminating SDFs.

Which method is implemented will be a matter for service providers. These sequences apply to both on-net and off-net access. The user has input the destination number and the SRF is still connected.

1) If number is a private (customer-defined) number, translate it to a routing address [involves SDF(o) only if Type A, and SDF(o) and SDF(t) if Type C; for Type B, SDF(o) returns an address which is not the final destination of the call].
2) Disconnect SRF, if connected.
3) If follow-on not allowed:
   – Arm DP 9 as EDP-N to report B-disconnect (optional) (Note 1).

   If follow-on allowed:
   – Arm DP 9 as EDP-R to detect B-disconnect; arm triggers as EDP-R to detect call set-up failure (DPs 4, 5, 6); also activate application timer on "B party no answer" (if required) (Note 1).
4) Furnish Charging Information IF (or other charging IF) to initiate charging.
5) Call Information Request IF (if require transfer of call data to SDF at end of call).
6) Restart processing to set up call to destination number using Connect IF (Note 2).

For Type B only, call is routed to terminating end for further translation:

7) Call is routed to terminating end SSF/CCF, where DP 3 is armed as TDP-R.
8) Recognition of GVNS request, suspension of call processing in CCF, information flow to SCF advising initiation of GVNS request.

9) Translation of dialled number to address of called party.

10) Restart processing in CCF with Connect IF.

NOTES

1 – DP 9 has already been armed to detect A disconnect.

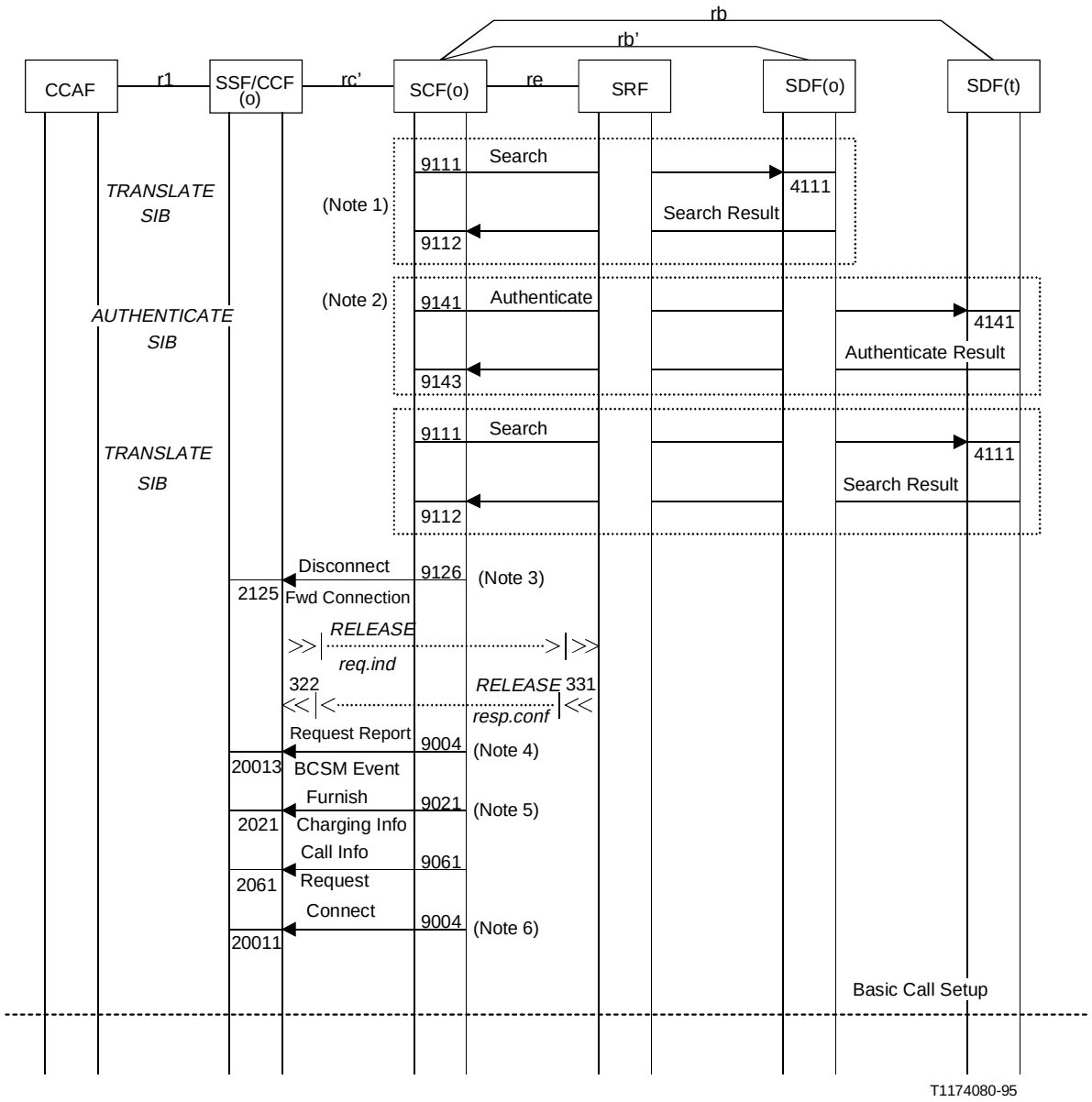
2 – Where follow-on is not allowed, the control relationship between the SSF and the SCF is now changed to a monitor relationship if DP 9 is armed as EDP-N, or to no relationship if DP 9 is not armed. Where follow-on is allowed, the control relationship persists.

A.3.1.4.2 Information flow diagrams

Information flow diagrams are shown for the following sequences:

Figure A.3-6: Call set-up, Type A: translation completed in the originating network using originating SDF only; Type B: commencement of translation in originating SDF; Type C: translation completed in the originating network using originating and terminating SDFs.

Figure A.3-7: Call set-up, Type B: call routed to terminating end for further translation.



NOTES

1 – This query on the originating network SDF is required only if the dialled number has to be translated to another number for routing purposes. For Type A call set-up, the translation is completed in the originating SDF. For Type B, the routing address returned by this query will not be the final destination of the call. For Type C, the translation query on SDF(o) returns information requiring the SCF(o) to access SDF(t) for further translation information. If the translation fails, a user on off-net access is offered retry (Figure A.3-10), while a call from an on-net user is cleared down (Figure A.3-4).

2 – It is assumed that the establishment of the authorized relationship between SCF(o) and the remote SDF provides adequate authorization of the user. If this is not the case, a SCREEN SIB for user authorization will be required before the TRANSLATE SIB.

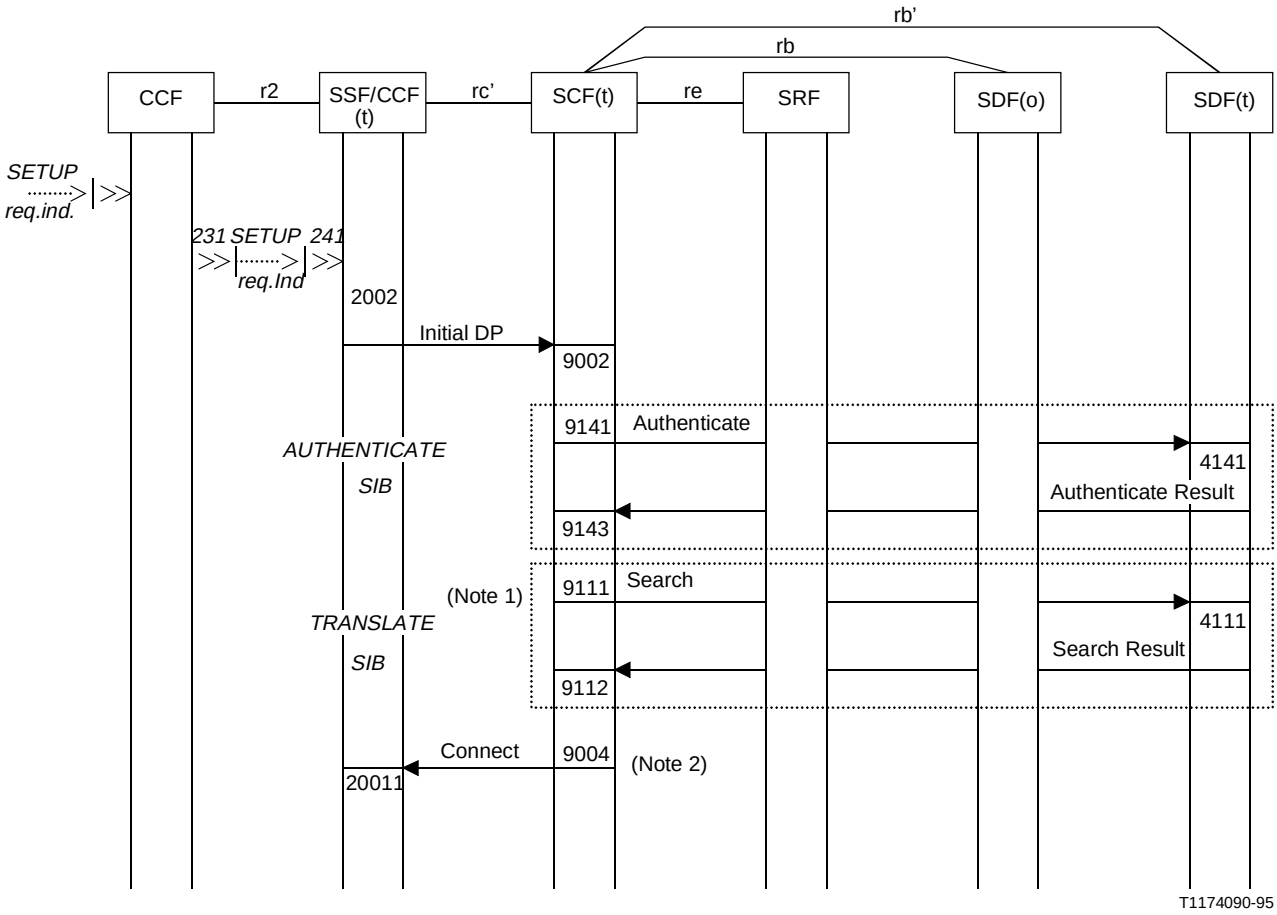
3 – The disconnection of the SRF will not be applicable in all cases, as the SRF will only be connected for remote access or when the user has input authorization or accounting codes.

4 – If follow-on calls are not allowed, DP 9 will be armed as EDP-N to detect B-disconnect (having already been armed to detect A-disconnect). If follow-on calls are allowed. DP 9 will be armed as EDP-R to detect B-disconnect, and DPs 4, 5 and 6 will be armed as EDP-R to detect call set-up failure.

5 – This is an example only. Other charging methods can be used.

6 – Call processing restarts at PIC 3 in the originating BCSM.

Figure A.3-6/Q.85.6 – Call set-up
Type A: translation completed in the originating network using originating SDF only;
Type B: commencement of translation in originating SDF;
Type C: translation completed in the originating network using originating and terminating SDFs



NOTES

1 – The originating network was unable to translate the destination number completely, and the call was routed to the terminating network for further translation. The interaction with SCF(t) is via SSF(t). This query on the terminating end SDF is to translate the dialled number to the final destination. A preliminary query might be required for terminating call screening. If the translation fails, a user on off-net access is offered retry (Figure A.3-10), while a call from an on-net user is cleared down (Figure A.3-4).

2 – Call processing restarts at PIC 3 in the originating BCSM.

Figure A.3-7/Q.85.6 – Call set-up, Type B: call routed to terminating end for further translation

A.3.1.5 Call follow-on

A.3.1.5.1 Initiation of follow-on

Calls from a GVNS user using remote access may be single calls, in which the procedure terminates at the end of the call, or may allow follow-on. Follow-on will be offered to the remote access GVNS user after the B party disconnects at the end of a conversation, or following call set-up failure due to route congestion, B party busy or B party no answer. For discussion of outgoing call set-up, see A.3.1.4.

For follow-on after a successful call, DP 9 is armed as EDP-R to detect B party release. It is assumed that the RELEASE req.ind. is passed back immediately to the SSF/CCF. (See A.3.1.7 for further discussion on recognition of B party release.) It is also assumed that B party re-answer is not supported. Call processing is suspended at DP 9 and the SRF is reconnected to prompt the GVNS user to input a new destination number. Processing can then be restarted at the previous call commencement point, i.e. DP 3, but it is assumed that the status of A party resources should be identical with those obtaining at DP 3 before the first call was made.

In cases where the Release signal is not passed back to the originating exchange, it is possible that O_Mid_Call DP (DP 8) could be armed to allow the calling party to invoke follow-on from the active phase of the call. It is assumed that the caller would be aware from voice path indications that the called party had disconnected. This mechanism has not been examined further, but in Figures A.3-8 and A.3-9 it is possible that follow-on could be initiated by O_Midcall or Event Report BCSM req.ind. from SSF to SCF rather than by Release from the terminating end.

Follow-on after call set-up failure is initiated by detection of armed detection points at DP 4 (route selection failure), DP 5 (B Party busy) or DP 6 (B party does not answer). In the cases of DP 4 and DP 5, a RELEASE req.ind. with the cause is returned by the terminating end. Detection of DP 6, B party no answer, is triggered by expiry of a timer in the originating exchange (see Recommendation Q.71 [6]). The value of this timer will be network-dependent, hence in some networks follow-on after no answer may not be offered to the GVNS user until after an unacceptably long delay. In these cases a special timer set by the SCF in the SSF can be used to over-ride the normal timer, with follow-on being offered after a shorter time. This application timer is set via Request Report BCSM Event IF. The explanation given in 6.4.2.35/Q.1214 is: "If this timer expires, the SSF automatically tears down the forward connection to the B party to avoid synchronization problems, then notifies the SCF". The mechanism of notification is by Event Report BCSM req.ind. Thus in this case B party release is assumed to have occurred and been completed before the SCF is notified of timer expiry.

A.3.1.5.2 Release of resources

If follow-on calls are to be supported, the Q.71 procedures for call cleardown must be modified whenever call processing is suspended after B party RELEASE or no-answer timeout. In the follow-on case the A party is not being cleared so the normal DISCONNECT req.ind. towards the A party cannot be sent. Cleardown must be completed in the forward (B party) direction and any charging for the call should be stopped.

Once any of the detection points 4, 5, 6 or 9 are armed as EDP-R to report B party release, the SSF/CCF can assume that follow-on call is required, and hence can clear only the B party resources, as required, on detection of any of the relevant DPs. This could be done in parallel with or before the event is reported to the SCF by Event Report BCSM req.ind.

In this case B party re-answer cannot be supported.

