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GENERAL RECOMMENDATIONS ON TELEPHONE SWITCHING AND SIGNALLING

FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN

STAGE 2 DESCRIPTION FOR COMMUNITY OF INTEREST SUPPLEMENTARY SERVICES

CLAUSE 6 – GLOBAL VIRTUAL NETWORK SERVICE (GVNS)

ITU-T Recommendation Q.85

(Previously "CCITT Recommendation")

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (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).

ITU-T Recommendation Q.85, clause 6 was prepared by ITU-T Study Group 11 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 7th of February 1995.

NOTE

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

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SUMMARY

This Recommendation defines the functional capabilities and the information flows needed to support the Global Virtual Network Service (GVNS) as described in the GVNS Stage 1 service description (see Recommendation F.16 [5]). This Recommendation should be used as the functional requirements to develop GVNS Stage 3 specifications. The functional model specified in this Recommendation is compatible with the functional model for Intelligent Network Capability Set 1 (CS-1) and should be used as the primary source for the functional requirements of GVNS.

Recommendation Q.85

STAGE 2 DESCRIPTION FOR COMMUNITY OF INTEREST SUPPLEMENTARY SERVICES

(Geneva, 1995)

6 Global Virtual Network Service (GVNS)

6.1 Scope

This Recommendation provides an implementation and technology independent stage 2 description for Global Virtual Network Service (GVNS) with PSTN inter-networking. Stage 2 identifies the functional capabilities and the information flows needed to support the service as described in stage 1. The stage 2 description also identifies user operations not directly associated with a call (see Recommendation I.130 [1]).

This Recommendation is specified according to the methodology specified in Recommendation Q.65 [2] and includes the descriptions of the relationship between this service and the basic call (see Recommendation Q.71) [4].

In addition, this Recommendation does not specify the requirements where the service is provided to the user via a private ISDN.

This Recommendation is applicable to the ISDN stage 3 Recommendation for GVNS. The term Stage 3 is defined in Recommendation I.130 [1].

6.2 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] CCITT Recommendation I.130 (1988), *Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN*.

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

[3] CCITT Recommendation I.112 (1993), *Vocabulary of terms for ISDNs*.

[4] CCITT Recommendation Q.71 (1993), *ISDN circuit mode switched bearer services*.

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

[6] CCITT Recommendation Z.100 (1993), *CCITT Specification and Description Language (SDL).*

[7] CCITT Recommendation E.164 (1991), *Numbering plan for the ISDN era*.

[8] CCITT Recommendation E.160 (1993), *Definitions relating to national and international numbering plans*.

6.3 Definitions

For the purposes of this Recommendation, the following definitions apply:

6.3.1 alternate terminating network routing number: In the forward direction, this is an alternate terminating network routing address that is provided as a second network address. In the backward direction, this is the alternate terminating network routing address that was used to route the call.

6.3.2 dialled number: The number which a GVNS user dialed excluding prefix digits.

6.3.3 GVNS service ID: Information to indicate a GVNS call.

6.3.4 GVNS user group identification: Information that uniquely identifies the GVNS customer: An example for the usage of such information is to locate the address of the database record of a GVNS customer.

6.3.5 integrated services digital network (ISDN): See 2.3/I.112 [3], definition 308.

6.3.6 ISDN number: A number conforming to the numbering plan and structure specified in Recommendation E.164 [7].

6.3.7 On-net/Off-net indicator: Information which is used to indicate the type of a GVNS termination. Possible values for the On-net/Off-net Indicator are: on-net, off-net, and no information.

6.3.8 Originating participating service provider identification: Information that uniquely identifies the participating service provider that provides customer access to GVNS to the calling user/interface.

6.3.9 prefix: See clause 1/E.160 [8].

6.3.10 routing number: Information used to complete a call to the terminating functional entity. This information is mandatory and is carried by an ISDN number.

NOTE – Whenever adjacent GVNS functional entities are implemented by separate GVNS Participating Service Providers, the Routing Number shall be an ISDN number unless another prior arrangement exists between the participating service providers.

6.3.11 services; telecommunications service: See clause 2.2/I.112 [3], definition 201.

6.3.12 terminating access indication: Information used to identify the type of access that the GVNS Terminating Participating Service Provider actually used to complete the call.

6.3.13 terminating network routing number: Information used by the terminating functional entity to route calls. This information is mandatory and is carried by either an ISDN number or a network-specific number.

6.3.14 terminating participating service provider identification: Information that uniquely identifies the participating service provider that provides customer access to GVNS to the called user/interface.

6.3.15 transit indication: Information that indicates that the call is not a terminating call and must be routed to the GVNS terminating service provider's network.

6.4 Symbols and abbreviations

For the purposes of this Recommendation, the following abbreviations are used:

CC	Call Control
CCA	Call Control Agent
conf.	confirm
DB	DataBase
GVNS	Global Virtual Network Service
ind.	indication
ISDN	Integrated Services Digital Network
LE	Local Exchange
PSTN	Public Switched Telephone Network
resp.	response
req.	request
SDL	Specification and Description Language
SL&DC	Service Logic and Data Control
SS&RC	Service Switching and Resource Control
TC	Transit Control
TR	Transit Exchange

6.5 Description

The Global Virtual Network Service is a global switched service supported by multiple networks and is offered to customers over PSTN and/or ISDN. While minimizing the need for dedicated network resources, GVNS provides private network functions to users at geographically dispersed international locations.[1)]

The customer's network configuration is defined per the customer's direction using customer-specific service information that is resident in multiple networks. Stations, user-network interfaces, and authorized remote access locations that are logically defined by the customer to be part of its virtual network during service provisioning or remote access (see below) are called on-net locations. These on-net locations form the GVNS user group. An on-net location belongs to one and only one GVNS user group; customers may define a physical entity (station or user network interface) as multiple on-net locations during service provisioning. As a result, one physical entity may be registered to one or more GVNS User Groups. A GVNS customer is assigned a unique identifier which identifies the GVNS User Group. A GVNS customer may choose to group users into one or more subgroups in order to allow sub-group dependent service interactions and operations.

The GVNS customer can define call screening to determine what types of calls are allowed from on-net locations. All calls made from an on-net location may terminate to an on-net or off-net location (i.e., non-GVNS location). If terminating to an on-net location, it could be done via a dedicated or a switched access. For either switched or direct access, a user may need to dial a special code (e.g. prefix or access code) to identify GVNS calls and/or the desired GVNS Participating Service Provider. The availability of Calling Line Identification (network-provided or network-verified) is necessary to provide authorized access to the GVNS.

A GVNS user may dial a private or a public number from an on-net location to reach off-net or other on-net locations. GVNS calls can also be made from non-GVNS locations. Such an access is called a remote access. At the customer's request, appropriate verification of the calling party may be required. In this case, the caller makes a call to a Remote Access Number (e.g. public number or service code) and provides an authorization code, and waits for authorization. Either the Remote Access Number or the authorization code provides authorized access to the GVNS. Once a non-GVNS location receives authorized access to a particular GVNS user group, it functions as an on-net location. As a GVNS Service Provider's option, the Calling Party could place additional calls without requiring re-entry of the authorization code for remote access.

GVNS allows the customer to define a private numbering plan. The number of digits sent and received between the customer's equipment and the GVNS service point will be, within a given range, specified by each GVNS Participating Service Provider. A customer should have the capability to define an on-net location with a customer-defined private number or a public number. A customer may also define off-net locations as part of its customer-defined numbering plan. Such locations are termed virtual on-net locations.

GVNS provides the customers with global services as a result of internetworking among the service providers in various countries. Many service providers already provide the service between pairs of countries via bilateral agreements. In view of the above, internetworking requirements become the primary focus of the ITU-T GVNS standardization effort to facilitate global deployment of GVNS among multiple countries.

6.6 Derivation of a functional model

6.6.1 Functional model description

This subclause contains a description of the functional model of GVNS and is depicted in Figure 6-1 below. The functional model contains five Functional Entities (FE1 to FE5) and four relationship types (r_a, r_b, r_c, and r_d). Functional entities are represented by circles and the relationship between two communicating functional entities is identified by a line joining them. Each functional entity is given a unique label (e.g., FE1, FE2) adjacent to the circle. The relationships are labelled (e.g. r_a) for ease of reference. The functional entity type is contained within the circle.

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1) Dedicated network resources may be used to access GVNS or in conjunction with GVNS.

The five FEs are characterized into the following three functional entity types:

– *Service Logic and Data Control (SL&DC)* – FEs of SL&DC type access and process service-related logic and data, and cooperate with each other, when necessary, to direct FEs of Call Control (CC) type.

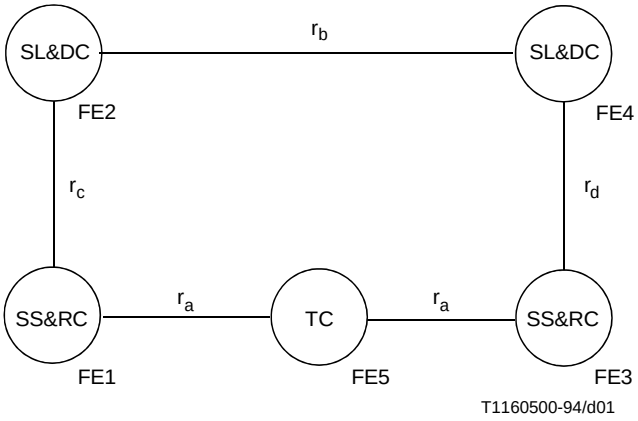
– *Service Switching and Resource Control (SS&RC)* – FEs of SS&RC type interfaces with FEs of CC type [4] of a basic service that are involved in a GVNS call and FEs of SL&DC type. SS&RC functions allow:

  a) FEs of CC type to be directed by FEs of SL&DC type; and

  b) FEs of CC type to invoke, when appropriate, the necessary network resource functions (e.g., tones and announcement, digit collection) to provide GVNS.

– *Transit Control (TC)* – FEs of TC type modify necessary GVNS information for transit-type of calls.

FE1 and FE3 are of the SS&RC type; FE2 and FE4 are of the SL&DC type. FE5 is of the TC type.



SL&DC Service Logic and Data Control
SS&RC Service Switching and Resource Control
TC Transit Control

FIGURE 6-1/Q.85

The GVNS functional model

6.6.2 Description of functional entities

6.6.2.1 Functional entity FE1

FE1 is of the Service Switching and Resource Control type. FE1 supports the functionality to:

a) recognize a GVNS service request and to interact with FE2;

b) remove prefix digits;

c) interact with FE5 and the originating CCA functional entity of a basic service that is involved in a GVNS call, as required;

d) establish and/or release a GVNS call (upon request of FE5 or the originating CCA functional entity of a basic service that is involved in a GVNS call);

e) establish, manipulate and release a GVNS call (upon request of FE2);

f) associate and relate the originating and terminating CCA functional entities of a basic service that are involved in a particular GVNS call;

g) manage the relationship between the originating and terminating CCA functional entities of a basic service that are involved in a GVNS call (i.e. maintain the overall perspective of the call).

6.6.2.2 Functional entity FE2

FE2 is of the Service Logic and Data Control type. FE2 supports the functionality to:

a) interface and interact with FE1;

b) store and process the service logic and data required to direct FE1 in handling a GVNS call;

c) perform originating GVNS call screening and routing determination;

d) interface and interact with FE4, if necessary, to process a GVNS call.

6.6.2.3 Functional entity FE3

FE3 is of the Service Switching and Resource Control type. FE3 supports the functionality to:

a) interface and interact with FE5;

b) recognize a GVNS service request from FE5 and interact with the terminating CCA functional entity of a basic service that is involved in a GVNS call;

c) interact with FE4, when necessary;

d) establish and/or release a GVNS call (upon request of FE5 or the terminating CCA functional entity of a basic service that is involved in a GVNS call);

e) establish, manipulate and/or release a GVNS call (upon request of FE4);

f) associate and relate the originating and terminating CCA functional entities of a basic service that are involved in a particular GVNS call;

g) manage the relationship between the originating and terminating CCA functional entities of a basic service that are involved in a GVNS call (i.e. maintain the overall perspective of the call).

6.6.2.4 Functional entity FE4

FE4 is of the Service Logic and Data Control type. FE4 supports the functionality to:

a) interface and interact with FE3, when requested by FE3;

b) store and process the service logic and data that is required to direct FE3 to handle a GVNS call when terminating GVNS call screening and routing determination is required;

c) interface and interact with FE2, when requested from FE2, to process a GVNS call.

