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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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CONTENTS

	<i>Page</i>
6 Global Virtual Network Service (GVNS)	1
6.1 Scope	1
6.2 References.....	1
6.3 Definitions	1
6.4 Symbols and abbreviations	2
6.5 Description.....	3
6.6 Derivation of a functional model	3
6.6.1 Functional model description.....	3
6.6.2 Description of functional entities.....	4
6.6.3 Relation with a basic service.....	5
6.7 Information flows	6
6.7.1 Information flow diagrams.....	6
6.7.2 Definition of individual information flows	13
6.7.3 Definition of relationships	16
6.8 SDL diagrams for Functional Entities	16
6.9 Functional entity actions.....	28
6.9.1 FEAs of FE1	28
6.9.2 FEAs of FE2	29
6.9.3 FEAs of FE3	29
6.9.4 FEAs of FE4	30
6.9.5 Functional entity – FE5.....	30
6.10 Allocation of functional entities to physical locations.....	31

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.

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.

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.

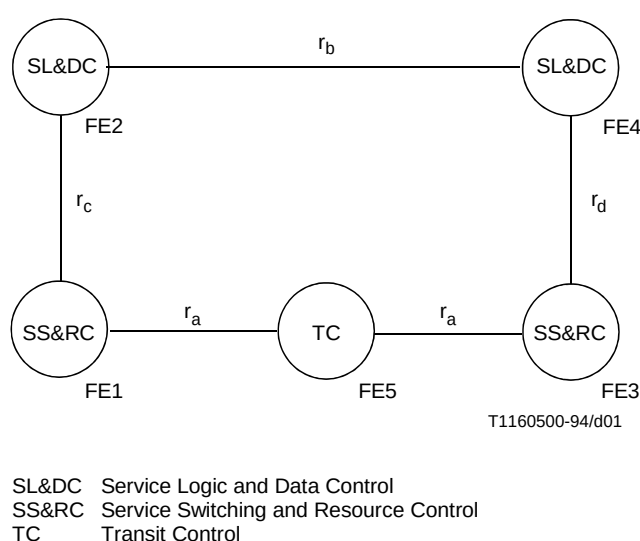


FIGURE 6-1/Q.85
The GVNS functional model

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

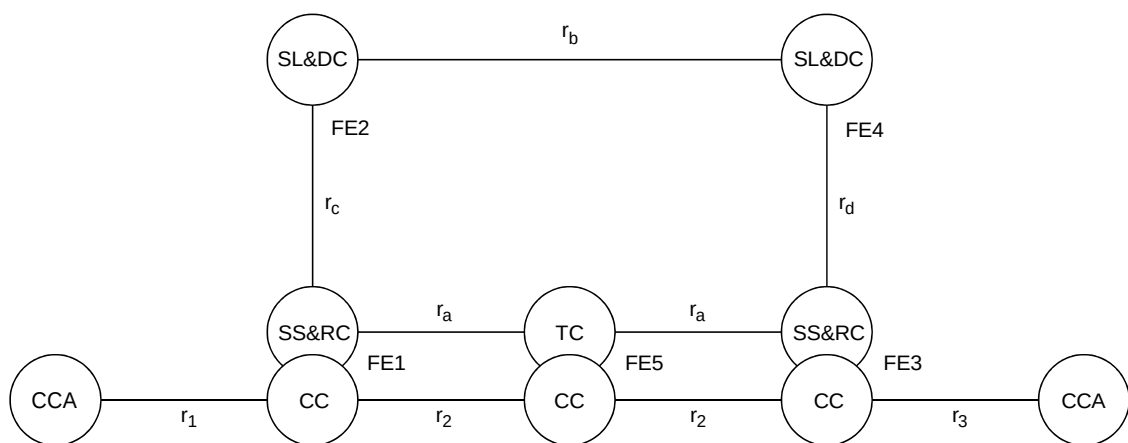
FE5 is of the Transit Control type. FE5 supports the functionality to:

- 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.





