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**Integrated Services Digital Network (ISDN);
Call Waiting (CW) supplementary service
Functional capabilities and information flows**

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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).

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 standpoint;
- 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 Call Waiting (CW) supplementary service. The stage 1 and stage 3 aspects are detailed in ETS 300 056 (1991) and ETS 300 058 (1991), respectively.

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1 Scope

This standard defines the stage two of the Call Waiting (CW) 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 stage 1 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, the 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 CW supplementary service permits a user to be informed of an incoming call (as per basic call procedures) with an indication that no interface information channel is available. The user then has the choice of accepting, rejecting or ignoring the waiting call (as per basic call procedures).

The CW supplementary service is considered meaningful when applied to the telephony teleservice and the speech and 3,1 kHz audio bearer services. Furthermore, it may also be applied to other circuit-switched services.

This standard is applicable to the stage three standards for the ISDN CW 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 a strict command or prohibition, as authorisation leaving freedom, as a capability or possibility, this shall be reflected in the text of the relevant and 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 ETS 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] ETS 300 056 (1991): "Integrated Services Digital Network (ISDN); Call Waiting (CW) supplementary service; Service description".

- [4] CCITT Recommendation I.112 (1988): "Vocabulary of terms for ISDNs".
- [5] ETS 300 140 (1992): "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Functional capabilities and information flows".
- [6] CCITT Recommendation Q.71 (1988): "ISDN 64 kbit/s circuit mode switched bearer services".
- [7] CCITT Recommendation I.210 (1988): "Principles of telecommunications services supported by an ISDN and the means used to describe them".
- [8] CCITT Recommendation Z.100 (1988): "Functional Specification and Description Language (SDL)".

3 Definitions

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

Information channel control: a terminal that has information channel control is active on a call, is alerting for an incoming call, has an outgoing call for which a channel has been selected, or has a call on hold with reservation.

Integrated Services Digital Network (ISDN): see CCITT Recommendation I.112 [4], § 2.3, definition 308.

Service; telecommunications service: see CCITT Recommendation I.112 [4], § 2.2, definition 201.

Subscriber B: see ETS 300 056 [3], Clause 3.

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

User A: see ETS 300 056 [3], Clause 3.

User B: see ETS 300 056 [3], Clause 3.

User C: see ETS 300 056 [3], Clause 3.

4 Symbols and abbreviations

CC	Call Control
CCA	Call Control Agent
CW	Call Waiting
FEA	Functional Entity Action
ISDN	Integrated Services Digital Network
LE	Local Exchange
PTNX	Private Telecommunications Network Exchange
SDL	Specification and Description Language

5 Description

Not applicable.

6 Derivation of the functional model

6.1 Functional model description

The functional model for the CW supplementary service shall be as shown in figure 1.

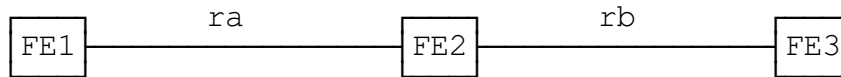


Figure 1

6.2 Description of the functional entities

The functional entities for the CW supplementary service above those of the basic call shall be as shown below:

FE1: Waiting call notification receiver;

FE2: Waiting call control;

FE3: Waiting call agent.

6.3 Relationship with a basic service

The relationship of the functional model for the CW supplementary service with a basic call (from user C to user B) shall be as shown in figure 2.

NOTE: The basic call model is defined in CCITT Recommendation Q.71 [5], subclause 2.1, with the exception that r1 represents an outgoing call relationship from a CCA and r3 represents an incoming call relationship to a CCA.

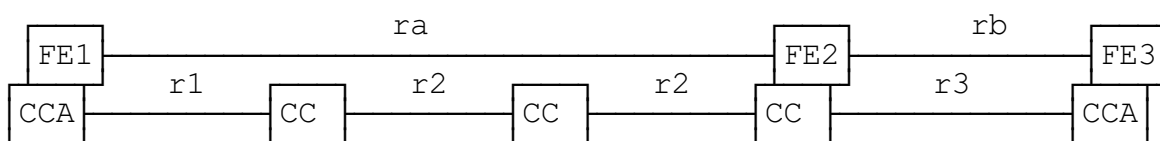


Figure 2

7 Information flow

7.1 Information flow diagrams

Figure 3 and figure 4 show the information flows for a successful waiting call.