6.6.2.5 Functional entity FE5

FE5 is of the Transit Control type. FE5 supports the functionality to:

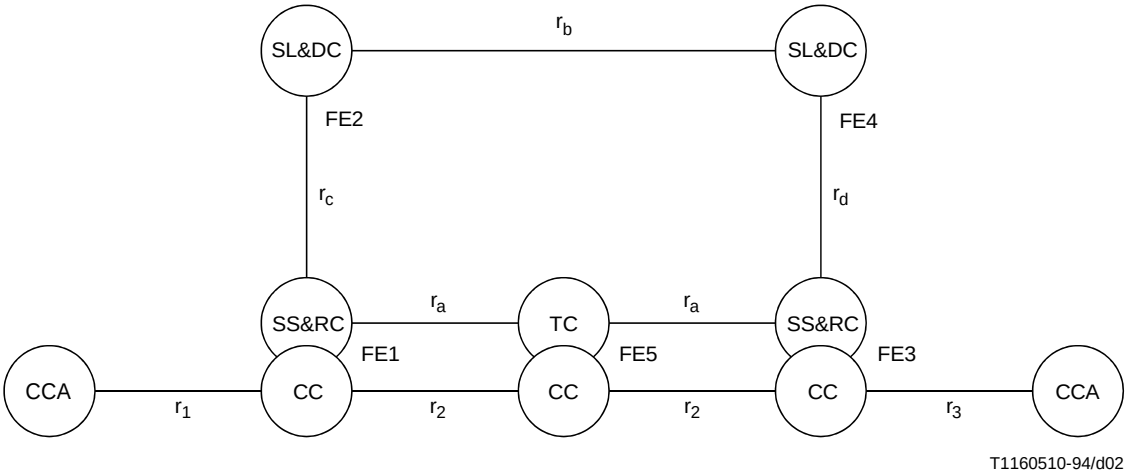
a) interface and interact with FE1 and FE3;

b) modify, when necessary, the GVNS information received in order to deliver the call to the terminating CC functional entity of a basic service that is involved in a GVNS call (e.g. GVNS User Group Identification);

c) pass through the call and/or GVNS information.

6.6.3 Relation with a basic service

The relationship between the functional models of GVNS and a basic service is shown in Figure 6-2.



CC Call Control
CCA Call Control Agent
SL&DC Service Logic and Data Control
SS&RC Service Switching and Resource Control
TC Transit Control

FIGURE 6-2/Q.85

Relationship between functional models of GVNS and a basic service

6.7 Information flows

6.7.1 Information flow diagrams

The information flow diagrams identified are based on the following three types of GVNS call processing mechanisms:

a) *Type A* – Customer-specific service information is stored in FE2.

b) *Type B* – Customer-specific service information is stored in both FE2 and FE4 but without direct interaction.

c) *Type C* – Customer-specific service information is stored in both FE2 and FE4 with direct interaction.

The following information flows are identified for GVNS:

– *Figure 6-3* – Information flow diagram of a successful GVNS call based on the GVNS Type A call processing mechanism.

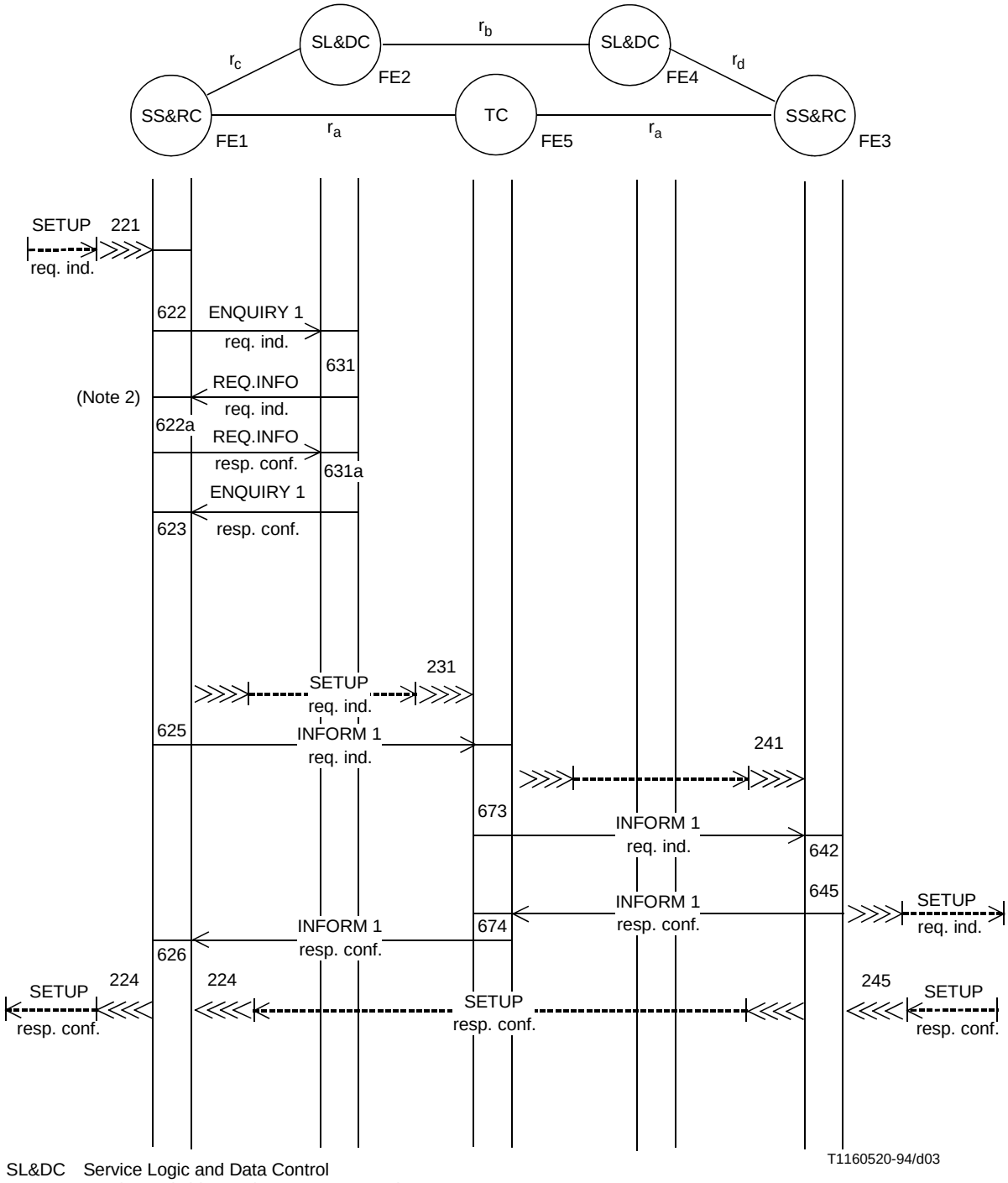
– *Figure 6-4* – Information flow diagram of a successful GVNS call based on the GVNS Type B call processing mechanism.

– *Figure 6-5* – Information flow diagram of a successful GVNS call based on the GVNS Type C call processing mechanism.

– *Figure 6-6* – Information flow diagram of an unsuccessful GVNS call based on the GVNS Type A or B call processing mechanism.

– *Figure 6-7* – Information flow diagram of an unsuccessful GVNS call based on the GVNS Type B call processing mechanism.

– *Figure 6-8* – Information flow diagram of an unsuccessful GVNS call based on the GVNS Type C call processing mechanism.



SL&DC Service Logic and Data Control
SS&RC Service Switching and Resource Control
TC Transit Control

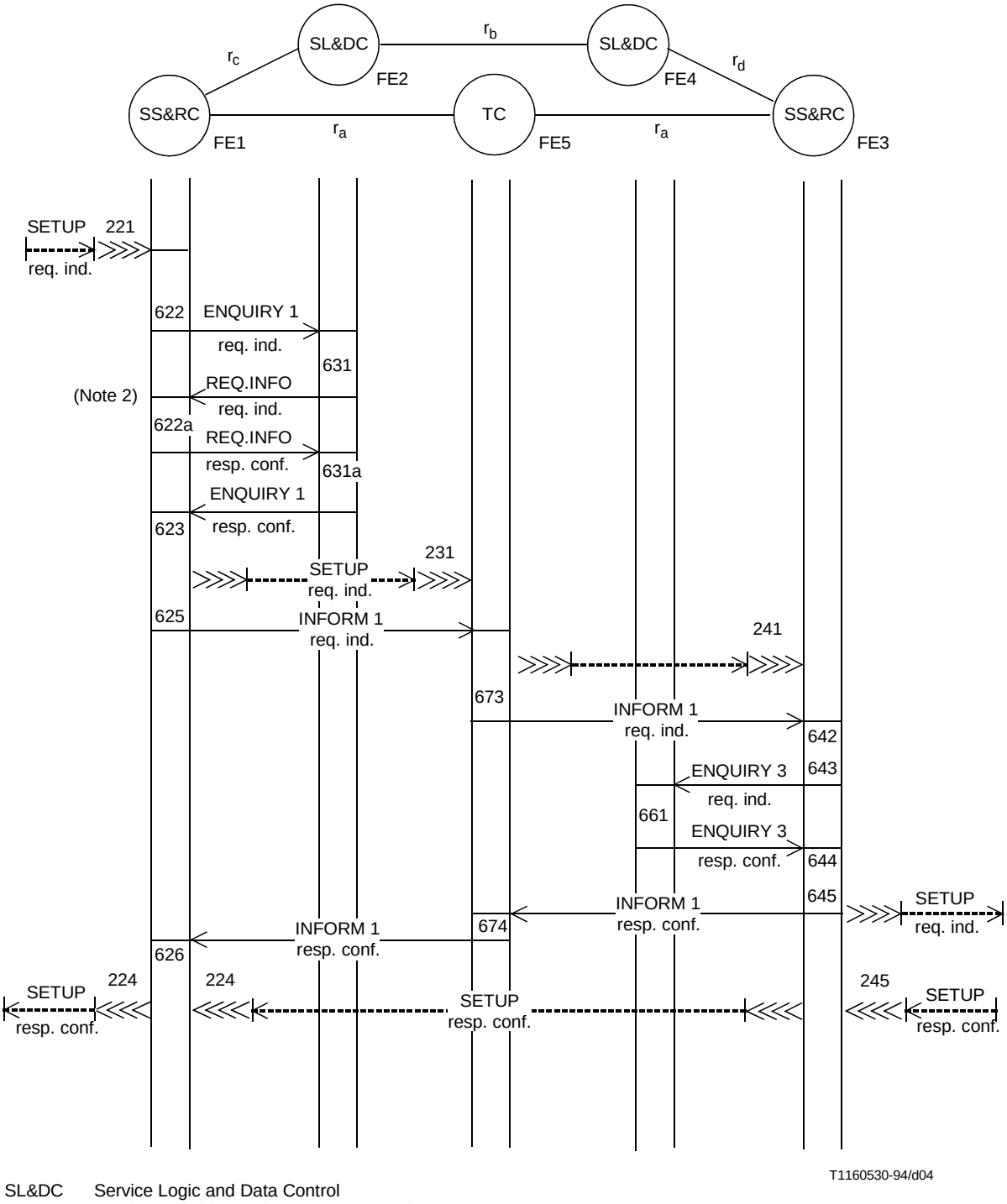
NOTES

1 The FE4 and the relationships between it and the FE2 and the FE3 are not applicable to the GVNS Type A call processing mechanism.

2 The REQ.INFO req. ind. and REQ.INFO resp. conf. information flows are only applicable for the remote access arrangement.

