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DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1

STAGE 3 DESCRIPTION FOR SUPPLEMENTARY SERVICES USING DSS 1

STAGE 3 DESCRIPTION FOR COMMUNITY OF INTEREST SUPPLEMENTARY SERVICES USING DSS 1

CLAUSE 3 – MULTI-LEVEL PRECEDENCE AND PREEMPTION (MLPP)

ITU-T Recommendation Q.955

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. 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, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation Q.955, clause 3, was prepared by the ITU-T Study Group XI (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 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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STAGE 3 DESCRIPTION FOR "COMMUNITY OF INTEREST" SUPPLEMENTARY SERVICES, USING DSS 1

(Helsinki 1993)

3 Multi-level precedence and preemption (MLPP)

3.1 Definition

The Multi-level Precedence and Preemption (MLPP) supplementary service provides prioritized call handling service. This supplementary service has two parts – precedence and preemption. Precedence involves assigning a priority level to a call. Preemption involves the seizing of resources, which are in use by a call of a lower precedence, by a higher level precedence call in the absence of idle resources. Users in networks that do not support this service will not be affected by this service.

The stage 1 description of the MLPP supplementary service is contained in 3/I.255.

The stage 2 description of the MLPP supplementary service is contained in 3/Q.85.

3.2 Description

3.2.1 General description

The MLPP supplementary service is provided as a network provider's option to a domain of a network. The domain can be the whole network or a subset of the network. The MLPP supplementary service applies to all network resources in the domain that are in common use. The maximum precedence level of a subscriber is set at the subscription time by the service provider based on the subscriber's need. The subscriber may select a precedence level up to and including the maximum subscribed to precedence level on a per call basis.

Precedence calls (calls using the MLPP supplementary service that have a higher precedence than the lowest level of precedence) that are not responded to by the called party (e.g. call unanswered and/or unacknowledged, called party busy with call of equal or higher precedence, or called party busy and non-preemptable) are diverted to a predetermined alternate party. This alternate party may be another subscriber or a network operating position.

Preemption may take one of two forms. First, the called party may be busy with a lower precedence call which must be preempted in favor of completing the higher precedence call from the calling party. Second, the network resources may be busy with calls some of which are of lower precedence than the call requested by the calling party. One or more of these lower precedence calls must be preempted to complete the higher precedence call. There are three characteristics of preemption:

1) Any party whose connection was terminated (whether that resource is reused or not) must receive a distinctive preemption notification.

2) Any called party of an active call that is being preempted by a higher precedence call should be required to acknowledge the preemption before being connected to the new calling party.

3) When there are no idle resources, preemption of the lowest lower level of precedence resources shall occur.

A call can be preempted any time after the precedence level of the call has been established and before call clearing has begun.

The MLPP supplementary service is not intended to provide preemption of users that do not subscribe to the MLPP supplementary service. The service provides for preemption of calls within the MLPP domain, which consists of the resources belonging to the users that subscribe to the MLPP supplementary service. In other words, calls that are originated by or made to non-MLPP users will not be preempted. Calls that are originated by MLPP subscribers may be preempted by calls of higher precedence only in networks that support this service.

3.2.2 Specific terminology

The following specific terminology is used in this Recommendation:

Precedence is the priority associated with a call.

A *precedence call* is a call using the MLPP supplementary service with precedence level higher than the lowest level of precedence.

An *MLPP call* is a call using the MLPP supplementary service that has a precedence level established and is either being setup or is setup. In the DSS 1, an MLPP call is a call from an MLPP subscriber for which a SETUP has been sent but no DISCONNECT has been sent or received (i.e. call states U1 through U10).

A *preempting call* is a call using the MLPP supplementary service with a precedence level higher than the lowest (i.e. ROUTINE) level of precedence, for which a call setup request has been received at the exchange.

User is a DSS 1 protocol entity at the user side of the user-network interface. A *user* is identified by a terminal, which is addressed by its ISDN number. A *called user* is considered *busy* if he is on an active call (i.e. in call state U10).

Network is a DSS 1 protocol entity at the network side of the user-network interface.

A *preemptable circuit* is a circuit that is active with or reserved for an MLPP call: (1) within the same domain as the preempting call and (2) with a lower precedence than the preempting call. A busy or reserved circuit for which a precedence level has not been specified is not a preemptable circuit.

A *preemption initiating exchange* is the exchange that is congested (i.e. no idle circuits) and has received a preempting call setup.

Congestion has been encountered when it is determined that all circuits capable of routing the MLPP call are busy (i.e. no idle circuits.)

Response Timer T_K is as defined in 3/Q.85. The length of this timer is in the range of 4-30 seconds.

An *alternate party* is as defined in 3/Q.85.

OE (Originating Exchange) is an exchange that is directly connected to a calling user.

DE (Destination Exchange) is an exchange that is directly connected to a called user.

The "*Invoke*", "*Return Result*", and "*Return Error*" components shall be as defined in 8.2.3.1.1/Q.932.

3.2.3 Qualifications on the applicability to telecommunication services

This supplementary service is considered meaningful when applied to the Telephony Teleservice, speech, 3.1 kHz audio, 7 kHz audio, and 64 kbit/s unrestricted bearer services. Furthermore, it may be meaningful when applied to other services.

3.2.4 State definitions

No additional call states, beyond those specified in Recommendations Q.931 and Q.932, are identified for the MLPP service.

3.3 Operational requirements

3.3.1 Provision/withdrawal

For a given ISDN number, a maximum authorized precedence level may be subscribed to for each service or collectively for all services.

3.3.1.1 Terminal options

A user, as identified by a terminal, has the following subscription options for the MLPP supplementary service:

1) Maximum authorized precedence level (see Note 1):
   a) 0 (FLASH OVERRIDE – highest)
   b) 1 (FLASH)
   c) 2 (IMMEDIATE)
   d) 3 (PRIORITY)
   e) 4 (ROUTINE – lowest).
2) Alternate party:
   a) yes
      – network operating position
      – alternate party directory number
   b) no.
3) Access resources non-preemptable (see Note 2):
   a) yes
   b) no.

