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Foreword

This European Telecommunication Standard (ETS) has been produced by the Signalling Protocols & Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI) and was adopted having passed through the ETSI standards approval procedure.

In accordance with CCITT Recommendation I.130 [1], the following three level structure is used to describe the supplementary telecommunications services as provided by European public telecommunications operators under the pan-European Integrated Services Digital Network (ISDN):

- Stage 1: is an overall service description, from the user's stand-point;

- Stage 2: identifies the functional capabilities and information flows needed to support the service described in stage 1; and

- Stage 3: defines the signalling system protocols and switching functions needed to implement the service described in stage 1.

This ETS details the stage 2 aspects (functional capabilities and information flows) needed to support the Closed User Group (CUG) supplementary service. The stage 1 and stage 3 aspects are detailed in ETS 300 136 (1992) and ETS 300 138 (1992), respectively.

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1 Scope

This standard defines stage two of the Closed User Group (CUG) supplementary service for the pan-European Integrated Services Digital Network (ISDN) as provided by European public telecommunications operators. Stage two identifies the functional capabilities and the information flows needed to support the service description. The stage two description also identifies user operations not directly associated with a call (see CCITT Recommendation I.130 [1]).

This standard is specified according to the methodology specified in CCITT Recommendation Q.65 [2].

This standard does not formally describe the relationship between this supplementary service and the basic call, but where possible this information is included for guidance.

In addition this standard does not specify the requirements where the service is provided to the user via a private ISDN. This standard does not specify the requirements for the allocation of defined functional entities within a private ISDN; it does however define which functional entities may be allocated to a private ISDN.

This standard does not specify the additional requirements where the service is provided to the user via a telecommunications network that is not an ISDN.

The CUG supplementary service enables users to form groups to and from which access is restricted. A specific user may be a member of one or more closed user groups. Members of a specific closed user group can communicate among themselves but not, in general, with users outside the group.

The CUG supplementary service is applicable to all telecommunication services.

This standard is applicable to the stage three standards for the ISDN CUG supplementary service. The term "stage three" is also defined in CCITT Recommendation I.130 [1]. Where the text indicates the status of a requirement (i.e. as strict command or prohibition, as authorisation leaving freedom, or as a capability or possibility) this shall be reflected in the text of the relevant stage three standards.

Furthermore, conformance to this standard is met by conforming to the stage three standards with the field of application appropriate to the equipment being implemented. Therefore no method of testing is provided for this standard.

2 Normative references

This standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] CCITT Recommendation I.130 (1988): "Method for the characterisation 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 characterisation of services supported by an ISDN".

[3] CCITT Recommendation I.112 (1988): "Vocabulary of terms for ISDNs".

[4] CCITT Recommendation Q.71 (1988): "ISDN 64 kbit/s circuit mode switched bearer services".

[5] ETS 300 136 (1992): "Integrated Services Digital Network (ISDN); Closed User Group (CUG) supplementary service; Service description".

[6] CCITT Recommendation Q.85 (1988): "Community of interest supplementary services".

[7] CCITT Recommendation I.210 (1988): "Principles of telecommunication services supported by an ISDN and the means to describe them".

3 Definitions

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

Closed user group (CUG) index: see ETS 300 136 [5], Clause 3.

Closed user group call: see ETS 300 136 [5], Clause 3.

Closed user group interwork code: is a code to uniquely identify the closed user group inside the network.

Closed user group with incoming access: see ETS 300 136 [5], Clause 3.

Closed user group with incoming and outgoing access: see ETS 300 136 [5], Clause 3.

Closed user group with outgoing access: see ETS 300 136 [5], Clause 3.

Closed user group: see ETS 300 136 [5], Clause 3.

CUG-domain: a CUG domain is an area of common CUG interlock codes. The domain internal CUG interlock codes need not be released via the boundary of the domain. A closed user group application may span over several domains. Both domains shall treat the other domain's closed user group as a single member of its own closed user group.

Incoming calls barred within a CUG: see ETS 300 136 [5], Clause 3.

Integrated Services Digital Network (ISDN): see CCITT Recommendation I.112 [3], § 2.3, definition 308.

Outgoing calls barred within a CUG: see ETS 300 136 [5], Clause 3.

Service; telecommunications service: see CCITT Recommendation I.112 [3], § 2.2, definition 201.

Supplementary service: see CCITT Recommendation I.210 [7], § 2.4.

4 Symbols and abbreviations

CC	Call Control, typically and LE
CCA	Call Control Agent, typically and TE
CUG	Closed User Group
DB	Data Base
DDI	Direct Dialling In
FEA	Functional Entity Actions
IA	Incoming Access
ICB	Incoming Calls Barred

ISDN	Integrated Services Digital Network
LE	Local Exchange
MSN	Multiple Subscriber Numbering
OA	Outgoing Access
OCB	Outgoing Calls Barred
PCUG	Preferential CUG
PTN	Private Telecommunications Network
TE	Terminal Equipment

5 Description

Not applicable.

6 Derivation of the functional model

6.1 Functional model description

The functional model for the CUG supplementary service shall be as shown in figures 1 and 2.

The functional model for the application of the CUG supplementary service within a single CUG domain shall as be shown in figure 1.

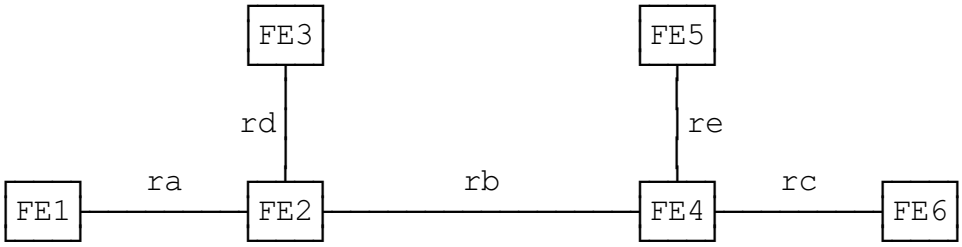


Figure 1

The expanded functional model used for interworking between CUG domains shall be as shown in figure 2.

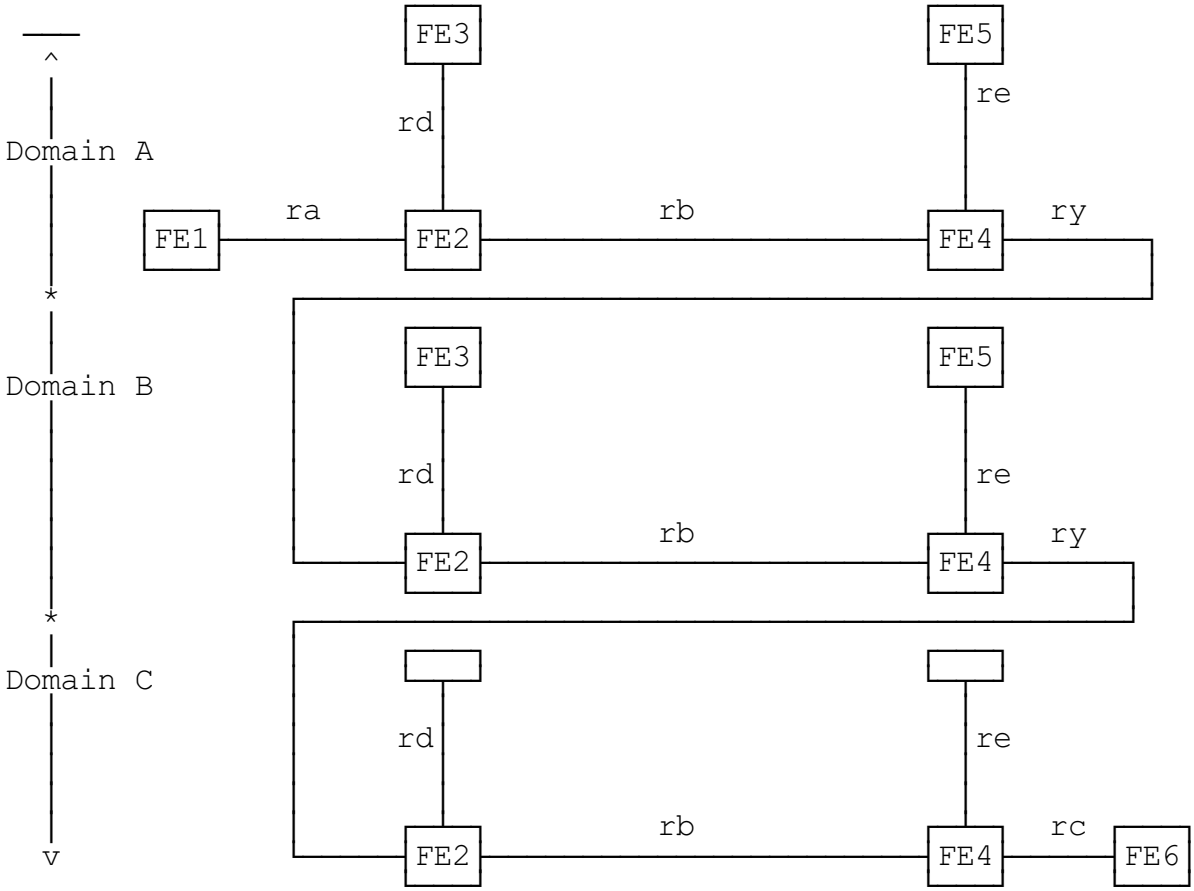


Figure 2

6.2 Description of the functional entities

The functional entities for the CUG supplementary service shall be:

FE1	originating CUG agent;
FE2	outgoing CUG determination;
FE3	outgoing CUG control;
FE4	incoming CUG determination;
FE5	incoming CUG control;
FE6	destination CUG agent.

6.3 Relationship with a basic service

The relationship of the functional model for the CUG supplementary service with a basic call may be as shown in figure 3.

NOTE: The basic call model is defined in CCITT Recommendation Q.71 [4], § 2.1, with the exception that r1 represents an outgoing call relationship and r3 represents an incoming call relationship.

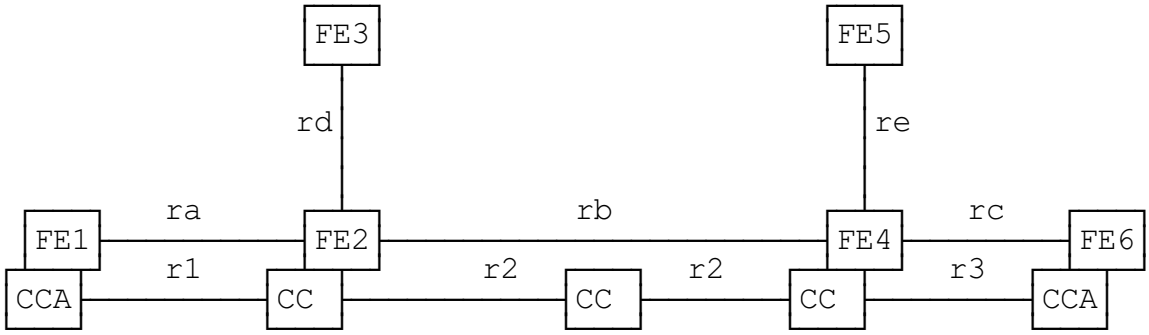


Figure 3

7 Information flows

7.1 Information flow diagrams

The information flows for the CUG supplementary services shall be as shown in figures 4, 5, 6, 7 and 8. Figures 5 and 8 show a portion of the flows appropriate to a call across multiple domains.

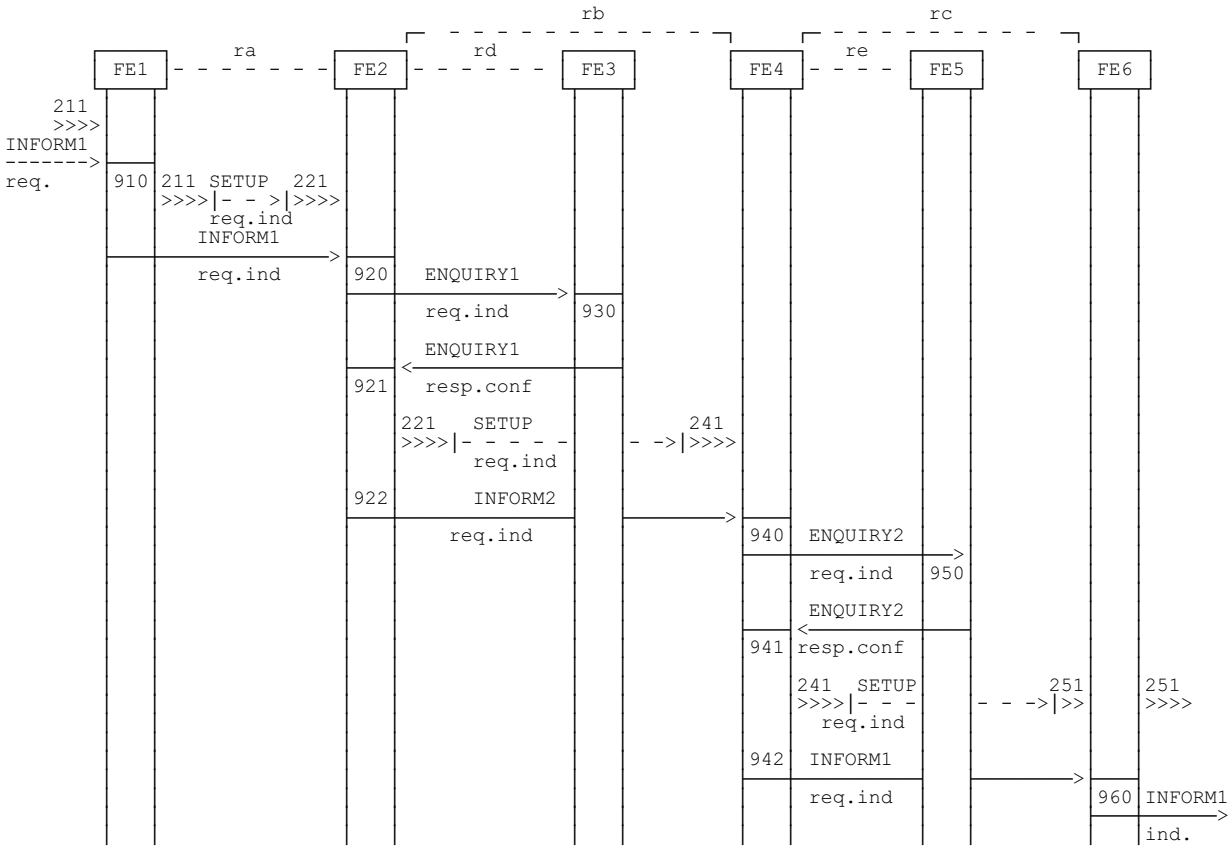
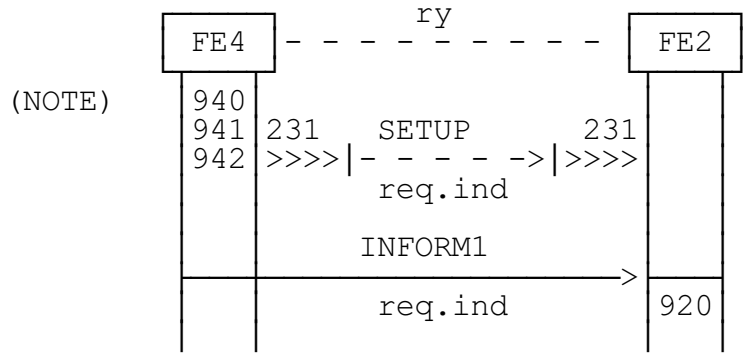