FIGURE 6-3/Q.85

Information flow diagram of a successful GVNS call based on the GVNS type A call processing mechanism



SL&DC Service Logic and Data Control
SS&RC Service Switching and Resource Control
TC Transit Control

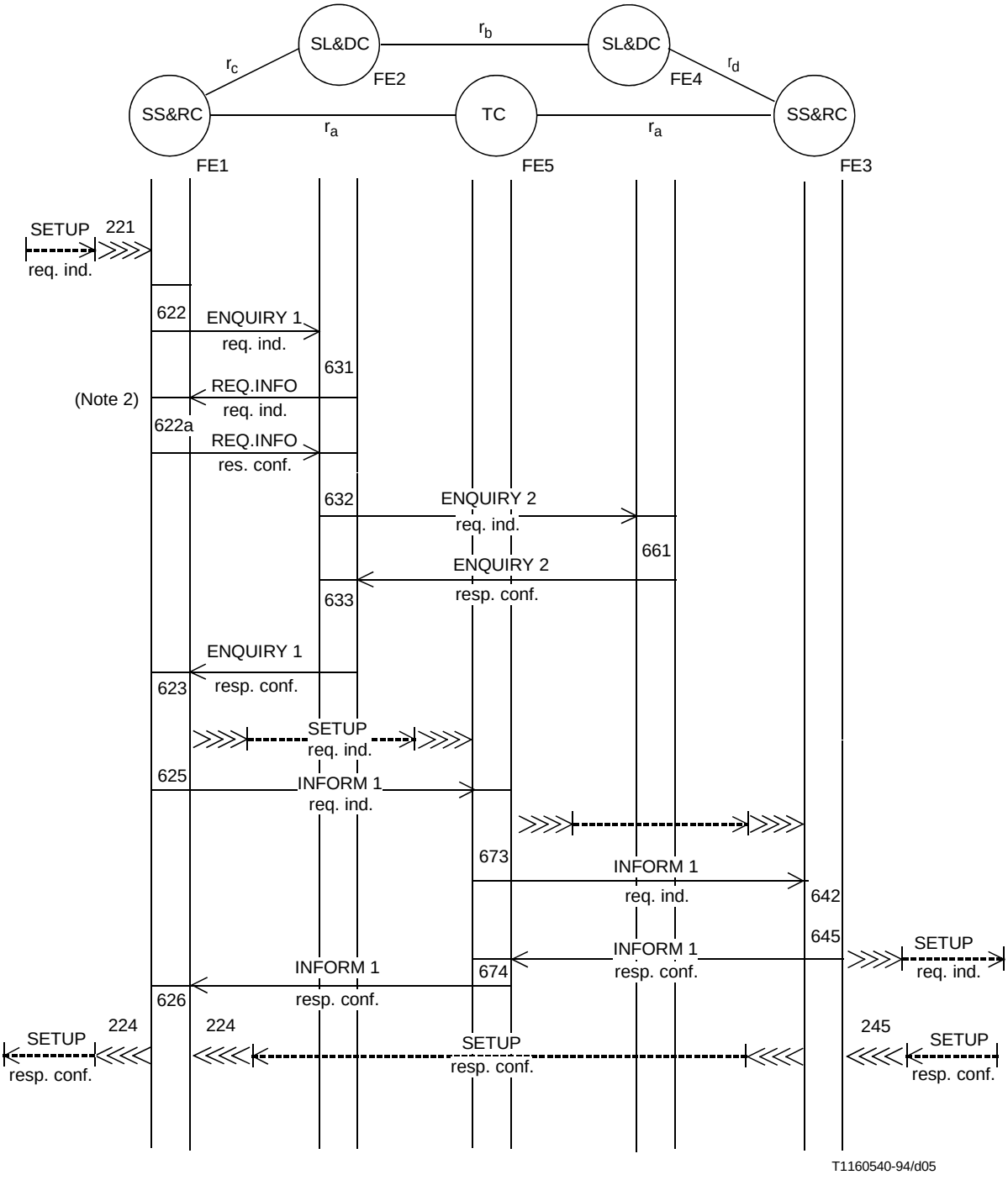
NOTES

1 The relationships between the FE4 and the FE2 are not applicable to the GVNS Type B call processing mechanism.

2 The REQ.INFO req. ind. and REQ.INFO resp. conf. information flows are only applicable for the remote access arrangement.

FIGURE 6-4/Q.85

Information flow diagram of a successful GVNS call based on the GVNS type B call processing mechanism



SL&DC Service logic and data control
SS&RC Service Switching and resource control
TC Transit control

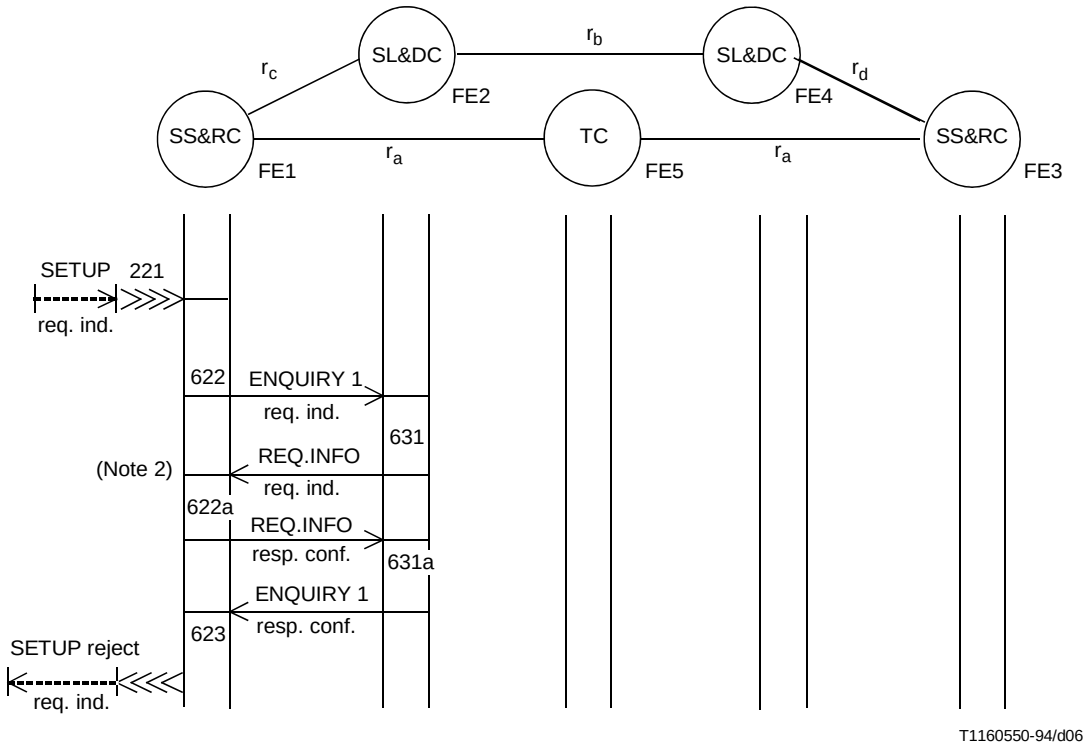
NOTES

1 The relationships between the FE3 and the FE4 are not applicable to the GVNS Type C call processing mechanism.

2 The REQ.INFO req. ind. and REQ.INFO resp. conf. information flows are only applicable for the remote access arrangement.

FIGURE 6-5/Q.85

Information flow diagram of a successful GVNS call based on the GVNS type C call processing mechanism



SL&DC Service Logic and Data Control
SS&RC Service Switching and Resource Control
TC Transit Control

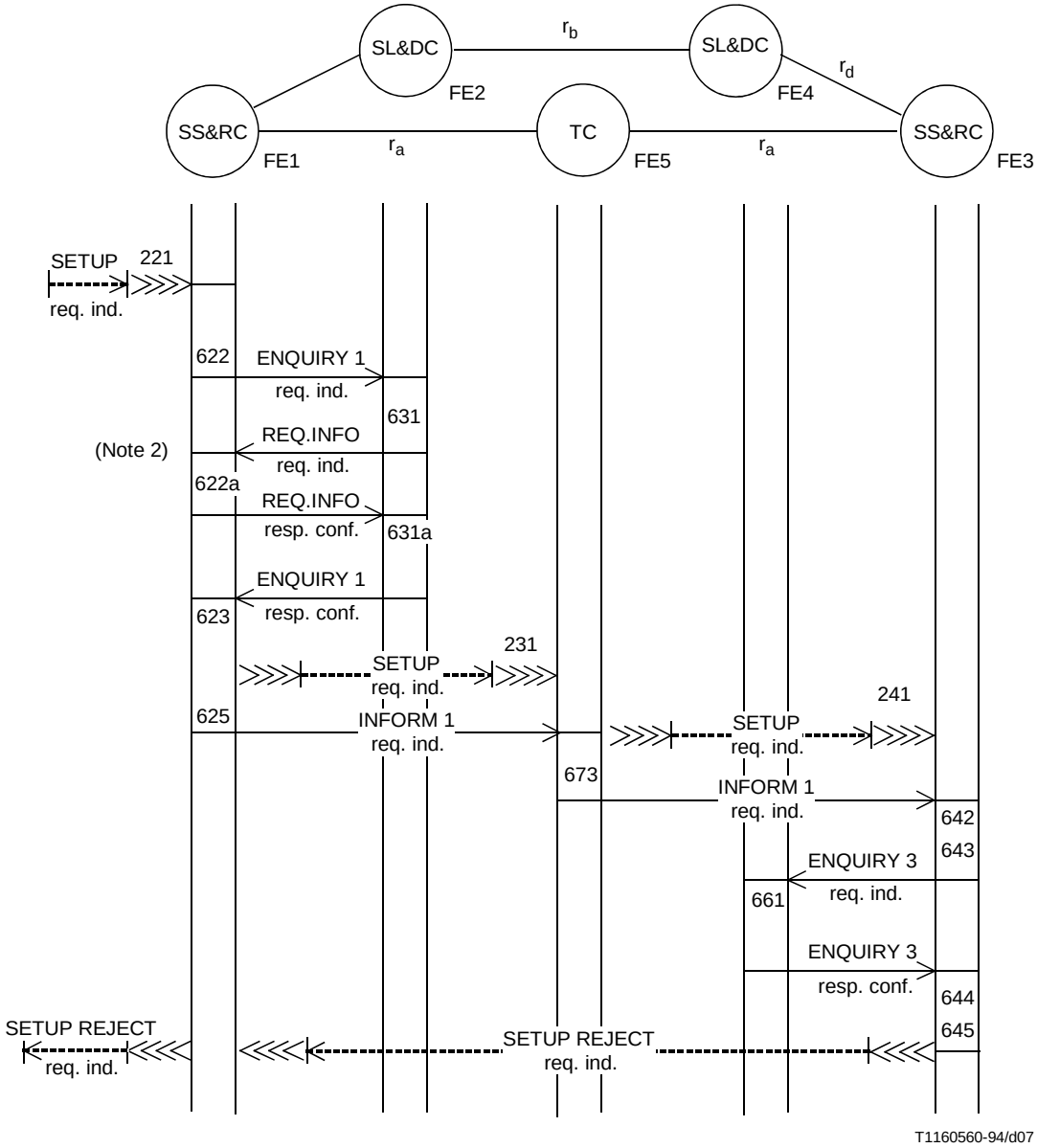
NOTES

1 The FE4 and the relationships between it and the FE2 and the FE3 are not applicable to the GVNS Type A call processing mechanism.

2 The REQ.INFO req. ind. and REQ.INFO resp. conf. information flows are only applicable for the remote access arrangement.