NOTES

1 A call of higher precedence level can preempt calls of lower precedence. For example, a FLASH call can preempt IMMEDIATE, PRIORITY, or ROUTINE calls.

2 A user having this option will not experience preemption of calls by higher precedence calls, if the cause for preemption would be due to called party busy condition. However, the user may still experience preemption of calls due to a lack of network resources other than the user's own access resources.

Terminal equipment invoking MLPP supplementary service should be able to indicate the precedence level of the call in the SETUP message and should support Cause values: #8, "preemption" and #46, "precedence call blocked".

Terminal equipment that receive MLPP calls, including that of the alternate party, should support the Hold and Retrieve functions, as defined in 6.2.1/Q.932, Cause value: #8, "preemption". Terminal equipment receiving MLPP calls do not have to subscribe to the call hold supplementary service.

3.3.1.2 Network options

As described in MLPP supplementary service Recommendations I.255.3 (for stage 1) and 3/Q.85 (for stage 2).

3.3.2 Requirements on the originating network side

Notification to the calling, called, and preempted users (as a result of preemption in the network or access) shall be conveyed in call control messages using Cause #8 and #46 in the Cause information element, as described in this Recommendation.

Notification to the calling user of delay in call setup shall be conveyed in the NOTIFY message using notification description "0 0 0 0 1 0 0" in the Notification indicator information element, as described in this Recommendation.

Notification to all conferees of served user preemption shall be conveyed in the NOTIFY message using notification description "1 0 0 1 1 1 1" in the Notification indicator information element, as described in this Recommendation.

Notification to the remaining parties of a three way conversation that conference is disconnected as a result of preemption of one of the two calls, shall be conveyed in the NOTIFY or DISCONNECT message using notification description "1 0 0 1 1 0 0" in the Notification indicator information element, as described in this Recommendation.

3.3.3 Requirements in the network

This subclause is not applicable to DSS 1.

3.3.4 Requirements on the terminating network side

Notification to the calling, called, and preempted users (as a result of preemption in the network or access) shall be conveyed in call control messages using Cause #s 8 and #46 in the Cause information element, as described in this Recommendation.

3.4 Coding requirements

3.4.1 Messages

The following messages are applicable to the operation of the MLPP supplementary service: SETUP, ALERTING, NOTIFY, REGISTER, FACILITY, HOLD, HOLD ACKNOWLEDGE, HOLD REJECT, DISCONNECT, RELEASE, and RELEASE COMPLETE.

The SETUP, ALERTING, NOTIFY, DISCONNECT, RELEASE, and RELEASE COMPLETE messages shall be as defined in 3.3.1/Q.931. For the SETUP, NOTIFY, and DISCONNECT messages the following changes are required.

The SETUP message will contain the Facility information element. In addition, it shall contain the optional Calling party number, Called party number, and Channel identification information elements as mandatory information elements. The NOTIFY message shall contain the Notification indicator information element to indicate delay in call setup, as described in the MLPP procedure. The DISCONNECT message shall include the Cause information element, coded as described in this Recommendation.

The FACILITY message shall contain the Return Result or Return Error components in its Facility information element when it is sent in response to the REGISTER message that shall be used to invoke an MLPP DSS 1 Look-ahead For Busy (LFB) query. The RELEASE COMPLETE message shall be used to terminate the signalling association created by the REGISTER message.

The REGISTER, FACILITY, HOLD, HOLD ACKNOWLEDGE, and HOLD REJECT messages shall be as defined in 7.1/Q.932. The REGISTER message shall contain the Bearer capability, Calling party number, Called party number, and Channel identification information elements encapsulated within the Invoke component of the Facility information element. The HOLD message shall also contain the Cause information element, coded as appropriate to the MLPP procedure.

3.4.2 Codesets

All information elements are in codeset 0. Cause values #8 and #46, contained in the Cause information element, are proposed codeset 0 values.

3.4.3 Information elements

The following information elements are applicable.

3.4.3.1 Facility information element

For the functional protocol, the Facility information element, as described in 8.2.2/Q.932, shall be used for three MLPP operations, mLPPCallpreemption with operation value 26 (for management of the circuit occupied by the to be preempted call), mLPPCallrequest (for MLPP call) with operation value 25 and mLPPLFBquery [for MLPP Look-ahead for Busy (LFB) query] with operation value 24. The MLPP operations and errors are defined in 3.4.

3.4.3.2 Cause Information Element

For indicating the preemption of the call in the network and in the access, the Cause information element, as described in 4.5.12/Q.931, shall be used with the two proposed codepoints for cause values described in Table 3-1.

TABLE 3-1/Q.955

Cause information element

Number	Label	Meaning
8	Preemption	
46	Precedence call blocked	No preemptable circuit or called user is busy with a call of equal or higher precedence level

3.4.3.3 Notification indicator information element

For indicating call completion delay; conference disconnected, preemption; and for indicating conference floating, served user preempted, the Notification indicator information element, as described in 4.5.21/Q.931, shall be used with the notification descriptions, as described in Table 3-2.

TABLE 3-2/Q.955

Notification indicator information element

Notification Description (Octet 3)	
Bits	
7 6 5 4 3 2 1	
0 0 0 0 1 0 0	Call completion delay
1 0 0 1 1 1 1	Conference floating served user preempted
1 0 0 1 1 0 0	Conference disconneted, preemption

3.4.4 Definition of operations and errors

The definition of operations and errors required for the MLPP supplementary service using the ASN.1, as specified in Recommendation X.208 and using the OPERATION and ERROR macros, as defined in Figure 4/X.219, is in Table 3-3.