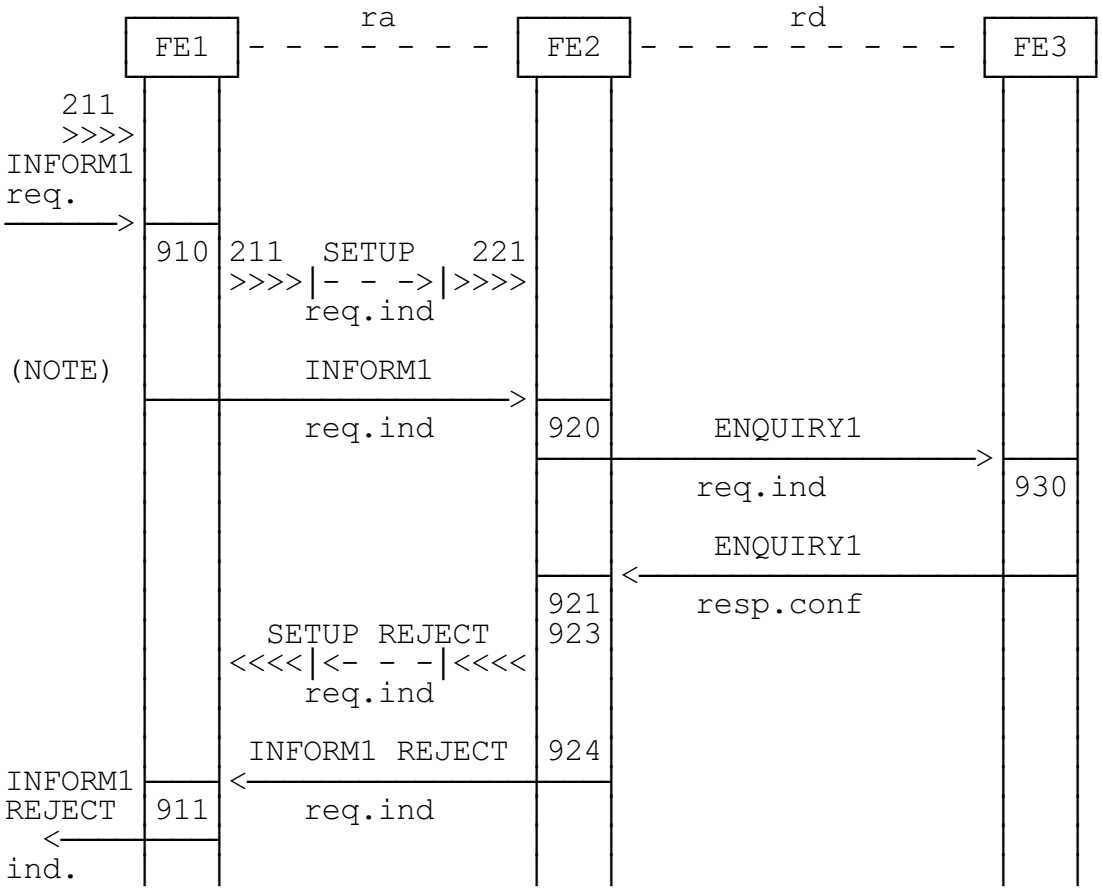
Figure 4



NOTE: A call to this point is covered in figure 4.

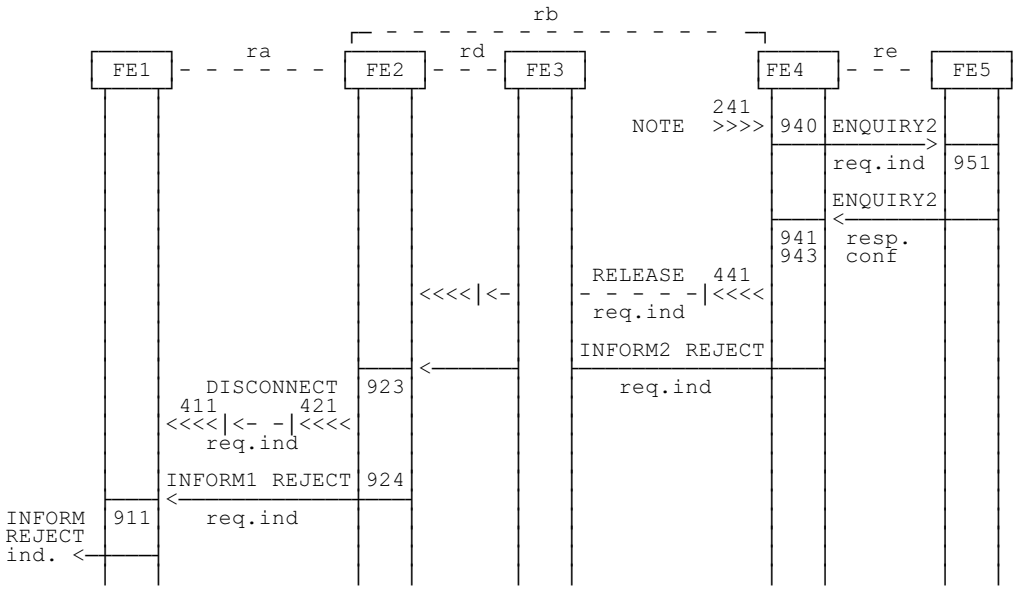
Figure 5: Chaining of CUG domains

Successful CUG calls between different CUG domains showing information flows across relationship ry according to the functional model given in figure 2.



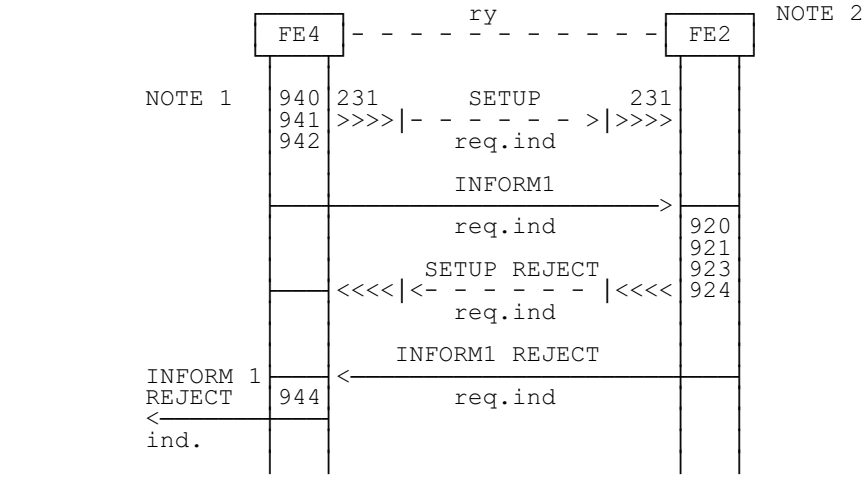
NOTE: Depending on the progress of the basic call INFORM1 REJECT will be sent simultaneously with the appropriate basic call clearing information flow.

Figure 6: Unsuccessful CUG calls - case 1: own CUG domains



NOTE: A call to this point is covered in figure 4.

Figure 7: Unsuccessful CUG calls - case 2: another CUG domain



NOTE 1: A call to this point is covered in figure 4.

NOTE 2: Depending on the progress of the basic call INFORM1 REJECT will be sent simultaneously with the appropriate basic call clearing information flow.

Figure 8: Chaining of CUG domains

Figure 8 shows unsuccessful CUG calls between different CUG domains showing information flows across relationship ry according to the functional model given in figure 2.

7.2 Definition of individual information flows

7.2.1 Relationship ra

7.2.1.1 Contents of INFORM1

The contents of INFORM1 shall be as in table 1.

Table 1

Name	req.ind
CUG index	Optional
OA indication	Optional

7.2.1.2 Contents of INFORM1 REJECT

The contents of INFORM1 REJECT shall be as in table 2.

Table 2

Name	req.ind
CUG specific reason	Mandatory

7.2.2 Relationship rb

7.2.2.1 Contents of INFORM2

The contents of INFORM2 shall be as in table 3.

Table 3

Name	req.ind
CUG interlock code	Mandatory (NOTE)
OA indication	Optional

NOTE: Where the INFORM2 information flow crosses an international gateway, the CUG interlock code shall be an international CUG interlock code.

7.2.2.2 Contents of INFORM2 REJECT

The contents of INFORM2 REJECT shall be as in table 4.

Table 4

Name	req.ind
CUG specific reason	Mandatory

7.2.3 Relationship rc

INFORM1, contains only the CUG index.

INFORM1 REJECT, is defined in subclause 7.2.1.2.

7.2.4 Relationship rd

7.2.4.1 Contents of ENQUIRY1

The contents of ENQUIRY1 shall be as in tables 5 and 6.

Table 5

Name	req.ind
Calling party number (NOTE)	Mandatory
Basic service	Mandatory
CUG index	Optional
OA indication	Optional

NOTE: FE2 may send the ENQUIRY1 to FE3 as soon as sufficient addressing information to identify the access can be included.

The result shall be one of the following parameters.

Table 6

Name	resp.conf
non CUG	Optional
CUG interlock code	Optional
reject reason	Optional

NOTE: The information elements above shall be mutually exclusive.

7.2.5 Relationship re

7.2.5.1 Contents of ENQUIRY2

The contents of ENQUIRY2 shall be as in tables 7 and 8.

