INTERNATIONAL TELECOMMUNICATION UNION

CCITT Q.83

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN

STAGE 2 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES SECTION 1 – CALL WAITING (CW) SECTION 4 – TERMINAL PORTABILITY

Modifications and addenda to:
Recommendation Q.83

Geneva, 1991

FOREWORD

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Recommendation Q.83, §§ 1 and 4 was prepared by Study Group XI and was approved under the Resolution No. 2 procedure on the 10th of September 1991.

CCITT NOTE

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

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Recommendation Q.83

STAGE 2 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES

(revised 1991)

1 Call waiting (CW)

1.1 *Scope*

This Recommendation defines the stage 2 of the integrated services digital network (ISDN) as provided for the call waiting (CW) supplementary service. Stage 2 identifies the functional capabilities and the information flows needed to support the service description. The stage 2 description also identifies user operations not directly associated with a call (see Rec. I.130 [1]).

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

This Recommendation 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 Recommendation does not specify the requirements where the service is provided to the user via a private ISDN. This Recommendation 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 Recommendation 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 subscriber to be notified 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 meaningful when applied to other services.

This Recommendation is applicable to the stage 3 Recommendations for the ISDN CW supplementary service. The term "stage 3" is also defined in Recommendation I.130 [1].

1.2 *References*

The references are cited at the appropriate places in the text and the publications are listed hereafter. Dated references, subsequent amendments to or revisions of any of these publications apply to this Recommendation only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] CCITT Rec. I.130 – *Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN*, 1988.

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

[3] CCITT Rec. I.253.1 – *Call Waiting (CW) supplementary service*.

[4] CCITT Rec. I.112 – *Vocabulary of terms for ISDNs*, 1988.

[5] CCITT Rec. Q.83.2 – *Call Hold (CH) supplementary service*.

[6] CCITT Rec. Q.71 – *ISDN 64 kbit/s circuit mode switched bearer services*, 1988.

[7] CCITT Rec. I.210 – *Principles of telecommunications services supported by an ISDN and the means used to describe them*, 1988.

Editor's note – References [3] and [5] will become dated references to the next published versions of these Recommendations. The titles may need subsequent amendments.

1.3 Definitions

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

integrated services digital network (ISDN)

See definition 308 of § 2.3 of Recommendation I.112 [4].

service: telecommunications service

See definition 201 of § 2.2 of Recommendation I.112 [4].

supplementary service

See § 2.4 of Recommendation I.210 [7].

subscriber B

Subscriber B is the subscriber who is provided by the network with the CW supplementary service on a particular interface.

user B

User B is the one user who reacts to the call waiting at subscriber B.

user C

User C is the user who has originated a call to subscriber B which causes the CW supplementary service to be invoked.

user A

User A is a user who is engaged in a call with user B (this call can be in any state).

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.

1.4 *Symbols and abbreviations*

CC Call control

CCA Call control agent

CW Call Waiting

FE Functional entity

FEA Functional entity action

ISDN Integrated services digital network

LE Local exchange

PNX Private network exchange

SDL Specification and description language

1.5 Description

Not applicable.

1.6 *Derivation of the functional model*

1.6.1 *Functional model description*

The functional model for the CW supplementary service shall be as shown in Figure 1-1/Q.83.

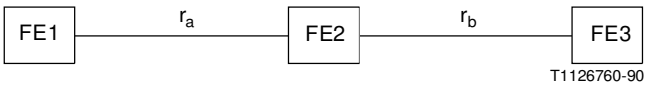


FIGURE 1-1/Q.83

Functional model

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.

1.6.3 *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 1-2/Q.83.

Note – The basic call model is defined in § 2.1 of Recommendation Q.71 [6], with the exception that r_1 represents an outgoing call relationship from a CCA and r_3 represents an incoming call relationship to a CCA.

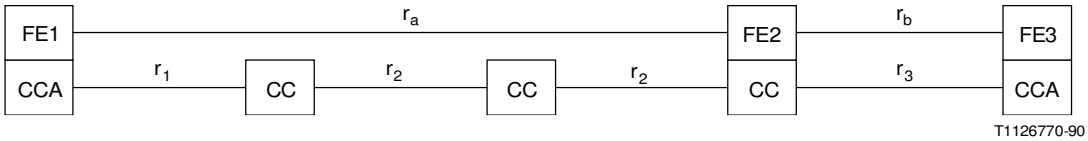


FIGURE 1-2/Q.83

Relationship of functional model with a basic call

1.7 *Information flow*

1.7.1 *Information flow diagrams*

Figures 1-3/Q.83 and 1-4/Q.83 show the information flows for a successful waiting call.