TABLE 3-3/Q.955

Definition of operations and errors

```
-- Begin MLPP-operations definitions
MLPP-operations{ccitt recommendation q 955 mlpp (3) operations-and-errors(1)}
DEFINITIONS ::=
BEGIN
EXPORTS mLPPLFBquery, mLPPCallrequest, mLPPCallpreemption,
        unauthorizedPrecedenceLevel;
IMPORTS OPERATIONS, ERRORS
        FROM Remote-Operation-Notation
        {joint-iso-ccitt remote-operations(4) notation(0)}
        userNotSubscribed, rejectedByNetwork
        FROM General-Error-List
        {ccitt recommendation q 950 general-error-list(1)}
        Q931InformationElement
        FROM Embedded-Q931-Types
        {ccitt recommandation q 932 embedded-q931-types(5)};
```

TABLE 3-3/Q.955 *(continued)*

Definition of operations and errors

```
-- Begin mLPPLFBquery operation

MLPPLFBquery    OPERATION
                ARGUMENT        MLPP_LFB_arg
                RESULT          MLPP_LFB_resp
                ERRORS          {userNotSubscribed,rejectedByNetwork}

MLPP_LFB-arg    ::=  SEQUENCE {MLPP_params, IE_arg}

MLPP_params     ::=  SEQUENCE
                     {Prec_level, LFB_Indictn, MLPP_Svc_Domn}

Prec_level      ::=  ENUMERATED
                     {
                     flashOverride(0), flash(1), immediate(2), priority(3), routine(4)
                     }
                     -- Prec_level identifies the precedence level of the MLPP call.

LFB_Indictn     ::=  ENUMERATED
                     {
                     lfbAllowed(0), lfbNotAllowed(1), pathReserved(2)
                     }
                     -- LFB_Indictn is coded for values, as indicated.

MLLP_Svc_Domn   ::=  OCTET STRING (size(5))
                     -- Initial two octets provide the International ID, while the
                     -- following three octets provide the MLPP Domain
                     -- identification.

IE_arg          ::=  Q931InformationElement
                     -- Bearer capability, Calling party number, Called party
                     -- number, and Channel identification information elements in
                     -- the IE_arg shall be as defined in Q.931.

MLPP_LFB_resp   ::=  SEQUENCE {StatusQuery, Location}
                     -- The MLPP DSS1 LFB query response contains two
                     -- parameters, StatusQuery and Location.

StatusQuery     ::=  ENUMERATED
                     {
                     success(1),
                       -- Many cases as described in the optional MLPP LFB
                     failure(2),
                       -- Many cases as described in the MLPP procedure with LFB
                       -- option.
                     bearerCapabilityNotAuthorized(3),
                       -- bearer capability check failure, not authorized
                     bearerCapabilityNotImplemented(4),
                       -- bearer capability check failure, not implemented
                     bearerCapabilityNotAvailable(5),
                       -- bearer capability check failure, not available
                     pathReservationDenied(6)
                       -- circuit cannot be reserved at the far end
                     }
```

TABLE 3-3/Q.955 *(concluded)*

Definition of operations and errors

```
Location              ::=  Q931InformationElement
                           -- a bit string which conforms to Octect 3 of the Cause
                           -- information element as defined in Q.931, except that bit 8 is
                           -- marked as a spare.
-- End of mLPPLFBquery operation.
-- Begin mLPPCallrequest operation

MLPPCallrequest       OPERATION   MLPP_params
                      ARGUMENT    StatusRequest
                      RESULT      {userNotSubscribed, rejectedByNetwork,
                      ERRORS      unauthorizedPrecedenceLevel}

StatusRequest         ::=  ENUMERATED
                           {
                           successCalledUserMLPPSubscriber(1),
                           -- Called user is an MLPP subscriber.
                           successCalledUserNotMLPPSubscriber(2),
                           -- Called user is not an MLPP subscriber.
                           failureCaseA(3),
                           -- MLPP call from the calling user is a precedence call and
                           -- cannot be completed.
                           failureCaseB(4)
                           -- MLPP call from the calling user or MLPP call between two
                           -- MLPP subscribers experiences preemption.
                           }
-- End mLPPCallrequest operation.
-- Begin mLPPCallpreemption operation

MLPPCallpreemption    OPERATION
                      ARGUMENT    Preempt_params
                      RESULT
                      ERRORS

Preempt_params        ::=  ENUMERATED
                           {
                           circuitReservedForReuse(1),
                           -- Circuit of the to be preempted call is reserved for reuse
                           circuitNotReservedForReuse(2),
                           -- Circuit of the to be preempted call is not reserved for
                           -- reuse
                           }
-- End mLPPCallpreemption operation

UnauthorizedPrecedenceLevel    ::=  ERROR
-- An indication that the calling user has exceeded the authorized, maximum
-- precedence level.

mLPPLFBquery MLPPLFBquery                                  ::=  24

mLPPCallrequest MLPPCallrequest                            ::=  25

mLPPCallpreemption MLPPCallpreemption                      ::=  26

unauthorizedPrecedenceLevel UnauthorizedPrecedenceLevel    ::=  44

END
-- End MLPP-operations.
```

3.5 Signalling requirements

3.5.1 Activation/deactivation/registration

Not applicable.

3.5.2 Invocation and operation

Invocation and operation without an optional MLPP DSS 1 LFB query is illustrated in Figures 3-1 through 3-3 and described in 3.5.2.1.

3.5.2.1 MLPP DSS 1 procedure without LFB option

3.5.2.1.1 Procedure at originating exchange/originating user side

3.5.2.1.1.1 Normal operation

The calling user shall implicitly invoke the MLPP supplementary service by sending a SETUP message to the network.

The calling user shall explicitly invoke the MLPP supplementary service by including the Facility information element in the SETUP message sent to the network. The Invoke component of the mLPPCallrequest operation within the Facility information element contains the precedence level (Prec_level), LFB Indication (LFB_Indictn), and MLPP Service Domain (MLPP_Svc_Domn). The precedence level inserted by the user may be up to and including the maximum subscribed to precedence level on a per call basis. The LFB Indication and MLPP Service Domain values are set according to user subscription options.