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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

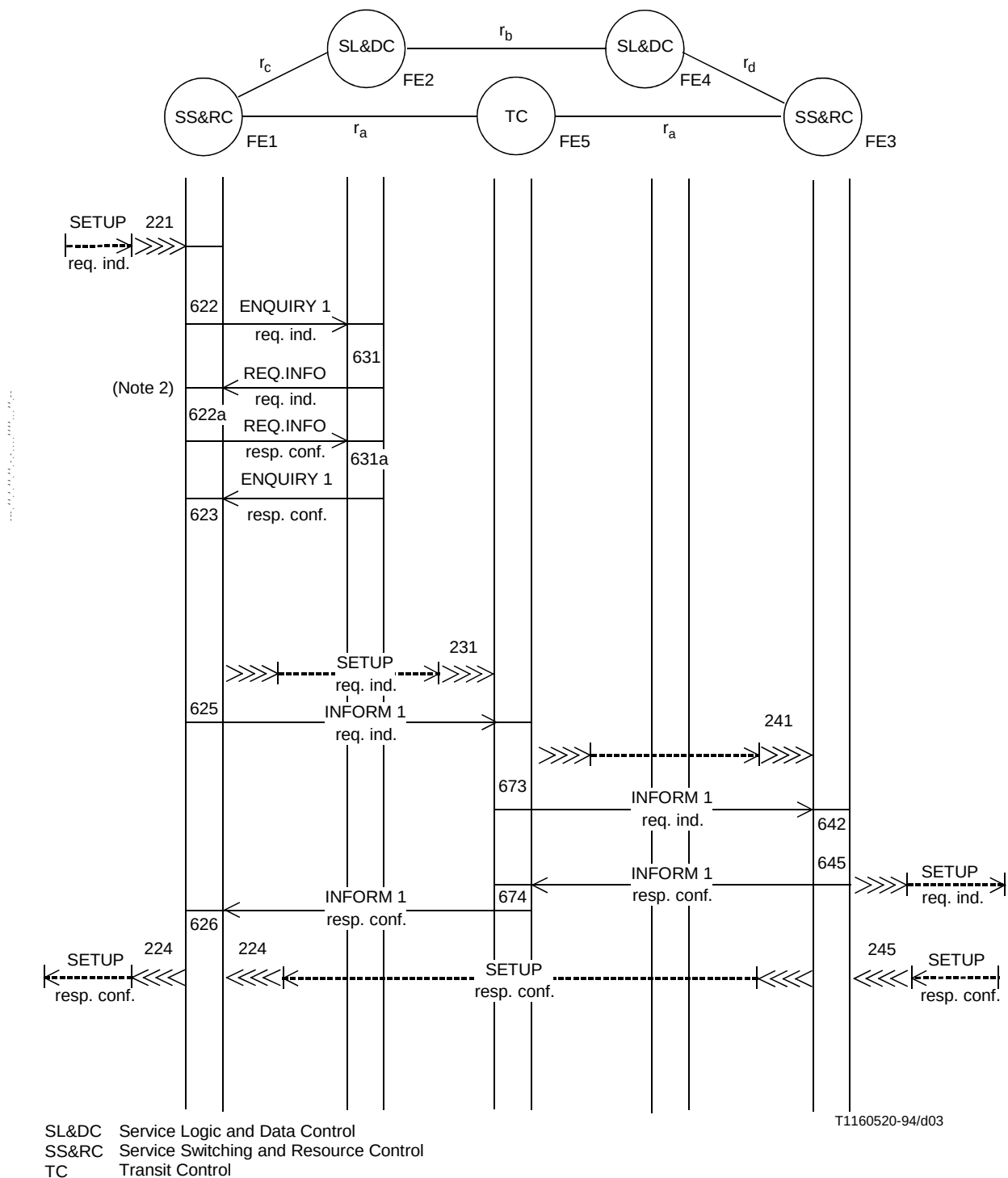
6.7.1 Information flow diagrams

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

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



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