A.3.1.5.3 Outline description

The following is a high-level description of the actions required for the network to set up a follow-on call:

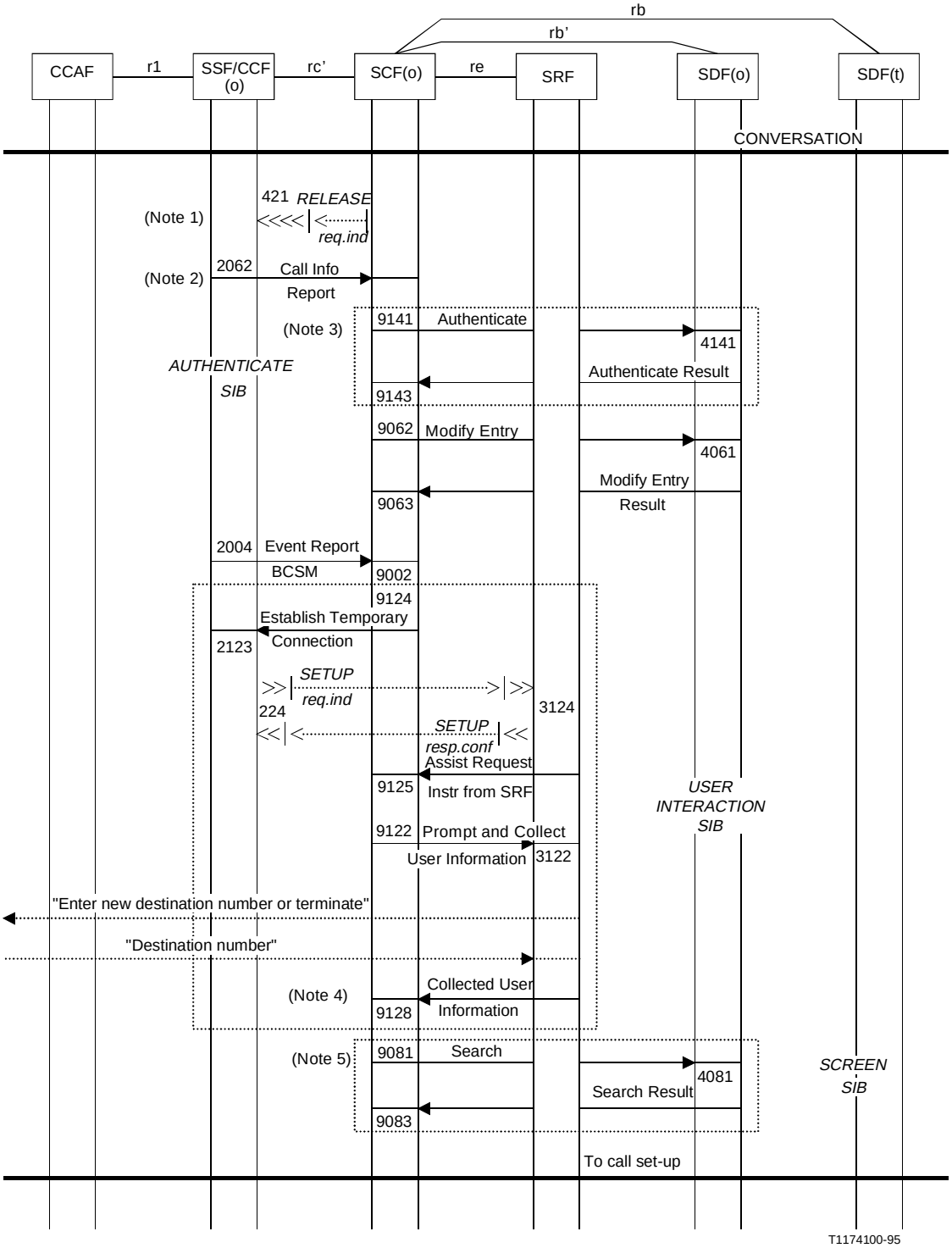
1) B disconnects after conversation, or call set-up fails.
2) Report to SCF (Event Report BCSM IF).
3) Reconnect SRF (Establish Temporary Connection IF).
4) Prompt user for next destination number.
5) Decision:
   - If destination number input, screen destination number [optional, interaction with SDF(o)], then go to call set-up.
   - If A party disconnects, terminate call.

A.3.1.5.4 Information flow diagrams

Information flows are shown for the following procedures:

Figure A.3-8: Follow-on call after successful call.

Figure A.3-9: Follow-on call after failure of call set-up.



NOTES

1 – B-party release is detected and reported to SCF. It may be necessary to recognize Clearback and (network-initated) Suspend as well. O_Disconnect req.ind. could be used instead of Event Report BCSM req.ind. if it is desired to pass the release cause to the SCF. It will be necessary to modify Q.71 procedures in order to release the B party, by sending RELEASE resp.conf. towards the B party at this point, without sending DISCONNECT req.ind. towards the A party.

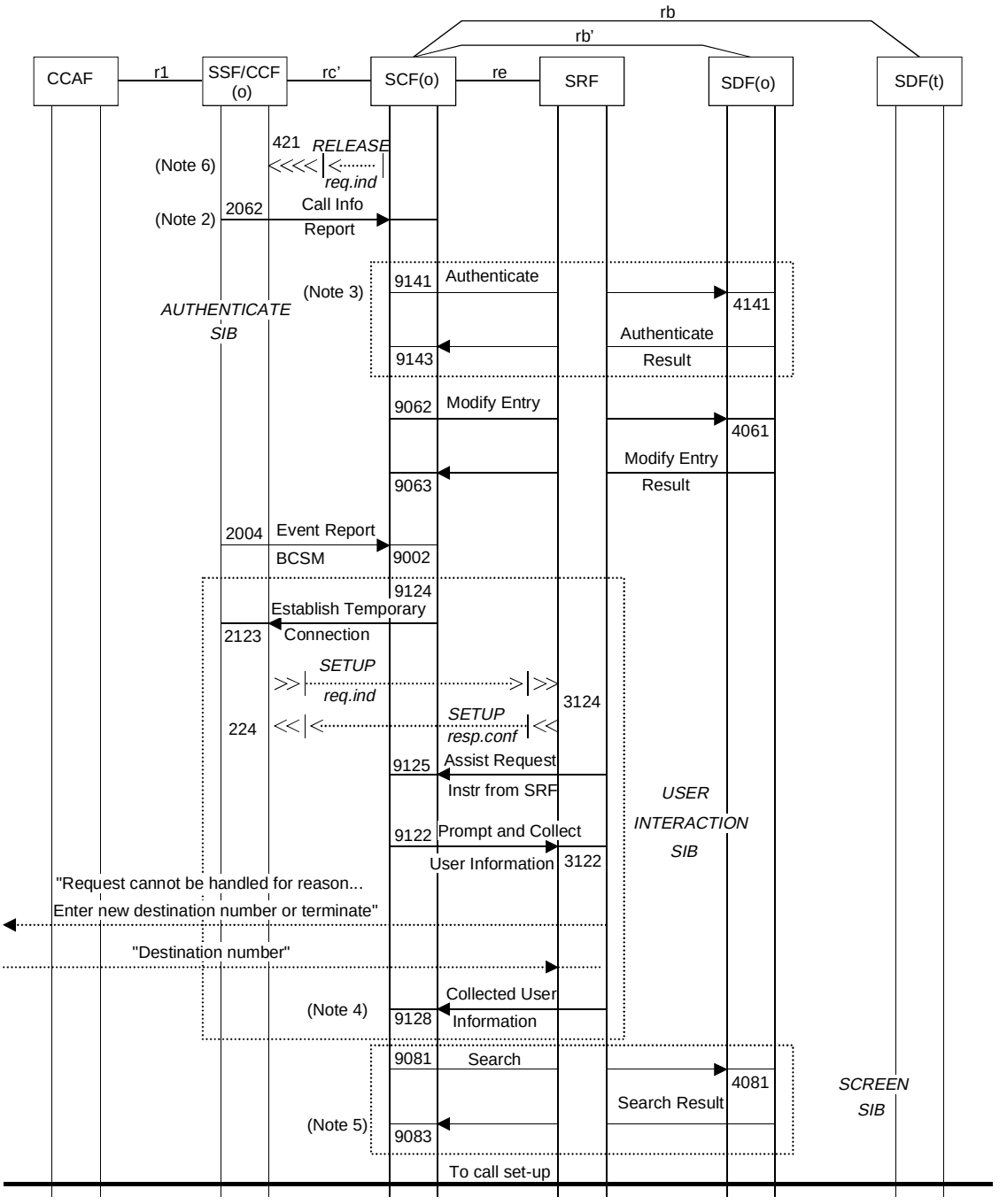
2 – Any Call Information Report which was requested for the previous call will now be sent.

3 – It is assumed that a new authorized relationship will need to be established between the SCF and the SDF.

4 – If the user terminates, control transfers to A party abandon (Figure A.3-13). Q.71 procedures may need to be modified as, although the B party who was previously connected has been released, other actions related to the previous call may still be required.

5 – The dialled destination number may be screened if required. If the destination number is allowed, go to call set-up (Figure A.3-6); if the destination number is not allowed, go to user retry (Figure A.3-10).

Figure A.3-8/Q.85.6 – Follow-on call after successful call



NOTES

1 – B-party release is detected and reported to SCF. It may be necessary to recognize Clearback and (network-initiated) Suspend as well. O_Disconnect req.ind. could be used instead of Event Report BCSM req.ind. if it is desired to pass the release cause to the SCF. It will be necessary to modify Q.71 procedures in order to release the B party, by sending RELEASE resp.conf. towards the B party at this point, without sending DISCONNECT req.ind. towards the A party.

2 – Any Call Information Report which was requested for the previous call will now be sent.

3 – It is assumed that a new authorized relationship will need to be established between the SCF and the SDF.

4 – If the user terminates, control transfers to A party abandon (Figure A.3-13). Q.71 procedures may be need to be modified as, although the B party who was previously connected has been released, other actions related to the previous call may still be required.

5 – The dialled destination number may be screened if required. If the destination number is allowed, go to call set-up (Figure A.3-6); if the destination number is not allowed, go to user retry (Figure A.3-10).

6 – Set-up of the outgoing call has failed and the appropriate DP will be detected. B party no answer (DP 6) may be triggered by timeout in the originating SSF, rather than by receipt of RELEASE req.ind. Since the call has not been answered, A party abandon can still be detected at DP 10.

Figure A.3-9/Q.85.6 – Follow-on call after failure of call set-up

A.3.1.6 Error and failure handling sequences

A.3.1.6.1 Outline description

The procedures for advising a user that a request has been denied and prompting for new input apply only to remote access. The number of retries allowed for entry of any item (authorization, account code, destination number) is subject to a retry limit. For security reasons, it is assumed that the retry limit applying to authorization may differ from that applying to entry of other parameters. It is assumed that the SCF operates the counter, in conformance with IN CS-1 principles.

The following is a high-level description of the actions involved in rejecting a user request and either offering retry or terminating interaction with the user. The user has input information and the SRF is connected.

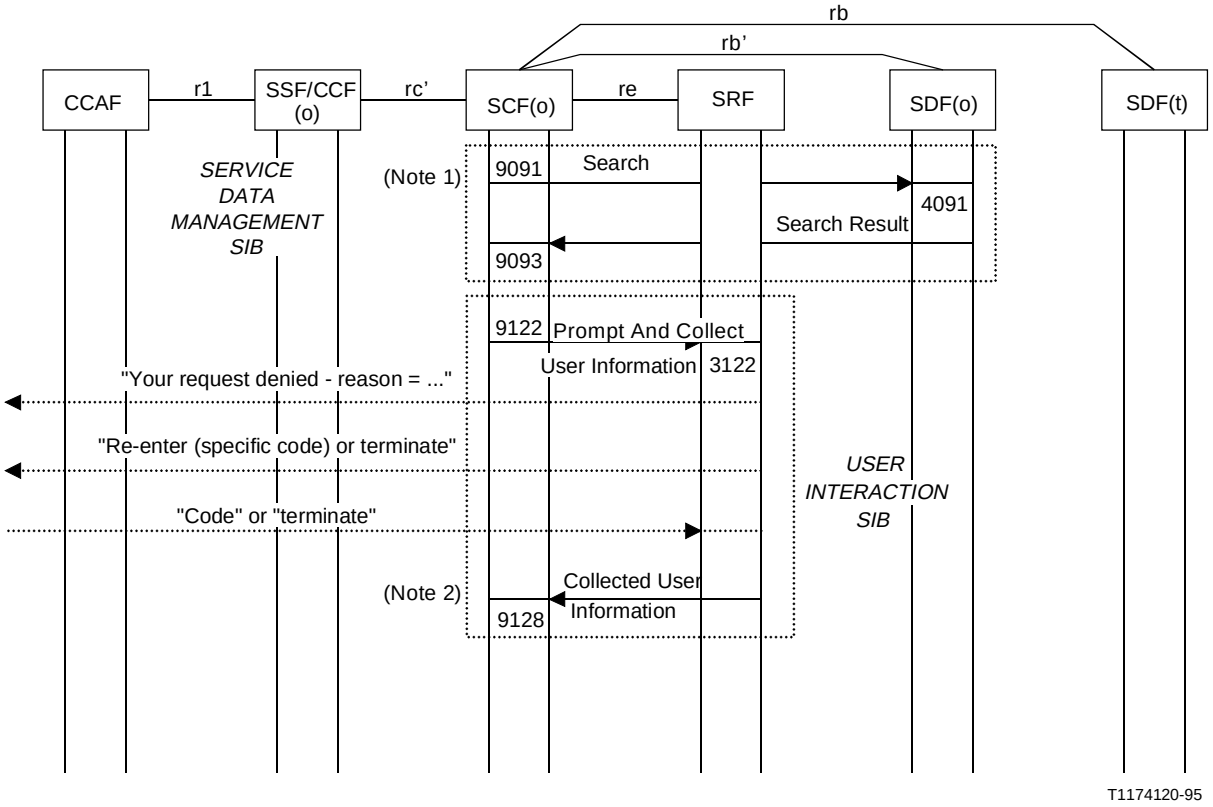
1) The limit value of retry attempts allowed for this parameter is retrieved from SDF(o).
2) Retry logic counter is activated in the SCF.
3) The counter is modified and tested to check whether the limit of retries is reached.
4) Decision:
   - If reached, advise user, update SDF(o) with record of failed attempt (Figure A.3-11) and go to "Network initiated disconnection" (Figure A.3-12).
   - If not reached, request user to input value again.

A.3.1.6.2 Information flow diagrams

The information flows are shown for the following procedures:

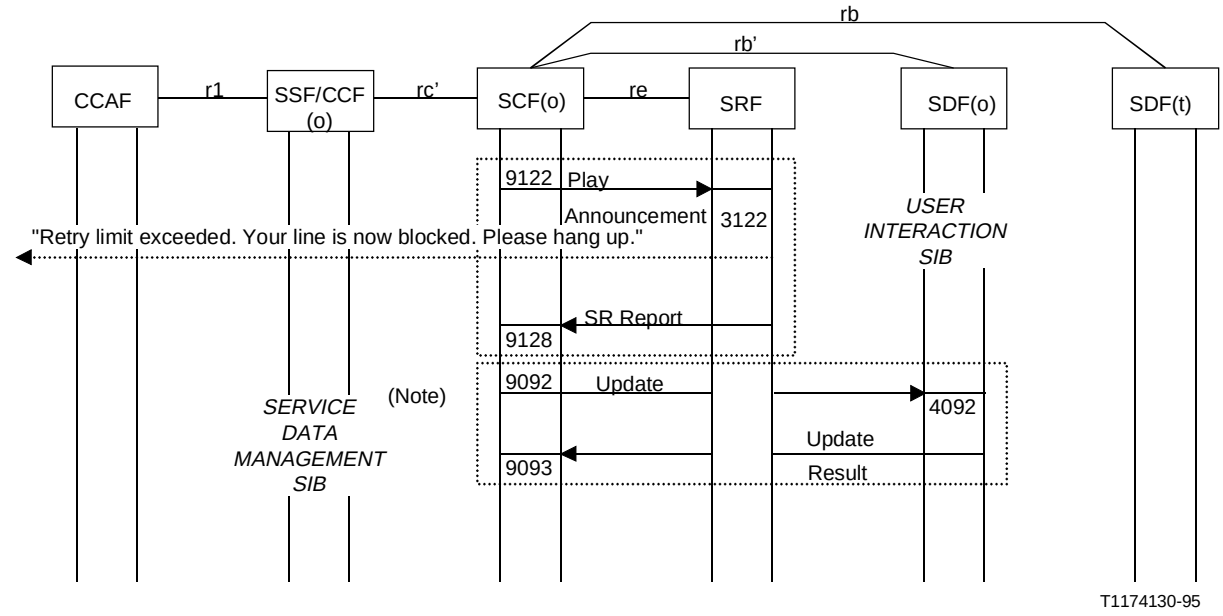
Figure A.3-10 User request denied – retry allowed.

Figure A.3-11 Maximum retries reached.



NOTES
1 – On first execution of this sequence the retry limit is retrieved from SDF(o) and the counter value is modified as required. If the limit is reached, control transfers to Figure A.3-11.
2 – If the user terminates, control transfers to A party abandon (Figure A.3-13).

Figure A.3-10/Q.85.6 – User request denied – retry allowed



NOTE – The IFs "Update" and "Update Result" may consist of either Modify Entry and Modify Entry Result IFs, or Add Entry and Add Entry Result IFs, depending on how the data is stored. The SDF(o) is updated with a record of the failed authorization attempts. Security measures may be required to reject further attempts. The user is advised of failure and requested to hang up. The network then does a forced release of the call and disconnects the SRF (Figure A.3-12).

Figure A.3-11/Q.85.6 – Maximum retries reached

A.3.1.7 Call release sequences

One of the sequences for release of the calling user (Figures A.3-12 to A.3-15) will take place at the end of every GVNS call. The sequences can be initiated by the user hanging up either spontaneously or as the response to an announcement, or by forced release by the originating network. The SCF can initiate a forced release, either immediately or after a timeout, e.g. if the user does not hang up within a specified time of being requested to do so.