Upon receipt of a SETUP message for an MLPP service call, the originating exchange shall do the following:

1) If the Facility information element is not present in the SETUP message for a call invoking MLPP supplementary service (i.e. from an MLPP subscriber) and the calling user has subscribed to the MLPP supplementary service for the bearer capability in the SETUP message the originating exchange shall formulate a Facility information element with a precedence level equal to ROUTINE by coding Prec_level to “routine”.

2) If the Facility information element is present in the SETUP message for a call invoking the MLPP supplementary service, it shall validate the precedence level to insure that it falls within the range that the calling user is authorized.

   In both cases in items 1) and 2) above, the originating exchange shall also set appropriate codes for LFB Indication (LFB_Indictn) and MLPP Service Domain (MLPP_Svc_domn) in the Facility information element. If the LFB option is supported by the network and subscribed to for the precedence level in the SETUP message, the LFB_Indictn is coded “lfbAllowed”. If the LFB option is not supported by the network or if the LFB option is supported by the network but not subscribed to for the precedence level in the SETUP message, LFB_Indictn is coded “lfbNotAllowed”.

3) Upon formulating the Facility information element with a precedence level equal to ROUTINE or receiving the Facility information element with a valid precedence level, the originating exchange shall mark the circuit busy with the precedence level and MLPP Service Domain of the outgoing MLPP call, send the CALL PROCEEDING message toward the calling user and a Setup Indication toward the network, and wait for the network response. Upon receipt of the CALL PROCEEDING message, the calling user shall mark the outgoing circuit busy with the precedence level and MLPP Service Domain of the outgoing MLPP call. Upon receiving an Alerting Indication that user alerting is initiated at the called user, the originating exchange shall check to determine if the called user is an MLPP subscriber or not. If the called user is not an MLPP subscriber, the originating exchange shall unmark the previously marked circuit for the MLPP call; if the called user is an MLPP subscriber, the originating exchange shall retain

marking on the previously marked circuit for the MLPP call. Then, in both cases above, the MLPP call setup will continue, as described in 5.1/Q.931, except that upon receipt of the ALERTING message, the calling user shall unmark the previously marked circuit if the StatusRequest in the Return Result component of its Facility information element is coded to "successCalledUserNotMLPPSubscriber".

3.5.2.1.1.2 Exceptional Procedures

1) Upon receipt of a SETUP message for an MLPP service call, the originating exchange shall check to determine if the network supports the invoked MLPP service. If this check is not satisfied, the Facility information element shall be ignored or not formulated and the MLPP call setup shall continue as if it were a basic call, as described in 5.1/Q.931, except that the first call control message shall contain the Return Error component of the mLPPCallrequest operation in its Facility information element, which is coded to "rejectedByNetwork".

2) If the Facility information element is present in the SETUP message for a call invoking the MLPP supplementary service (i.e. from an MLPP subscriber) and if the calling user exceeds the maximum subscribed precedence level, the originating exchange shall return a RELEASE COMPLETE message toward the calling user, which contains the Return Error component of the mLPPCallrequest operation in its Facility information element with Error "unauthorizedPrecedenceLevel".

3) If the Facility information element is not present in the SETUP message for a call invoking MLPP supplementary service (i.e. from an MLPP subscriber) and if the calling user has not subscribed to the MLPP supplementary service for the bearer capability in the SETUP message, the originating exchange shall reject the call by sending a RELEASE COMPLETE message toward the calling user, which contains the Return Error component of the mLPPCallrequest operation in its Facility information element with Error "userNotSubscribed".

4) The precedence call may not be completed as a result of a network exchange being busy with calls of equal or higher precedence (on the path toward the called user) or no preemptable circuit at the called interface. In this case, upon receipt of the Release Indication with cause value #46, "precedence call blocked" from the network, the originating exchange shall return a DISCONNECT message toward the calling user with the same cause value to clear the call. The DISCONNECT message shall also contain the Return Result component of the mLPPCallrequest operation in its Facility information element with StatusRequest coded to "failureCaseA", indicating call failure.

5) The precedence call may not be completed as a result of called user, who has not subscribed to alternate party, is busy with either: (a) a call of equal or higher precedence than the calling user and no call completion supplementary services (e.g. call waiting) or call offering supplementary services (e.g. call forwarding busy) are available or (b) non-preemptable access resources and no call completion supplementary services (e.g. call waiting) or call offering supplementary services (e.g. call forwarding busy) are available. In this case, upon receipt of the Release Indication with cause value #46, "precedence call blocked" from the network, the originating exchange shall return a DISCONNECT message toward the calling user with the same cause value to clear the call. The DISCONNECT message shall also contain the Return Result component of the mLPPCallrequest operation in its Facility information element with StatusRequest coded to "failureCaseA", indicating call failure.

6) An MLPP call may be preempted as a result of preemption in the network or access. In this case, upon receipt of the Release Indication with cause value #8, "preemption" from the network, the originating exchange shall return a DISCONNECT message toward the calling user with the same Cause to clear the call. The DISCONNECT message shall also contain the Return Result component of the mLPPCallrequest operation in its Facility information element with StatusRequest coded to "failureCaseB", indicating call failure.

3.5.2.1.2 Procedure at destination exchange/destination user side

3.5.2.1.2.1 Normal operation

Upon receipt of the Setup Indication, the destination exchange that serves the called user shall mark the incoming circuit (identified by the Channel identification information element within the SETUP message) busy at the precedence level and MLPP Service Domain of the MLPP call. Then:

If LFB Indication was set to "pathReserved", the network shall stop timer T_{LR} which it had started upon marking a circuit to the called user as reserved (see 3.5.2.2.2.1). Then:

- If the reserved (or marked) circuit to the called user (as identified by a match between the Calling Party Number within the Setup Indication and Calling Party Numbers of the "reserved" circuits) is found and it is not idle, and if the called user is busy, the procedure in item 3) b) (1) (a) below shall be followed; otherwise, the procedure in item 2) b) (1) below shall be followed.
- If the reserved circuit to the called user is found and it is idle, it shall be marked with the precedence level and MLPP Service Domain of the incoming MLPP call, and the procedure in item 1) b) below shall be followed.
- If the reserved circuit to the called user is not found, the LFB Indication is coded to "lfbNotAllowed", and the procedure in the items below shall be followed.