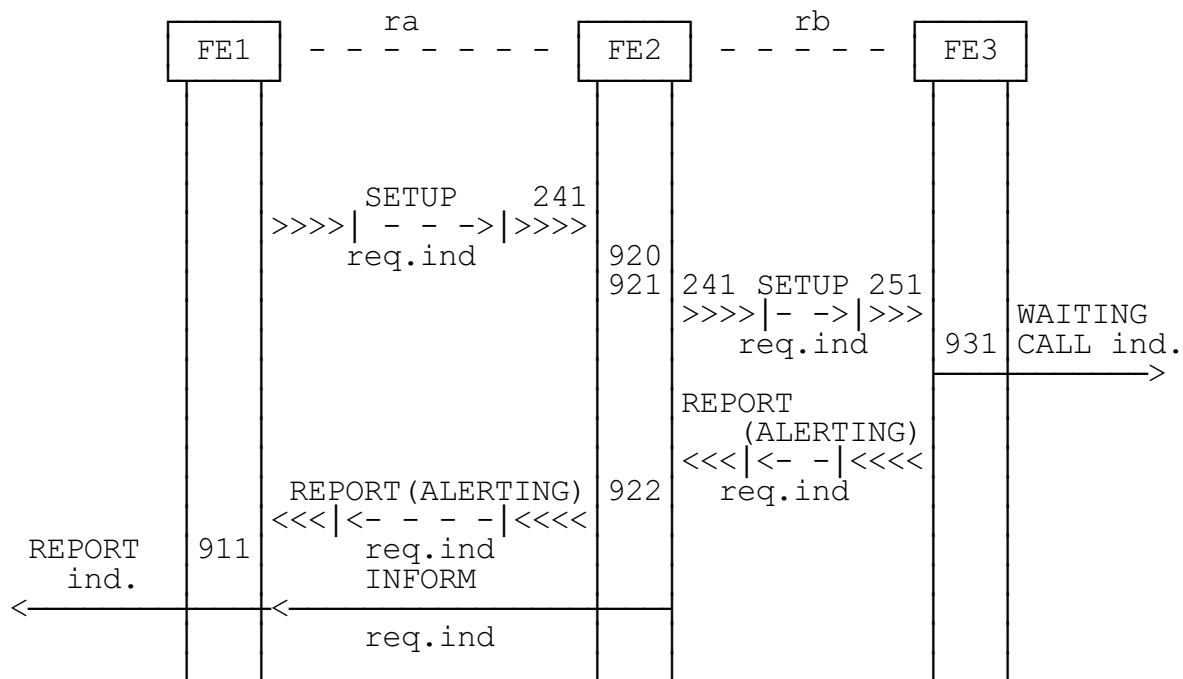


Figure 3: Notification of waiting call

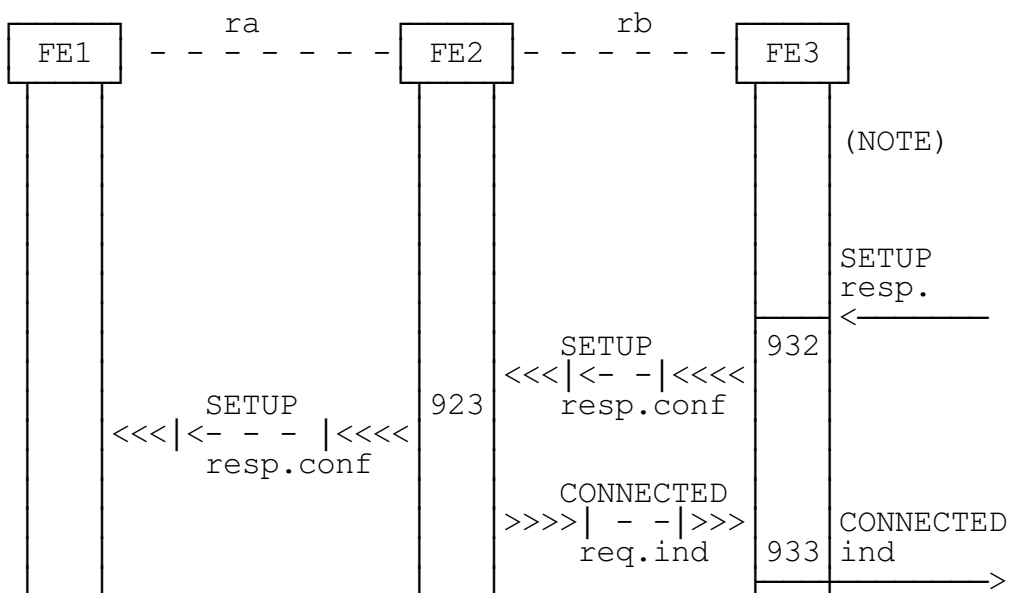


Figure 4: Acceptance of waiting call

NOTE: Subscriber B may either clear the call A-B using the basic call clearing procedures as described in CCITT Recommendation Q.71 [6], or, if the call hold supplementary service is subscribed, may hold the call A-B using the procedures specified in ETS 300 140 [5], subclause 7.1.

7.2 Definition of individual information flows.

7.2.1 Relationship ra

7.2.1.1 Contents of INFORM

The contents of INFORM shall be as shown in table 1.

Table 1

Name	req.ind
Waiting call notification	Optional (NOTE)

NOTE: Mandatory if subscriber B subscribes to "calling user receives notification that their call is waiting", else not provided.

7.2.2 Relationship rb

7.2.2.1 Contents of SETUP

The contents of SETUP shall be as in basic call (defined in CCITT Recommendation Q.71 [6]) and additionally as shown in table 2.

Table 2

Name	req.ind
No information channel	Mandatory

7.2.2.2 Contents of CONNECTED

The contents of CONNECTED shall be as basic call and additionally as shown in table 3.