The following release sequences are shown:

– Network-initiated release – at end of call or on error or failure, e.g. after authorization rejection.

– A party abandon – at any time before answer or A party disconnect after B party, follow-on enabled; SRF may or may not be connected.

– A party disconnect – after answer; SRF not connected.

– B party release – at any time after answer for single call, no follow-on allowed (see Note).

NOTE – The case of B party release when follow-on is allowed, either after conversation or because of call set-up failure, is covered in Figures A.3-8 and A.3-9. If the A party then clears, instead of making a follow-on call, cleardown proceeds as shown in Figure A.3-13.

In Figures A.3-12 to A.3-15 the release sequences apply to the case of ISDN access. For PSTN simple sequences will apply.

It is assumed that the appropriate detection points for detecting call abandon (DP 10) and disconnect (DP 9) will always be appropriately armed as EDP-N for detecting A party release, so the case of unarmed DPs has not been shown. For detecting B party disconnect for follow-on outgoing calls, DP 9 will also be armed as EDP-R with Leg ID information element specified as B party.

The O_Disconnect information flow could be used instead of Event Report BCSM to pass the Release Cause information element to the SCF, if required. This has not been shown here, and Event Report BCSM req.ind. is used to report detection of DP 9, O_Disconnect.

The sequence for release of the SRF (if connected) following call abandon is assumed to be controlled by the SSF/CCF (see 3.1.3.5.3/Q.1218). The SSF/CCF sends RELEASE req.ind. to the SRF to release it without waiting for the disconnect request (Disconnect Forward Connection) from the SCF. The SSF advises the SCF of call termination by sending Event Report BCSM. Once the SCF is thus advised that dialogue with the SSF is terminated, it will await any outstanding Call Information Report before returning to the idle state.

The procedures for call release are based on the corresponding procedures in Recommendation Q.1218. For call abandon before answer, subclause 3.1.1.4/Q.1218 requires that all CCF resources have been de-allocated before sending notification (Event Report BCSM req.ind.) to the SCF. When the first party disconnects after answer, the Event Report BCSM req.ind. is sent first and thus precedes de-allocation of CCF resources. This is required for implementing follow-on in outgoing calls.

A.3.1.7.1 Information flow diagrams

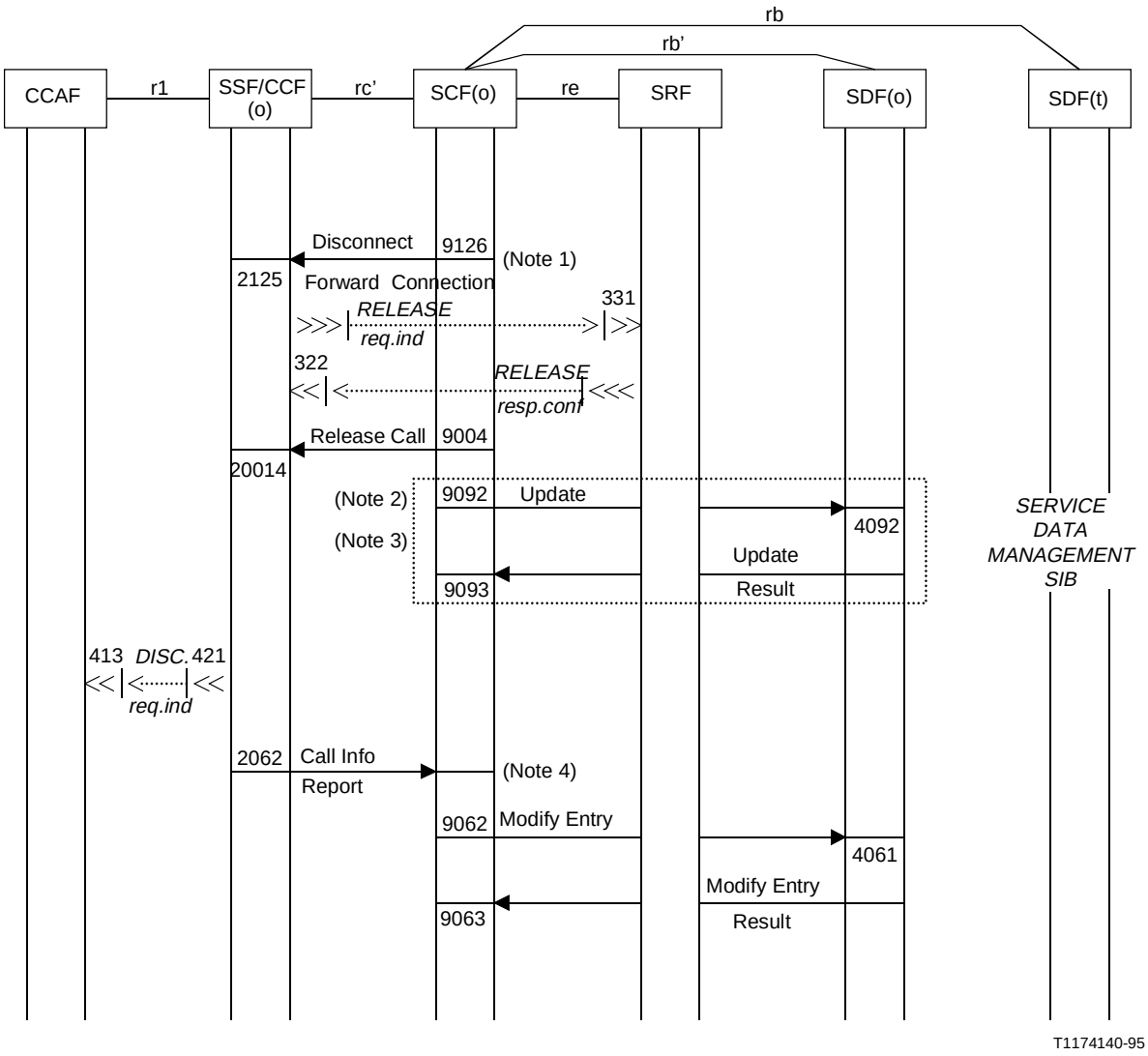
The information flows are shown for the following procedures:

Figure A.3-12: Network initiated disconnection.

Figure A.3-13: A party abandon or A party disconnect after B, follow-on allowed; SRF may or may not be connected.

Figure A.3-14: A party initiated disconnection; SRF not connected.

Figure A.3-15: B party initiated disconnection.



NOTES

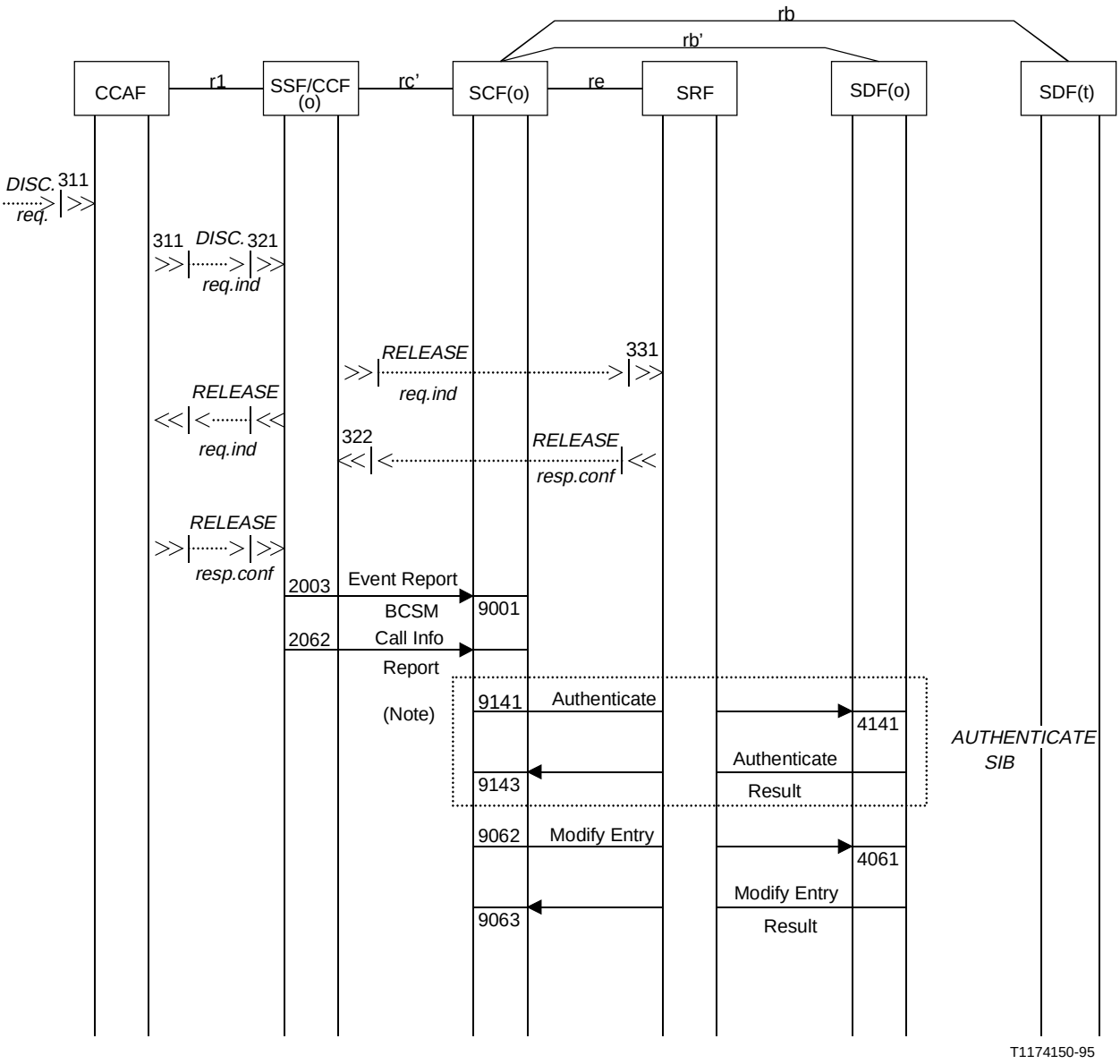
1 – The order in which the Disconnect Forward Connection req.ind and the Release Call req.ind are sent to the SSF/CCF is significant (see 3.1.1/Q.1218).

2 – It may be necessary to establish an authorized relationship between the SCF and the SDF before the Update. This Update operation to record the cause of the network-initiated disconnection is only required if it has not already been done.

3 – The IFs "Update" and "Update Result" may consist of either Modify Entry and Modify Entry Result IFs, or Add Entry and Add Entry Result IFs, depending on how the data is stored.

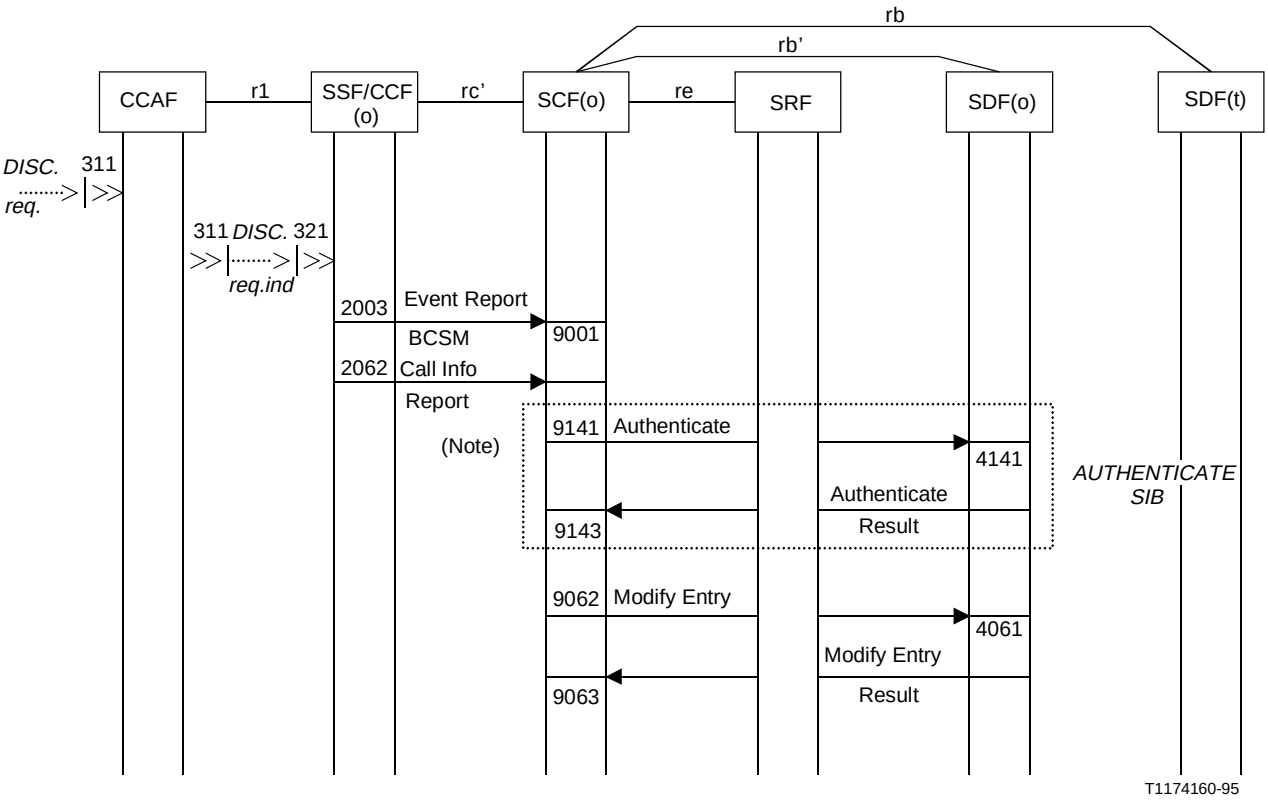
4 – Call Information Report req.ind will only be outstanding if this sequence occurs subsequent to call set-up.

Figure A.3-12/Q.85.6 – Network initiated disconnection



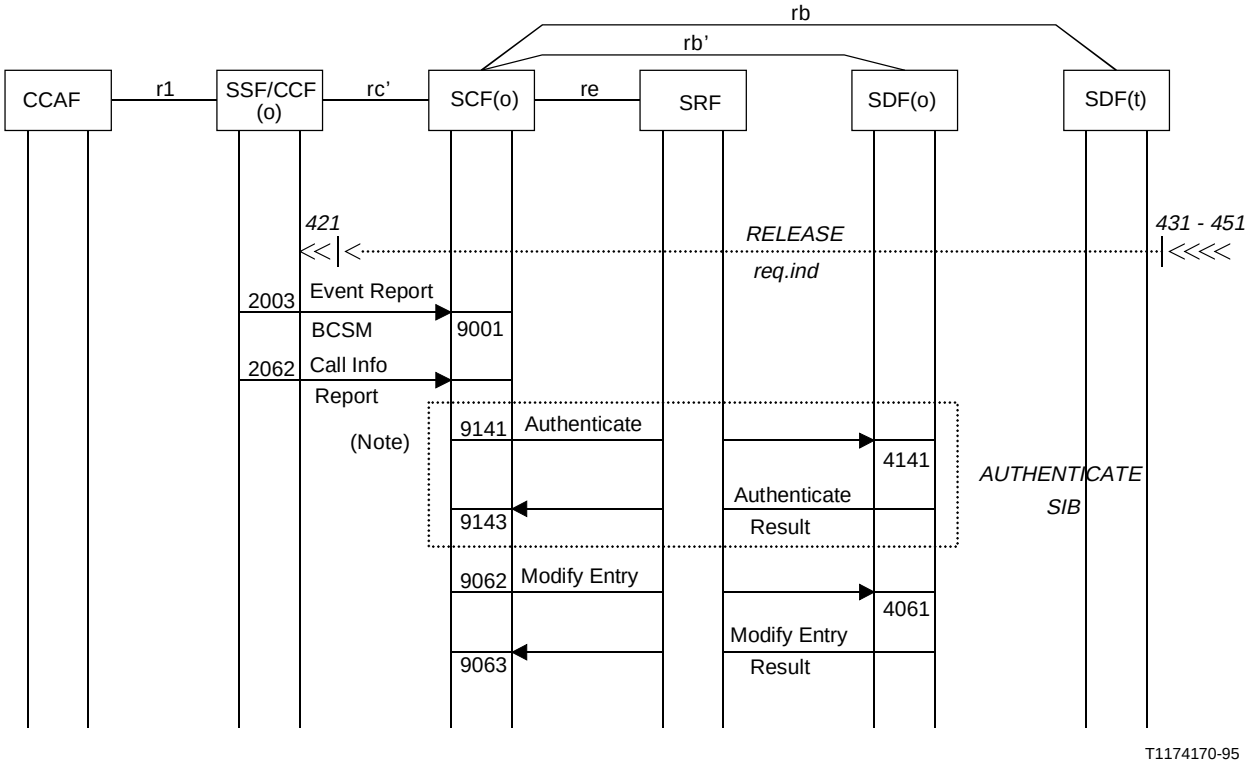
NOTE – The re-establishment of an authorized relationship between the SCF and SDF is always required in the case of A party disconnect, and may be required in the case of A party abandon if call processing has been re-started,

Figure A.3-13/Q.85.6 – A party abandon or A party disconnect after B, follow-on allowed; SRF may or may not be connected



NOTE – The re-establishment of an authorized relationship between the SCF and SDF is now required.