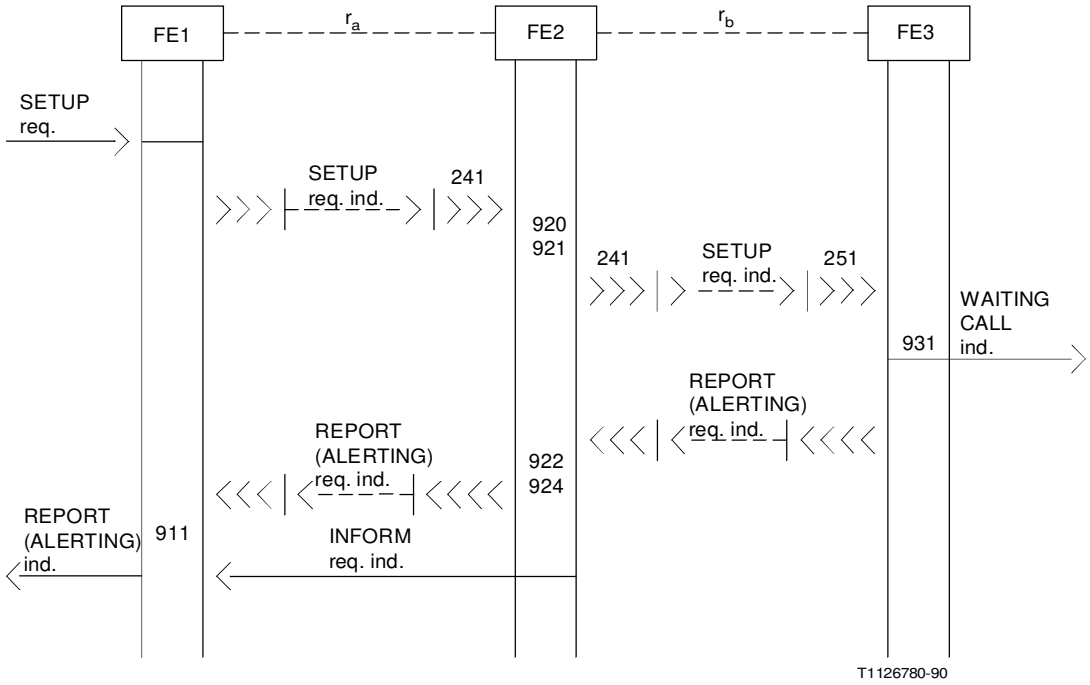
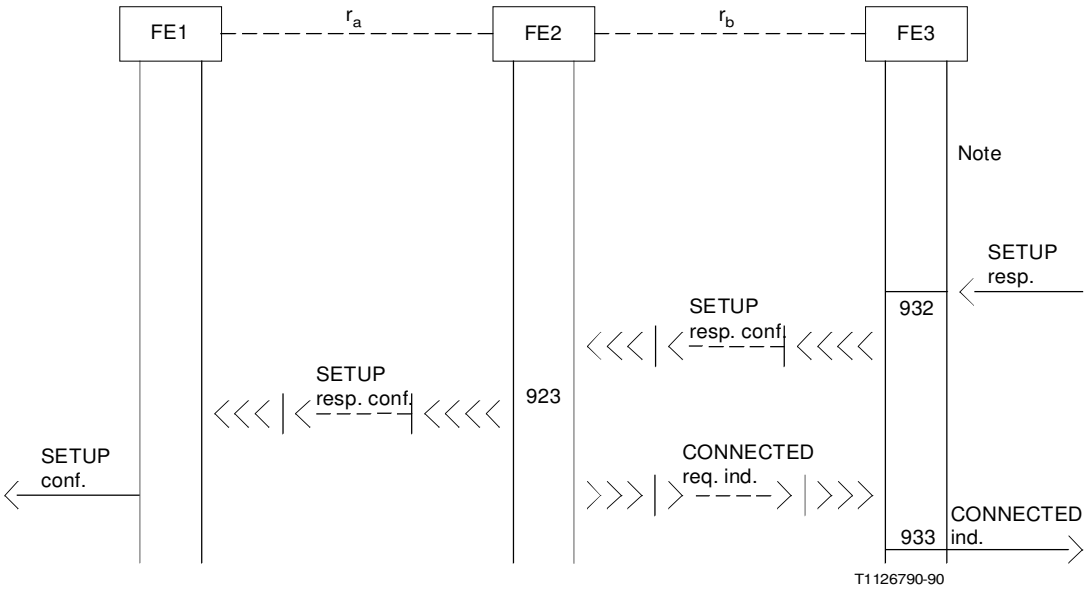


FIGURE 1-3/Q.83

Notification of waiting call



Note – Subscriber B may either clear the call A-B using the basic call clearing procedures as described in Recommendation Q.71 [6], or if the call hold supplementary service is subscribed, may hold the call A-B using the procedures specified in [5].

FIGURE 1-4/Q.83

Call waiting acceptance

1.7.2 *Definition of individual information flows*

1.7.2.1 *Relationship r_a*

1.7.2.1.1 *Contents of INFORM*

The contents of INFORM shall be as shown in Table 1-1/Q.83.

TABLE 1-1/Q.83

INFORM contents

Name	Req. ind.
Waiting call notification	Optional (Note)

Note – Mandatory if subscriber B subscribes to "calling user receives notification that his call is waiting", otherwise not provided.

1.7.2.2 *Relationship r_b*

1.7.2.2.1 *Contents of SETUP*

The contents of SETUP shall be as basic call and additionally as shown in Table 1-2/Q.83.

TABLE 1-2/Q.83

SETUP contents

Name	Req. ind.
No information channel	Mandatory

1.7.2.2.2 *Contents of CONNECTED*

The contents of CONNECTED shall be as basic call and additionally as shown in Table 1-3/Q.83.

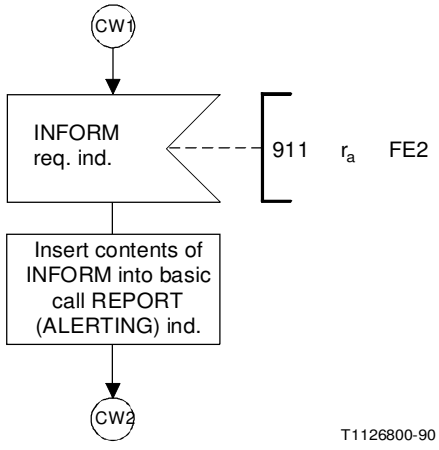
TABLE 1-3/Q.83

CONNECTED contents

Name	Req. ind.
Channel ID – channel number – exclusive; only the indicated channel is acceptable	Optional (Note)

Note – The channel identification is normally required. As a network option, the channel identification is not included if the user had responded with an exclusive channel identification. In this case, the terminal must connect to the last B-channel indicated to the network.

1.8 *SDL diagrams for functional entities*



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 Recommendation Q.71 [6].