FIGURE 6-6/Q.85

Information flow diagram of an unsuccessful GVNS call based on the GVNS type A or type B call processing mechanism



SL&DC Service Logic and Data Control
SS&RC Service Switching and Resource Control
TC Transit Control

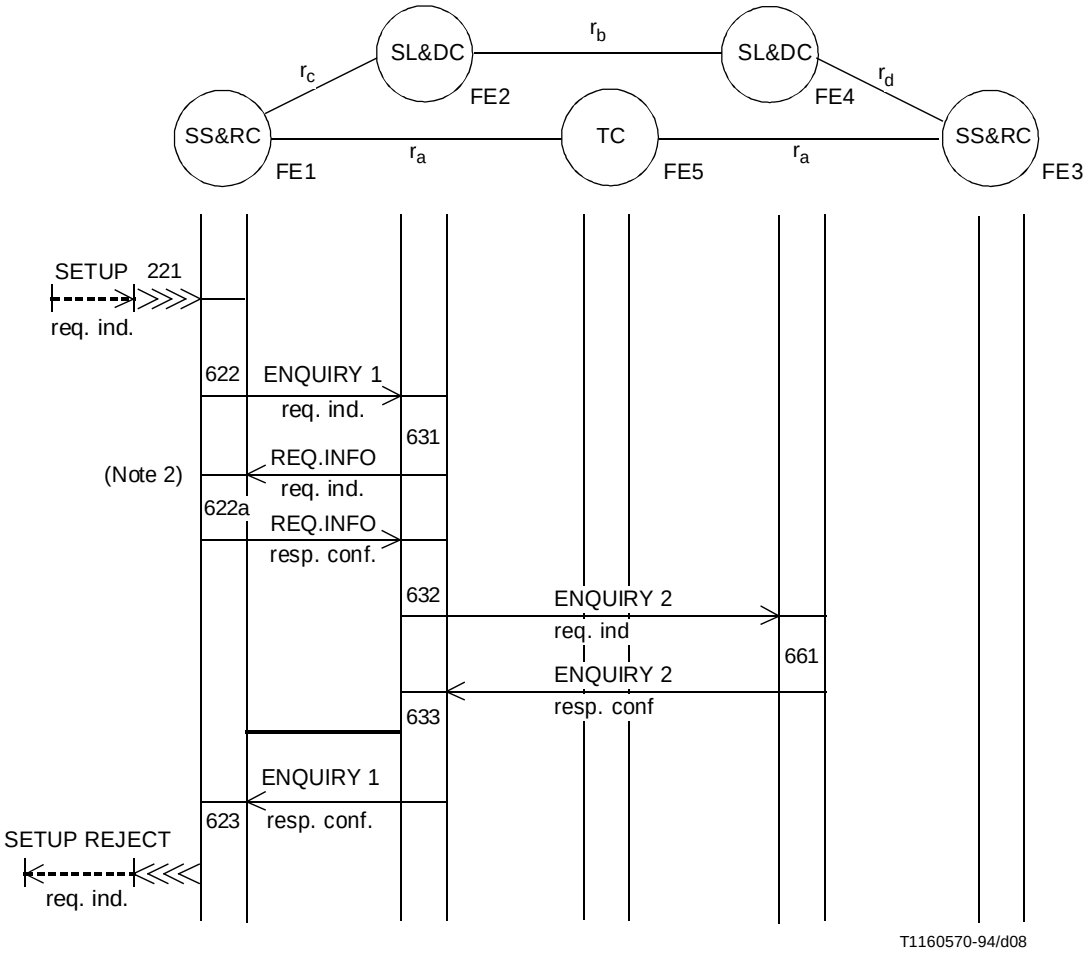
NOTES

1 The relationships between the FE4 and the FE2 are not applicable to the GVNS Type B call processing mechanism.

2 The REQ.INFO req. ind. and REQ.INFO resp. conf. information flows are only applicable for the remote access arrangement.

FIGURE 6-7/Q.85

Information flow diagram of an unsuccessful GVNS call based on the GVNS type B call processing mechanism



SL&DC Service Logic and Data Control
SS&RC Service Switching and Resource Control
TC Transit Control

NOTES

1 The relationships between the FE3 and the FE4 are not applicable to the GVNS Type C call processing mechanism.

2 The REQ.INFO req. ind. and REQ.INFO resp. conf. information flows are only applicable for the remote access arrangement.

FIGURE 6-8/Q.85

Information flow diagram of an unsuccessful GVNS call based on the GVNS type C call processing mechanism

6.7.2 Definition of individual information flows

This subclause defines the meaning of the identified GVNS information flows as well as their content.

Other than the information flows defined for ISDN Circuit Mode Switched Bearer Services (see Recommendation Q.71 [4])[2], the following additional information flows are identified for GVNS:

a) ENQUIRY 1 req. ind.;
b) ENQUIRY 1 resp. conf.;
c) ENQUIRY 2 req. ind.;
d) ENQUIRY 2 resp. conf.;
e) ENQUIRY 3 req. ind.;
f) ENQUIRY 3 resp. conf.;
g) REQ.INFO req. ind.;
h) REQ.INFO resp. conf.;
i) INFORM 1 req. ind.;
j) INFORM 1 resp. conf.

6.7.2.1 Definition of information flow ENQUIRY 1 req. ind. and resp. conf.

ENQUIRY 1 req. ind. is used to request originating GVNS call screening and routing information translation. This is a confirmed information flow and ENQUIRY 1 resp. conf. is used to carry back the information on rejecting the call or on how to route the call. This information flow is within the r_c relationship.

The following items of information are or may be conveyed in the ENQUIRY 1 req. ind. and ENQUIRY 1 resp. conf. information flows:

TABLE 6-1/Q.85

Information items for ENQUIRY 1 req. ind. and resp. conf. information flows

Item	Relationship	Req. ind.	Resp. conf.
Network-provided or Network-verified Calling Line Identification	r_c	Mandatory	–
GVNS User Group Identification	r_c	–	Mandatory
Dialed Number	r_c	Mandatory	Optional
Routing Number	r_c	–	Mandatory
Terminating Network Routing Number	r_c	–	Mandatory
Terminating Participating Service Provider Identification	r_c	–	Mandatory
On-net/Off-net Indicator	r_c	–	Mandatory
Alternate Terminating Network Routing Number	r_c	–	Optional
Transit Indication	r_c	–	Mandatory
GVNS Service ID	r_c	Optional	–

6.7.2.2 Definition of information flow ENQUIRY 2 req. ind. and resp. conf.

ENQUIRY 2 req. ind. is used to request GVNS routing information translation. This is a confirmed information flow and ENQUIRY 2 resp. conf. that is used to carry back information on rejecting the call or on how to route the call. This information flow is within the r_b relationship.

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[2] The information flows defined in Recommendation Q.71 [4] include CONNECTED req. ind., DISCONNECT req. ind., PROCEEDING req. ind., RELEASE req. ind. and resp. conf., REPORT req. ind., SETUP req. ind. SETUP resp. conf., and SETUP REJECT req. ind.

The following items of information are conveyed in the ENQUIRY 2 req. ind. and ENQUIRY 2 resp. conf. information flows:

TABLE 6-2/Q.85

Information items for ENQUIRY 2 req. ind. and resp. conf. information flows

Item	Relationship	Req. ind.	Resp. conf.
GVNS User Group Identification	r_b	Mandatory	–
Dialed Number	r_b	Mandatory	–
Routing Number	r_b	–	Mandatory
Terminating Network Routing Number	r_b	–	Mandatory
Alternate Terminating Network Routing Number	r_b	–	Optional
On-net/Off-net Indicator	r_b	–	Mandatory
Authorization Code	r_b	Mandatory (Note)	–
NOTE – The authorization code information item is only applicable in the case of the remote access arrangement.			

6.7.2.3 Definition of information flow ENQUIRY 3 req. ind. and resp. conf.

ENQUIRY 3 req. ind. is used to request remote GVNS call screening and routing information translation. This is a confirmed information flow and ENQUIRY 3 resp. conf. is used to carry back the information on rejecting the call or on how to route the call. This information flow is within the r_d relationship.

The following items of information are or may be conveyed in the ENQUIRY 3 req. ind. and ENQUIRY 3 resp. conf. information flows:

TABLE 6-3/Q.85

Information items for ENQUIRY 3 req. ind. and resp. conf. information flows

Item	Relationship	Req. ind.	Resp. conf.
GVNS User Group Identification	r_d	Mandatory	–
Dialed Number	r_d	Optional	–
Terminating Network Routing Number	r_d	Mandatory	Mandatory
Alternate Terminating Network Routing Number	r_d	Optional	Optional
GVNS Service ID	r_d	Optional	–

6.7.2.4 Definition of information flow REQ.INFO req. ind. and resp. conf.

REQ.INFO req. ind. is used to request collection of user provided information. This is a confirmed information flow and REQ.INFO resp. conf. is used to carry back the information requested. This information flow is within the r_c relationship.

The following items of information are or may be conveyed in the ENQUIRY 3 req. ind. and ENQUIRY 3 resp. conf. information flows:

TABLE 6-4/Q.85

Information items for REQ. INFO req. ind. and resp. conf. information flows

Item	Relationship	Req. ind.	Resp. conf.
Request for Authorization Code Indication	r_c	Mandatory	–
Authorization Code	r_c		Mandatory

6.7.2.5 Definition of information flow INFORM 1 req. ind. and resp. conf.

INFORM 1 req. ind. is used to carry GVNS information during the setup of the call. This is a confirmed information flow. This information flow is within the r_a relationship.

The following items of information are contained or may be conveyed in the INFORM 1 req. ind. and INFORM 1 resp. conf. information flows:

TABLE 6-5/Q.85

Information items for INFORM 1 req. ind. and resp. conf. information flows

Item	Relationship	Req. ind.	Resp. conf.
GVNS Service ID	r_a	Mandatory	–
Routing Number	r_a	Mandatory	–
Terminating Network Routing Number	r_a	Mandatory	–
GVNS User Group Identification	r_a	Mandatory	–
Dialed Number	r_a	Optional	–
Alternate Terminating Network Routing Number	r_a	Optional (Note 1)	Optional
Originating Participating Service Provider Identification	r_a	Mandatory (Note 2)	
Terminating Participating Service Provider Identification	r_a	Mandatory (Note 3)	
Transit Indication	r_a	Mandatory (Note 4)	
Terminating Access Indication	r_a	–	Mandatory

NOTES

1 The FE1 may send an Alternate Terminating Network Routing Number to the FE3 so that the FE3 may use this information to route the call to an alternate termination. However, the FE3 may derive an alternate termination address directly without relying on the FE1 to provide this information. In the latter case, the FE1 does not need to send an Alternate Terminating Network Routing Number to the FE3; however, the FE3 may send back to the FE1 the Alternate Terminating Network Routing Number that it derives and uses to route the call. Such information is valuable when tracing customer trouble reports.

2 This information is needed for the terminating network or an intermediate network (in the case of transit calls) to identify the originating participating service provider to support the settlement process.

3 This information is needed for an intermediate network that supports GVNS to identify the terminating participating service provider in the transit scenario. In its physical realization, this piece of information may be specified in the Routing Number information element.

4 This information is needed for the connecting network that supports GVNS to differentiate a transit call from a non-transit call. In its physical realization, this piece of information 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 ID.

6.7.3 Definition of relationships

6.7.3.1 Definition of relationship r_a

Relationship r_a consists of the following information flows:

- INFORM 1 req. ind.
- INFORM 1 resp. conf.

6.7.3.2 Definition of relationship r_b

Relationship r_b consists of the following information flows:

- ENQUIRY 2 req. ind.
- ENQUIRY 2 resp. conf.

6.7.3.3 Definition of relationship r_c

Relationship r_c consists of the following information flows:

- ENQUIRY 1 req. ind.
- ENQUIRY 1 resp. conf.
- REQ.INFO req. ind.
- REQ.INFO resp. conf.

6.7.3.4 Definition of relationship r_d

Relationship r_d consists of the following information flows:

- ENQUIRY 3 req. ind.
- ENQUIRY 3 resp. conf.

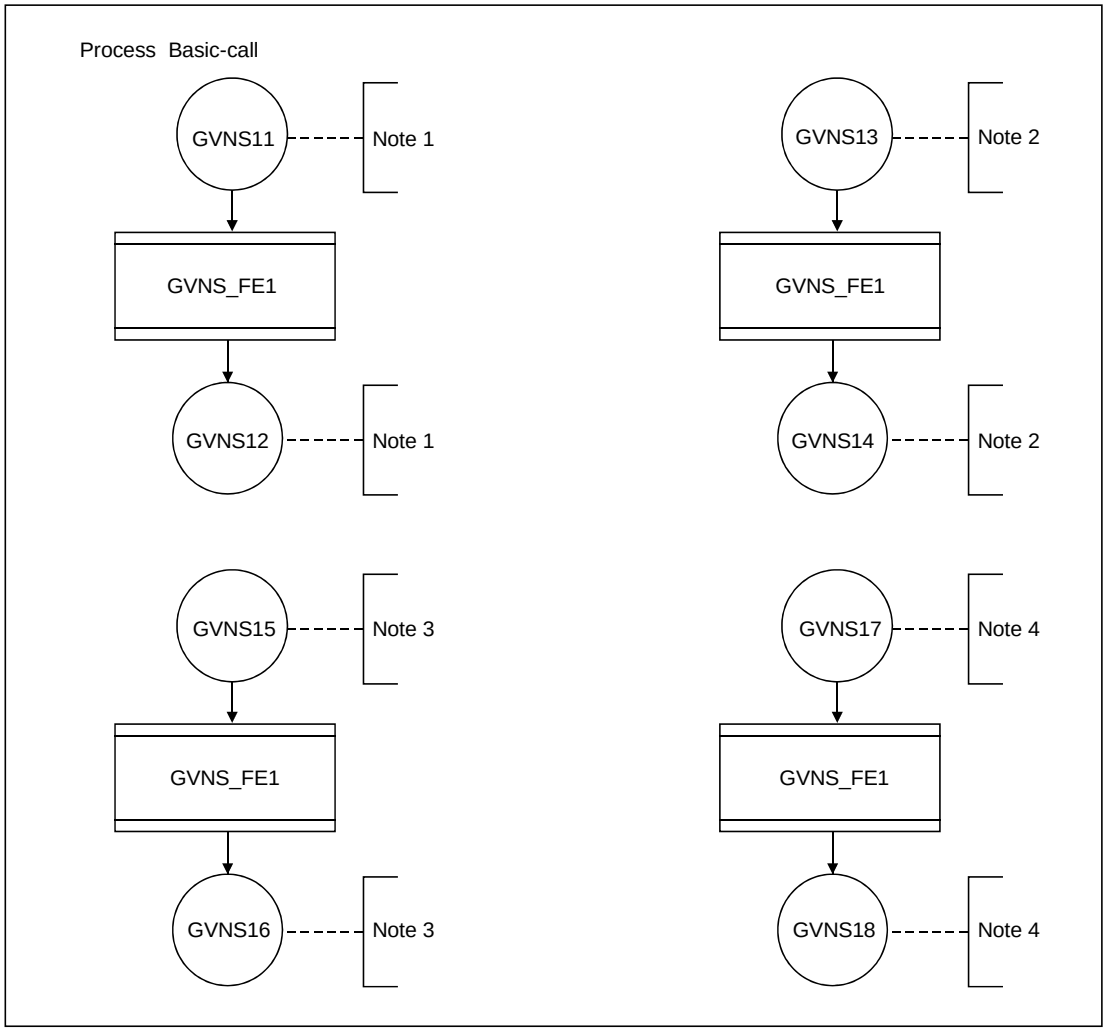
6.8 SDL diagrams for Functional Entities

The SDLs included in this document cover only the allowable (expected) sequences for successful call set-up and release. It is assumed that errors detected by the incoming and outgoing signalling system protocols are handled within those protocol state machines. These protocol-specific considerations are outside the scope of this Stage 2 service description.