Figure A.3-14/Q.85.6 – A party initiated disconnection; SRF not connected



NOTE – The re-establishment of an authorized relationship between the SCF and SDF is now required.

Figure A.3-15/Q.85.6 – B party initiated disconnection

A.3.2 Information flows

A.3.2.1 Definition of individual information flows

The IN CS-1 information flows and information elements used in this Annex are described in clause 5/Q.1214 and clause 6/Q.1214 (see Table A.3-1).

Table A.3-1 – Clauses of Recommendation Q.1214 in which IFs are described

Interface	IF name	Q.1214 reference	
SSF to SCF	Call Information Report	5.2.6	6.4.2.10
	Event Report BCSM	5.3	6.4.2.22
	Initial DP	5.3	6.4.2.25
SCF to SSF	Call Information Request	5.2.6	6.4.2.11
	Connect	5.3	6.4.2.16
	Disconnect Forward Connection	5.2.12	6.4.2.19
	Establish Temporary Connection	5.2.12	6.4.2.20
	Furnish Charging Information	5.2.2	6.4.2.23
	Release Call	5.3	6.4.2.33
	Request Report BCSM Event	5.3	6.4.2.35
SCF to SDF	Add Entry	5.2.9	6.6.2.7
	Authenticate	5.2.14	6.6.2.5
	Modify Entry	5.2.9	6.6.2.3
	Search	5.2.9	6.6.2.1
SDF to SCF	Add Entry Result	5.2.9	6.6.2.8
	Authenticate Result	5.2.14	6.6.2.6
	Modify Entry Result	5.2.9	6.6.2.4
	Search Result	5.2.9	6.6.2.2
SCF to SRF	Play Announcement	5.2.12	6.5.2.4
	Prompt and Collect User Information	5.2.12	6.5.2.5
SRF to SCF	Assist Request Instructions From SRF	5.2.12	6.5.2.1
	Collected User Information	5.2.12	6.5.2.3
	Specialized Resource Report	5.2.12	6.5.2.6

A.3.2.2 Relationship to information flows in Recommendation Q.85.6

In Recommendation Q.85.6 the information flows INFORM1 req.ind. and INFORM1 resp.conf. (relationship ra in Figure A.2-1) represent requirements on network signalling which will be identical for the IN CS-1 case.

The remaining Q.85.6 information flows can be mapped to IN CS-1 information flows (see Table A.3-2).

Table A.3-2 – Comparison between Q.1214 and Q.85.6 IFs

Q.1214 IF	Q.85.6 IF	Q.1214 Relationship	Q.85.6 Relationship
Initial DP req.ind	ENQUIRY1 req.ind	rc' [SSF(o) to SCF(o)]	rc
Initial DP req.ind	ENQUIRY3 req.ind	rc' [SSF(t) to SCF(t)]	rd
Connect req.ind	ENQUIRY1 resp.conf	rc' [SCF(o) to SSF(o)]	rc
Connect req.ind	ENQUIRY3 resp.conf	rc' [SCF(t) to SSF(t)]	rd
Search req.ind	ENQUIRY2 req.ind	rb and rb' (SCF to SDF)	rb
Search Result resp.conf	ENQUIRY2 resp.conf	rb and rb' (SDF to SCF)	rb
Prompt and Collect User Information req.ind	REQ.INFO. req.ind	re (SCF to SRF)	rc
Collected User Information req.ind	REQ.INFO. resp.conf	re (SRF to SCF)	rc

A.3.2.3 Relationship to information elements in Recommendation Q.85.6

The information content of the information flows in this Annex can be compared to those in Recommendation Q.85.6 by examining corresponding information elements in the information flows. The resulting mapping is shown in Tables A.3-3 to A.3-10. Information elements in the IN CS-1 information flows which are not required for GVNS are not shown. The assignment of the information element as M (mandatory) or O (optional) is as defined in Recommendation Q.85.6.

On the SSF-SCF interface (GVNS relationships rc and rd, Figure A.2-1), IN CS-1 provides two equivalent types of information flows for both SSF to SCF and SCF to SSF directions of flow. Thus Initial DP req.ind could be replaced by an appropriate DP-specific IF, e.g. Analysed Information req.ind, and Connect req.ind could be replaced by Analyse Information req.ind. These alterations would not change the IEs of interest.

Tables A.3-3 to A.3-10 show that there are some cases where there is no suitable IE in the IN CS-1 information flow, but in general there is either correspondence between the two sets of information elements, or the necessary information can be derived in a physical realization where required. It is expected that this lack of correspondence at the IF level will be addressed in IN CS-2.

Table A.3-3/Q.85.6 – Relationship rc' – SSF(o) to SCF(o)

Q.85.6: ENQUIRY1 req.ind		CS-1: Initial DP req.ind
Network provided or network verified CLI	M	Calling Party Number
Dialled Number	M	Dialled digits
GVNS Service ID	O	Service Key

Table A.3-4/Q.85.6 – Relationship rc' – SCF(o) to SSF(o)

Q.85.6: ENQUIRY1 resp.conf		CS-1: Connect req.ind
GVNS User Group Identification	M	No suitable IE (Note 1)
Dialled Number	O	No suitable IE (Note 2)
Routing Number	M	Destination Routing Address + Route List + Forwarding Condition (Note 3)
Terminating Network Routing Number	M	Destination Routing Address + Route List + Forwarding Condition (Note 3)
Terminating Participating Service Provider Identification	M	No suitable IE (Note 4)
On-net/Off-net Indicator	M	No suitable IE (Note 5)
Alternate Terminating Network Routing Number	O	Destination Routing Address + Route List + Forwarding Condition (Note 3)
Transit Indication	M	No suitable IE (Note 6)

NOTES

1 –In a physical realization, this information can be transferred from the SCF to the SSF in the extensions parameter of the ConnectArg data type (see 2.13/Q.1218 [5].

2 –This information is already available in the SSF.

3 –Destination Routing Address is a list of possible routing addresses; Route List specifies a list of routes to be used by the SSF; Forwarding Condition specifies a condition upon which an alternate Destination Routing Address would apply (Busy, No Answer, Any). Together these information elements will contain all information required in this Q.85.6 information item.

4 –This IE can possibly be deduced in a physical realization from the routing number or from other information available to the SSF. If not, the extensions parameter of the ConnectArg data type could be used.

5 –This IE is needed at the originating SSF as that is the charge point for the call. The necessary information is passed to the SSF in a charging information flow (e.g. Furnish Charging Information req.ind), rather than in the Connect req.ind.

6 –Recommendation Q.85.6 (Note 4 to Table 6-5/Q.85.6) provides that in a physical realization this IE can be deduced from the comparison of the connecting network's identification with the information in either the Routing Number or the Terminating Participating Service Provider Identification.

Table A.3-5/Q.85.6 – Relationship re – SCF(o) to SRF – remote access only

Q.85.6: REQ.INFO req.ind		CS-1: Prompt and Collect User Information req.ind
Request for Authorization Code Indication	M	Information to Send + Collected Info

Table A.3-6/Q.85.6 – Relationship re – SRF to SCF(o) – remote access only

Q.85.6: REQ.INFO resp.conf		CS-1: Collected User Information req.ind
Authorization Code	M	Received Information

Table A.3-7/Q.85.6 – Relationship rb – SCF(o) to SDF(t)

Q.85.6: ENQUIRY2req.ind		CS-1: Search req.ind
GVNS User Group Identification	M	Base Object
Dialled Number		Selection
Authorization Code		Base Object (Note)
NOTE – In Recommendation Q.85.6 ENQUIRY2 req.ind, used for access to remote data, contains authorization information about the user (Authorization Code). In the IF diagrams of this Annex it has been assumed that the authorized relationship between SCF(o) and SDF(t) is adequately established by the AUTHENTICATE SIB, which could use the Authorization Code. If required, separate authorization of the user to the remote SDF would use SCREEN SIB, preceding the TRANSLATE SIB. In either case, two separate IFs are required to transfer the three IEs to the remote SDF.		

Table A.3-8/Q.85.6 – Relationship rb – SDF(t) to SCF(o)

Q.85.6: ENQUIRY2 resp.conf		CS-1: Search Result resp.conf
Routing Number	M	Search Info
Terminating Network Routing Number	M	Search Info
Alternate Terminating Network Routing Number	O	Search Info
On-net/Off-net Indicator	M	Search Info

Table A.3-9/Q.85.6 – Relationship rd – SSF(t) to SCF(t)

Q.85.6: ENQUIRY3 req.ind		CS-1: Initial DP req.ind
GVNS User Group Identification	M	Calling Party Business Group ID
Dialled Number	O	Dialled Digits
Terminating Network Routing Number	M	Called Party Number
Alternate Terminating Network Routing Number	O	No suitable IE (Note)
GVNS Service ID	O	Service Key + Misc Call Info
NOTE – This information element is optional as it may be derived at the terminating SSF.		

Table A.3-10/Q.85.6 – Relationship rd – SCF(t) to SSF(t)

Q.85.6: ENQUIRY3 resp.conf		CS-1: Connect req.ind
Terminating Network Routing Number	M	Destination Routing Address + Route List + Forwarding Condition
Alternate Terminating Network Routing Number	O	Destination Routing Address + Route List + Forwarding Condition

A.4 SDL diagrams for functional entities

The SDL diagrams have been based on the Finite State Machines of Recommendation Q.1218 [5]. The allowed sequencing of operations described in Recommendation Q.1218 for the IN Application Protocol INAP is identical to the allowed sequencing of information flows in the Distributed Functional Plane as described here.

The GVNS SDL diagrams are very informal and high level in the description of processing actions. Little or no information is included on error paths or timer control, which will be as described in Recommendation Q.1218.

The SDL diagrams for originating and terminating FEs are not shown separately, as the terminating FE SDL diagrams are an exact subset of the complete diagrams. For the terminating FEs, no procedures involving SRF connection are included in A.3, and hence for the terminating FE SDL diagrams no transitions and states involving SRF connection are relevant. Other procedures, not illustrated here, might involve connection of the SRF at the terminating end.

SDL diagrams are shown in the following figures:

Figure A.4-1: SDL diagram for SSF/CCF (seven sheets).

Figure A.4-2: SDL diagram for SCF (eight sheets).

Figure A.4-3: SDL diagram for SDF (one sheet).

Figure A.4-4: SDL diagram for SRF (three sheets).