FIGURE 1-5/Q.83

CW – FE1

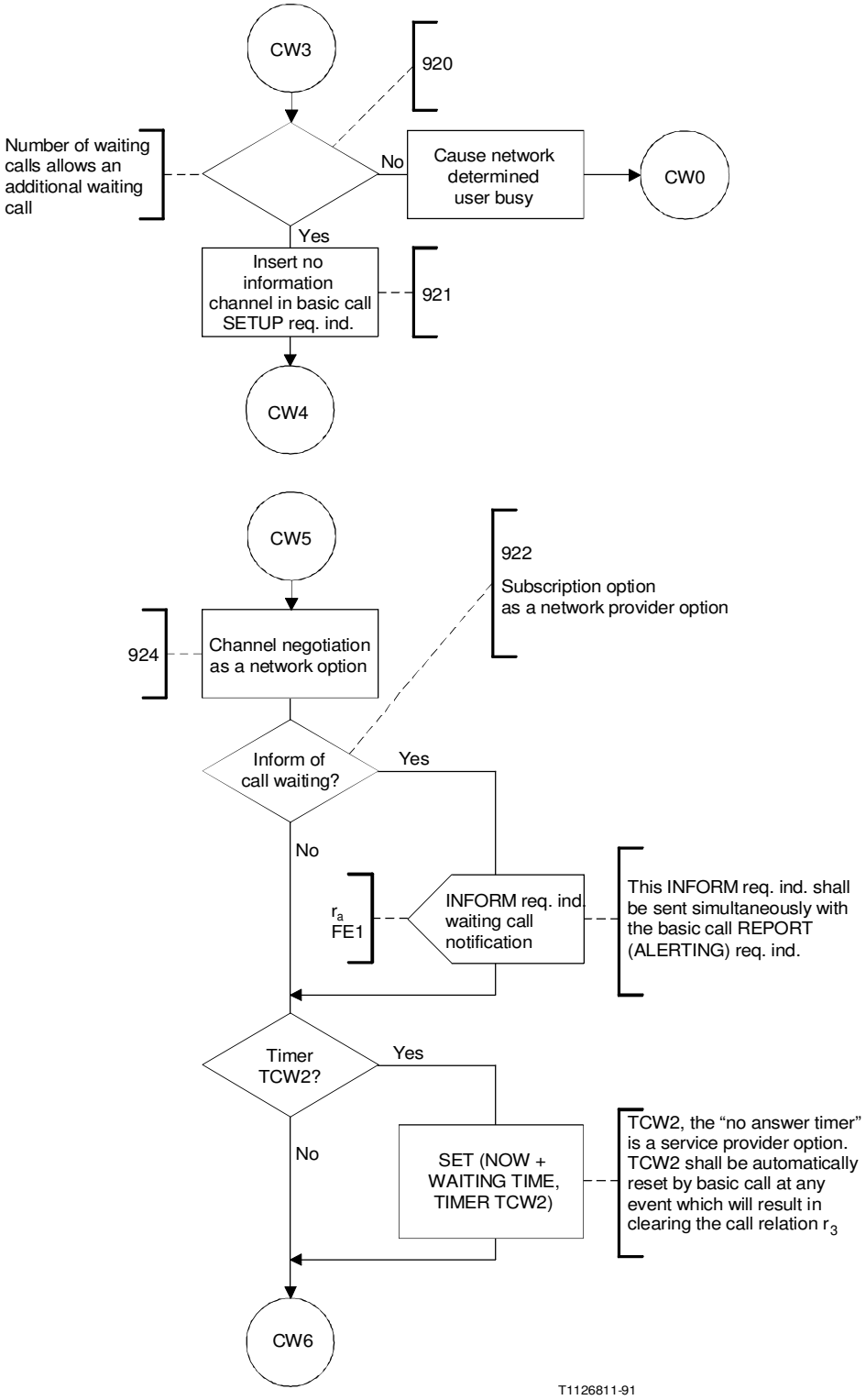
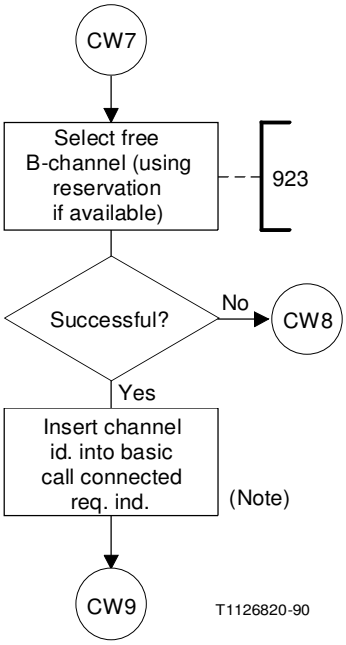


FIGURE 1-6/Q.83 (sheet 1 of 3)

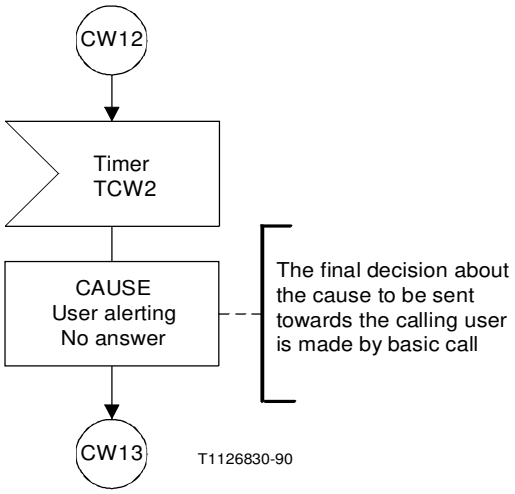
CW – FE2



Note – The channel identification is normally required. As a network option, the channel identification is not included if the user had responded with an exclusive channel identification. In this case, the terminal must connect to the last B-channel indicated to the network.

FIGURE 1-6/Q.83 (sheet 2 of 3)

CW – FE2



Note 1 – CW3 and CW4 break the basic call transition during FEA 241 (see Figure 2-9 (sheet 7 of 19)) and FEA 241A (see Figure 2-9 (sheet 13 of 19) of Recommendation Q.71 [6]) within the action box "perform terminating screening". The conditions for basic call to invoke CW are as defined in Recommendation I.253.1 [3]. The exit CW0 is the entry of a decision of whether supplementary services (other than the CW supplementary service) are provided.

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 Recommendation Q.71 [6]) and state 2 CALL SENT (see Figure 2-9 (sheet 14 of 19) of 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 Recommendation Q.71 [6]), state 2 CALL SENT (see Figure 2-9 (sheet 15 of 19) of Recommendation Q.71 [6]) and state 27 r_1-r_1 CALL SENT (ALERTING) (see Figure 2-9 (sheet 16 of 19) of Recommendation Q.71 [6]) at receipt of SETUP resp. conf. prior to sending SETUP resp. conf. on r_2 and prior to sending CONNECTED req. ind.

Note 4 – CW8 leads to the release of the call relation towards that specific user equipment. This would be the same procedural exit 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 Recommendation Q.71 [6].)

Note 5 – The exit point to CW12 is within the same basic CC call state as for CW7, CW13: normally the expiry of TCW2 shall lead to call clearing; at interaction with other supplementary services (e.g. Call Forwarding) other actions may be taken.

FIGURE 1-6/Q.83 (sheet 3 of 3)

CW – FE2

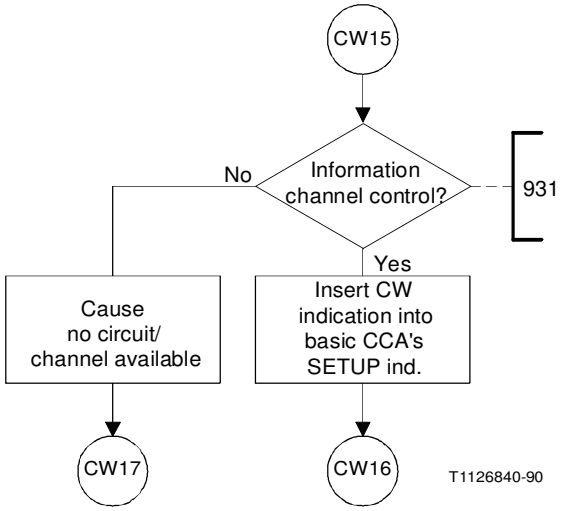
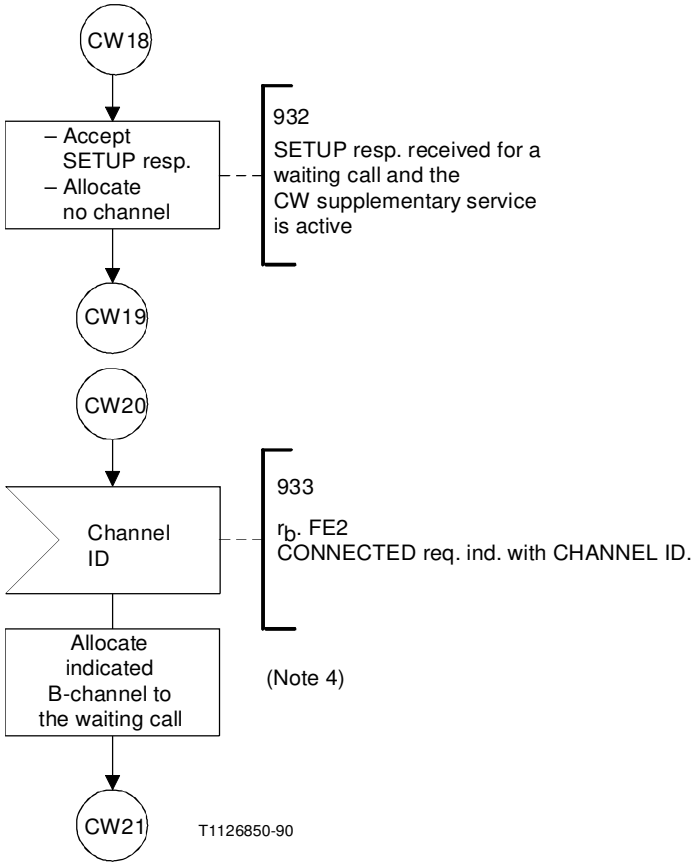