Table 7

Name	req.ind
Called party number (NOTE)	Mandatory
Basic service	Mandatory
CUG interlock code	Optional
non CUG	Optional

NOTE: FE4 may send the ENQUIRY2 to FE5 with the access identifying digits only, i.e. in this case the DDI digits shall not be included.

The result shall be one of the following parameters.

Table 8

Name	resp.conf
non-CUG	Optional
CUG index	Optional
reject reason	Optional

7.2.6 Relationship ry

FE4 shall treat this relationship as a rc relationship.

FE2 shall treat this relationship as a ra relationship.

NOTE: The public network's FE4 shall not send the OA indication to the private network's FE2.

INFORM1, shall be as defined in subclause 7.2.1.1.

INFORM1 REJECT, shall be as defined in subclause 7.2.1.2.

At this relationship the CUG index is used with the exception of preferential CUG at the interface between a public and private network.

At the interface between two public networks the international CUG interlock code is mandatory.

8 SDL diagrams for functional entities

8.1 FE1

The SDL for FE1 is shown in figure 9.

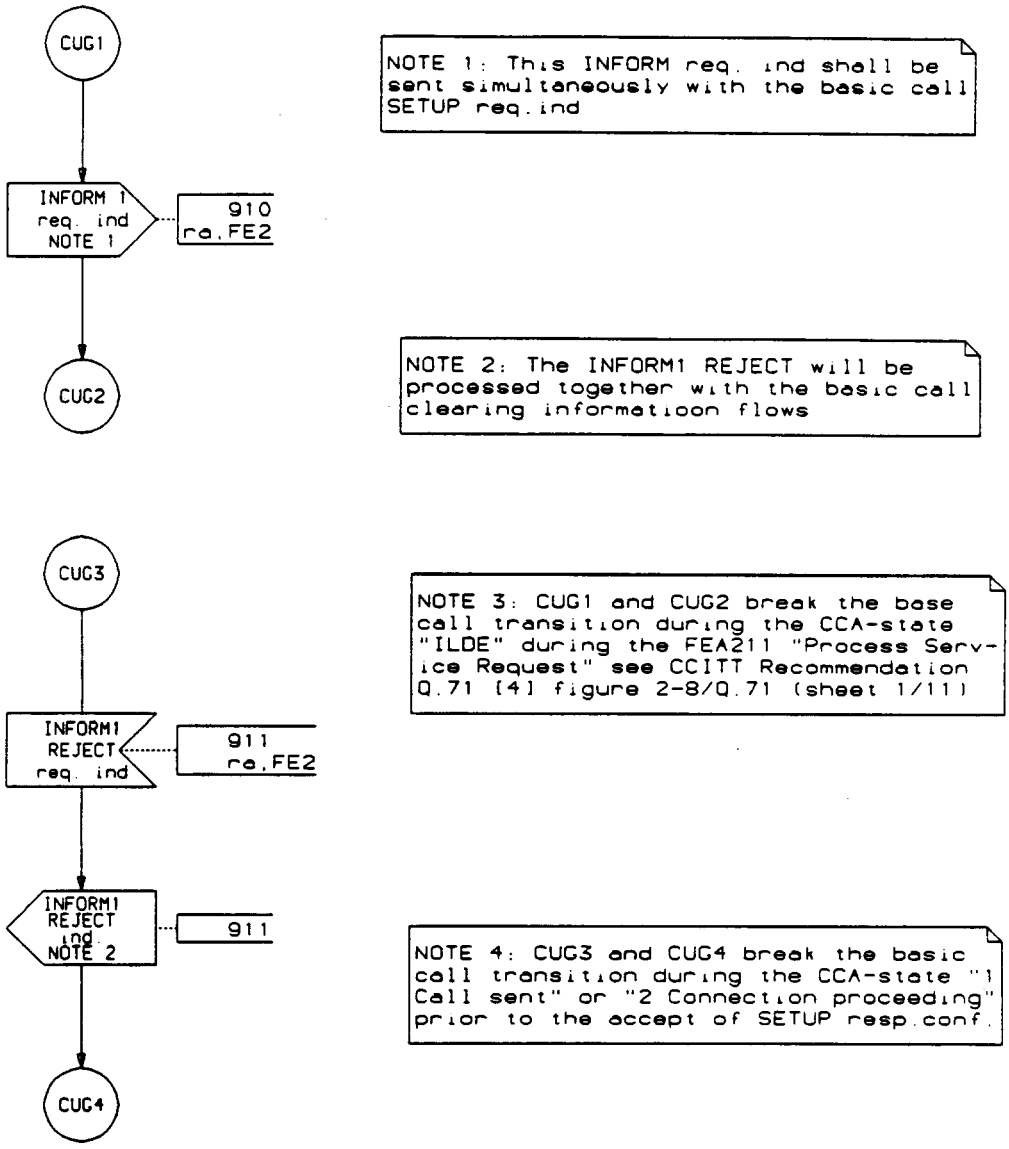


Figure 9

8.2 FE2

The SDL for FE2 is shown in figure 10.