Table 3

Name	req.ind
Channel ID	Mandatory

- channel number
- exclusive; only the indicated channel is acceptable

8 SDL diagrams for functional entities

The SDLs are provided according to CCITT Recommendation Z.100 [8].

8.1 CW supplementary service functions in FE1

The SDL for FE1 is shown in figure 5.

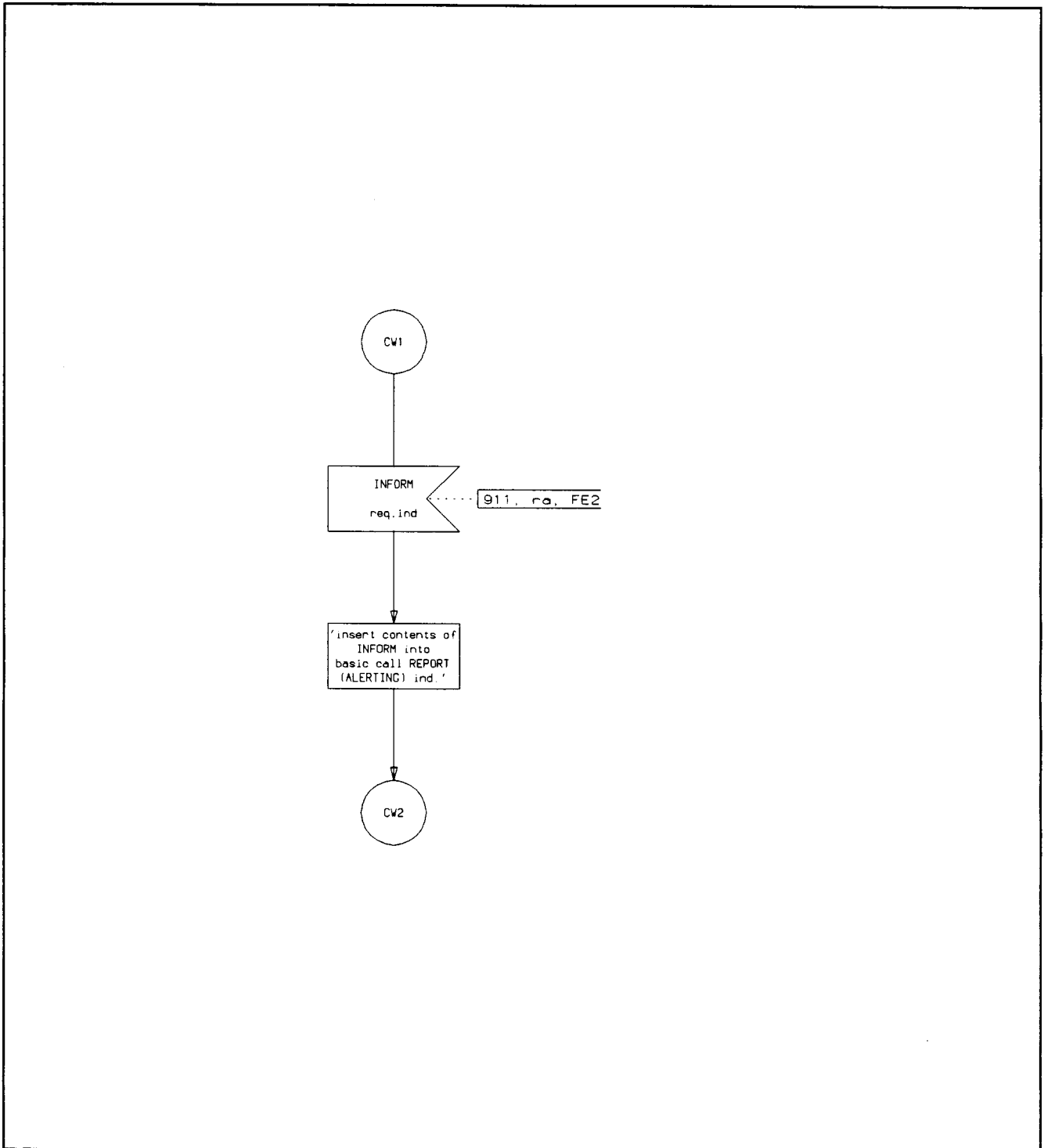


Figure 5

Note to figure 5.

NOTE: CW1 and CW2 break the basic call transition during the CCA-state "1 CALL SENT" after the receipt of REPORT req.ind and prior to the output REPORT ind. (see figure 2-8 (sheet 2 of 11) of CCITT Recommendation Q.71 [6]).

8.2 CW supplementary service functions in FE2

The SDL for FE2 is shown in figure 6.