The call control states describe the state of the functional entity in terms of the states of the relationships in both directions.

6.8.1 SDLs for FE1, which is of the Service Switching and Resource Control (SS&RC) type, are shown in Figure 6-9.

6.8.2 SDLs for FE2, which is of the Service Logic and Data Control (SL&DC) type, are shown in Figure 6-10.



NOTES

1 GVNS11 and GVNS12 break the basic call of the *en bloc* sending case in Q.71 FE2 for GVNS call processing. They should be included in Recommendation Q.71 [4], Figure A.2/Q.71, (sheet 11 of 20).

2 GVNS13 and GVNS14 break the basic call of the digit-by-digit sending case in Q.71 FE2 for GVNS call processing. The should be included in Recommendation Q.71 [4], Figure A.2/Q.71 (sheet 19 of 20).

3 GVNS15 and GVNS16 break the basic call processing at the equivalent point to that indicated by Note 1, but where Q.71 FE2 supports the relationships r_2* to r_2 (these SDLs are not currently specified in Recommendation Q.71 [4]). Relationship r_2* is the relationship between an outgoing gateway exchange and an incoming gateway exchange (e.g. for a PTNX connected to a public local exchange).

4 GVNS17 and GVNS18 break the basic call processing at the equivalent point to that indicated by Note 2, but where Q.71 FE2 supports the relationships r_2* to r_2 (these SDLs are not currently specified in Recommendation Q.71 [4]). Relationships r_2* is the relationship between an outgoing gateway exchange and an incoming gateway exchange (e.g. for a PTNX connected to a public local exchange).

FIGURE 6-9/Q.85 (sheet 1 of 3)

SDLs for FE1 (service switching and resource control type)

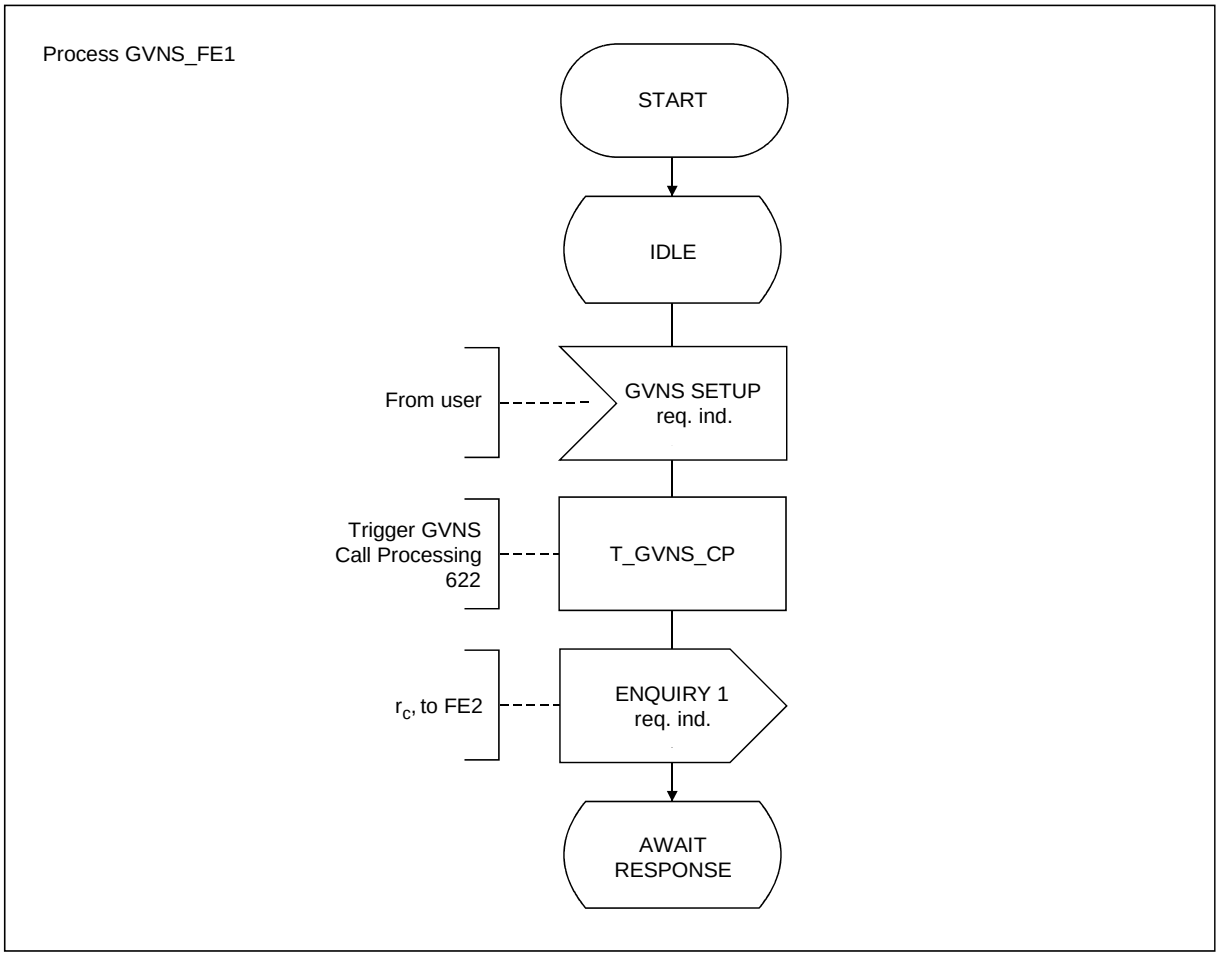


FIGURE 6-9/Q.85 (sheet 2 of 3)

SDLs for FE1 (service switching and resource control type)

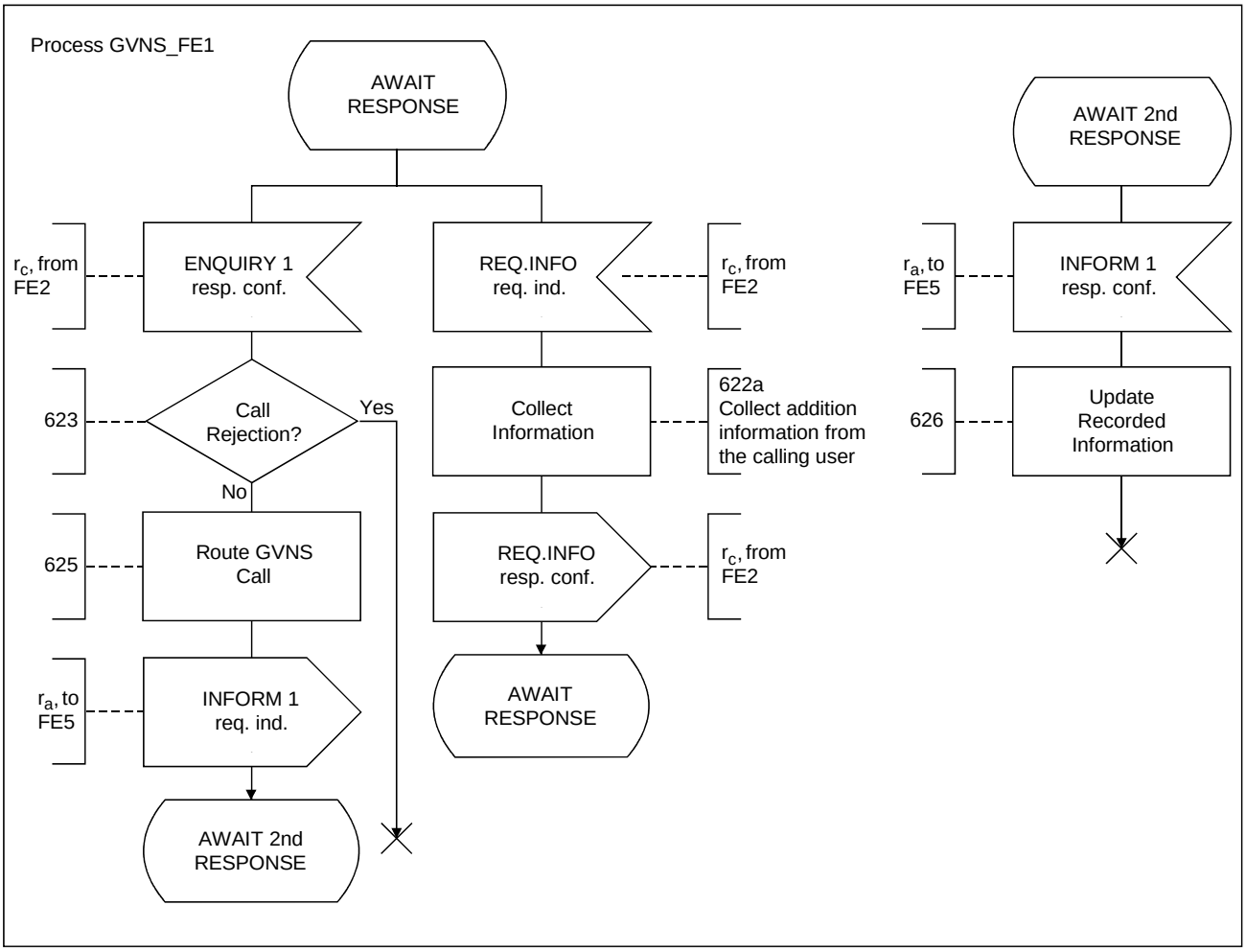


FIGURE 6-9/Q.85 (sheet 3 of 3)

SDLs for FE1 (service switching and resource control type)