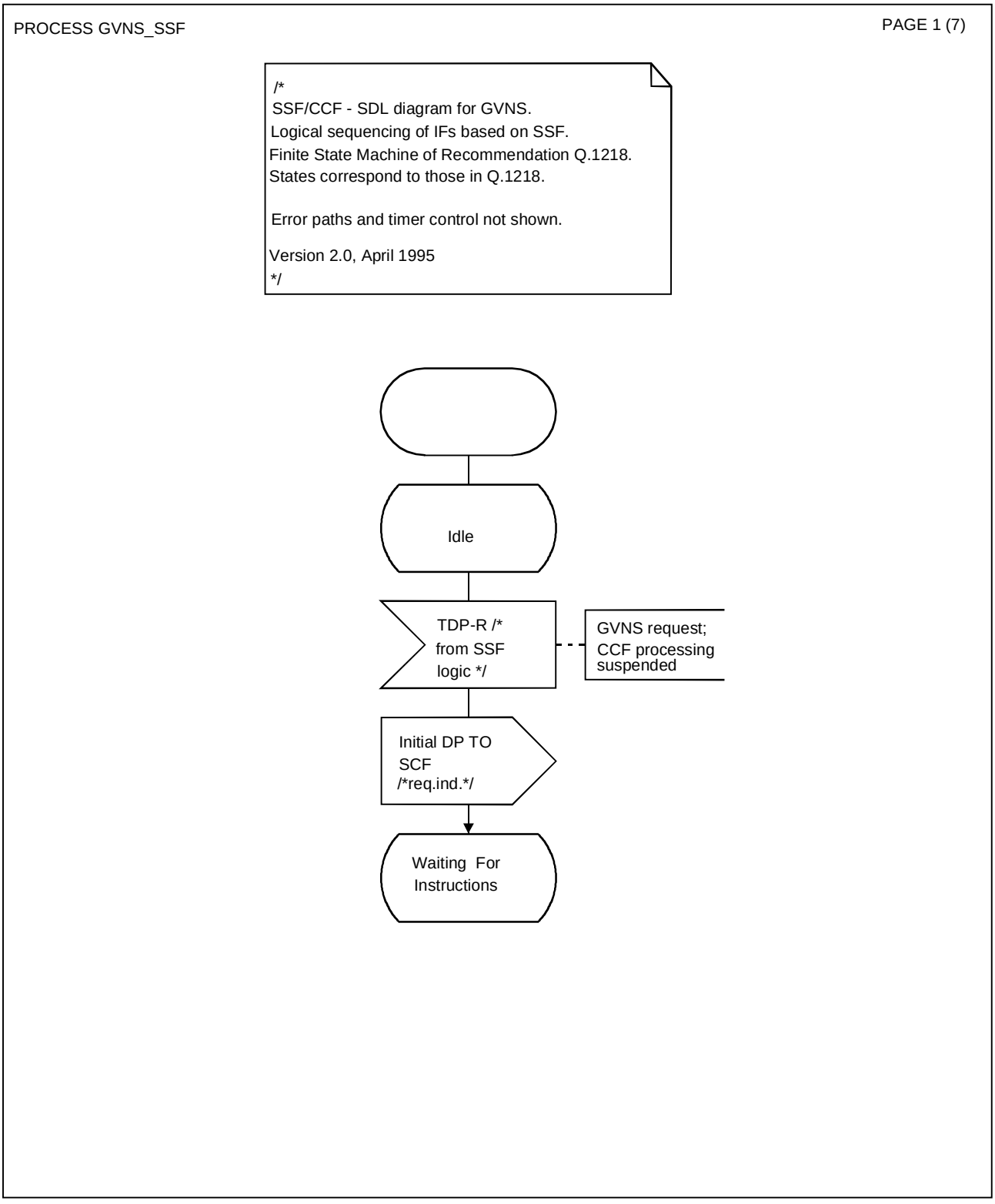


Figure A.4-1/Q.85.6 (sheet 1 of 7) – SDL diagram for SSF/CCF

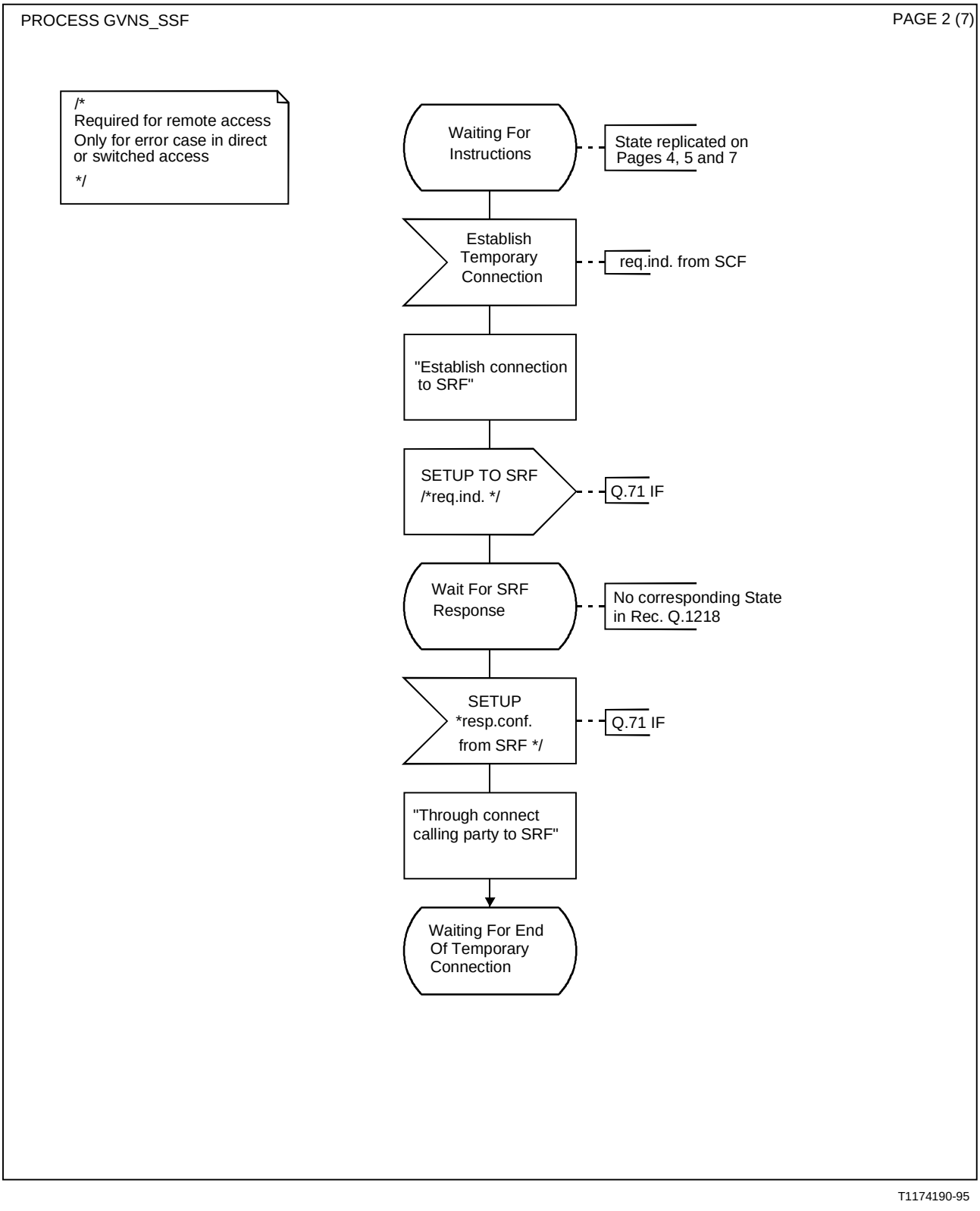


Figure A.4-1/Q.85.6 (sheet 2 of 7) – SDL diagram for SSF/CCF

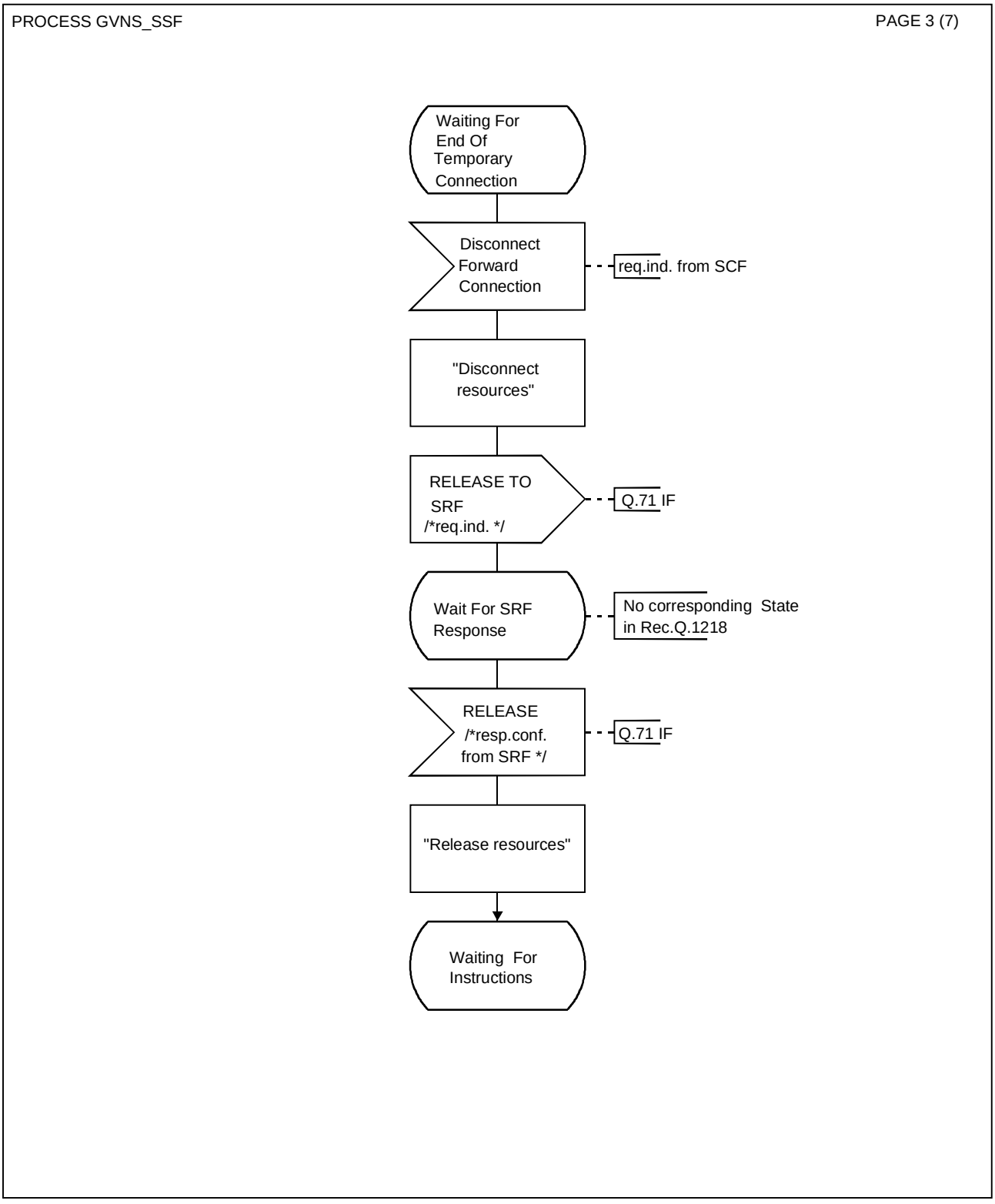


Figure A.4-1/Q.85.6 (Sheet 3 of 7) – SDL diagram for SSF/CCF

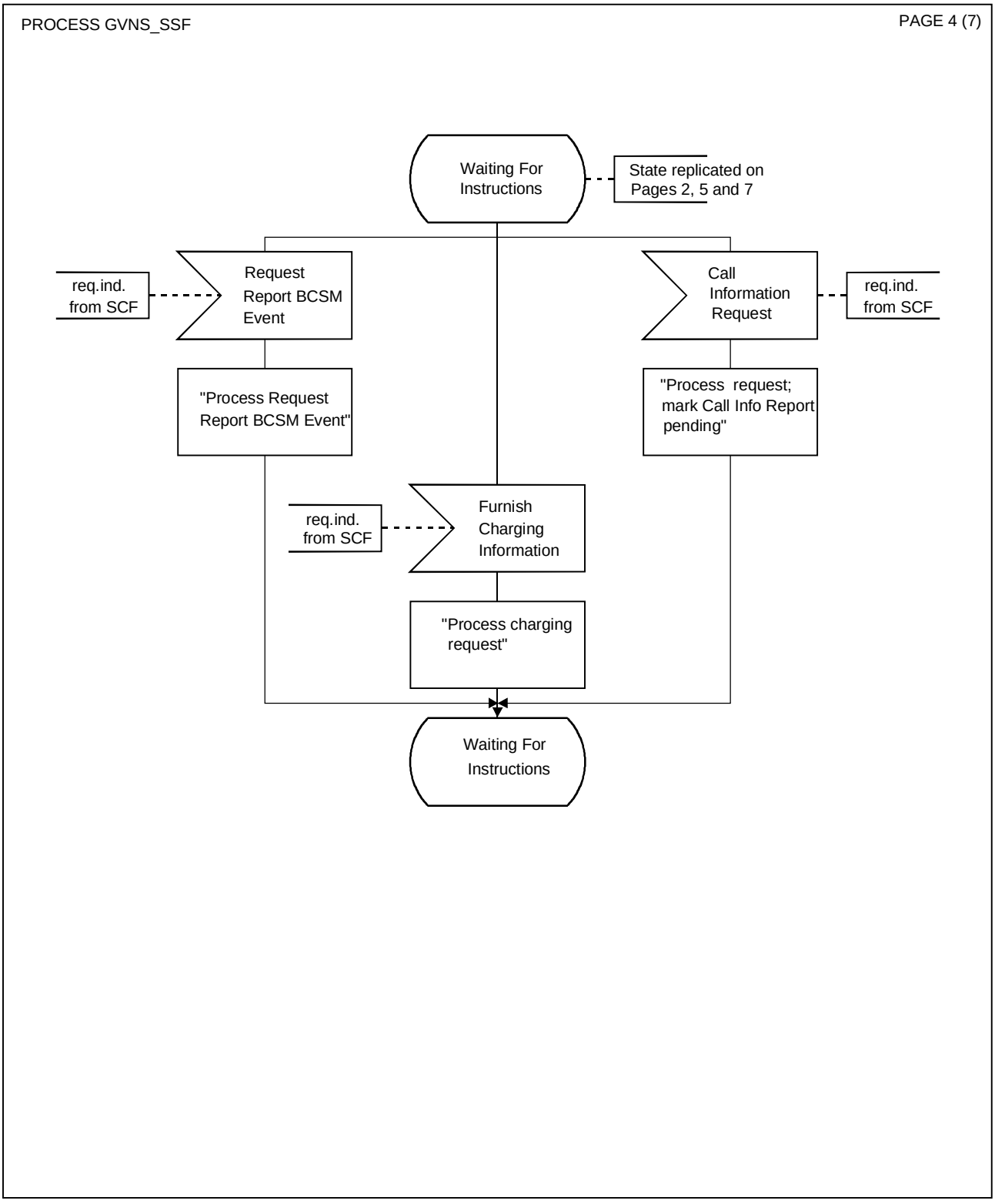


Figure A.4-1/Q.85.6 (sheet 4 of 7) – SDL diagram for SSF/CCF

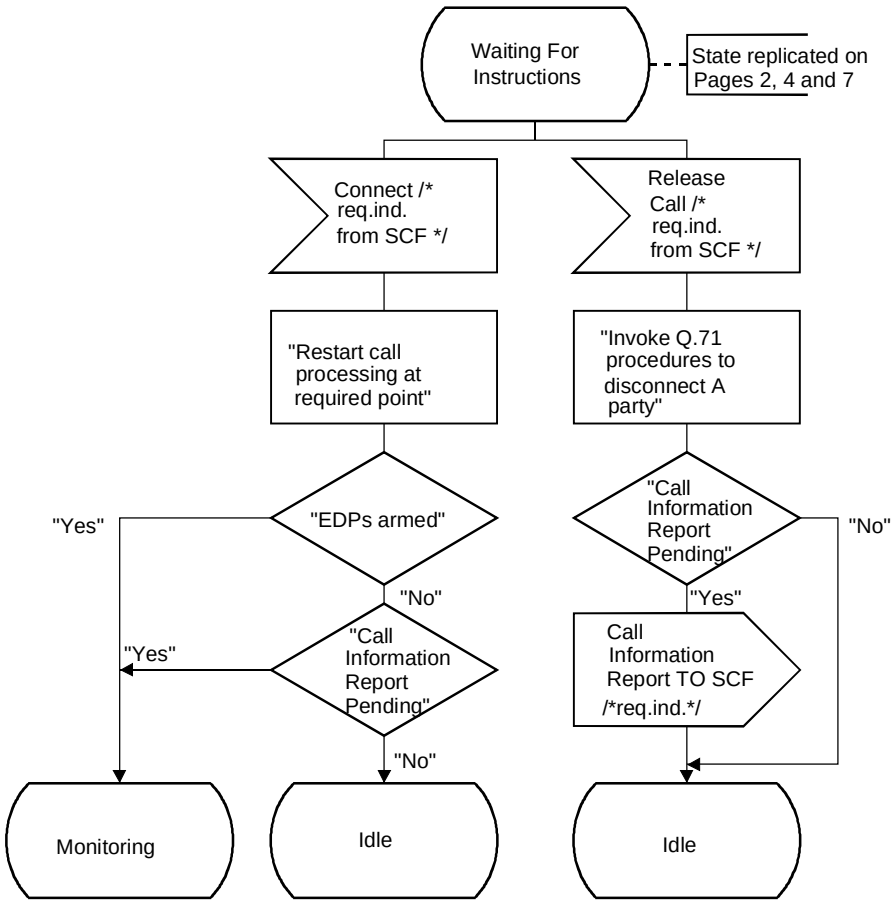


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Figure A.4-1/Q.85.6 (sheet 5 of 7) – SDL diagram for SSF/CCF

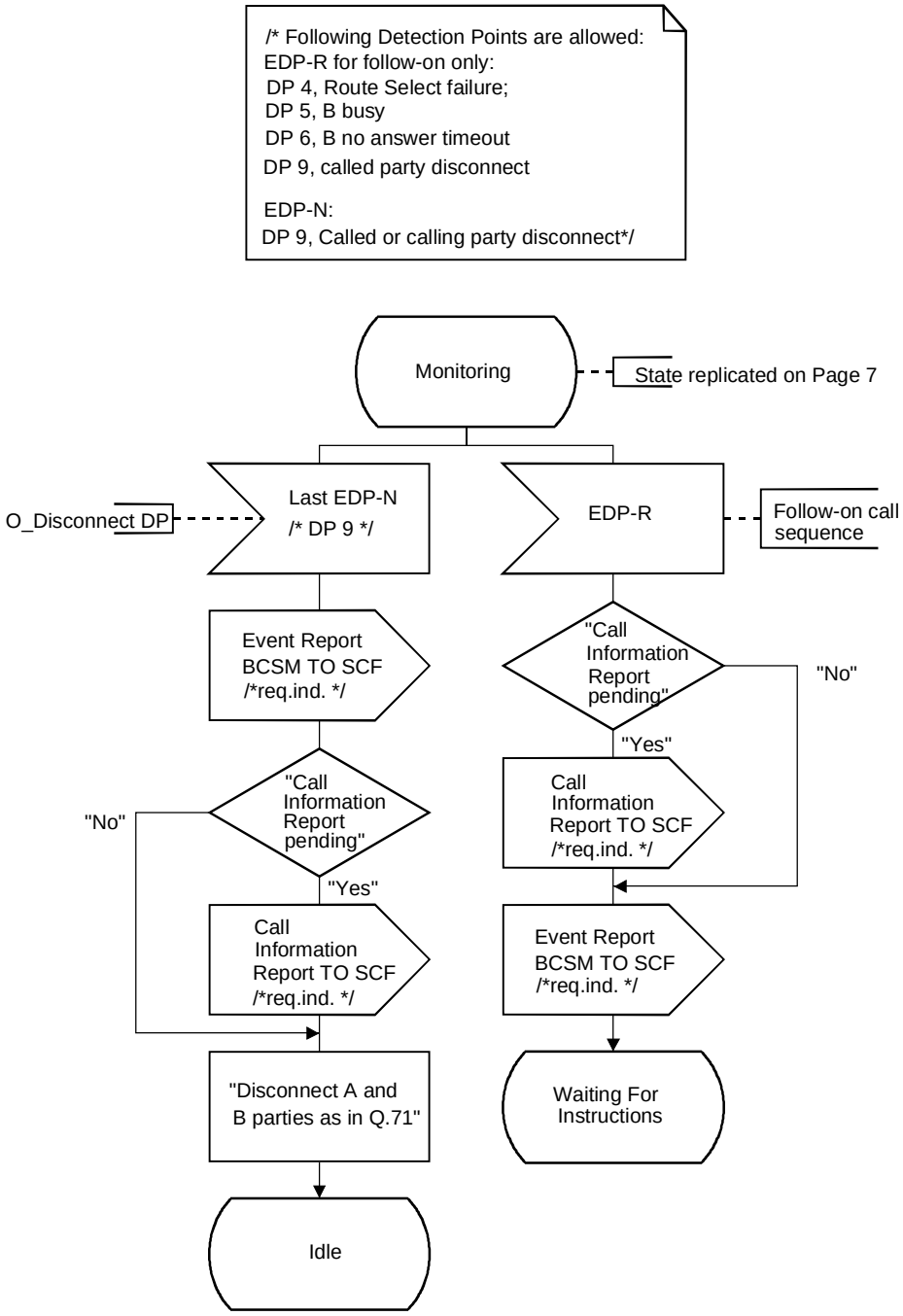

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Figure A.4-1/Q.85.6 (sheet 6 of 7) – SDL diagram for SSF/CCF