If LFB Indication was not set to "pathReserved", the procedure in the items below shall be followed.

1) If the called user is idle and an idle circuit to deliver the call to the called user exists, it shall mark the idle circuit busy at the precedence level and MLPP Service Domain of the incoming MLPP call. Then:

   a) If the incoming call is a ROUTINE call, a SETUP message shall be sent to the called user, which contains the Invoke component of the mLPPCallrequest operation in its Facility information element. The called user shall respond with: a CALL PROCEEDING message and mark the idle circuit busy at the precedence level and MLPP Service Domain of the incoming MLPP call or RELEASE COMPLETE message. Upon receipt of a CALL PROCEEDING message from the called user indicating that compatibility requirements have been satisfied, the procedure in item 4) shall be followed; otherwise, upon receipt of a RELEASE COMPLETE message from the called user with cause value #88, "incompatible destination", indicating that compatibility requirements have not been satisfied, the network shall unmark the previously marked circuit and clear the incoming call with the same cause value.

   b) If the incoming call is a precedence call, a SETUP message shall be sent to the called user, which contains the Invoke component of the mLPPCallrequest operation in its Facility information element. The called user shall respond with: a CALL PROCEEDING message and mark the idle circuit busy at the precedence level and MLPP Service Domain of the incoming MLPP call or a RELEASE COMPLETE message. Upon receipt of a CALL PROCEEDING message from the called user, indicating that compatibility requirements have been satisfied, the following procedure will be followed; otherwise, upon receipt of a RELEASE COMPLETE message from the called user with cause value #88, "incompatible destination", indicating that compatibility requirements have not been satisfied, the network shall unmark the previously marked circuit and continue the preempting call setup employing the procedure in item 3) b) (1) (b), items 1) through 3).

      (1) If an alternate party is subscribed to, then:

         (a) Upon receipt of ALERTING message, sent by the called user, indicating that the called user has been notified of the precedence call, the network shall start timer T_K. The ALERTING message shall contain the Return Result component of the mLPPCallrequest operation in its Facility information element. Then, the destination exchange shall check the StatusRequest to determine if the called user is an MLPP subscriber. If the called user is *not* an MLPP subscriber (as indicated by StatusRequest coded to "successCalledUserNotMLPPSubscriber"), the destination exchange shall unmark the previously marked circuit for the MLPP call; if the called user is an MLPP subscriber (as indicated by StatusRequest coded to "successCalledUserMLPPSubscriber"), the destination exchange shall retain marking on the previously marked circuit for the MLPP call. If the called user responds with a CONNECT message before the expiry of timer T_K (indicating called user acceptance of preemption), the network shall stop timer T_K and the network shall complete the MLPP call setup, as described in 5.2.7/Q.931. If no CONNECT message

is received from the called user before the expiry of timer T_K, the network shall stop timer T_K and the network shall divert the precedence call to the alternate party, using the procedures as described in 3/Q.952 for the call forwarding no reply supplementary service. The setup sent to the alternate party shall contain: the precedence level and MLPP Service Domain of the diverted precedence call, LFB Indication set to "lfbNotAllowed", and the reason for redirection = Call Forwarding No Reply.

(b) If no ALERTING message is received, the network shall divert the precedence call to the alternate party, using the procedures as described in 3/Q.952 for the call forwarding no reply supplementary service. The setup sent to the alternate party shall contain: the precedence level and MLPP Service Domain of the diverted precedence call, LFB Indication set to "lfbNotAllowed", and the reason for redirection = Call Forwarding No Reply.

(2) If no alternate party is subscribed to, then the procedure in item 4) shall be followed.

2) If the called user is idle, but an idle circuit to deliver the call to the called user does not exist, then:

a) If the call is a ROUTINE call, clearing of the calling user shall be initiated by sending a Reject Indication to the network with cause value #34, "no circuit/channel available".

b) If the call is a precedence call and the existing MLPP call is at lower precedence, then:

(1) If preemptable access resources exist, the network shall mark the circuit (carrying the existing MLPP call) with the precedence level and MLPP Service Domain of the incoming call and the network shall send a SETUP message, which contains the Invoke component of the mLPPCallrequest operation in its Facility information element, to the called user. The called user may respond with a CALL PROCEEDING message or a RELEASE COMPLETE message. Then:

Upon receipt a CALL PROCEEDING message from the called user, indicating that compatibility requirements have been satisfied, the network shall clear the existing MLPP call to the busy user (i.e. "other user") on the called interface toward: (a) the busy user, using a DISCONNECT message and (b) the network with cause value #8 and the preempting call setup continues employing the procedure in item 5). The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitReservedForReuse".

Upon receipt of a RELEASE COMPLETE message from the called user with cause value #88, "incompatible destination", indicating that compatibility requirements have not been satisfied, the network shall unmark the previously marked circuit and continue the preempting call setup employing the procedure in item 3) b) (1) (b), items 1) through 3) except that the "called user" is to be interpreted as the "other user" under consideration on the called interface.

(2) If preemptable access resources do not exist, the network shall continue the preempting call setup employing the procedure in item 3) b) (1) (b), items 1) through 3) except that the "called user" is to be interpreted as the "other user" under consideration on the called interface.

c) If the call is a precedence call and the existing MLPP call is at equal or higher precedence, then the procedure in item 3) b) (1) (b) shall be followed.