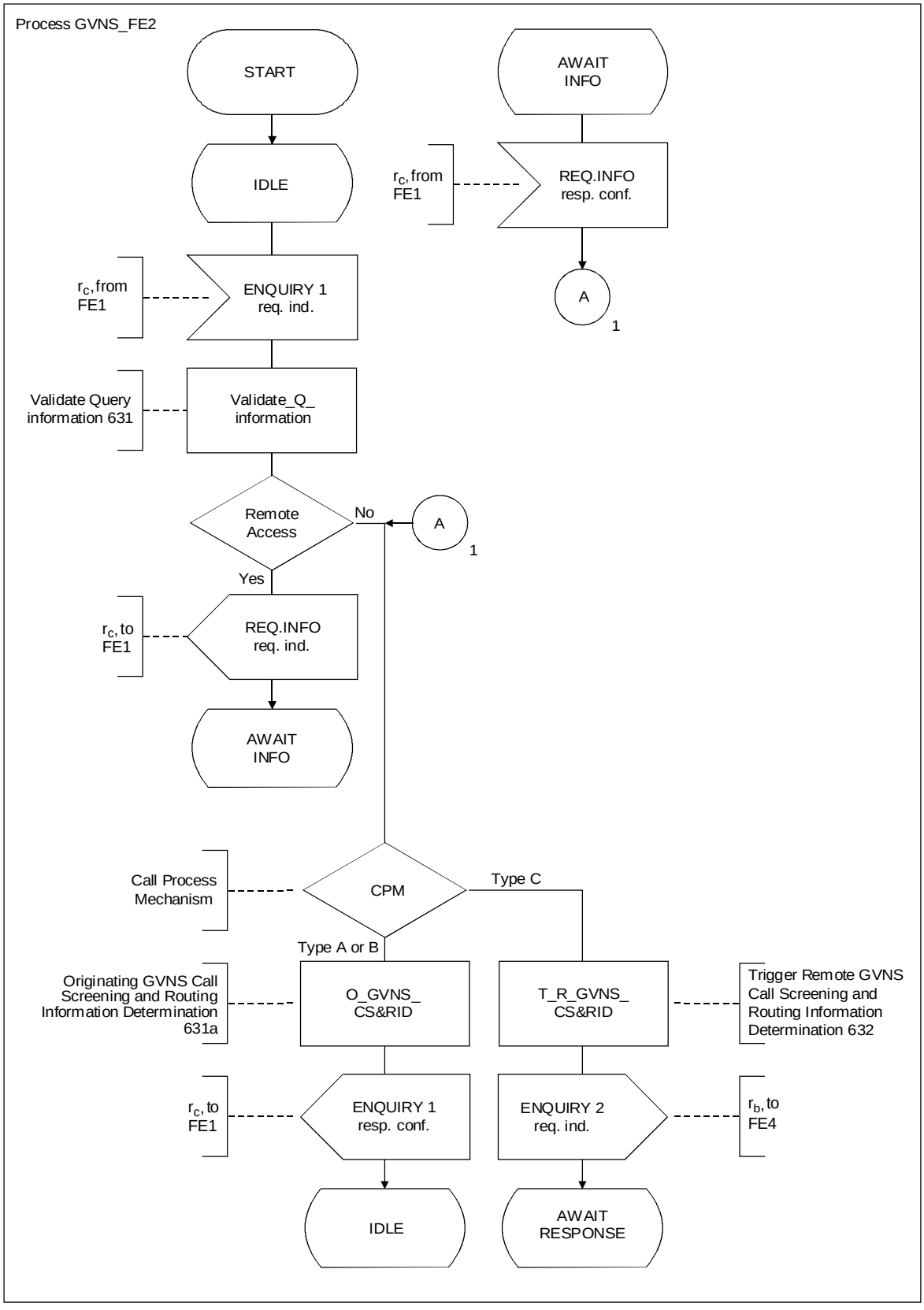


FIGURE 6-10/Q.85 (sheet 1 of 2)

SDLs for FE2 (service logic and data control type)

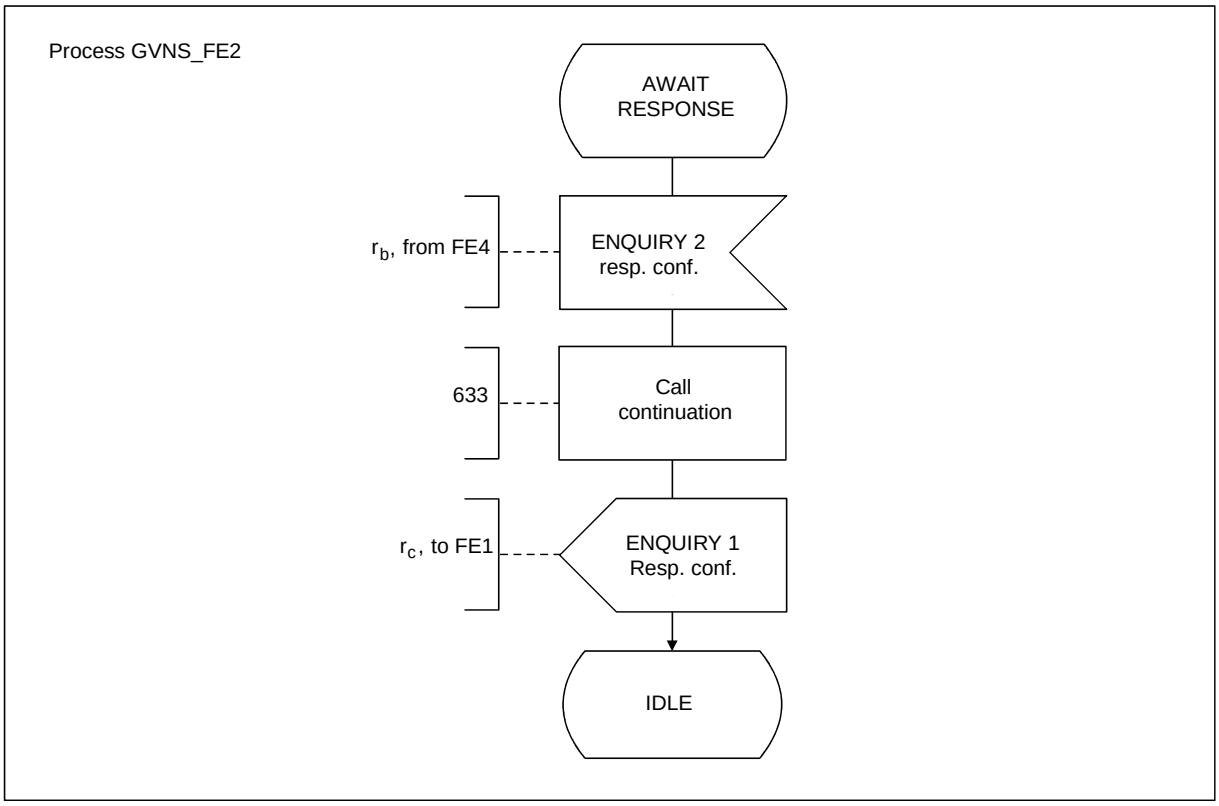
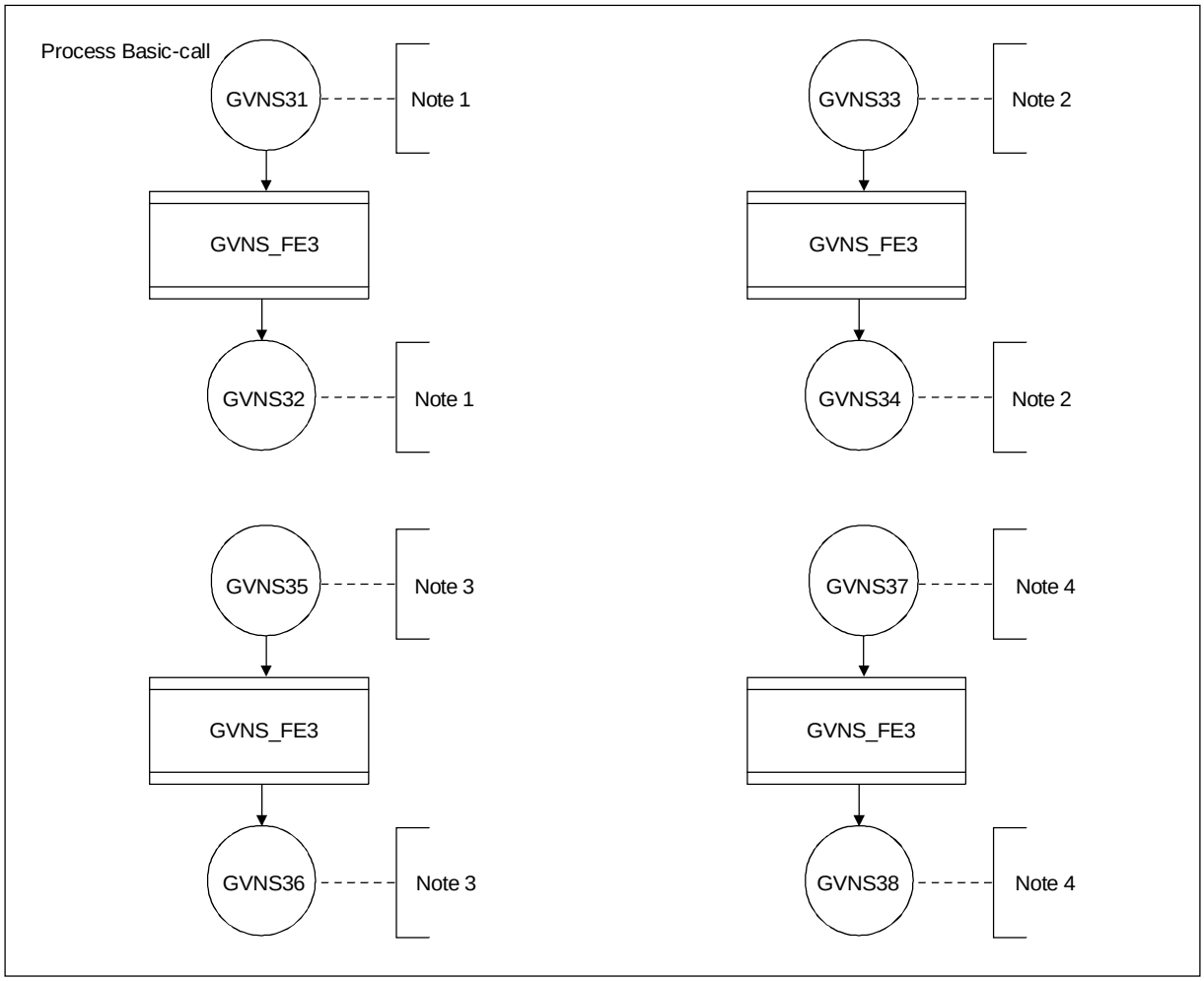


FIGURE 6-10/Q.85 (sheet 2 of 2)

SDLs for FE2 (service logic and data control type)

6.8.3 SDLs for FE3, which is of the Service Switching and Resource Control (SS&RC) type, are shown in Figure 6-11.



NOTES

1 GVNS31 and GVNS32 break the basic call of the*en bloc* sending case in Q.71 FE4 for GVNS call processing. They should be included in Recommendation Q.71 [4], Figure A.4/Q.71, (sheet 7 of 17).

2 GVNS33 and GVNS34 break the basic call of the digit-by-digit sending case in Q.71 FE4 for GVNS call processing. The should be included in Recommendation Q.71 [4], Figure A.4/Q.71 (sheet 15 of 17).

3 GVNS35 and GVNS36 break the basic call processing at the equivalent point to that indicated by Note 1, but where Q.71 FE4 supports the relationships r_2 * to r_2 (these SDLs are not currently specified in Recommendation Q.71 [4]). Relationship r_2 * is the relationship between an outgoing gateway exchange and an incoming gateway exchange (e.g. for a public local exchange connected to a PTNX).

4 GVNS37 and GVNS38 break the basic call processing at the equivalent point to that indicated by Note 2, but where Q.71 FE4 supports the relationship r_2 * to r_2 (these SDLs are not currently specified in Recommendation Q.71 [4]). Relationship r_2 * is the relationship between an outgoing gateway exchange and an incoming gateway exchange (e.g. for a public local exchange connected to a PTNX).