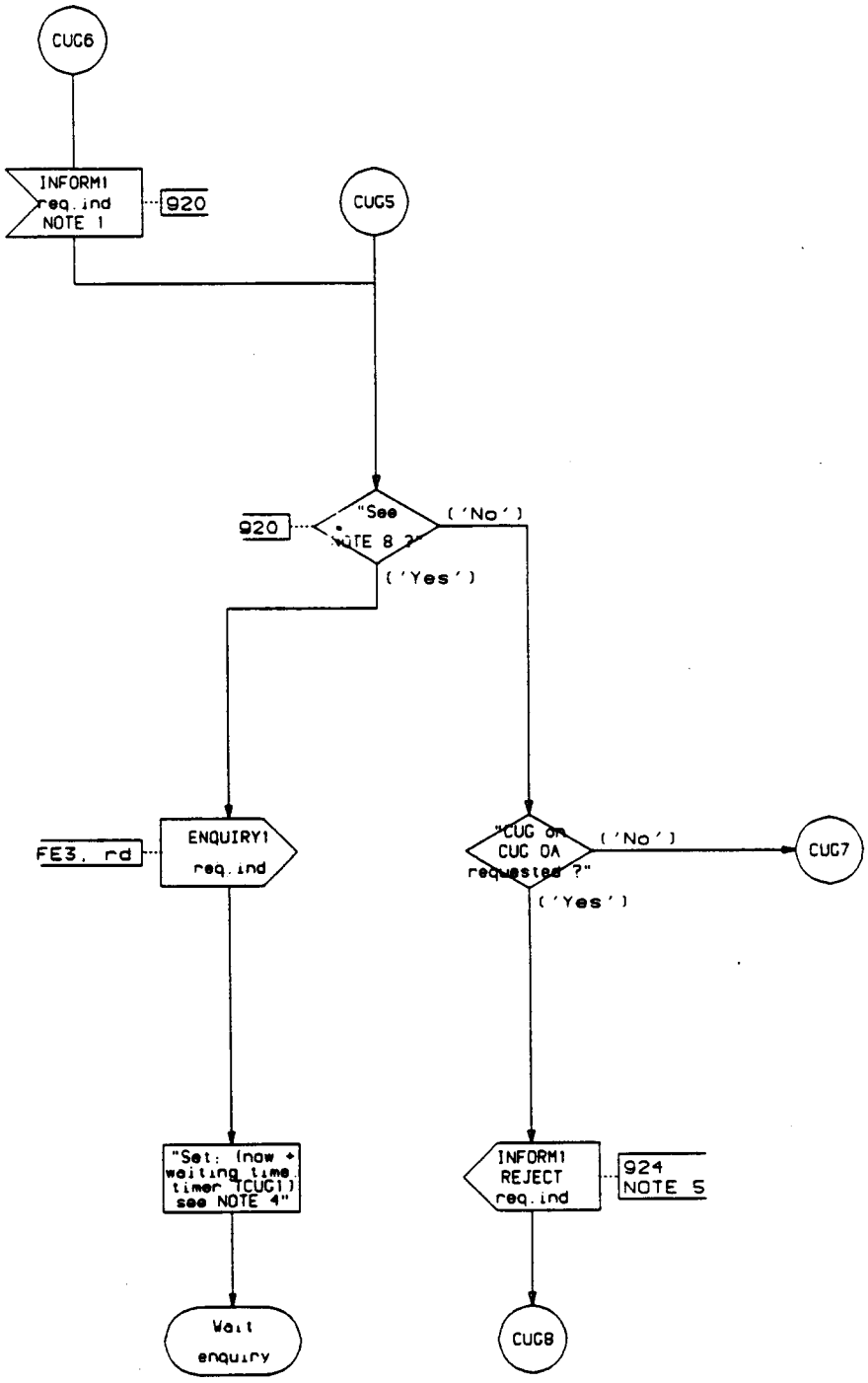


Figure 10 (sheet 1 of 3): FE2 outgoing CUG determination

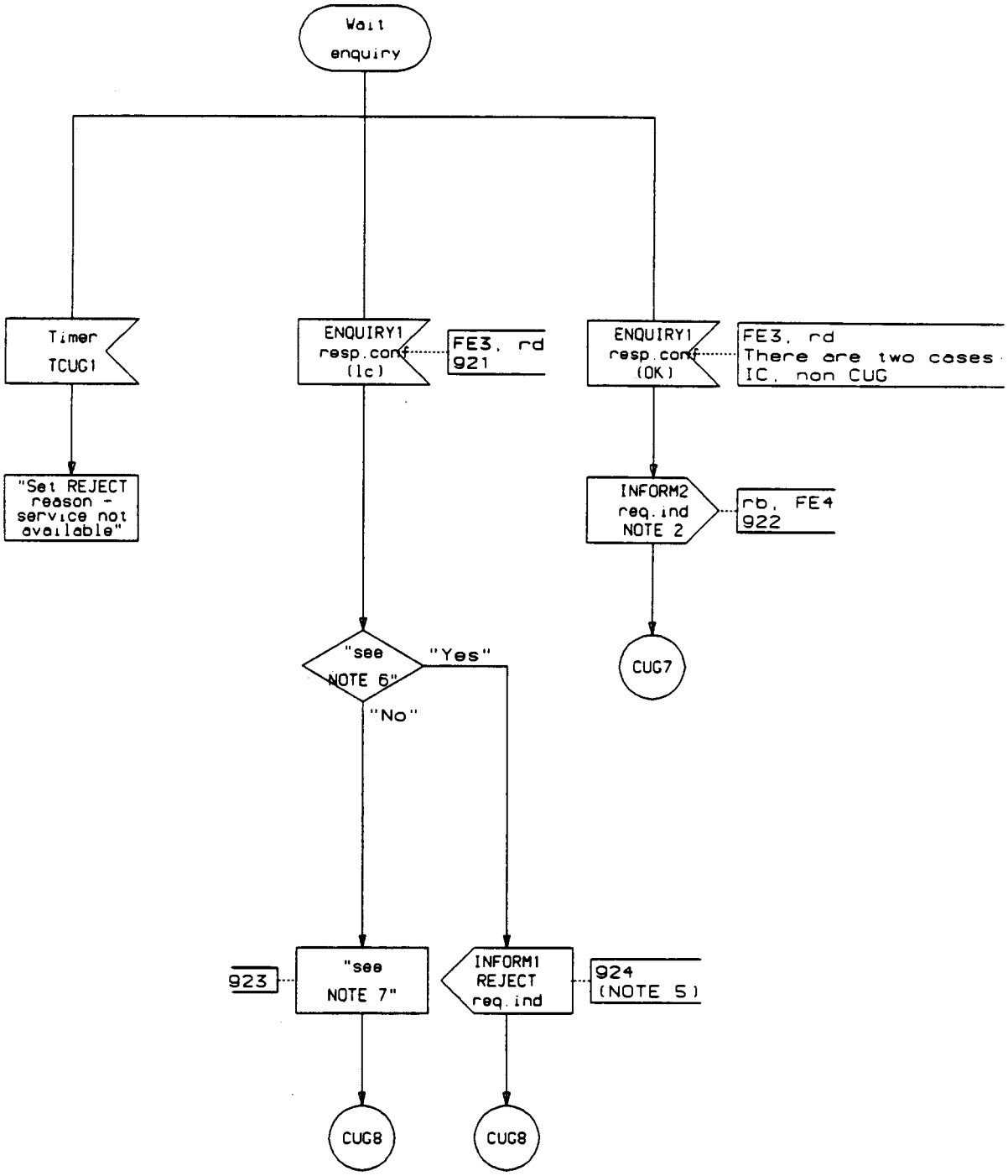


Figure 10 (sheet 2 of 3): FE2 outgoing CUG determination

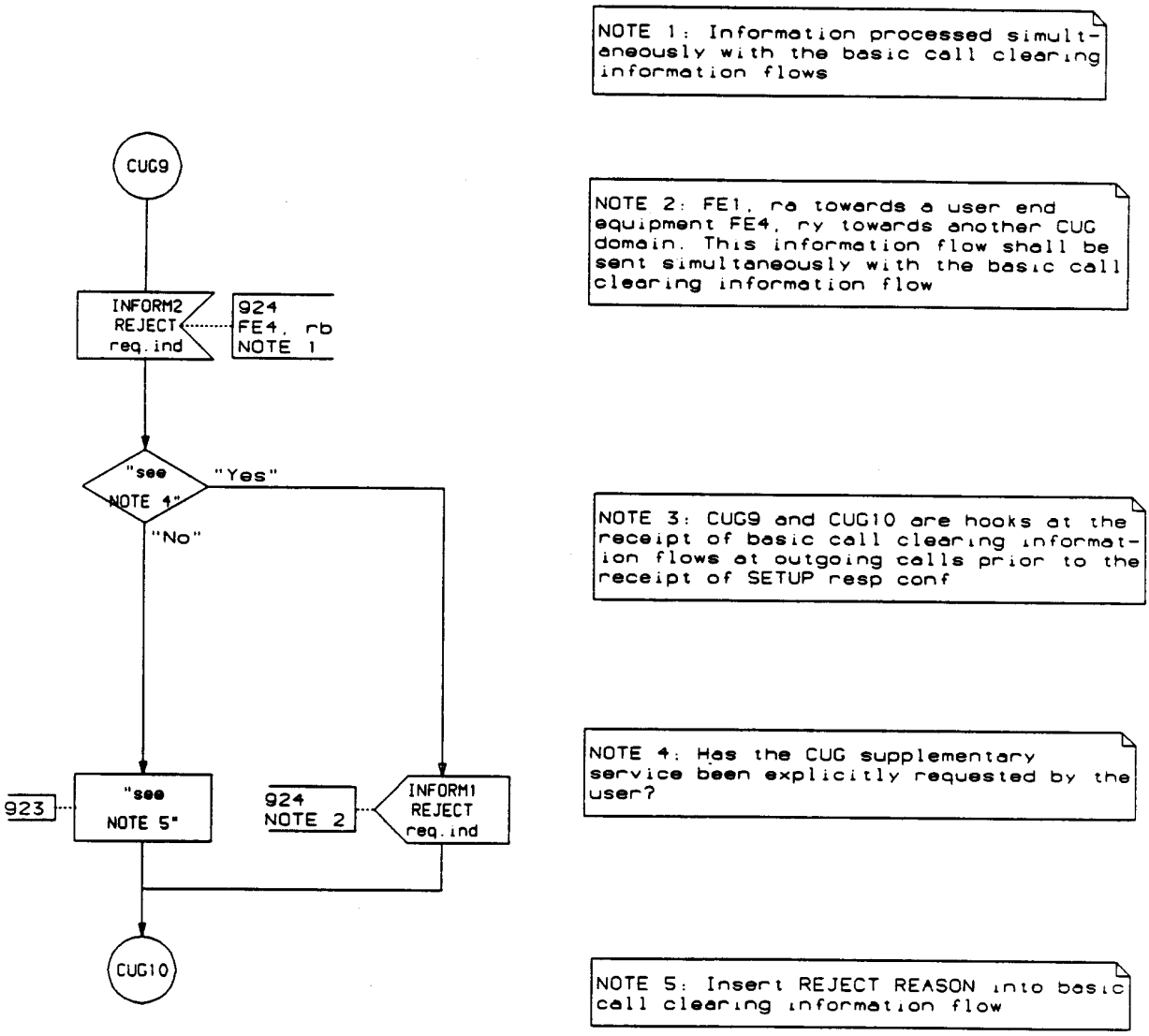


Figure 10 (sheet 3 of 3): FE2 outgoing CUG determination

Notes to figure 10:

NOTE 1: - ra, FE1 from a user end equipment;

- ry from another CUG domain.