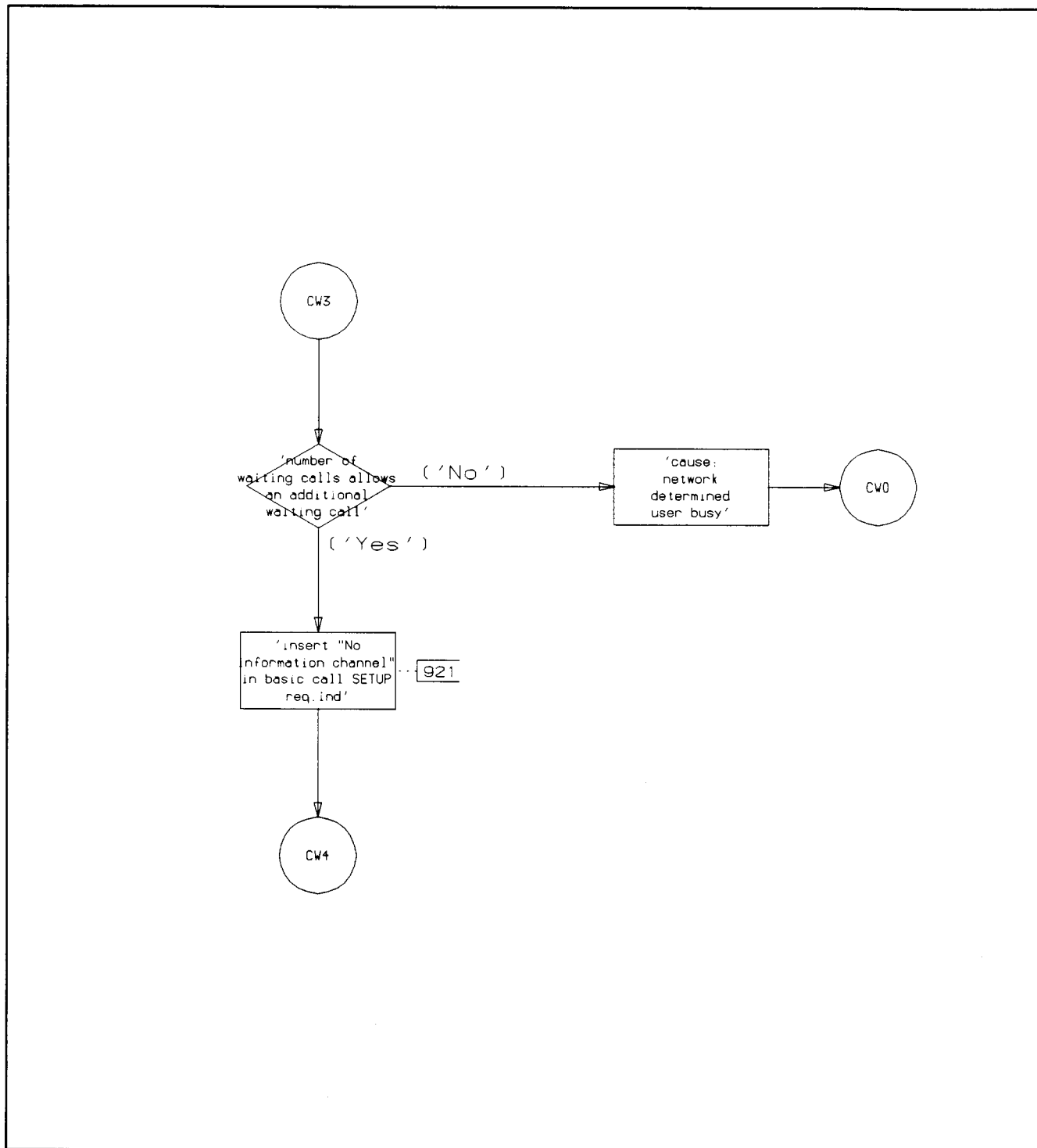


Figure 6 (Sheet 1 of 4)