FIGURE 1-7/Q.83 (sheet 1 of 2)

CW – FE3



Note 1 – CW15 and CW16 break the basic call transition during the basic call CC's FEA 251 (see Figure 2-8 (sheet 7 of 11) of 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 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 Recommendation Q.71 [6]) at receipt of CONNECTED req. ind. prior to the action box FEA 252 CONNECT.

Note 4 – The channel identification is normally required. As a network option, the channel identification is not included if the user had responded with an exclusive channel identification. In this case, the terminal must connect to the last B-channel indicated to the network.

FIGURE 1-7/Q.83 (sheet 2 of 2)

CW – FE3

1.9 *Functional entity actions (FEAs)*

1.9.1 *FEAs of FE1*

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

1.9.2 *FEAs of FE2*

920: The functional entity shall:

– recognize 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.

924: If the channel identification received from FE3 indicates “exclusive” the channel may be reserved as a network option.

1.9.3 *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”.

Note – The channel identification is normally required. As a network option, the channel identification is not included if the user had responded with an exclusive channel identification. In this case, the terminal must connect to the last B-channel indicated to the network.

1.10 *Allocation of functional entities to physical locations*

The allocations of functional entities for the CW supplementary service are shown in Table 1-4/Q.83.

TABLE 1-4/Q.83

	FE1	FE2	FE3
Scenario 1	TE	LE	TE
Scenario 2	TE	PNX	TE

Note – FE2 and FE3 are always allocated at opposite ends of the same acces.

4 Terminal portability

4.1 *Scope*

This Recommendation defines the stage 2 of the integrated services digital network (ISDN) as provided by telecommunications operators for the Terminal Portability (TP) supplementary service. Stage 2 identifies the functional capabilities and the information flows needed to support the service as description. 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].

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

The TP supplementary service allows a user to move a terminal from one socket to another within one given basic access during the active state of a call.

The portability of a terminal during the idle state is part of the basic access capabilities and does not require any procedure.

The portability of a terminal in the call establishment and in the call clearing phases is not possible.

The TP supplementary service applies to some interactive telecommunication services requiring the attendance of a human being, such as telephony, videotelephony, etc.

However, the network will not take any action to restrict its applicability.

The relative terminals should provide at the man/machine interface the capabilities for:

– suspension of the call(s);

– resumption of the call(s);

– indication of the phase of the call(s) (i.e. active phase and suspended phase) as long as the terminal remains plugged in.

The TP supplementary service does not apply to non-interactive services such as facsimile, teletex, mixed-mode, computer communication, etc. The relative terminals should not provide for the above mentioned capabilities.

It is a user's responsibility to resume the call with a terminal which is compatible both with the remote terminal and with the type of connection previously established.

This Recommendation is applicable to the stage 3 Recommendations for the ISDN integrated services digital network TP supplementary service. The term “stage 3” is also defined in Recommendation I.130 [1]. Where the text indicates the status of a requirement, i.e. as a strict command or prohibition, as authorization leaving freedom, as a capability or possibility, this shall be reflected in the text of the relevant stage 2 and stage 3 Recommendations.

Furthermore, conformance to this Recommendation is met by conforming to the stage 3 Recommendations with the field of application appropriate to the equipment being implemented. Therefore no method of testing is provided for this Recommendation.

4.2 *References*

The references are cited at the appropriate places in the text and the publications are listed hereafter.

[1] CCITT Rec. I.130 – *Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN*, 1988.

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

[3] CCITT Rec. Q.9 – *Vocabulary of switching and signalling terms*, 1988.

[4] CCITT Rec. I.112 – *Vocabulary of terms for ISDNs*, 1988.

[5] CCITT Rec. Q.71 – *ISDN 64 kbit/s circuit mode switched bearer services*, 1988.

[6] CCITT Rec. I.210 – *Principles of telecommunication services supported by an ISDN and the means used to describe them*, 1988.

[7] CCITT Rec. I.251 – *Number identification supplementary services*, 1988.

4.3 *Definition*

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

integrated services digital network (ISDN)

See definition 308 of § 2.3 of Recommendation I.112 [4].

service: telecommunication service

See definition 201 of § 2.2 of Recommendation I.112 [4].

supplementary service

See § 2.4 of Recommendation I.210 [6].

basic access

See definition 1551 of § 1 of Recommendation Q.9 [3].

4.4 *Symbols and abbreviations*

CC	Call control
CCA	Call control agent
FE	Functional entity
FEA	Functional entity action
ISDN	Integrated services digital network
LE	Local exchange
PNX	Private network exchange
SDL	Specification and description language
TE	Terminal equipment
TP	Terminal portability

4.5 *Description*

The description for this service can be found in § 8 of Recommendation I.251 [7].

4.6 *Derivation of the functional model*

4.6.1 *Functional model description*

The functional model for the TP supplementary service is shown in Figure 4-1/Q.83.

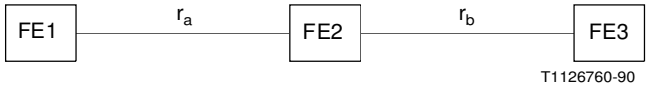


FIGURE 4-1/Q.83

Functional model

4.6.2 *Description of the functional entities*

The functional entities required by the TP supplementary service above those of the basic call shall be as follows:

FE1: served user's service agent;

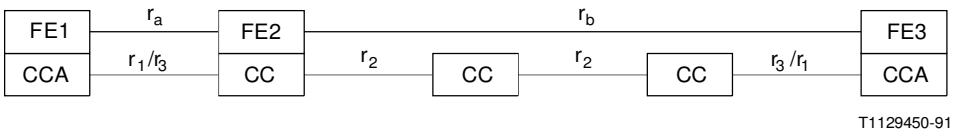
FE2: TP service control entity;

FE3: remote user's service agent.