3) If the called user is busy, then:

a) If the call is a ROUTINE call, clearing of the calling user shall be initiated by sending an Indication to the network with cause value #17, "user busy".

b) If the call is a precedence call, then:

(1) If the called user is busy with a call of lower precedence, then:

(a) If preemptable access resources exist, the network shall mark the circuit (carrying the MLPP call of the called user) with the precedence level and MLPP Service Domain of the incoming call and the network shall send a SETUP message, which contains the Invoke component of the mLPPCallrequest operation in its Facility information element, to the called user. The called user may respond with a CALL PROCEEDING message or a RELEASE COMPLETE message. Then:

1) Upon receipt a CALL PROCEEDING message from the called user, indicating that compatibility requirements have been satisfied, the network shall place the existing MLPP call on hold, using a HOLD message delivered to the called user with cause value #8, "preemption" (in order to notify the called user of intended preemption) and the network shall start the timer T_K. Upon sending the CALL PROCEEDING message, the called user shall mark the circuit with which the called user is busy with the precedence level and MLPP Service Domain of the incoming MLPP call.

If the called user responds with a HOLD ACKNOWLEDGE message is received before the expiry of timer T_K (indicating the acceptance of intended preemption), the network shall stop the timer T_K and the network shall clear the existing MLPP call to: (a) the called user, using a DISCONNECT message and (b) the remote (to be preempted) user with a cause value #8 and the network shall continue the preempting call setup employing the procedure in item 5). The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitReservedForReuse".

If no HOLD ACKNOWLEDGE message is received from the called user before the expiry of the timer T_K, the network shall stop the timer T_K. Then, if an alternate party is subscribed to, the network shall clear the existing MLPP call to: (a) the called user using a DISCONNECT message and (b) the remote (to be preempted) user with a cause value #8 and the network shall divert the incoming (preempting) call to the alternate party, using the procedures as described in 2/Q.952 for the call forwarding busy supplementary service. The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitNotReservedForReuse". The setup sent to the alternate party shall contain: the precedence level and MLPP Service Domain of the diverted precedence call, LFB Indication set to "lfbNotAllowed" and the reason for redirection = Call Forwarding Busy. Otherwise (i.e. when no HOLD ACKNOWLEDGE message is received from the called user before the expiry of the timer T_K and no alternate party is subscribed to), the network shall clear the existing MLPP call to: (a) the called user, using a DISCONNECT message and (b) the remote (to be preempted) user with a cause value #8 and the network shall continue the preempting call setup employing the procedure in item 5). The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitReservedForReuse".

If the called user corresponds with a STATUS message in response to the HOLD message sent by the network indicating that the called user's terminal does not support the Hold function, the network shall clear the existing MLPP call to: (a) the called user, using a DISCONNECT message and (b) the remote (to be preempted) user with a cause value #8 and the network shall continue the preempting call setup employing the

procedure in item 5). The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitReservedForReuse".

2) Upon receipt of a RELEASE COMPLETE message from the called user with cause value #88, "incompatible destination", indicating that compatibility requirements have not been satisfied, the network shall unmark the previously marked circuit and continue the preempting call setup employing the procedure in item 3) b) (1) (b), items 1). through 3).

(b) If preemptable access resources do not exist, then:

1) If call completion or call offering supplementary services are available, then procedures as defined in MLPP supplementary service interactions with call completion or call offering supplementary services shall be initiated.

2) If call completion or call offering supplementary services are not available, but alternate party is subscribed to, the network shall divert the incoming precedence call to the alternate party, using the procedures as described in 2/Q.952 for the call forwarding busy supplementary service. The setup sent to the alternate party shall contain: the precedence level and MLPP Service Domain of the diverted precedence call, LFB Indication set to "lfbNotAllowed", and the reason for redirection = Call Forwarding Busy.

3) If call completion or call offering supplementary services are not available and no alternate party is subscribed to, the network shall clear the calling user with cause value #46, "precedence call blocked".

(2) If the called user is busy with a call of equal or higher precedence, the procedure in item 3) b) (1) (b) shall be followed.

4) Upon receipt of the ALERTING message from the called user, which contains the Return Result component of the mLPPCallrequest operation in its Facility information element, the destination exchange shall check the StatusRequest to determine if the called user is an MLPP subscriber. If the called user is *not* an MLPP subscriber (as indicated by StatusRequest coded to "successCalledUserNotMLPPSubscriber"), the destination exchange shall unmark the previously marked circuit for the MLPP call; if the called user is an MLPP subscriber (as indicated by StatusRequest coded to "successCalledUserMLPPSubscriber"), the destination exchange shall retain marking on the previously marked circuit for the MLPP call. Then, in both cases above, the network shall complete the MLPP call setup as described in 5.2.7/Q.931.

5) Upon sending the DISCONNECT message in case (a), the network shall start the timer T_{RR} to ensure that the circuit reserved for reuse is unreserved at the expiry of timer T_{RR}. Then:

a) If the existing call is cleared within timer T_{RR}, as indicated by the network receiving RELEASE message from the destination user (called user or other user, as appropriate), which contains the Return Result component of the mLPPCallpreemption operation in its Facility information element, the network shall stop the timer T_{RR} as indicated by the network receiving RELEASE message from the destination user (called user or other user, as appropriate), which contains the Return Result component of the mLPPCallpreemption operation in its Facility information element the network shall continue the preempting call by using the same (reserved) circuit and following the procedure in items 1) b) (1) or 1) b) (2), as appropriate.

b) If the timer T_{RR} expires and no response is obtained to the DISCONNECT message, from the destination user (called user or other user, as appropriate), the network shall stop the timer T_{RR}, unreserved the marked circuit, and the procedure in this section (see 3.5.2.1.2.1, starting with item 1)) shall be followed, if this was the first attempt to setup the MLPP call; otherwise, the network shall clear the call toward calling user with cause value #46, "precedence call blocked".

3.5.2.1.2.2 Exceptional procedures

1) If the called user's terminal does not support the Hold function, the user may return a STATUS message with cause value #98, "message not compatible with call state or message type nonexistent or not implemented" or cause value #97, "message type non-existent or not implemented" in response to the HOLD message sent by the destination network. Alternatively, the user may return a STATUS ENQUIRY message as described in 5.8.4/Q.931. In both cases, the destination network shall clear the existing MLPP call to: (a) the called user, using a DISCONNECT message and (b) the remote (to be

preempted user) user with a cause value #8 and the network shall continue the preempting call setup employing the procedure in 3.5.2.1.2.1, item 5). The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitReservedForReuse".