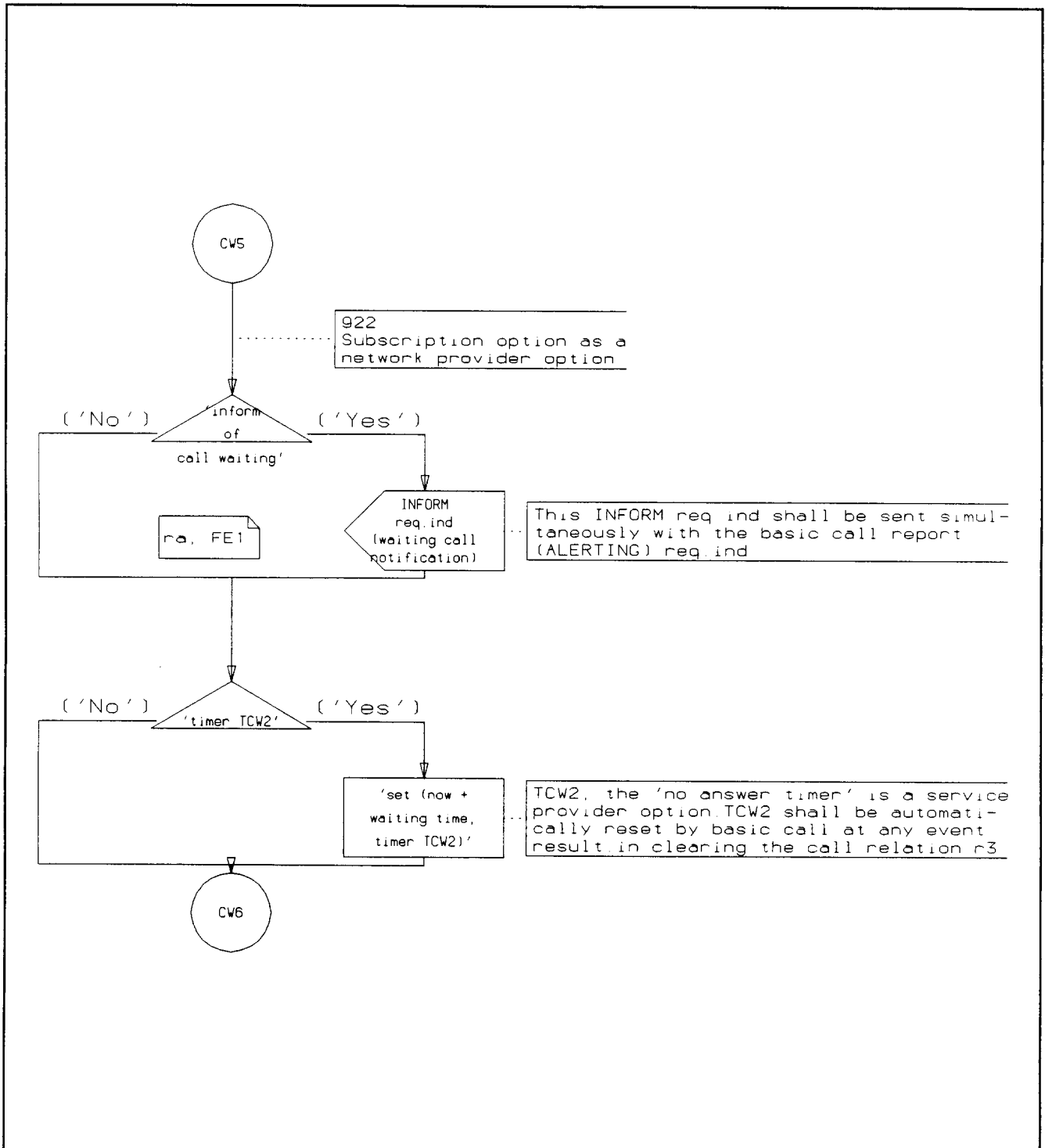


Figure 6 (Sheet 2 of 4)