4.6.3 Relationship with a basic service

The relationship with a basic service is shown in Figure 4-2/Q.83. The model for basic call handling is defined in Recommendation Q.71 [5].

Note – The basic call model is defined in § 2.1 of Recommendation Q.71 [5], with the exception that r_1 represents an outgoing call relationship from a CCA and r_3 represents an incoming call relationship to a CCA.



Note – The service is applicable to both incoming and outgoing calls

FIGURE 4-2/Q.83

Relationship with a basic service

4.7 *Information flows*

4.7.1 *Information flow diagrams*

The information flows for the TP supplementary service are shown in Figure 4-3/Q.83 and Figure 4-4/Q.83.

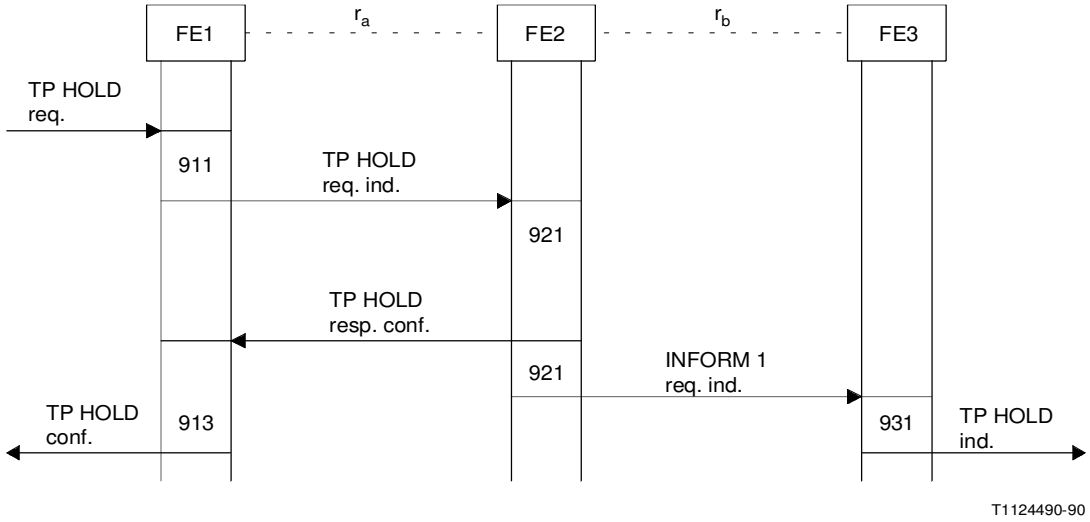


FIGURE 4-3/Q.83

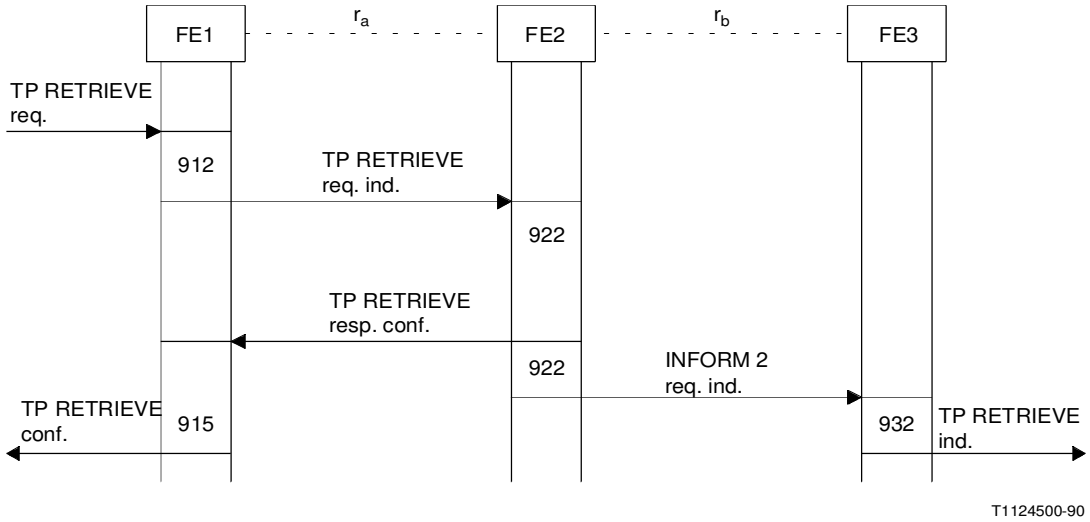


FIGURE 4-4/Q.83

Figure 4-3/Q.83 shows the progression from an active call established from A to B through to call A to B on hold. Figure 4-4/Q.83 shows the progression from call A to B on hold through to an active call established from A to B.

4.7.2 *Definition of the individual information flows*

The contents of the information flows (see Figure 4-3/Q.83) specific to the TP supplementary service are given in the paragraphs below.

4.7.2.1 *Relationship r_a*

4.7.2.1.1 *Contents of TP HOLD*

The contents of TP HOLD are shown in Table 4-1/Q.83.

TABLE 4-1/Q.83

Parameter	Req. ind.	Resp. conf.
Call identity	Optional	

4.7.2.1.2 *Contents of TP RETRIEVE*

The contents of TP RETRIEVE are shown in Table 4-2/Q.83.

TABLE 4-2/Q.83

Parameter	Req. ind.	Resp. conf.
Call identity Channel identity	Optional	 Mandatory

4.7.2.1.3 *Contents of TP HOLD REJECT*

The contents of TP HOLD REJECT are shown in Table 4-3/Q.83.