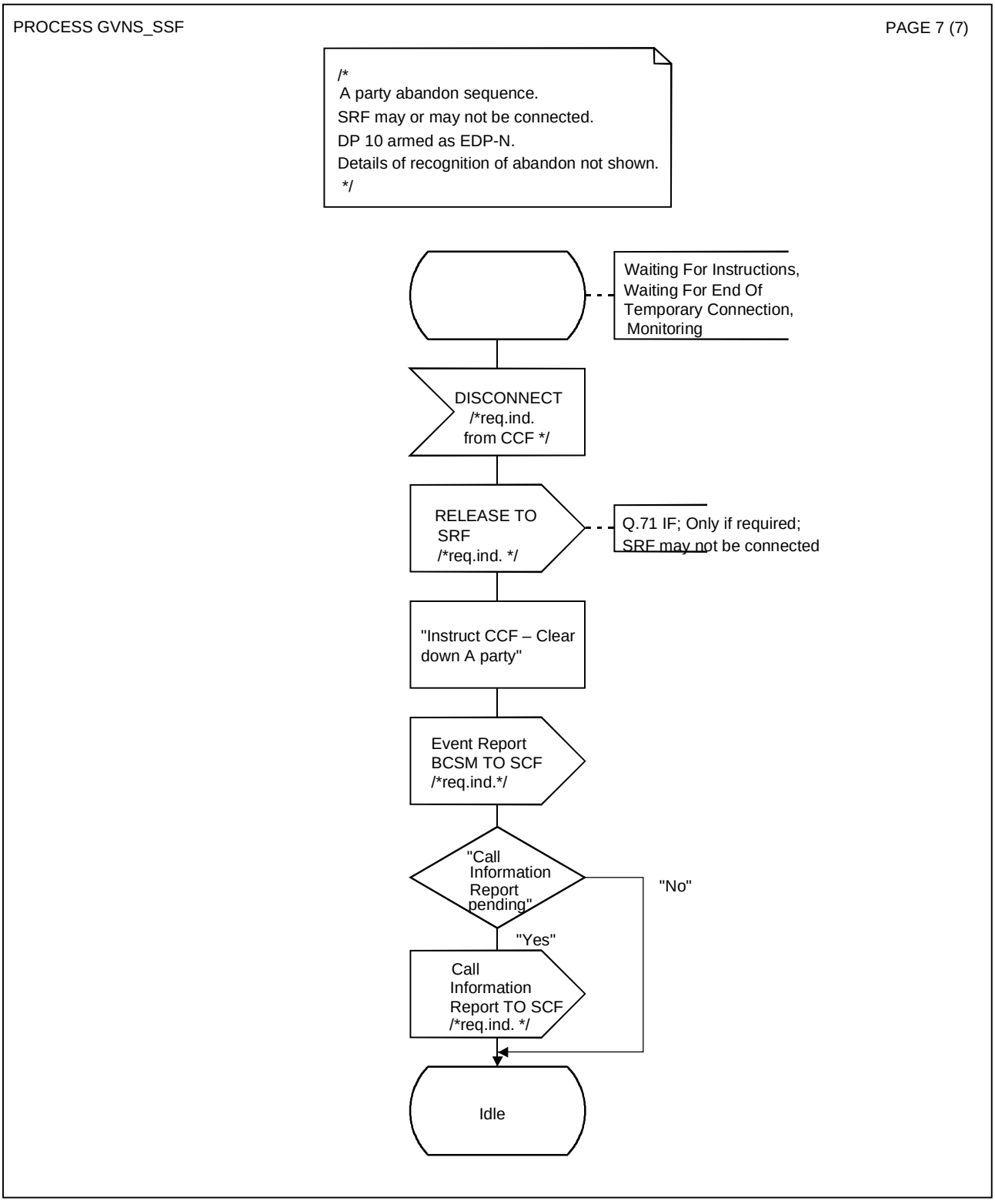

Figure A.4-1/Q.85.6 (sheet 7 of 7) – SDL diagram for SSF/CCF

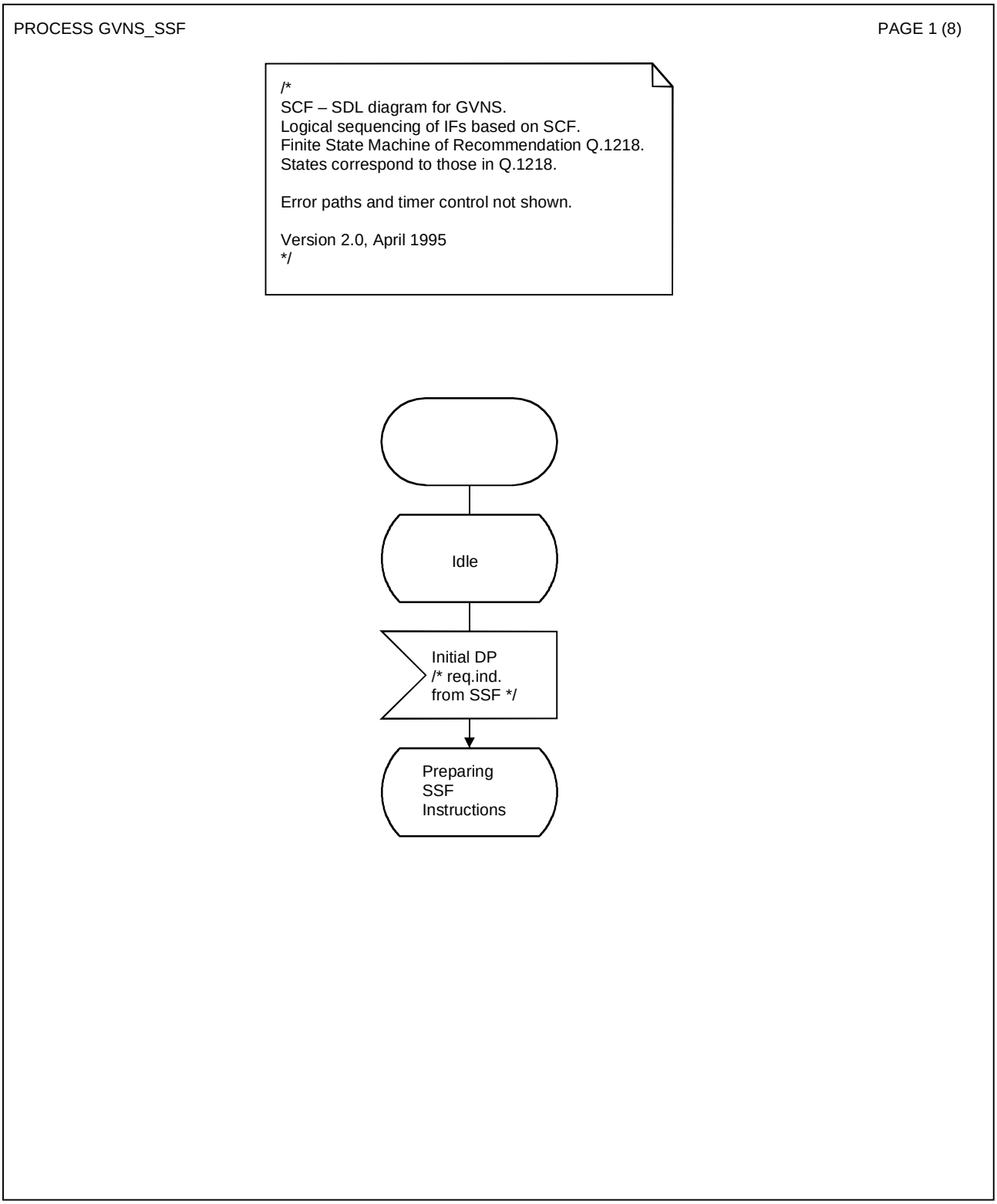

Figure A.4-2/Q.85.6 (sheet 1 of 8) – SDL diagram for SCF

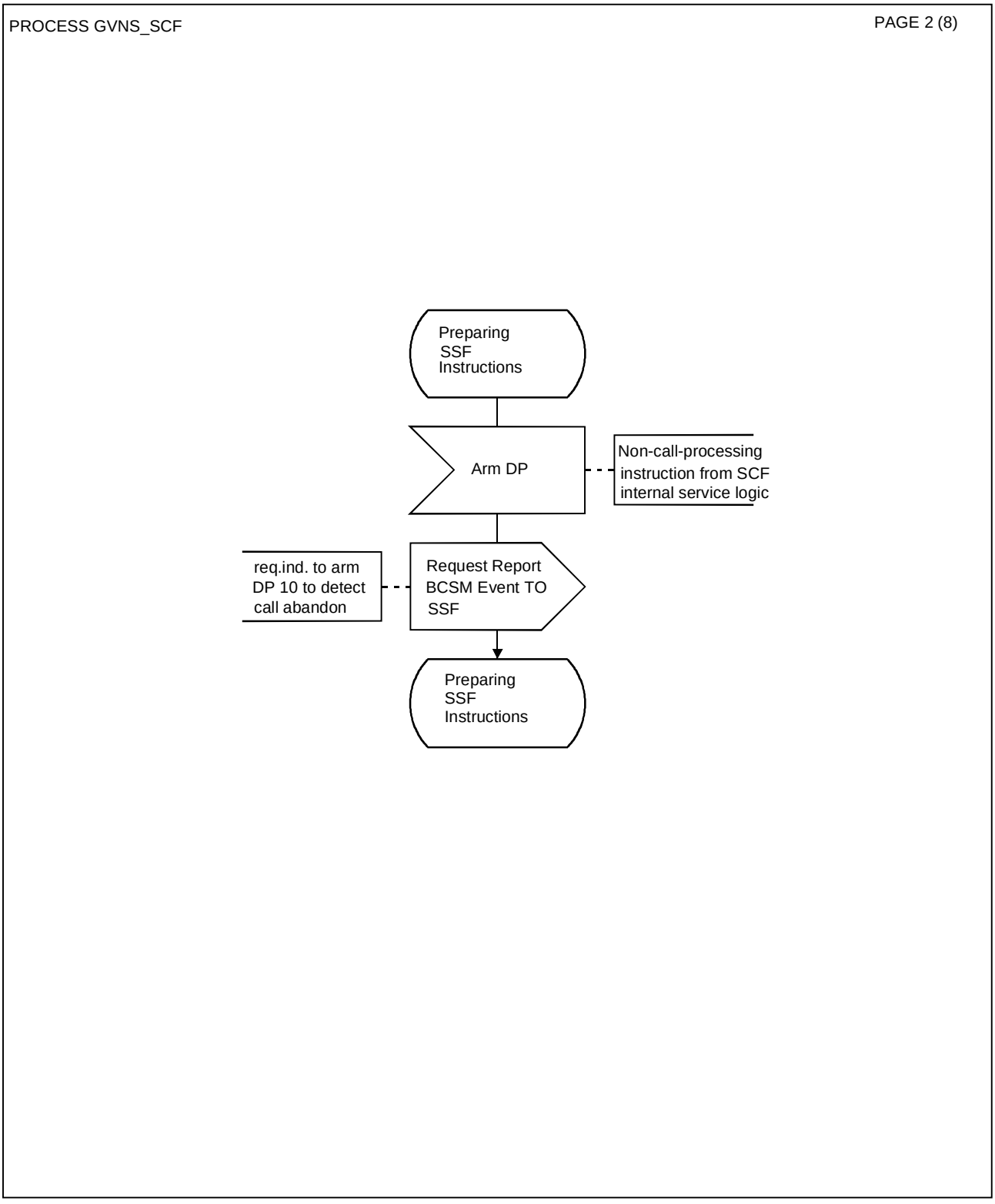

Figure A.4-2/Q.85.6 (sheet 2 of 8) – SDL diagram for SCF

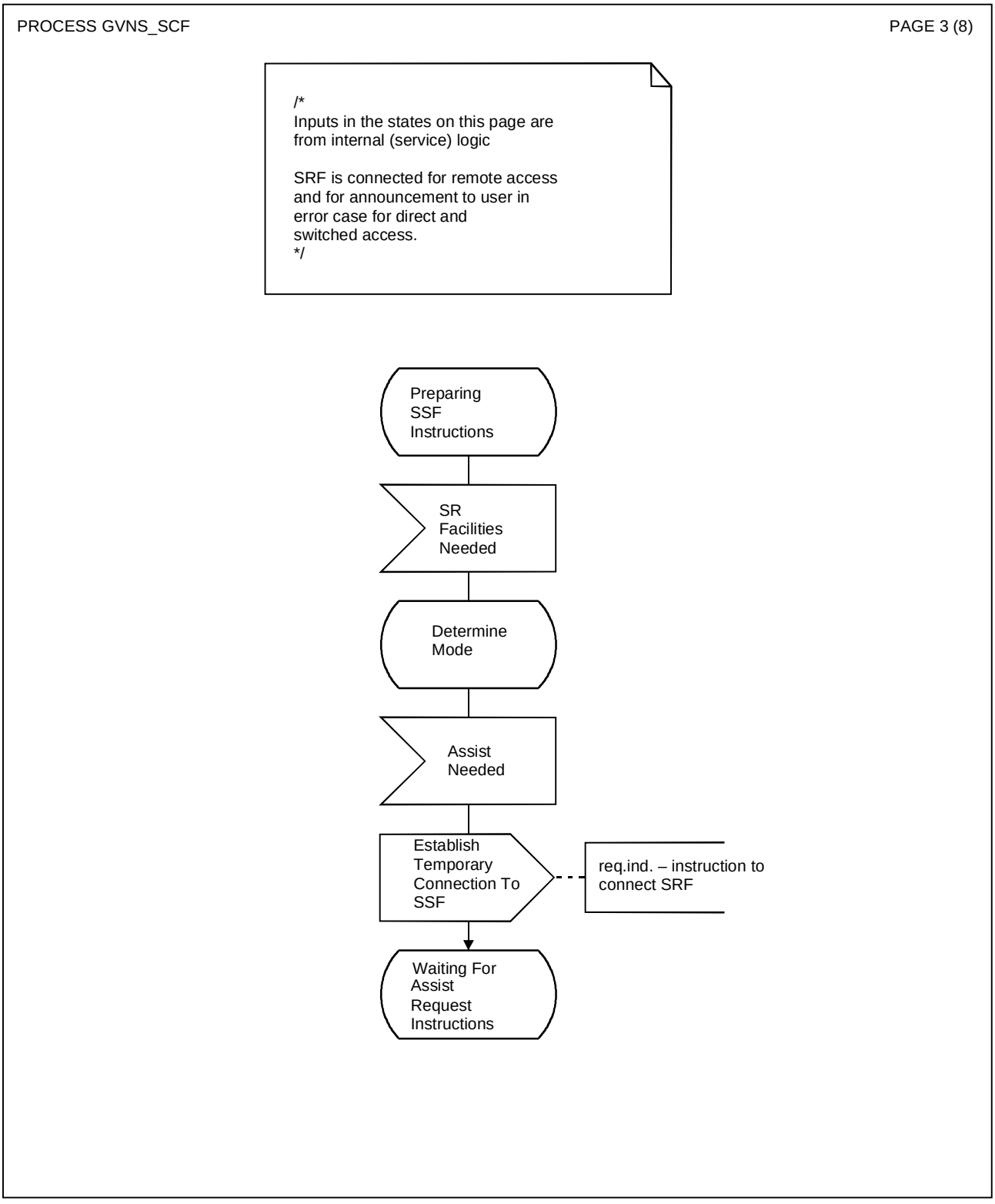

Figure A.4-2/Q.85.6 (sheet 3 of 8) – SDL diagram for SCF

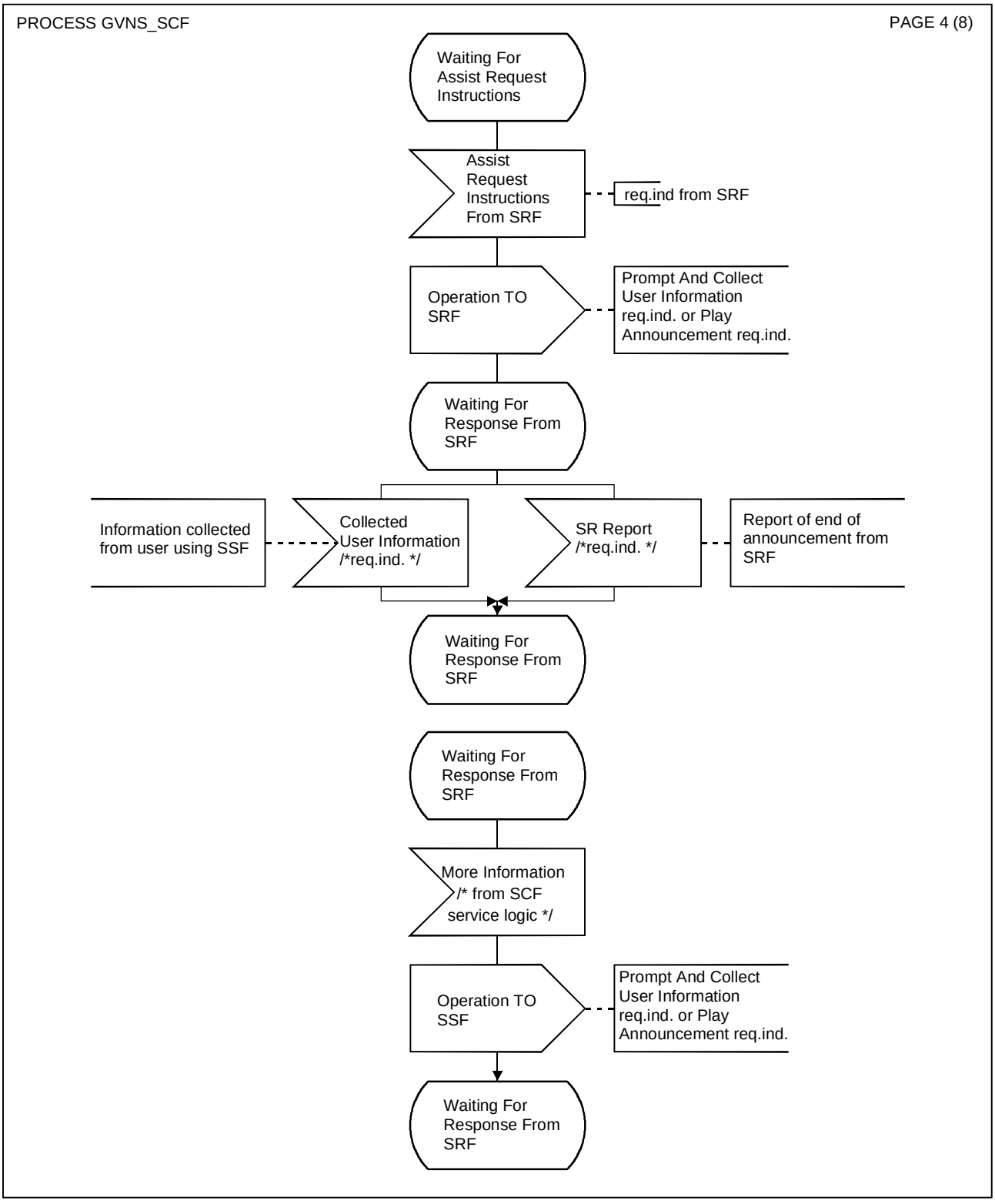