2) If the incoming call is a precedence call and the called user is busy with a call of lower precedence and has preemptable access resources, then the following procedure is followed if the called user responds with a HOLD REJECT message within response timer T_K to the HOLD message sent by the network. The network shall clear the existing MLPP call to: (a) the called user, using a DISCONNECT message and (b) the remote (to be preempted) user with a cause value #8 and the network shall continue the preempting call setup employing the procedure in 3.5.2.1.2.1, item 5). The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitReservedForReuse".

3) An MLPP call may be preempted as a result of preemption in the network or access. In this case, upon receipt of the Release Indication or DISCONNECT message with cause value #8, "preemption" the destination network shall, respectively send the DISCONNECT message toward the called user or Release Indication toward the network with the same Cause to clear the call. The DISCONNECT message shall also contain the Return Result component of the mLPPCallrequest operation in its Facility information element, containing StatusRequest coded to "failureCaseB", indicating call failure.

3.5.2.2 Optional MLPP DSS 1 LFB procedure

When the LFB option is provided in the DSS 1, then the MLPP DSS 1 LFB query shall be invoked in the DSS 1 environment to continue the network LFB query. The DSS 1 shall employ the Invoke component of the mLPPLFBquery operation contained in the Facility information element of the REGISTER message to invoke the query and the Return Result or Return Error components of the mLPPLFBquery operation contained in the Facility information element of the FACILITY message to return the responses to the query. The signalling association created by the REGISTER message shall be terminated by employing the RELEASE COMPLETE message, as described in 6.3.2/Q.932.

The optional MLPP DSS 1 LFB procedure is illustrated in Figure 3-4 and described in the following.

3.5.2.2.1 Procedure at originating exchange/Originating user side

3.5.2.2.1.1 Normal operation

None identified.

3.5.2.2.1.2 Exceptional procedures

None identified.

3.5.2.2.2 Procedure at destination exchange/destination user side

3.5.2.2.2.1 Normal operation

When an LFB option is provided in the DSS 1, upon receipt of the network LFB query Indication, the destination network that serves the called user shall do the following:

1) If the incoming reserved circuit indicated in the network LFB query Indication is available, the network shall mark it (with precedence level, MLPP Service Domain, and Calling party number) reserved for use by the preempting call and the procedure below shall be followed.

   The destination network shall send a REGISTER message, containing the Invoke component of the mLPPLFBquery operation, toward the called user. The called user shall respond to the REGISTER message with a FACILITY message, containing the query response in the Return Result or Return Error

components of the mLPPLFBquery operation in its Facility information element. The network shall start timer T_L when the REGISTER message is sent. Then:

a) Upon receipt of the FACILITY message from the called user, containing the query response in the Return Result or Return Error components of the mLPPLFBquery operation in its Facility information element, the network shall do the following:

(1) If the Return Result component of the mLPPLFBquery operation is received with StatusQuery coded to "bearerCapabilityNotAuthorized", or "bearerCapabilityNotImplemented", or "bearerCapabilityNotAvailable" and cause value #88, "incompatible destination", the network shall stop the timer T_L and the network shall return a network LFB query response Indication with the same coding.

(2) If the Return Result component of the mLPPLFBquery operation is received with StatusQuery coded to "success", the network shall stop the timer T_L and then the following will occur:

(a) If the called user is idle and idle circuit to deliver the call to the called user exists, then the network shall mark a circuit to the called user (with precedence level, MLPP Service Domain, and Calling party number) as reserved for use by the preempting call and the network shall return a network LFB query response Indication, which contains the Return Result component of the mLPPLFBquery operation with StatusQuery coded to "success" and LFB Indication coded to "pathReserved".

The network shall start timer T_{LR} after marking the circuit reserved for use to ensure that the reserved circuit is unreserved at the expiry of timer T_{LR}.

(b) If the called user is idle, but an idle circuit to deliver the call to the called user does not exist, then the procedure in item 1) a) (2) (c) 1). (if preemptable access resources exist) or 1) a) (2) (c) 2). (if preemptable access resources do not exist) shall be followed. When comparing the precedence levels, the precedence level of the active MLPP call on the called interface instead of that of the MLPP call to the called user is employed and the network shall interpret the "called user" as the "other user" under consideration on the called interface.

(c) If the called user is busy, then:

1) If preemptable access resources exist, the network shall compare the precedence levels of the preempting call with the MLPP call with which the called user is busy and do the following:

a) If the called user is busy with a call of lower precedence than the calling user, the network shall mark the busy circuit to the called user (with precedence level, MLPP Service Domain, and Calling party number) reserved for use by the preempting call and the network shall return a network LFB query response Indication, which contains the Return Result component of the mLPPLFBquery operation with StatusQuery coded to "success" and LFB Indication coded to "pathReserved".

The network shall start the timer T_{LR} after marking the circuit reserved for use to ensure that the reserved circuit is unreserved at the expiry of timer T_{LR}.

b) If the called user is busy with a call of equal or higher precedence than the calling user, then the following procedure in item 1) a) (2) (c) 2). shall be followed.

2) If preemptable access resources do not exist, then:

a) If call completion or call offering supplementary services are available, the network shall return a network LFB query response Indication, which is coded to "success".

b) If call completion or call offering supplementary services are not available, but an alternate party is subscribed to, the network shall return a network LFB query response Indication, which is coded to "success".

c) If call completion or call offering supplementary services are not available and no alternate party is subscribed to, the network shall return a network LFB query response Indication, which is coded to "failure", after unreserving the marked circuit.

In all above cases, the network shall stop timer T_{LR} when subsequent SETUP for the preempting call is sent.

b) If no FACILITY message is received from the called user before the expiry of timer T_L, then the network shall stop the timer T_L and the network shall unreserve the circuit that was previously marked as reserved and the network shall return a network LFB query response Indication, which shall be coded to "success".