FIGURE 6-11/Q.85 (sheet 1 of 3)

SDLs for FE3 (service switching and resource control type)

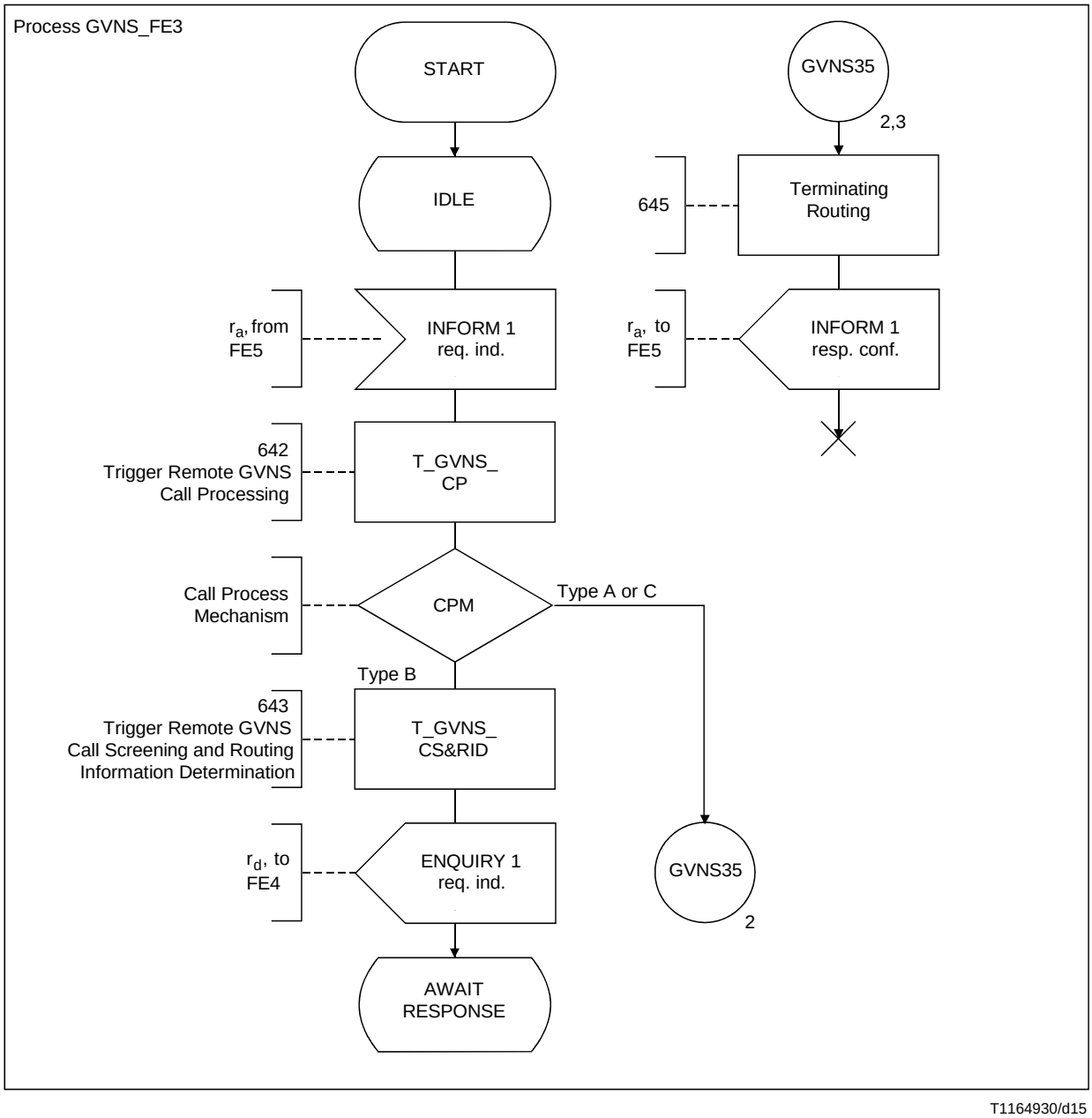


FIGURE 6-11/Q.85 (sheet 2 of 3)

SDLs for FE3 (service switching and resource control type)

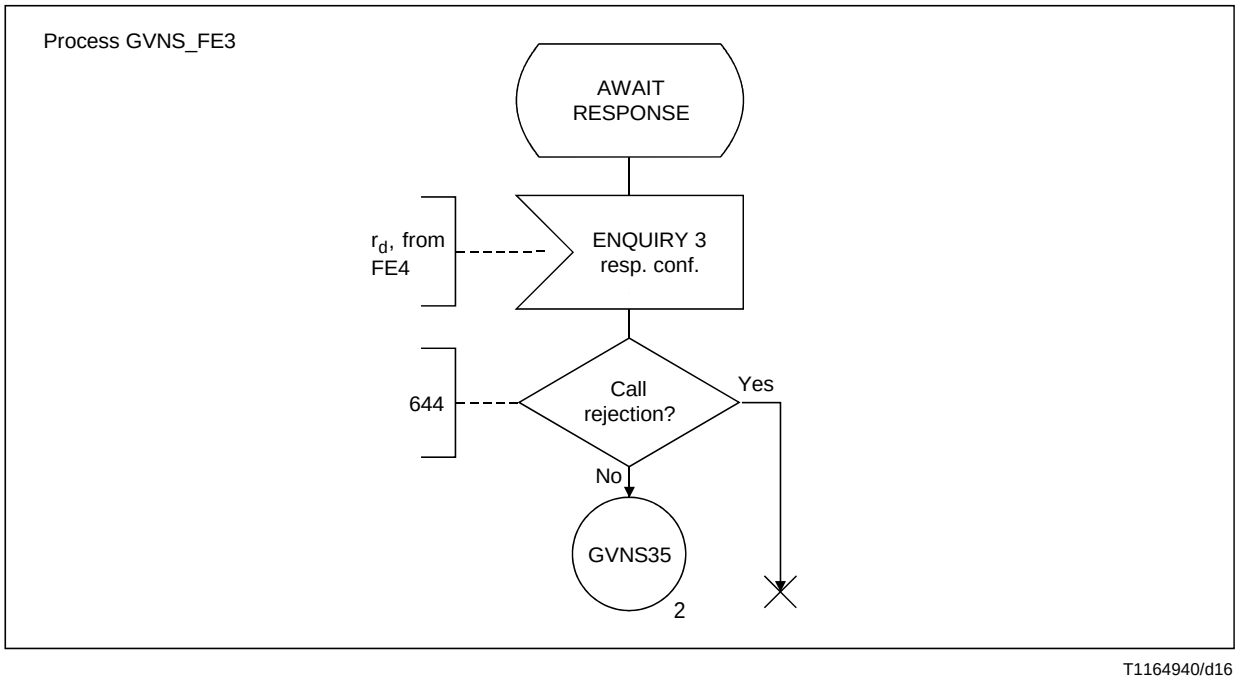


FIGURE 6-11/Q.85 (sheet 3 of 3)

SDLs for FE3 (service switching and resource control type)

6.8.4 SDLs for FE4, which is of the Service Logic and Data Control (SL&DC) type, are shown in Figure 6-12.

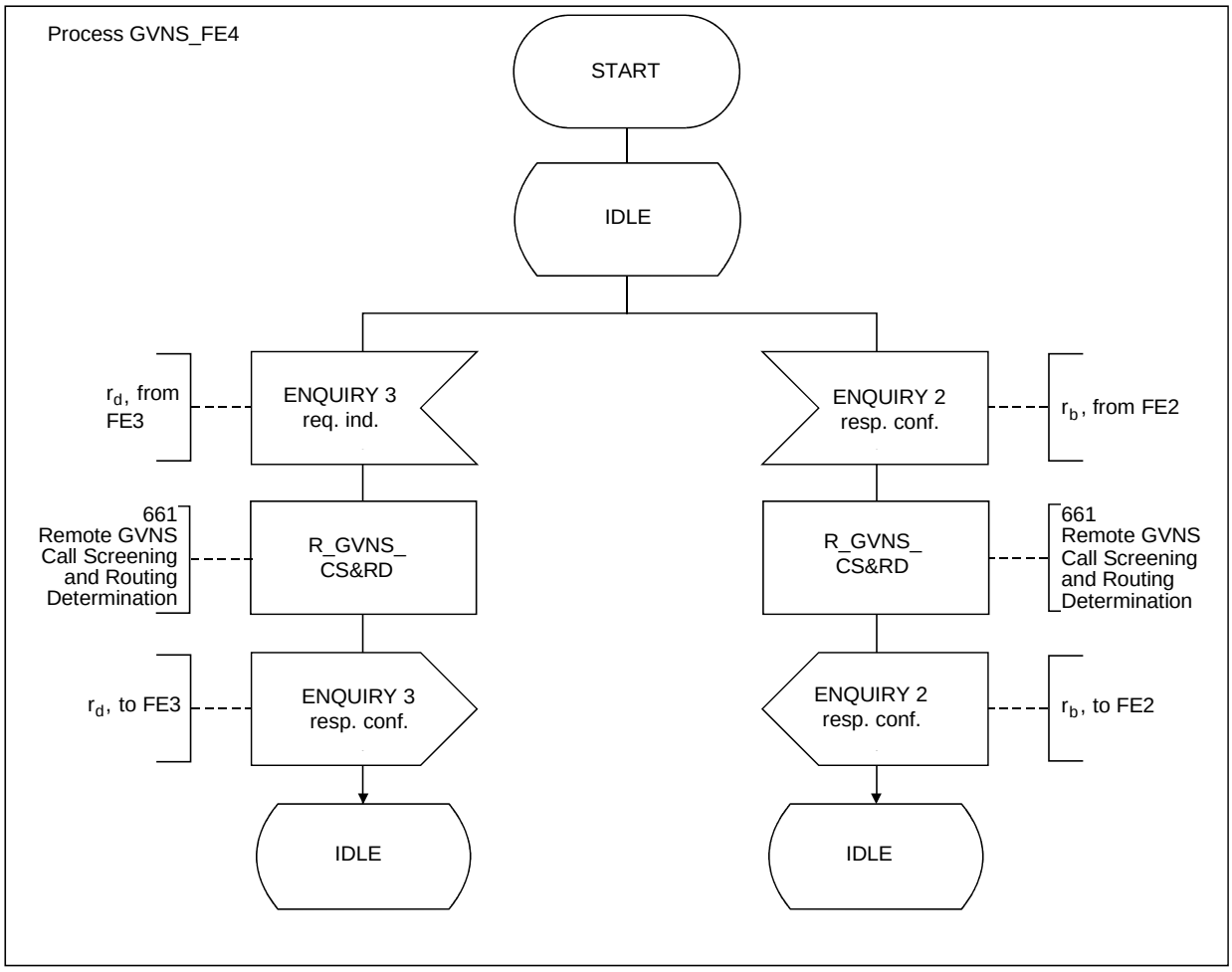
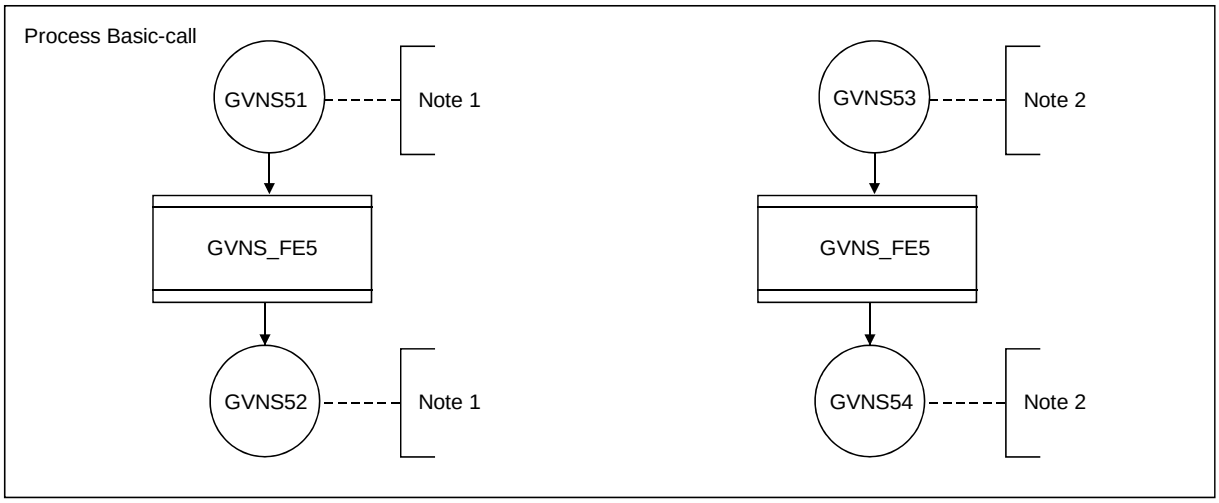


FIGURE 6-12/Q.85

SDLs for FE4 (service logic and data control type)

6.8.5 SDLs for FE5, which is of the Transit Control (TC) type, are shown in Figure 6-13.



NOTES

1 GVNS51 and GVNS52 break the basic call of the *en bloc* sending case in Q.71 FE3 for GVNS call processing. In Recommendation Q.71 [4], Figure A.3/Q.71 (sheet 1 of 7), the *en bloc* case. See Recommendation Q.71 for exact breaking points.

2 GVNS53 and GVNS54 break the basic call of the digit-by-digit sending case in Q.71 FE3 for GVNS call processing. In Recommendation Q.71 [4], Figure A.3/Q.71 (sheet 1 of 7), the case when outgoing set-up is possible in the digit-by-digit sending scenario. See Recommendation Q.71 for exact breaking point.