TABLE 4-3/Q.83

Parameter	Req. ind.
Reject reason	Mandatory

4.7.2.1.4 *Contents of TP RETRIEVE REJECT*

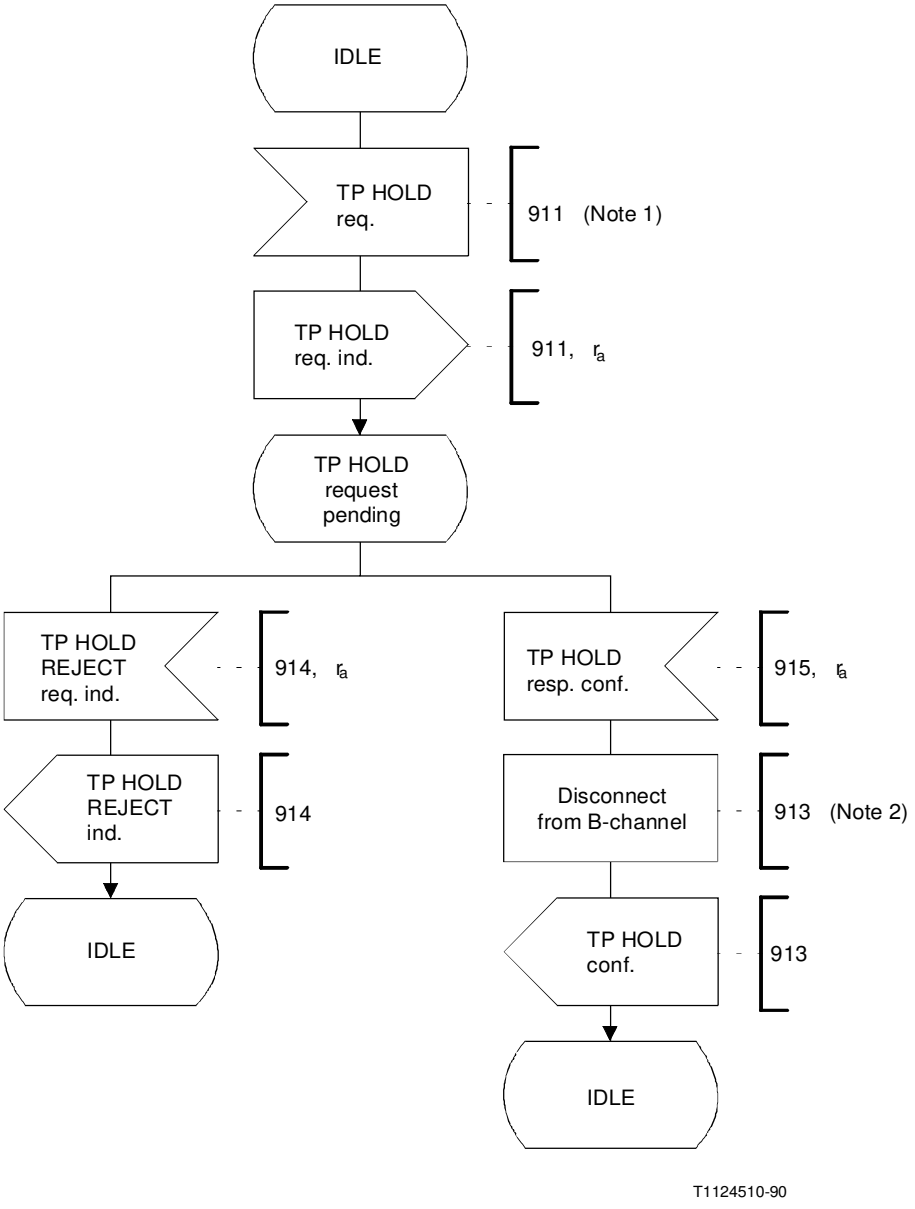
The contents of TP RETRIEVE REJECT are shown in Table 4-4/Q.83.

TABLE 4-4/Q.83

Parameter	Req. ind.
Reject reason	Mandatory

4.7.2.2 *Relationship r_b*

There are no parameters included in INFORM 1 and INFORM 2.

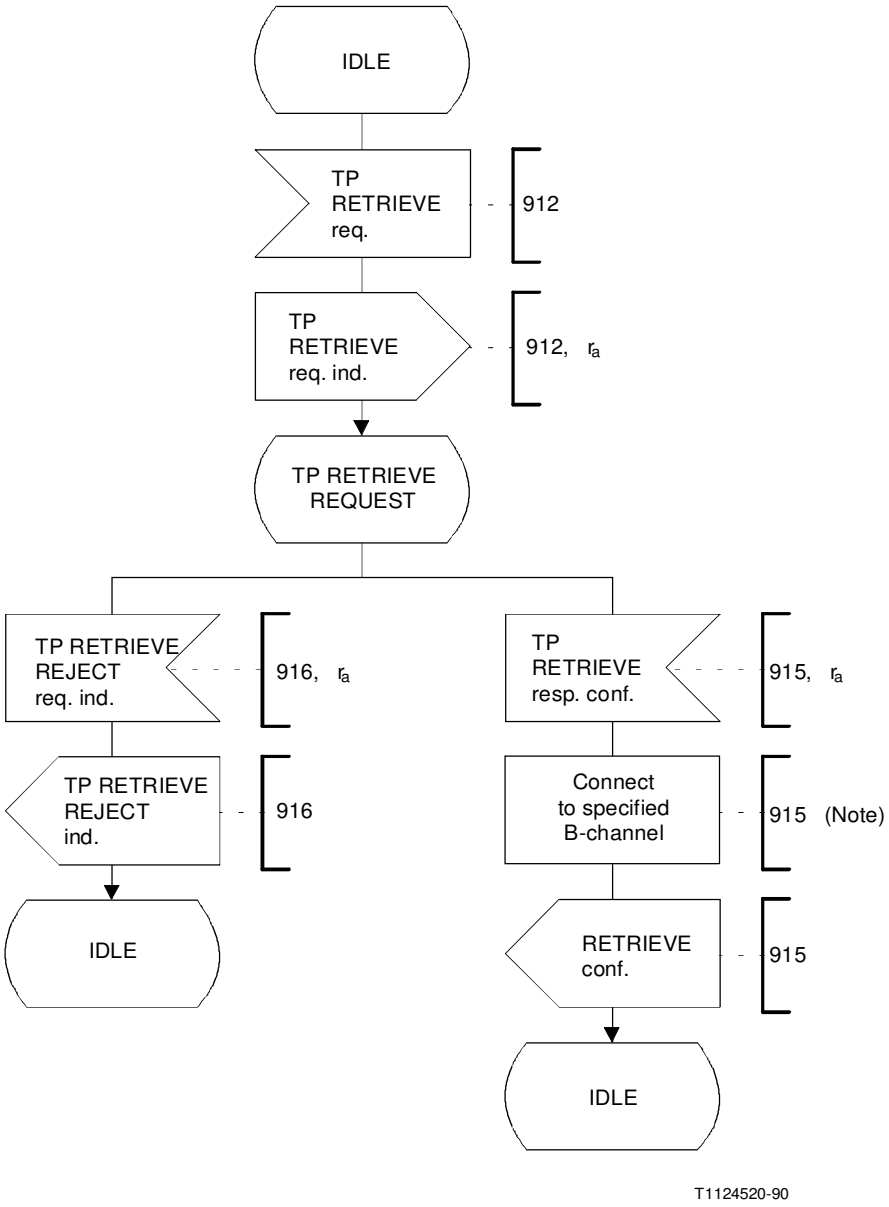


Note 1 – TP HOLD can only be requested when the basic call is in the active state.

Note 2 – The terminal associated with the call now held enters the basic call idle state.