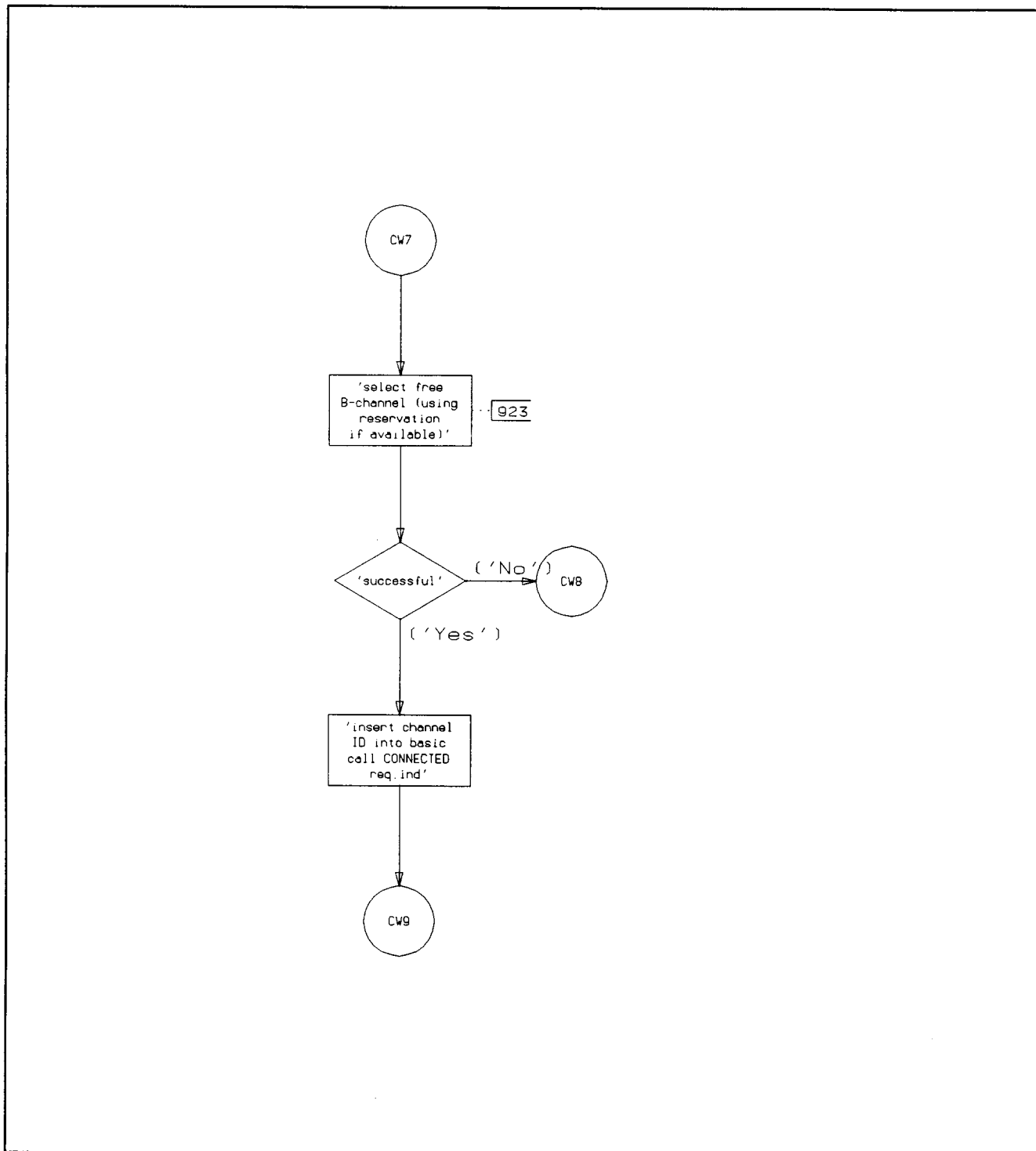


Figure 6 (Sheet 3 of 4)

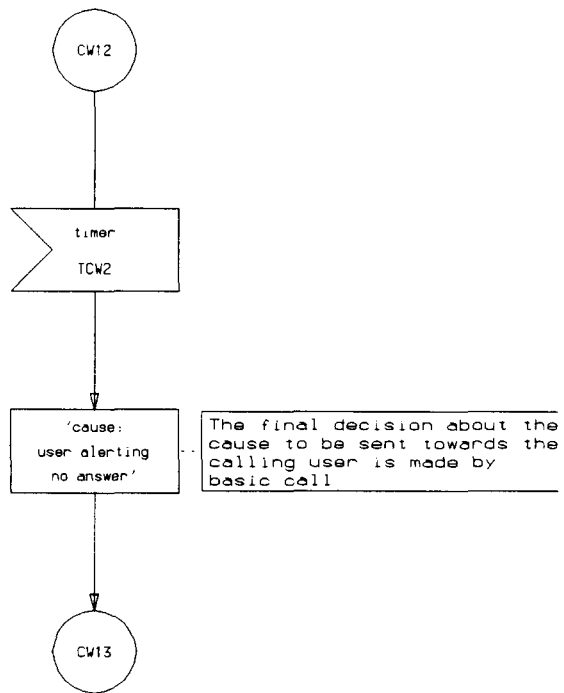


Figure 6 (Sheet 4 of 4)

Notes to figure 6.

NOTE 1: CW3 and CW4 break the basic call transition during FEA241 (see figure 2-9 (Sheet 7 of 19) and FEA241A (see figure 2-9 (Sheet 13 of 19) of CCITT Recommendation Q.71 [6] within the action box "Perform Terminating Screening". On FEA241 the exit CW0 is the entry to a decision of whether supplementary services (other than the CW supplementary service) are provided. On FEA241A it is connected to basic call following the NO branch of the decision "successful".

NOTE 2: CW5 and CW6 break the basic call transition during the basic CC call state 17 CALL SENT (see figure 2-9 (sheet 7 of 19) of CCITT Recommendation Q.71 [6] and state 2 CALL SENT (see figure 2-19 (sheet 14 of 19) of CCITT Recommendation Q.71 [6] at receipt of the first REPORT (ALERTING) req.ind.

NOTE 3: CW7 and CW9 break the basic call transition during the basic CC call state 17 CALL SENT (see figure 2-9 (sheet 8 of 19) of CCITT Recommendation Q.71 [6]), state 2 CALL SENT (see figure 2-9 (sheet 15 of 19) of CCITT Recommendation Q.71 [6] and state 27 r1-r1 CALL SENT (ALERTING) (see figure 2-9 (sheet 16 of 19) of CCITT Recommendation Q.71 [6]) at receipt of SETUP resp.conf prior of sending SETUP resp.conf on r2 and prior of sending CONNECTED req.ind.

NOTE 4: CW 8 leads to the release of the call relation towards that specific user equipment. This would be the same procedural exist of basic call being valid for a call that is not waiting with a non acceptable SETUP resp. The cause is according to the unsuccessful case. (Such an exit, however, is not identified within CCITT Recommendation Q.71 [6])

NOTE 5: CW12, the input "Timer TCW2", breaks the basic call at the same states as CW7.

CW13 reconnects after the input "Timer 1" and before the output "RELEASE req.ind "(see figure 2-9 sheet 8 of 19 of CCITT Recommendation Q.71 [6]).

Normally the expiry of the TCW2 shall lead to call clearing; at interaction with other supplementary services (e.g. call forwarding) other actions may be taken.

8.3 CW supplementary service functions in FE3

The SDL for FE3 is shown in figure 7.