FIGURE 6-13/Q.85 (sheet 1 of 3)

SDLs for FE5 (transit control type)

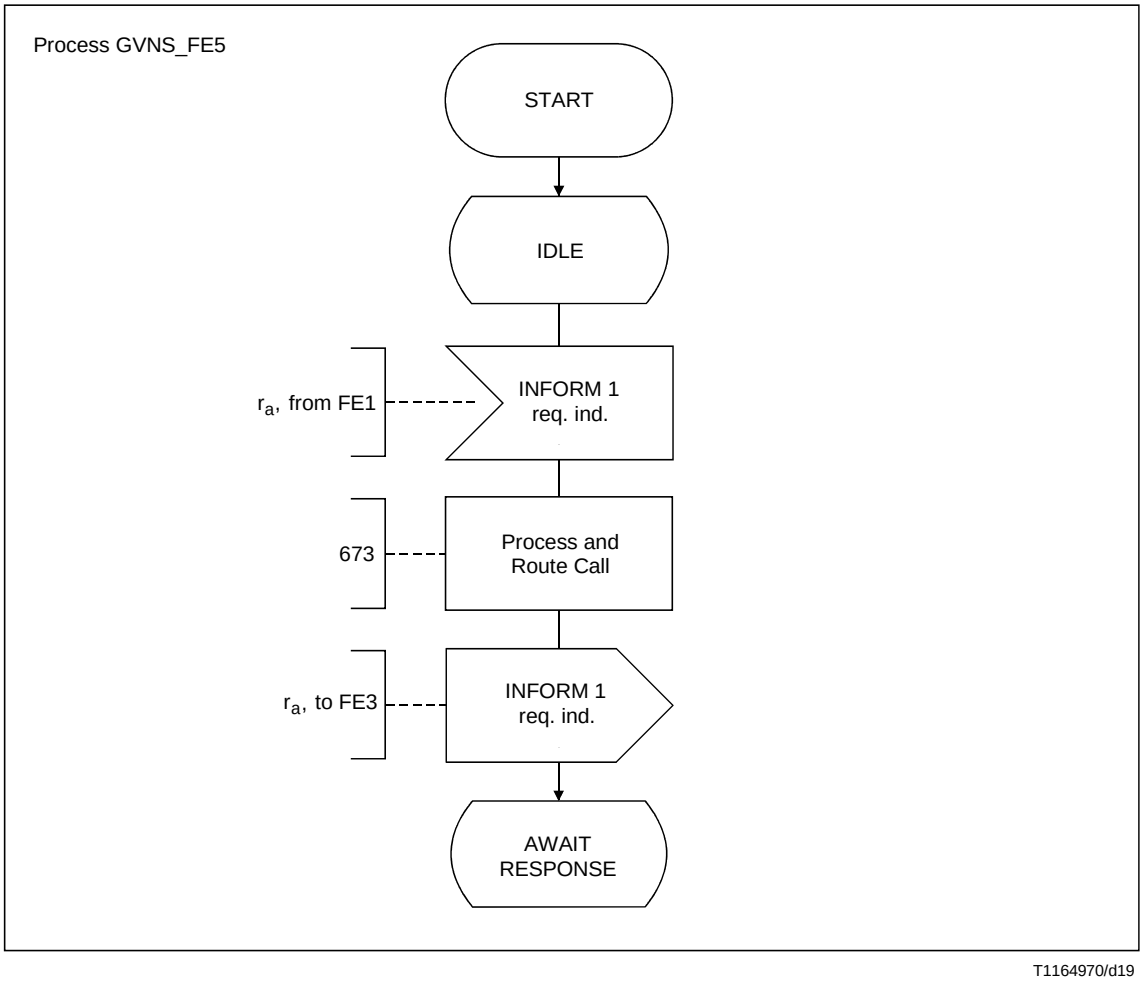


FIGURE 6-13/Q.85 (sheet 2 of 3)

SDLs for FE5 (transit control type)

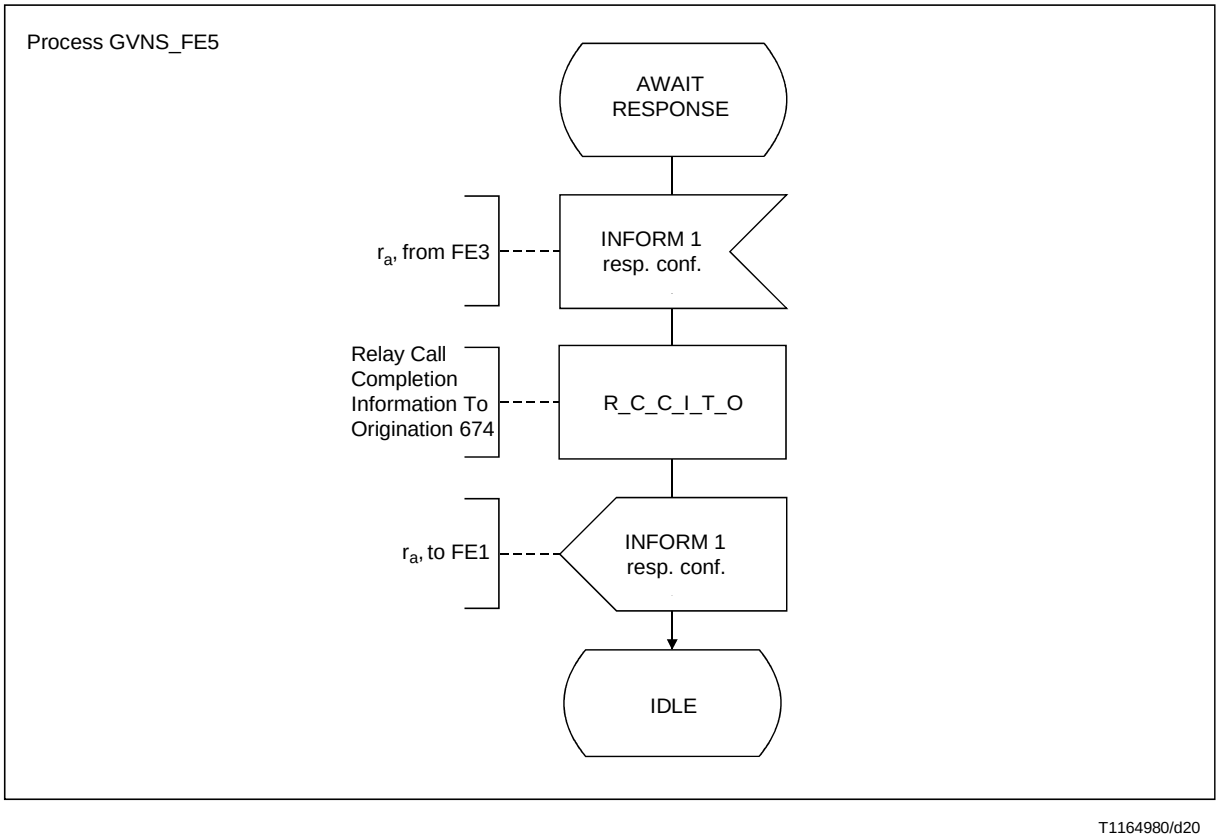


FIGURE 6-13/Q.85 (sheet 3 of 3)

SDLs for FE5 (transit control type)

6.9 Functional entity actions

Each Functional Entity Action (FEA) has been assigned an arbitrary reference number.

6.9.1 FEAs of FE1

FE1 provides functional extensions to the related CC-type FEs.

Reference number: 622 *Trigger GVNS call processing*

– Recognize the GVNS call.

– Validate subscription to the GVNS service for the calling user.

– Send ENQUIRY 1 req. ind. to FE2 for GVNS call screening and routing information determination.

Reference number: 622a *Collect information*

– Receive REQ.INFO req. ind. from FE2.

– Collect information from the user (The user may be allowed to re-enter the information in question when it is invalid.).

– Send REQ.INFO resp. conf. to FE2.

Reference number: 623 *Call continuation depending on data from FE2*

– Receive ENQUIRY 1 resp. conf. (call screening and routing information, if any) from FE2.

– Check the ENQUIRY 1 resp. conf. to see if call rejection occurs.

– Generate a call record for the call.

Reference number: 625 *Route GVNS call*

– Prepare and send GVNS identifications by formulating INFORM 1 req. ind. to FE5.

Reference number: 626 *Update Recorded Information*

– Receive INFORM 1 resp. conf. from FE5.

– Update the call record of the call in question.

6.9.2 FEAs of FE2

Reference number: 631 *Validate query information*

– Receive ENQUIRY 1 req. ind. from FE1.

– Validate information from FE1.

– Send REQ.INFO req. ind. to FE1 if additional user-provided information is needed.

Reference number 631a *Originating GVNS call screening and routing determination*

– Perform GVNS call screening.

– Derive GVNS routing number and terminating network routing number information or call rejection.

– Send screening and routing information, if any, to FE1 via ENQUIRY 1 resp. conf.

Reference number: 632 *Trigger remote GVNS call screening and routing information determination*

– Perform GVNS call screening.

– Formulate and send ENQUIRY 2 req. ind. to FE4 for additional GVNS call screening and/or GVNS routing information determination.

Reference number: 633 *Call continuation depending on data from FE4*

– Receive ENQUIRY 2 resp. conf. from FE4.

– Receive additional call screening information and routing information, if any, from FE4.

Check the ENQUIRY 2 resp. conf. to see if call rejection occurs.

– Formulate and send ENQUIRY 1 resp. conf. to FE1.

6.9.3 FEAs of FE3

FE3 provides functional extensions to the related CC-type FEs.

Reference number: 642 *Trigger remote GVNS call processing*

– Receive INFORM 1 req. ind. from FE1 or FE5.

– Recognize the GVNS call.

Reference number: 643 *Trigger remote GVNS call screening and routing information determination*

– Send ENQUIRY 3 req. ind. to FE4 for GVNS call screening and routing information determination.

Reference number: 644 *Call continuation depending on data from FE4*

– Receive ENQUIRY 3 resp. conf. from FE4.

– Receive call screening and routing information, if any, from FE4.

– Check the ENQUIRY 3 resp. conf. to see if call rejection occurs.

Reference number: 645 *Terminating routing*

– Use the information in the Routing Number and the Terminating Network Routing Number to complete the call.

– If the dedicated access for the GVNS call termination is busy use the alternate terminating network routing number, if it exists, to complete the call.

– Send INFORM 1 resp. conf. to FE5 or FE1.

NOTE – If an alternate terminating network routing number is used, FE3 may choose to send that number in the INFORM 1 resp. conf. information flow to the FE5 or the FE1.

6.9.4 FEAs of FE4

Reference number: 661 *Remote GVNS call screening and routing termination*

– Receive ENQUIRY 3 req. ind. from FE3 or ENQUIRY 2 req. ind. from FE2.

– Validate information from FE3 or FE2.

– Perform GVNS call screening.

– Derive the Routing Number and Terminating Network Routing Number information or call rejection.

– Formulate and send ENQUIRY 3 resp. conf. to FE3 or ENQUIRY 2 resp. conf. to FE2.

6.9.5 Functional entity – FE5

FE5 provides functional extensions to the related CC-type FEs.

Reference number: 673 *Process and route GVNS call*

– Receive INFORM 1 req. ind. from FE1.

– Analyse and use the information in the routing number (ISDN number) or the Terminating Participating Service Provider (TPSP) ID and the Transit Indication to route the call to the correct TPSP.

– Prepare and send GVNS identifications to FE3 (e.g. derive a GVNS User Group ID that is relevant to FE3 and/or FE4 from the GVNS User Group ID received from FE1).

Reference number: 674 *Relay Call Completion Information to Origination*

– Receive INFORM 1 resp. conf. from FE3.

– Send INFORM 1 resp. conf. to FE1.

6.10 Allocation of functional entities to physical locations

Table 6-6 shows the mapping of functional entities to possible physical locations with a focus on internetworking scenarios. Other scenarios are for further study.

TABLE 6-6/Q.85

Mapping of functional entities to possible physical locations

Scenarios	Functional Entities				
	FE1	FE2	FE5	FE3	FE4
Scenario 1	LE	DB	TR	LE	DB
Scenario 2	LE		TR	LE	
Scenario 3	LE		TR	LE	DB
Scenario 4	LE	DB	TR	LE	
Scenario 5	LE	DB		LE	DB
Scenario 6	LE			LE	
Scenario 7	LE			LE	DB
Scenario 8	LE	DB		LE	

Local Exchange (LE)
Transit Exchange (TR)
DataBase (DB)