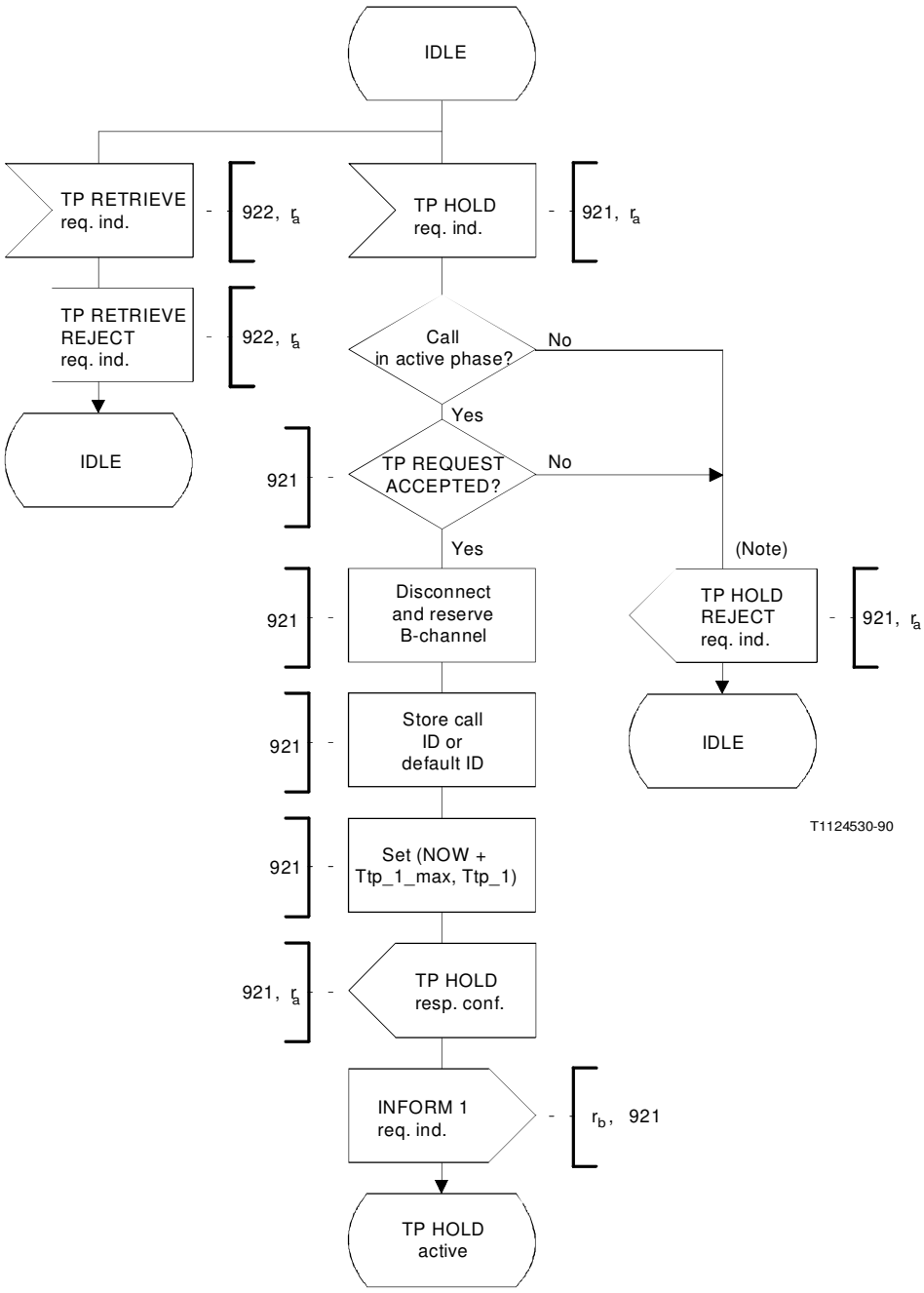
FIGURE 4-5/Q.83

TP supplementary service FE1 functions



Note – The terminal receiving the «retrieve confirmed» enters the basic call «active» state.

FIGURE 4-6/Q.83
Terminal portability FE1 functions



Note – The following interactions with other services will cause rejection of a TP hold request:

– call waiting in operation;

– request made to TP hold an already waiting call;

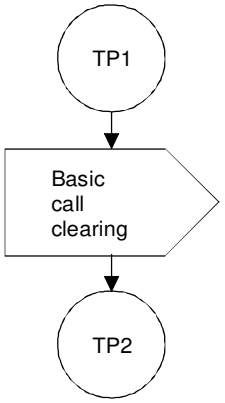
– request made to TP hold a call on hold;

– terminal managing an add-on conference;

– serviced user is already a served user for the three party (3PTY) supplementary service.

FIGURE 4-7/Q.83

TP supplementary service FE2 functions



Note – TP1 breaks basic call transitions:

– following the receipt of "DISCONNECT req. ind." and "RELEASE req. ind." (see figure 2-9/Q.71 (sheet 5 of 19) of Recommendation Q.71 [5], following the state "14 r_1-r_2ACTIVE". TP2 connects at the same point, and

– following the receipt of "DISCONNECT req. ind." and "RELEASE req. ind." (see figure 2-9/Q.71 (sheet 9 of 19) of Recommendation Q.71 [5], following the state "22 r_2-r_1 ACTIVE". TP2 connects at the same point.