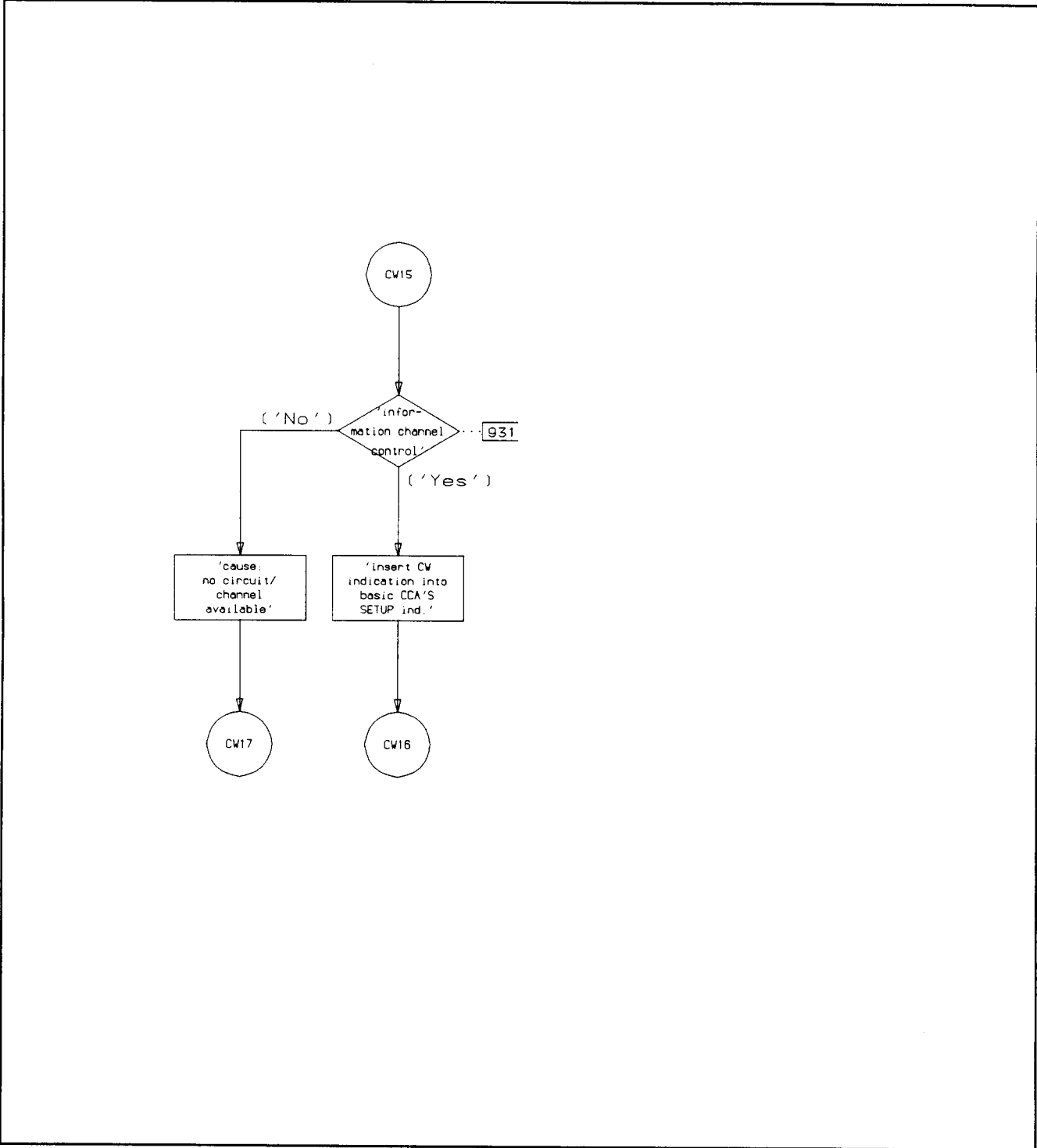


Figure 7 (Sheet 1 of 2)