NOTE 2: This INFORM req.ind shall be sent simultaneously with the basic call SETUP req.ind.

NOTE 3: At a call received from a Call Control Agent (CCA) CUG5, CUG6, CUG7 and CUG8 break the basic call transition during the Call Control (CC) call state "0 IDLE" during the FEA221 "Originating screening process attempt" (see CCITT Recommendation Q.71 [4], figure 2-9/Q.71 (sheet 1 of 19)).

At a call received from another CUG domain CUG5, CUG6, CUG7 and CUG8 break the basic call transition during the CC call state "O IDLE" during the FEA231 "Originating screening process attempt" (see CCITT Recommendation Q.71 [4], figure 2-9/Q.71 (sheet 7 of 19)).

The analysis of Multiple Subscriber Number (MSN) supplementary service or Direct Dialling IN (DDI) shall be performed prior to the invocation of CUG. CUG 7 is the connector to proceed with the call. CUG8 is the connector where the basic call shall be cleared.

NOTE 4: Timer TCUG1 shall be implemented in the case of the remote database. TCUG1 shall be automatically reset by basic call at any event resulting in clearing the call relation.

NOTE 5: - ra, FE1 towards a CCA;

- ry, FE4 towards another CUG domain.

This information flow shall be sent simultaneously with basic call clearing information flow.

NOTE 6: Has the CUG supplementary service been explicitly requested by the user?

NOTE 7: Insert REJECT REASON into basic call clearing information flow.

NOTE 8: Does the calling user subscribe to the CUG supplementary service?

8.3 FE3

The SDL for FE3 is shown in figure 11.

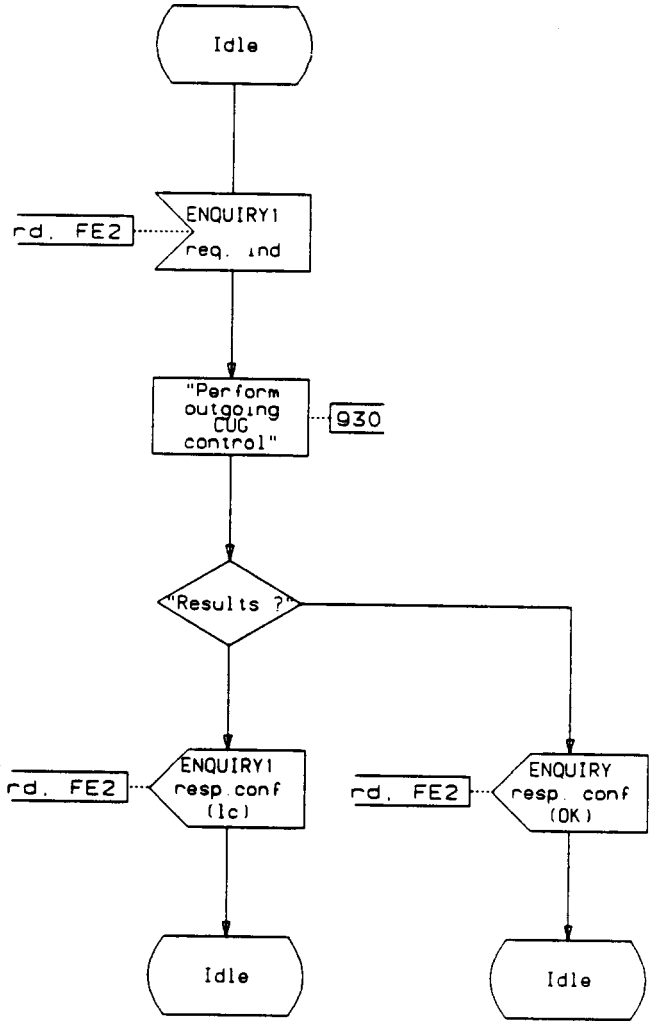


Figure 11

8.4 FE4

The SDL for FE4 is shown in figure 12.

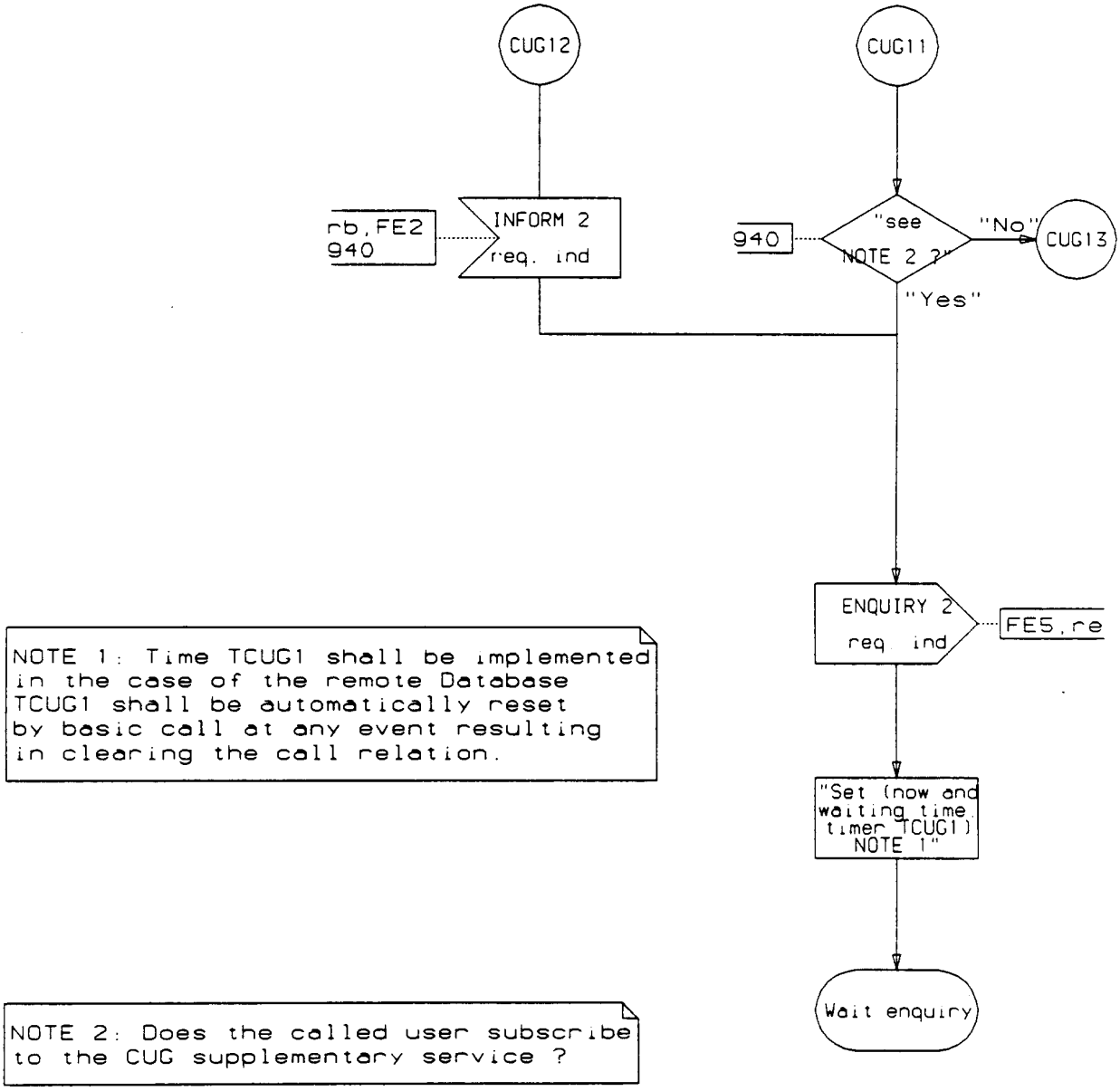
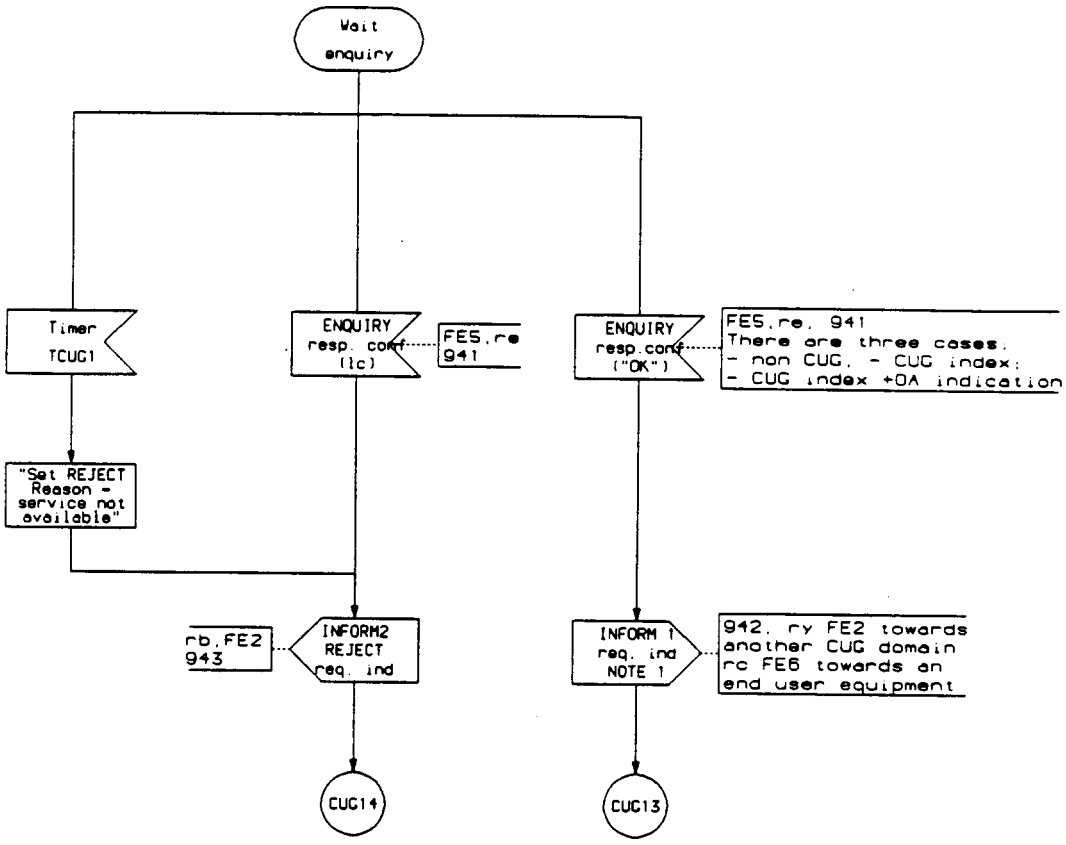