Figure A.4-2/Q.85.6 (sheet 4 of 8) – SDL diagram for SCF

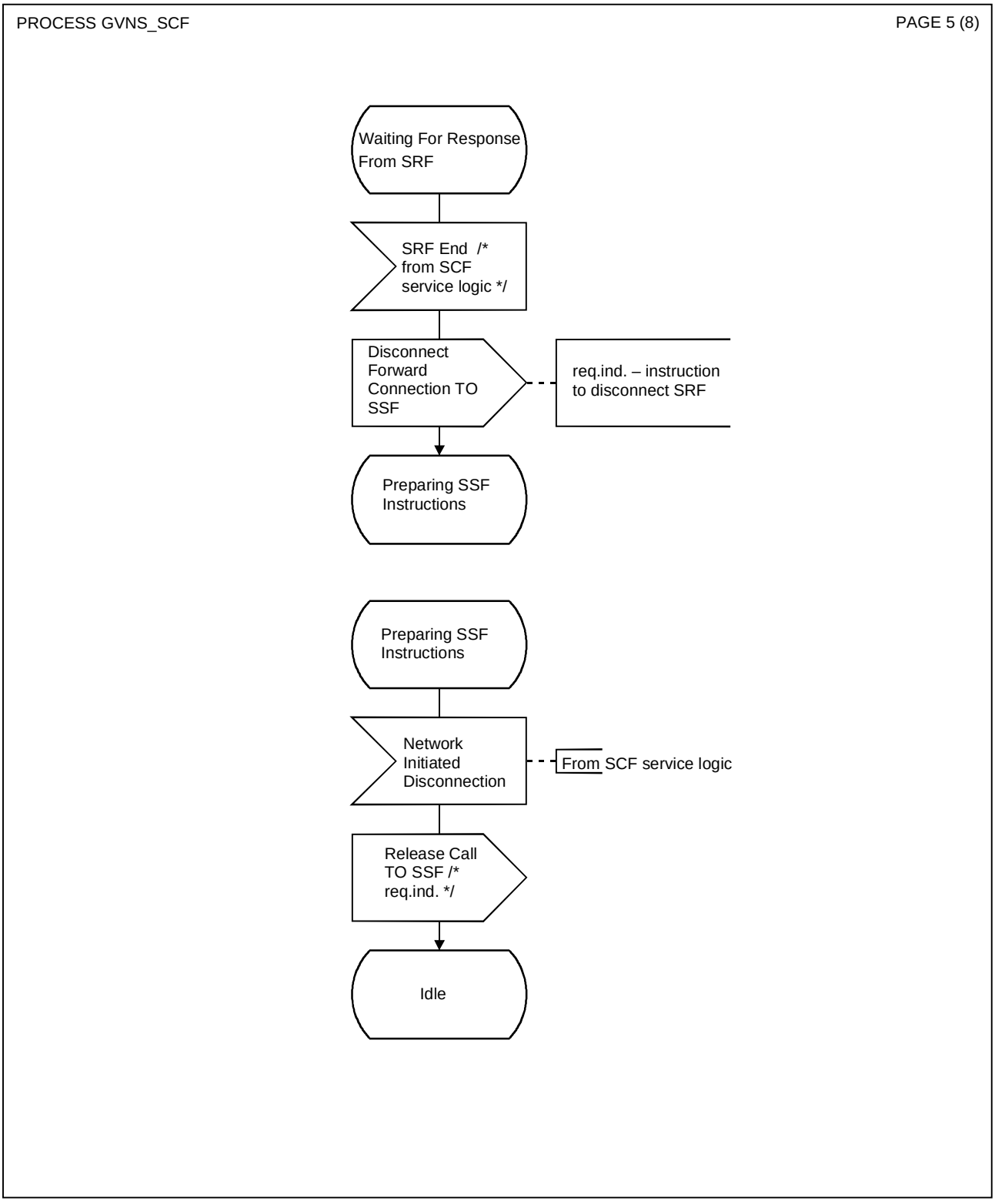

Figure A.4-2/Q.85.6 (sheet 5 of 8) – SDL diagram for SCF

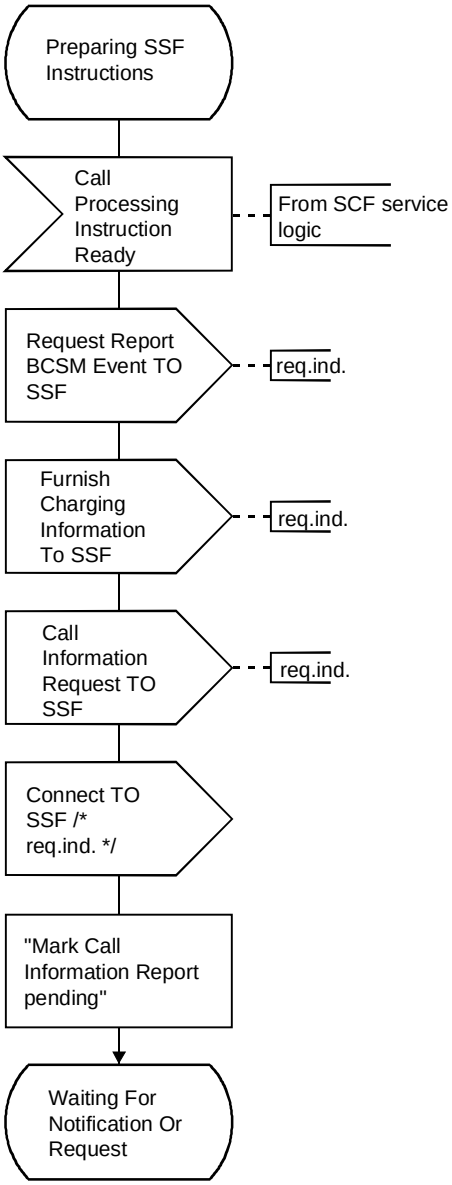

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Figure A.4-2/Q.85.6 (sheet 6 of 8) – SDL diagram for SCF

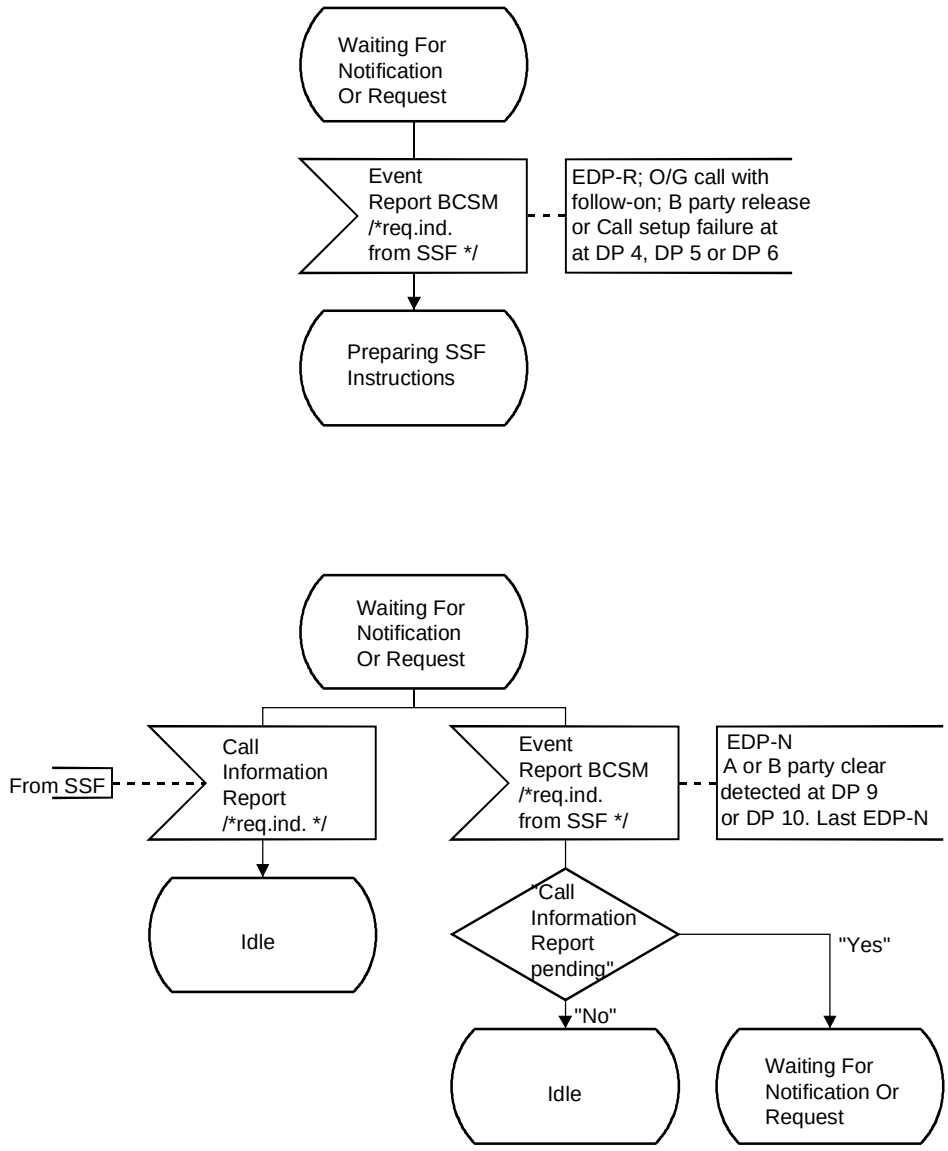

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Figure A.4-2/Q.85.6 (sheet 7 of 8) – SDL diagram for SCF