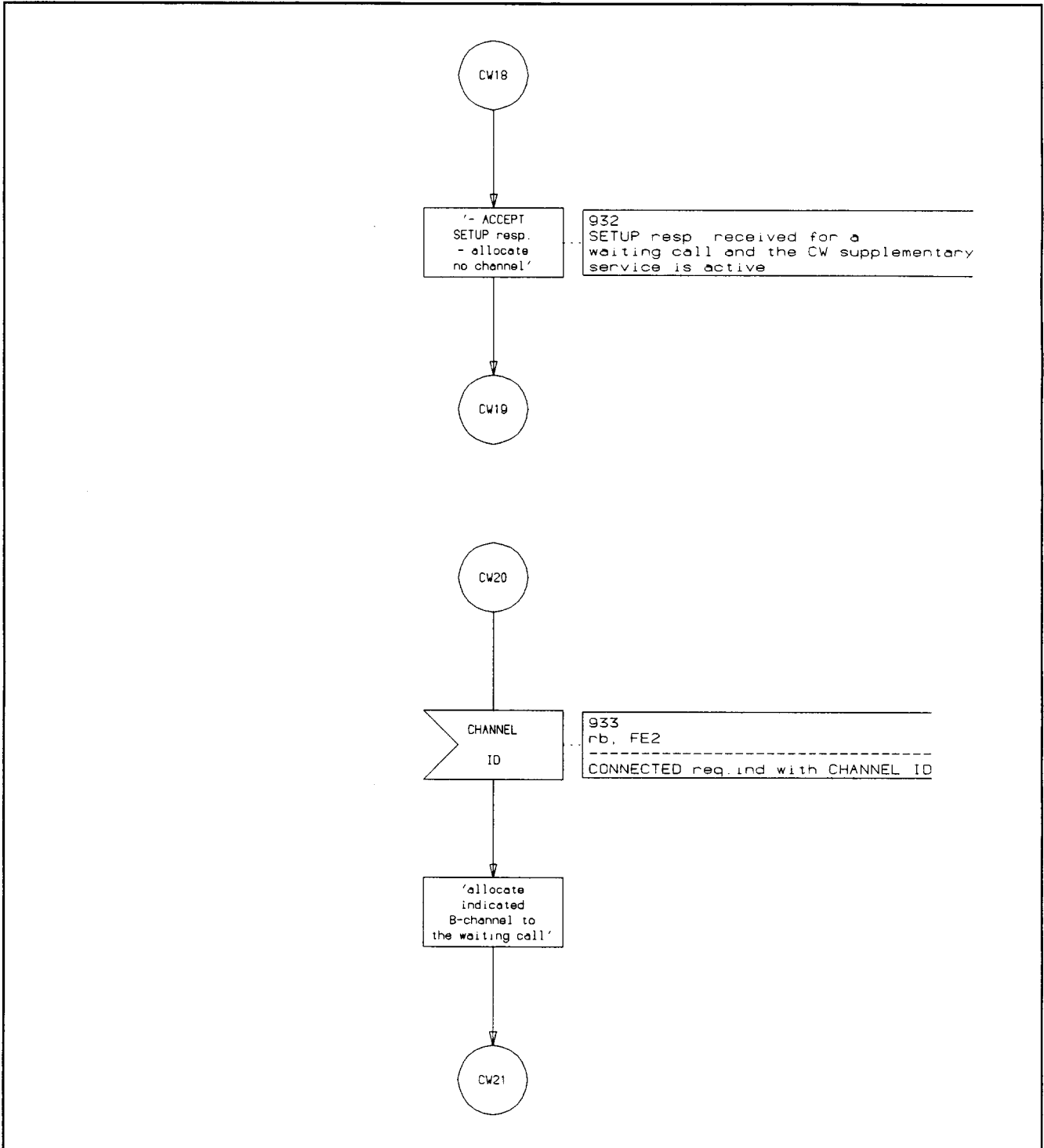


Figure 7 (Sheet 2 of 2)

Notes to figure 7.

- NOTE 1: CW15 and CW16 break the basic call transition during the basic call CCA's FEA251 (see figure 2-8 (sheet 7 of 11) of CCITT Recommendation Q.71 [6]) by following the "Y" branch of the decision "compatible" and prior to sending SETUP ind. and REPORT (alerting) req.ind CW17 is the same exit as if the Process Attempt action failed.
- NOTE 2: CW18 and CW19 break the basic call transition during the basic CCA call state 4 INCOMING SETUP see figure 2-8 (sheet 8 of 11) of CCITT Recommendation Q.71 [6] at receipt of SETUP resp. prior to sending SETUP resp.conf.
- NOTE 3: CW20 and CW21 break the basic call transition during the basic CCA call state 10 AWAIT CONNECTED see figure 2-8 (sheet 8 of 11) of CCITT Recommendation Q.71 [6] at receipt of CONNECTED req.ind prior to the action box FEA252 CONNECT.

9 Functional entity actions (FEAs)

9.1 FEAs of FE1

911: The functional entity shall receive the INFORM req.ind (waiting call notification) and indicate this to the user.

9.2 FEAs of FE2

920: The functional entity shall:

- recognise the CW supplementary service invoked from the basic service;
- check whether the number of waiting calls allows an additional waiting call.

921: The functional entity shall formulate the Channel ID value "no information channel" on receipt of the SETUP req.ind.

922: The functional entity shall:

- check whether the option "information of the calling user about CW" is subscribed. If subscribed it shall send INFORM (Waiting Call notification) req.ind;
- if the service provider option TCW2 is implemented it shall set TCW2.

923: The functional entity shall allocate a B-Channel to the waiting call on receipt of SETUP resp.conf.

9.3 FEAs of FE3

931: The functional entity shall:

- for extended B-Channel selection: accept a call with "no information channel indication";
- indicate this waiting call to the user.

- 932: The functional entity shall accept and transfer the user's SETUP resp. towards CCA.
- 933: The functional entity, for extended B-Channel selection, shall allocate the B-Channel indicated by the CONNECTED information flow to a call offered with "no information channel".

10 Allocation of functional entities to physical locations

The allocations of functional entities for the CW supplementary service are shown in table 1.

Table 1

	FE1	FE2	FE3
Scenario 1	TE	LE	TE
Scenario 2	TE	PTNX	TE
Scenario 3	TE	TE	TE

NOTE 1: FE2 and FE3 are always allocated at opposite ends of the same access, except for scenario 3 where they are collocated.

NOTE 2: In scenario 3 FE2 is not required to support indications specific to this supplementary service as only basic call procedures will apply and FE3 is only required to provide indications to user B.

History

Document history	
May 1992	First Edition
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