Figure 12 (sheet 1 of 3)



NOTE 4: This INFORM req. ind shall be sent simultaneously with the basic call SETUP req. ind

Figure 12 (sheet 2 of 3)

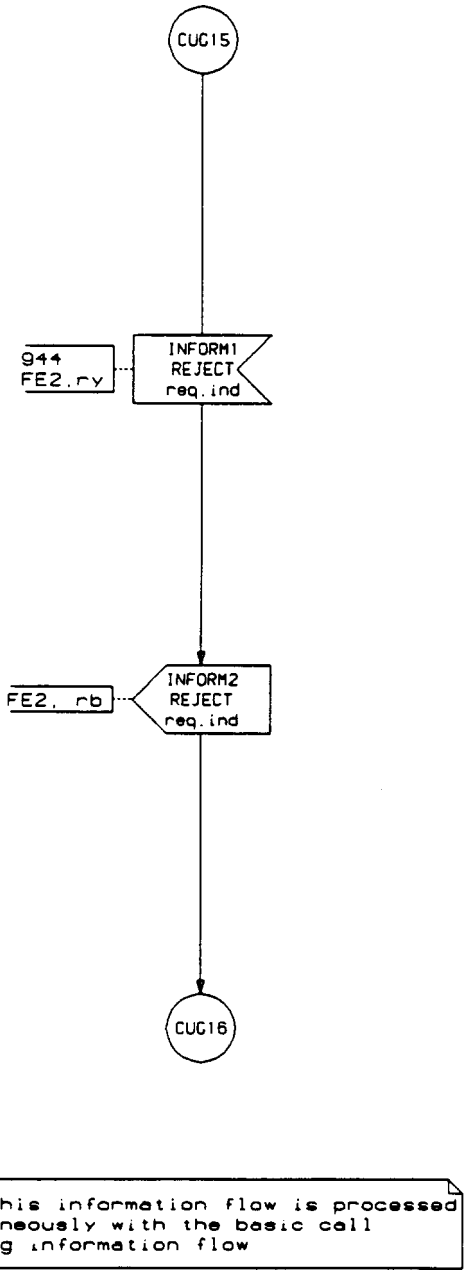


Figure 12 (sheet 3 of 3)

Notes to figure 12:

NOTE 3: CUG 11, CUG 12, CUG 13 and CUG 14 break the basic call transition at a call towards a user end equipment during FEA241 and FEA241A of "Terminating screening, process attempt" (prior to establishing a call reference) (see CCITT Recommendation Q.71 [4], figure 2-9 sheets 7/19 and 13/19 respectively).

At a call towards another CUG domain the break is at FEA231 "process attempt" (prior to establishing a call reference). The analysis of MSN and DDI shall be performed prior to the invocation of CUG. The CUG-specific checks shall be performed prior to the determination of network determined user busy. CUG 13 is the connector to proceed with the basic call. CUG 14 is the connector where the call shall be cleared.

NOTES 1, 2 and 4 are included in the SDL diagrams.

8.5 FE5

The SDL for FE5 is shown in figure 13.

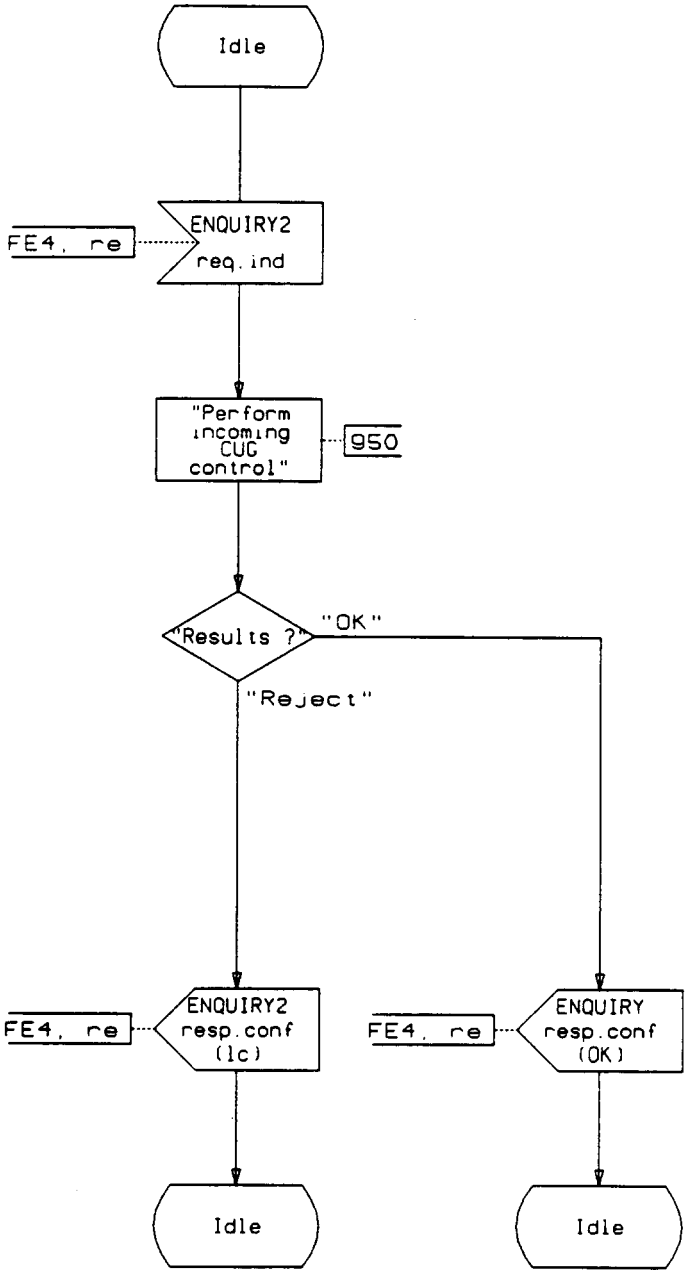


Figure 13

8.6 FE6

The SDL for FE6 is shown in figure 14.