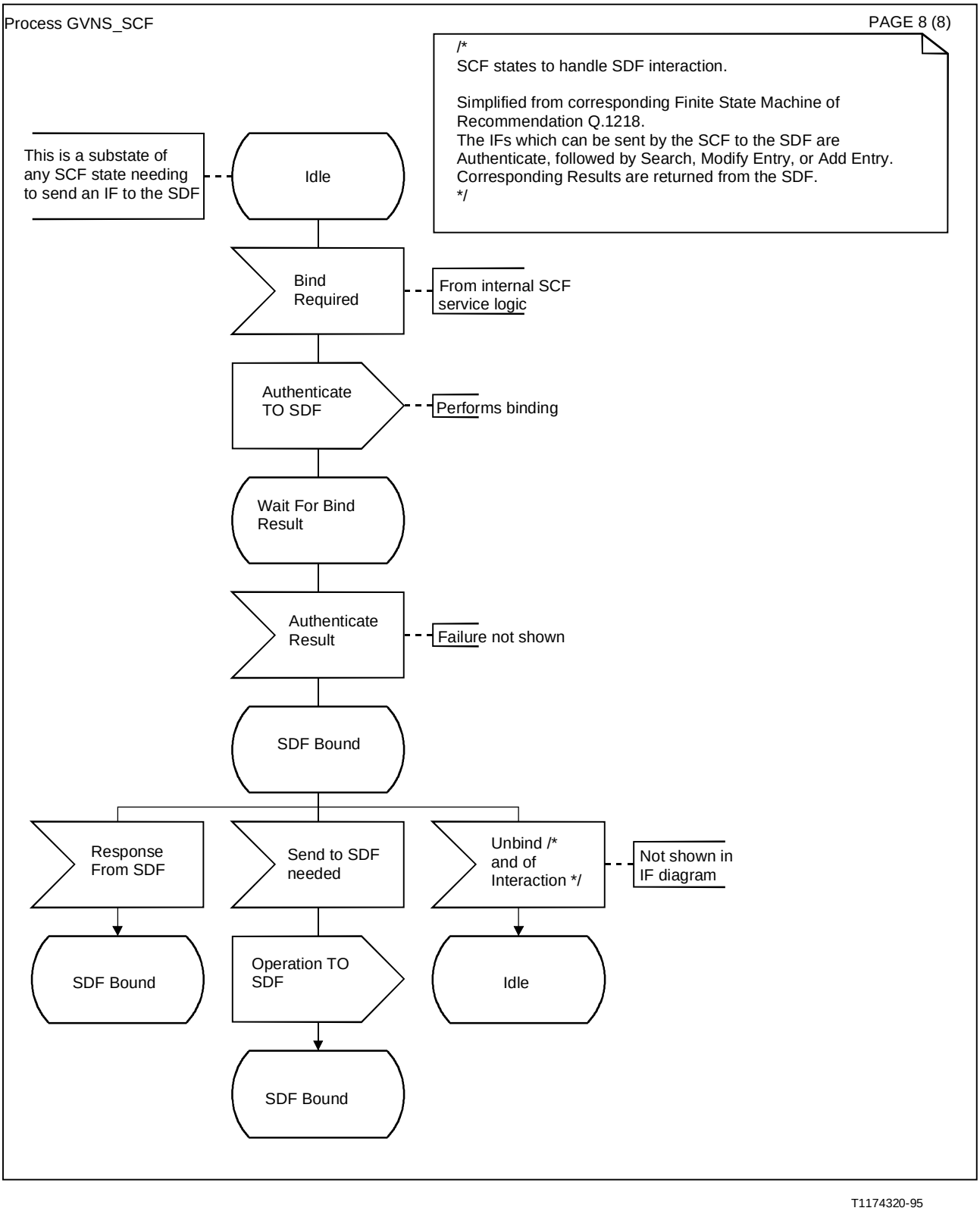

Figure A.4-2/Q.85.6 (sheet 8 of 8) – SDL diagram for SCF

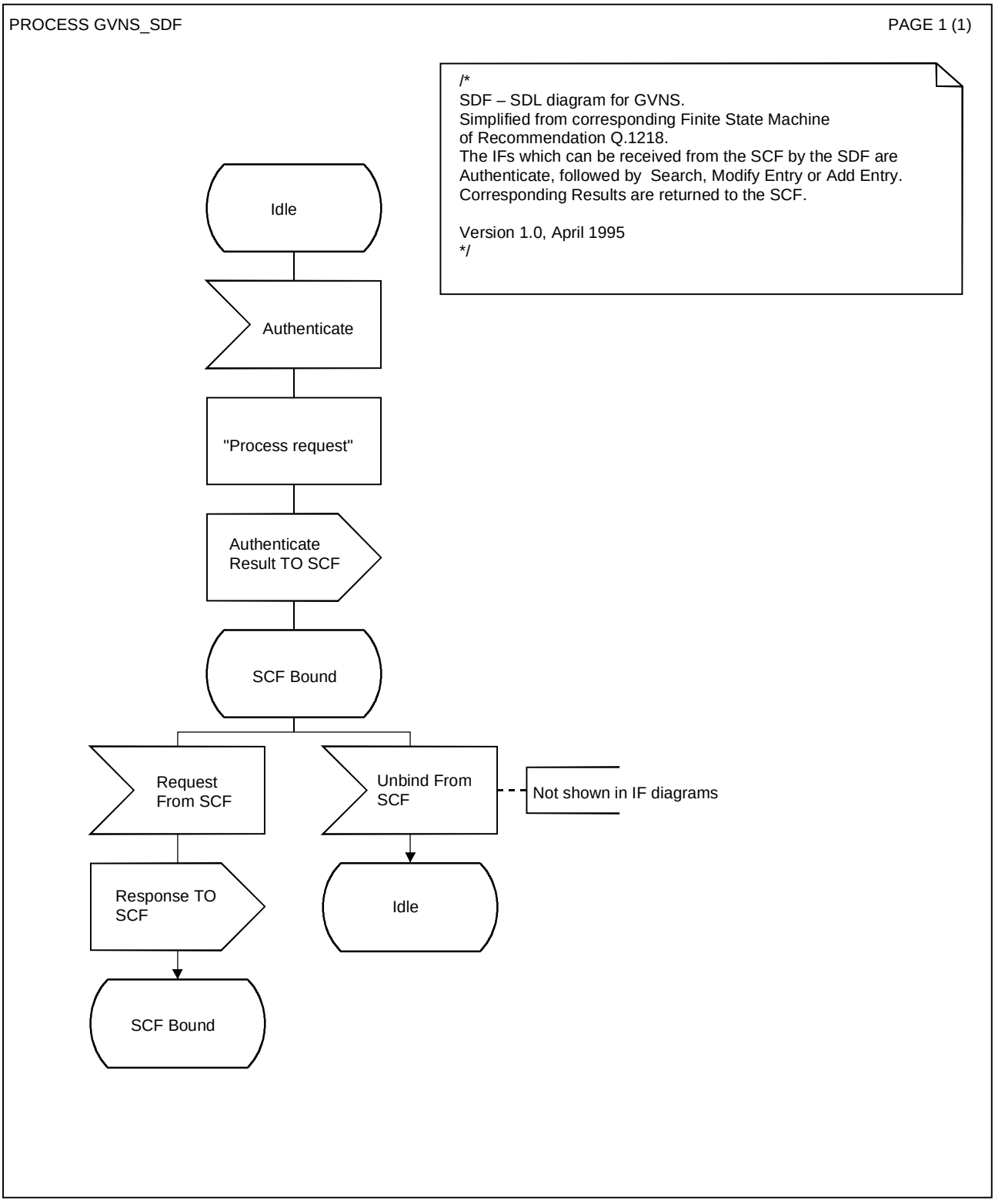

Figure A.4-3/Q.85.6 – SDL diagram for SDF

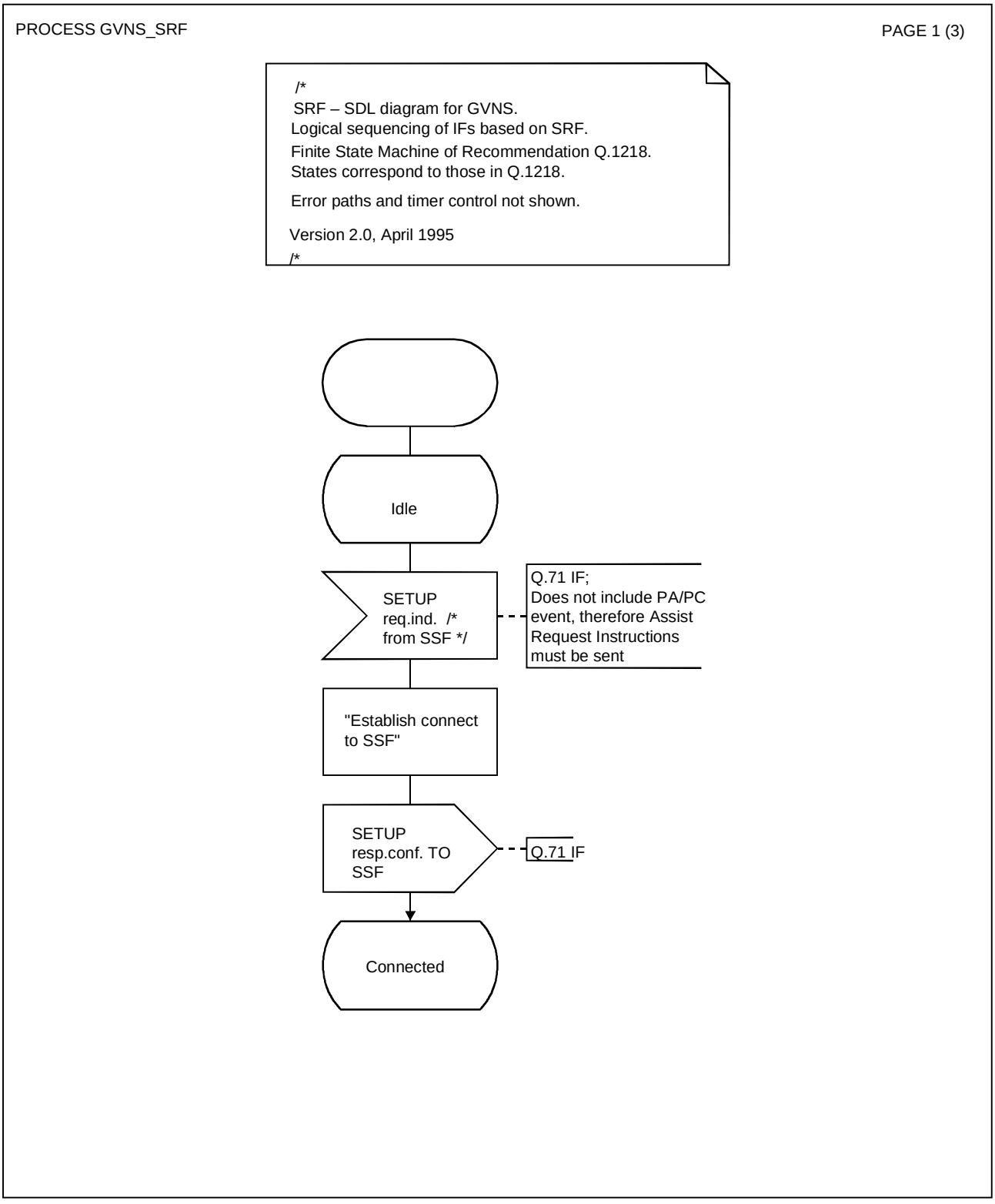

Figure A.4-4/Q.85.6 (sheet 1 of 3) – SDL diagram for SRF

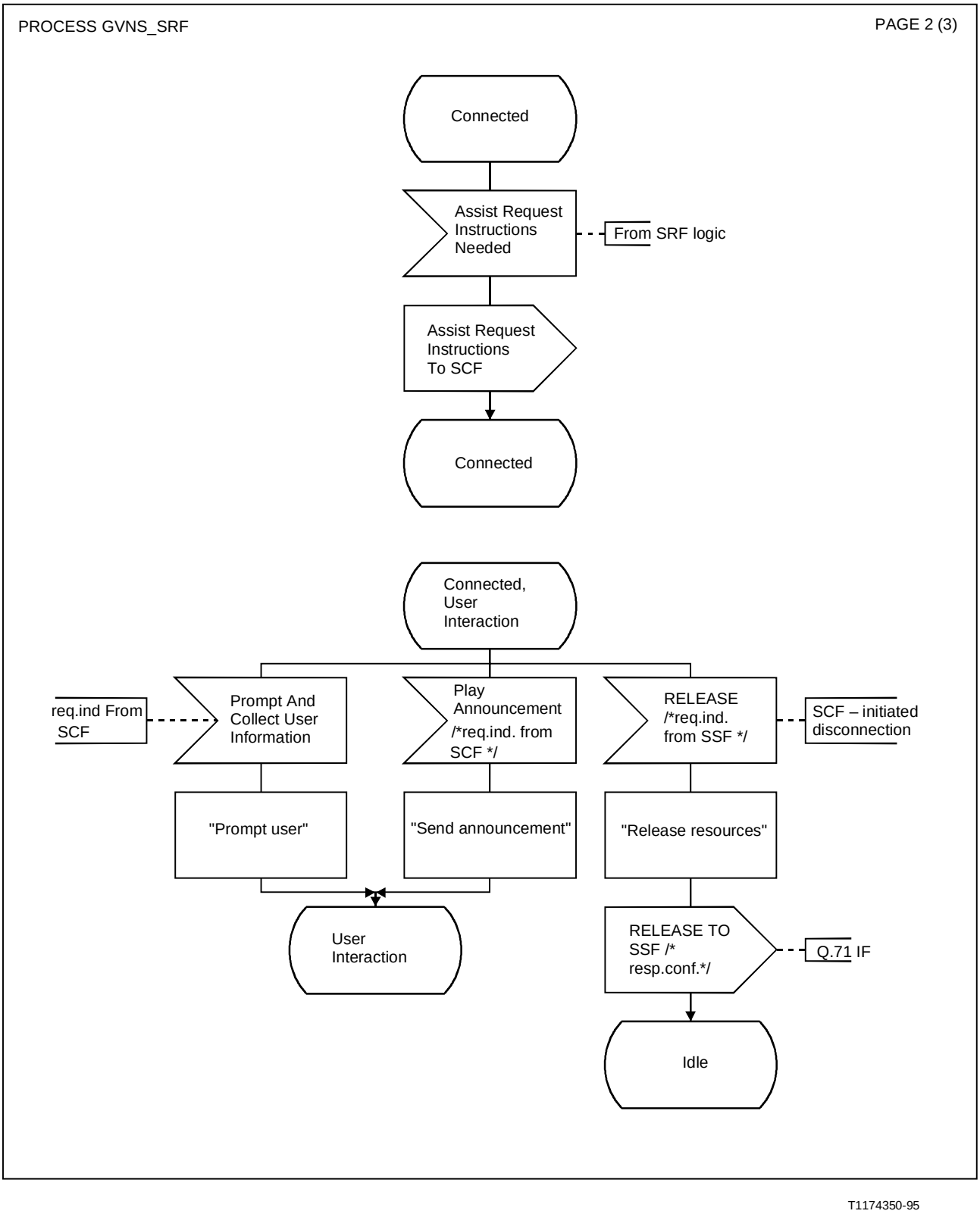

Figure A.4-4/Q.85.6 (sheet 2 of 3) – SDL diagram for SRF

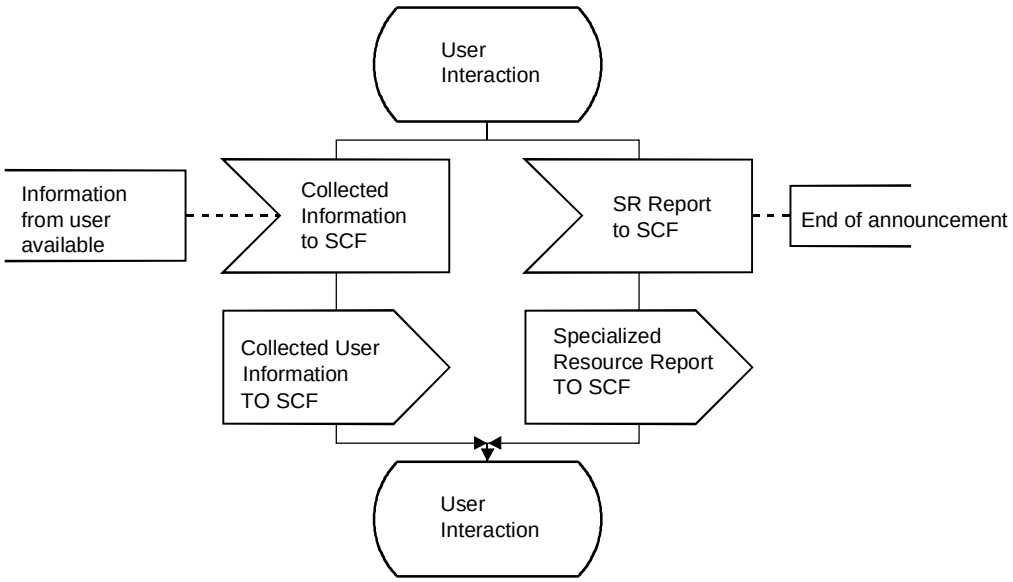

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Figure A.4-4/Q.85.6 (sheet 3 of 3) – SDL diagram for SRF

A.5 Functional entity actions

The functional entity actions with 4- or 5-digit identifiers which appear in the information flow diagrams in this Annex are the FEAs described in clause 5/Q.1214 [4]. The clauses of Recommendation Q.1214 in which individual FEAs are described are listed in Table A.5-1, which also shows the name of the SIB in which the FEA is described. The numbering scheme is described in 5.1.3/Q.1214.

Table A.5-1/Q.85.6 – Clauses of Recommendation Q.1214 and SIBs in which FEAs are described

Reference (Rec. Q.1214)	SIB	FE in which FEA located			
		SSF/CCF	SCF	SDF	SRF
5.3	Basic Call Process	2002 2003 20011 20013 20014	9001 9002 9004		
5.2.2	Charge	2021	9021		
5.2.6	Log Call Information	2061 2062	9061 9062 9063	4061	
5.2.8	Screen		9081 9083	4081	
5.2.9	Service Data Management		9092 9093	4091 4092	
5.2.12	User Interaction	2123 2125	9122 9124 9125 9126 9128		3122 3124
5.2.14	Authenticate		9141 9143	4141	

FEAs with 3-digit identifiers in the information flow diagrams of this Annex are Q.71 [6] FEAs and are defined there.

The FEAs of this Annex, when appropriately grouped, are compatible with the FEAs of Recommendation Q.85.6.

A.6 Mapping of functional entities to physical entities

As the functional model for GVNS is the IN CS-1 functional model, the mapping between functional entities FEs and physical entities PEs for GVNS is also identical with the related mapping for IN CS-1, as described in Recommendation Q.1215 [8]. The IN CS-1 mapping is entirely consistent with the GVNS mapping shown in Recommendation Q.85.6

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