FIGURE 4-8/Q.83

Hooks to basic call for FE2

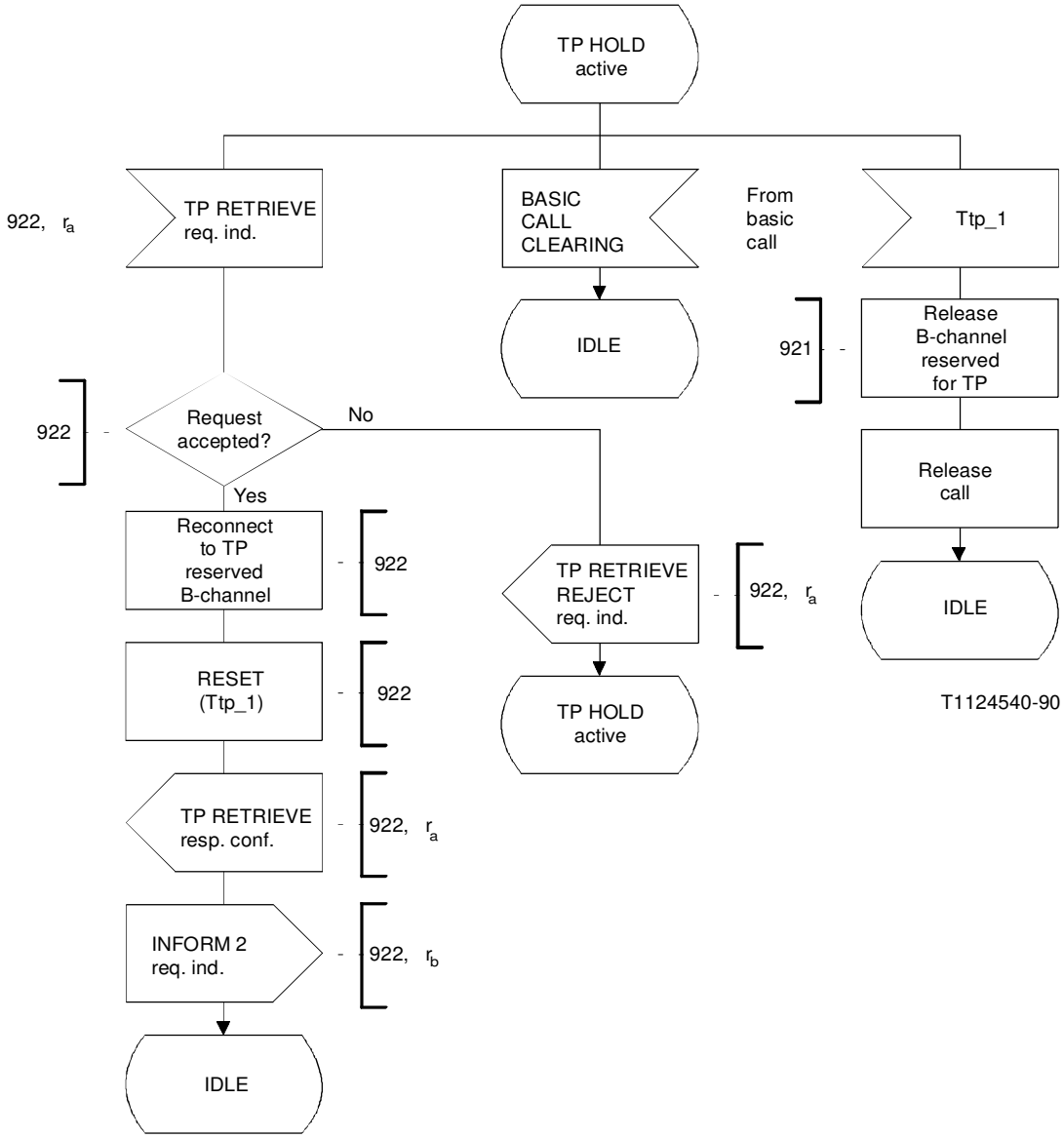


FIGURE 4-9/Q.83

TP supplementary service FE2 functions

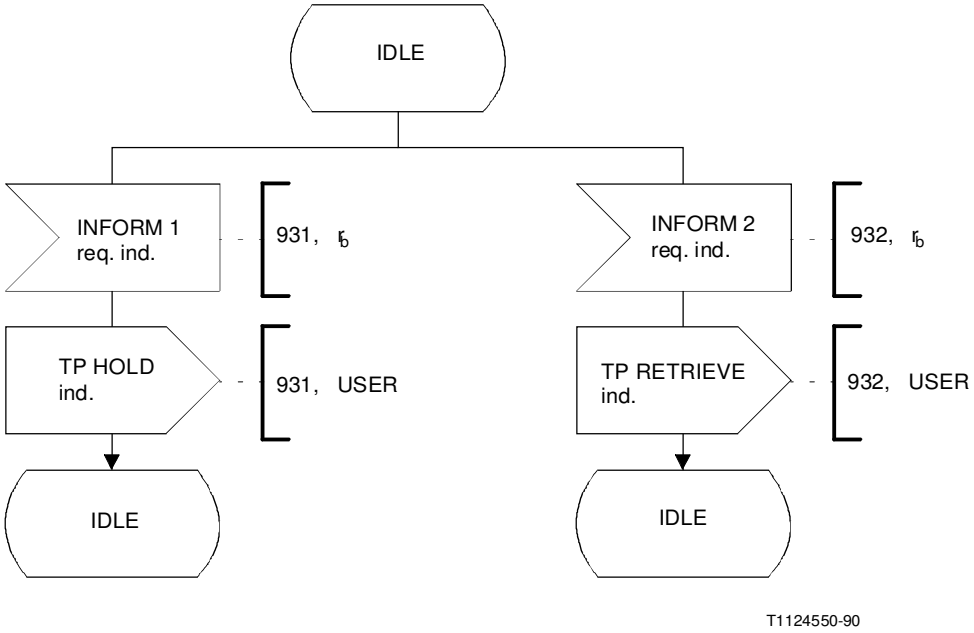


FIGURE 4-10/Q.83

TP supplementary service FE3 functions

4.9 *Functional entity actions (FEAs)*

4.9.1 *FEAs of FE1*

911: The functional entity shall recognize the user's request for terminal portability hold and, when provided by the user, shall accept an identity to identify the call for future terminal portability retrieval.

The functional entity shall generate a request to the network for terminal portability hold and, when provided by the user, shall forward the identity to enable future terminal portability retrieval.

912: The functional entity shall recognize the user's request for terminal portability retrieve for a call which had previously been held and, when provided, shall accept the user provided identity of the call on hold.

The functional entity shall generate a request to the network for terminal portability retrieve and, when provided by the user, shall forward the identity to enable future terminal portability retrieval.

913: The functional entity shall accept the TP HOLD resp. conf. from FE2; release the call from the indicated channel and send TP HOLD conf. to the served user.

914: The functional entity shall accept the TP HOLD REJECT req. ind. and send TP HOLD REJECT ind. to the served user.

915: The functional entity shall accept the TP RETRIEVE resp. conf. from FE2, connect the call to the indicated channel and send TP RETRIEVE conf. to the served user.

916: The functional entity shall accept the TP RETRIEVE REJECT req. ind. and shall send TP RETRIEVE REJECT ind. to the served user.

4.9.2 *FEAs of FE2*

921: The functional entity shall receive the terminal portability hold request from FE1, and shall confirm acceptance or indicate rejection. If the request is accepted, it shall:

– interrupt the existing call;

– reserve the resources used on that connection for a network operator specified time;

– notify the remote user's service agent that the call has been placed on terminal portability hold;

– assign the identity of the call to the identity provided by the served user's service agent or allocate the call a null value if none was received;

– start TP HOLD timer (Ttp_1).

922: The functional entity shall receive the terminal portability retrieve request from FE1 and validate the request. If the request is accepted it shall:

– re-establish the connection identified by FE1, or, in the absence of an identity from the served user's service agent, it shall use the default null value, over the reserved resources;

– notify the remote user's service agent that the call has been re-established;

– confirm the re-establishment of the connection to the controlling user;

– stop TP HOLD timer.

If the request for terminal portability retrieve is invalid the functional entity shall inform FE1.

4.9.3 *FEAs of FE3*

931: The functional entity shall accept the terminal portability hold notification and relay it to the non-served user.

932: The functional entity shall accept the terminal portability retrieve notification and relay it to the non-served user.

4.10 *Allocation of functional entities to physical localities*

The possible physical locations of functional entities are shown in Table 4-5/Q.83.

TABLE 4-5/Q.83

	FE1	FE2	FE3
Scenario 1	TE	LE	TE
Scenario 2	TE	PNX	TE

Note – These allocations constrain FE1 and FE2 to be at opposite ends of a basic call (r_1 or r_3) relationship.