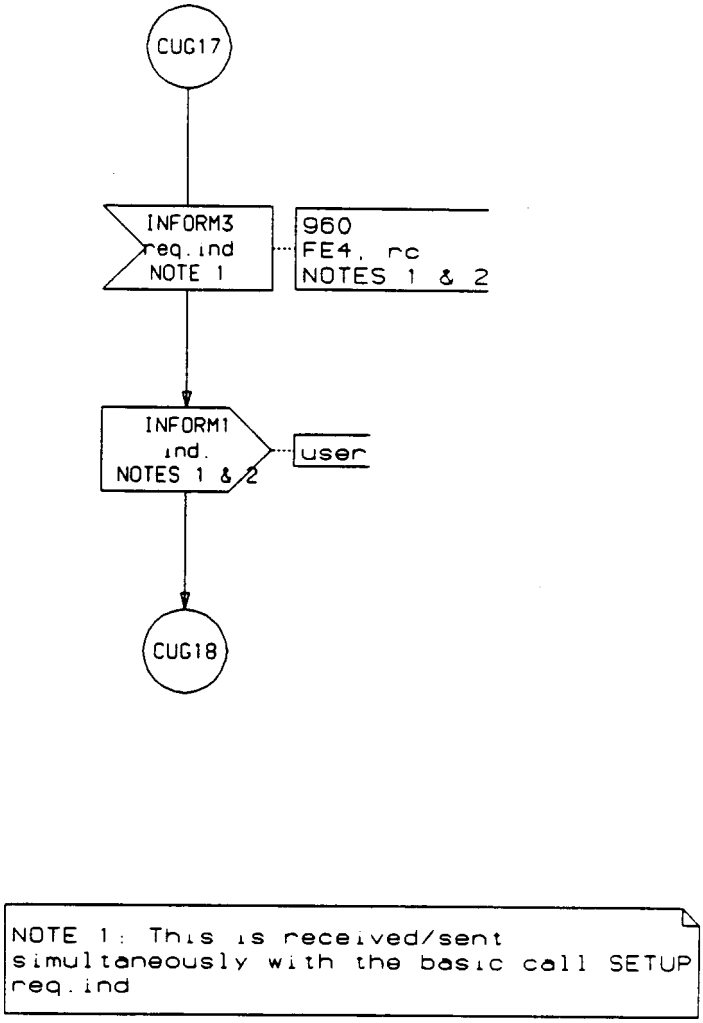


Figure 14

Note to figure 14.

NOTE 1: Included in the SDL diagram.

NOTE 2: CUG 17 and CUG 18 break the basic call transition during the basic CCA's FEA251 (see CCITT Recommendation Q.71 [4], figure 2-8 (sheet 7 of 11) by following the "Y" branch of the decision "compatible" and prior to sending SETUP ind.

9 Functional Entity Actions (FEAs)

9.1 FEAs of FE1

910: The functional entity shall receive a CUG request from the user and transfer the request simultaneously with the call setup request.

911: The functional entity shall recognise CUG-specific reject reasons and indicate the reason to its user.

9.2 FEAs of FE2

920: The functional entity shall:

- identify a CUG call;

- check the CUG subscription of the calling user;

- access the outgoing CUG control entity (FE3).

921: The functional entity shall receive the results of the CUG specific checks from the outgoing CUG control entity (FE3).

922: The functional entity shall:

- store the CUG characteristics as received from FE3;

- transfer the CUG request simultaneously with the basic call setup request as received from FE3.

923: The functional entity shall insert the reject reason into basic call clearing information flow element "cause".

924: The functional entity shall transfer simultaneously with basic call control clearing information flow INFORM1 REJECT with CUG specific reasons.

9.3 FEAs of FE3

930: The functional entity shall:

- perform validation checks of CUG information of a calling user according to table 9;

- convert the CUG index to an interlock code.

Table 9: Originating side call type determination

	User provided information			
Class of user	CUG Index	CUG Index + OA Indicator	OA Indicator	NO INFO
CUG with Preferential	CUG Call Using Index Provided	CUG Call Using Index Provided (OA discarded)	Reject Call	CUG Call Using Preferential CUG Index
CUG without Preferential	CUG Call Using Index Provided	CUG Call Using Index Provided (OA discarded)	Reject Call	Reject Call
CUG + OA with Preferential	CUG Call Using Index Provided	CUG Call Using Index Provided (OA discarded)	Normal Call (NON CUG)	CUG Call Using Preferential CUG Index
CUG + OA without Preferential	CUG Call Using Index Provided	CUG Call Using Index Provided (OA discarded)	Normal Call (NON CUG)	Normal Call (NON CUG)

9.4 FEAs of FE4

940: The functional entity shall:

- identify a call for a user with CUG service;

- access the incoming CUG control entity (FE5).

941: The functional entity shall receive the results of the CUG specific checks from the incoming CUG control entity.

942: The functional entity shall:

- store the CUG characteristics as received from FE5;

- transfer the CUG request as received from FE5 simultaneously with the basic call setup request.

943: The functional entity shall transfer simultaneously with basic call clearing information flow INFORM2 REJECT with CUG-specific reasons.

944: The functional entity shall, in the case of a call towards a PTN FE2, provide the capability to receive a CUG-specific rejection of the call from the PTN. At this case the requirement is to receive and transfer simultaneously with basic call control information flow CUG specific INFORM REJECT with CUG specific reason.

9.5 FEAs of FE5

950: The functional entity shall, according to table 10:

- convert the interlock code to CUG index;

- perform validation checks of CUG information of a called user (including the compatibility with the called user class - CUG IA - in case of an ordinary incoming call).

NOTE 1: Since the CUG OA user class is not concerned in the incoming case, it is not shown in the list in table 10. It shall be regarded that CUG OA user class is the same as user class CUG, and CUG OA/IA is the same as user class CUG IA in this table.

NOTE 2: Most of table 10 is performed in FE5.

Table 10: CUG checking in incoming side

Called user's class / SETUP presentation	Called user is CUG				Called user is not CUG
	CUG with or without pCUG		CUG IA with or without pCUG		
	No ICB	ICB	No ICB	ICB	
CUG	M (1)	REJ	M (1)	REJ	REJ
	NM REJ		NM REJ		
Ordinary	REJ		(3)		(3)

Notes to table 10:

NOTE 1: (1), (2) & (3) show the CUG parameter to be used in the SETUP to the called user, as follows:

- (1) CUG (index);
- (2) not used;
- (3) No CUG (ordinary call).

NOTE 2: ICB means incoming calls barred within the CUG. The interpretation logic is changed in this case as shown in each column in table 10. For example:

No ICB	ICB
M (1)	REJ

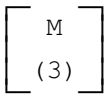
This means that when the interlock codes are matched and no ICB is applied for the CUG, then (1) is used. However, when ICB is applied for the CUG, the incoming call is rejected even if interlock codes are matched.

NOTE 3: M means that the interlock code is matched with the CUG of the called user.

NOTE 4: NM means "not matched".

NOTE 5: REJ means that an incoming call is rejected.

NOTE 6: Interpretation logic, e.g.:



means that when matched with CUG, no CUG selection facility field is set in the SETUP to the called user.

9.6 FEAs of FE6

960: The functional entity shall receive CUG indication simultaneously with the call setup request and indicating this to the user.

10 Allocation of functional entities to physical locations

The possible location of functional entities FE1, FE2, FE3, FE4, FE5 and FE6 are shown in table 11.

Table 11

SCENARIOS	FE1	FE2	FE3	FE4	FE5	FE6
Scenario 1	TE	LE1	LE1	LE2	LE2	TE
Scenario 2	TE	LE1	DB1	LE2	DB1	TE
Scenario 3	TE	LE1	DB1	LE2	DB2	TE
Scenario 4	TE	<- - - - PTN - - - -> & LE1 LE1 LE2 LE2				TE
Scenario 5	TE	LE1 LE1 LE2 LE2 & <- - - - PTN - - - ->				TE
Scenario 6	TE	<- - - - PTN - - - -> & LE1 LE1 LE2 LE2 & <- - - - PTN - - - ->				TE

NOTE: The symbol "&" represents the chaining of CUG domains of the public and private ISDN.

Network scenarios 1, 4, 5 and 6 represent the decentralised approach of the CUG service implementation.

Network scenario 2 describes the fully centralised approach with a unique database.

Network scenario 3 describes a centralised approach with two databases (DB1 and DB2).

History

Document history	
May 1992	First Edition
February 1996	Converted into Adobe Acrobat Portable Document Format (PDF)