In all above cases, the destination network shall terminate the signalling association created by the REGISTER message by sending a RELEASE COMPLETE message toward the called user.

2) If the incoming reserved circuit indicated in the network LFB query Indication is not available, then the network shall return a network LFB query response Indication with StatusQuery coded to "pathReservationDenied".

3.5.2.2.2.2 Exceptional procedures

1) When an LFB option is not provided in the DSS 1, then upon receipt of the network LFB query Indication, the destination network that serves the called user shall return a network LFB query response Indication, which is coded to "success" so that the preempting call may subsequently be offered when procedure in 3.5.2.1.2.1 is used.

3.6 Interactions with other supplementary services

3.6.1 Call Waiting

If the incoming call to be delivered to the called user (on the basis of the ISDN Number/Bearer Service) is an MLPP call and the called access is busy (i.e. no access channel is available), then:

1) If the incoming MLPP call is at a higher precedence level than the MLPP call of the lowest precedence level with which the called access is busy, then: preemption of that MLPP call shall occur as described in 3.5.2.1.2, if the user of that MLPP call has not subscribed to the "non-preemptable access resource" option; otherwise the network shall invoke the Call Waiting supplementary service by sending a SETUP message to the called user.

2) If the incoming MLPP call is at the same precedence level as that of the MLPP call of the lowest precedence level with which the called access is busy, then the network shall invoke the call waiting supplementary service by sending a SETUP message to the called user.

3) If the incoming MLPP call is at a lower precedence level than the MLPP call of the lowest precedence level with which the called access is busy, then the network shall invoke the call waiting supplementary service by sending a SETUP message to the called user.

NOTE – Based on the precedence level comparison, the terminal may prevent the application of call waiting tone to the called user and may use alternate methods (i.e. out-of-band indication) to inform the called user, if busy, that a lower precedence call is waiting.

For each of the three cases, the SETUP message, used for invoking the call waiting supplementary service, shall contain the precedence level of the incoming MLPP call in its Facility information element and the Number of Calls per ISDN Number/Bearer Service counter and the Number of Waiting Calls per ISDN Number/Bearer Service counter shall each be incremented.

3.6.2 Call Transfer

As specified in I/Q.952.

3.6.3 Connected Line Identification Presentation

No impact.

3.6.4 Connected Line Identification Restriction

No impact.

3.6.5 Calling Line Identification Presentation

No impact.

3.6.6 Calling Line Identification Restriction

No impact.

3.6.7 Closed User Group

No impact.

3.6.8 Conference Calling

All connections to the conferees on a conference call shall be processed at a precedence equal to the conference precedence selected by the conference controller.

If a conferee is preempted, then after the conferee has been disconnected from the conference bridge, the network shall include cause value #8, "preemption" in the FACILITY message sent to the conference controller (i.e. served user) for notification, as described in 1.6/Q.954.

When the served user is preempted, the NOTIFY message sent to all conferees (i.e. remote users) shall contain a Notification indication information element with Notification Description coded to "Conference floating, served user preempted".

3.6.9 Direct-Dialling-In

No impact.

3.6.10 Call Diversion services

3.6.10.1 Call Forwarding Busy

If the called user has subscribed to the Call Forwarding Busy supplementary service, then:

1) If the incoming MLPP call to the called user is a ROUTINE call, the procedure as described in 2/Q.952 shall be followed.

2) If the incoming MLPP call to the called user is a precedence call, then:

   a) If the called interface is busy with an MLPP call of lower precedence in the same MLPP service domain and preemptable, the network shall preempt that call to complete the incoming MLPP call to the called user, as described in 3.5.2.1.2.

   b) If the called interface is: (1) busy with: MLPP calls of equal or higher precedence in the same MLPP service domain, non-MLPP calls, and/or MLPP calls in other MLPP service domains or (2) busy and non- preemptable, then:

The network shall forward the call, in accordance with the procedures of 2/Q.952, whether or not the called user has subscribed to the alternate party option. The destination network shall retain control of the forwarded call and start a timer T_{MCF} when the SETUP message is sent to the forwarded-to-user only if the called user has subscribed to the alternate party option. The SETUP message sent to the forwarded-to-user shall also contain the precedence level (in Prec_level of its Facility information element) of the call so that the forwarded-to-user may be preempted, as described in 3.5.2.1.2, to complete the call to the forwarded-to-user.

If no response is received from the forwarded-to-user in the form of a CONNECT message or a Connect Request Indication before the expiry of timer T_{MCF}, or a response is received in the form of a RELEASE COMPLETE message or a Release Request Indication before the expiry of timer T_{MCF}, the network shall stop the timer T_{MCF} and the network shall divert the incoming MLPP call to the alternate party, as described in 3.5.2.1.2. The destination network shall initiate clearing of the MLPP call to the forwarded-to-user, if it has not already occurred.

If a response is received from the forwarded-to-user in the form of a CONNECT message or a Connect Request Indication before the expiry of timer T_{MCF}, the network shall stop the timer T_{MCF} and the network shall continue to forward the call, as described in 3.5.2.1.2.

3.6.10.2 Call Forwarding No Reply

If the called user has subscribed to the Call Forwarding No Reply supplementary service, then:

1) If the incoming MLPP call to the called user is a ROUTINE call, the procedure as described in 3/Q.952 shall be followed.

2) If the incoming MLPP call to the called user is a precedence call, then:

   a) On expiry of timer T_K, and if the called user has subscribed to the alternate party option of the MLPP supplementary service, the network shall divert the call to the alternate party, as described in 3.5.2.1.2.

   b) On expiry of timer T-CFNR (see 3/Q.952), and if the called user has not subscribed to the alternate party option of the MLPP supplementary service, the network shall forward the call, as described in 3/Q.952. The network shall include in the SETUP message sent to the forwarded-to-user after the expiry of timer T-CFNR, the precedence level (in Prec_level of its Facility information element) of the call so that the forwarded-to-user may be preempted, as described in 3.5.2.1.2, to complete the call to the forwarded-to-user.

3.6.10.3 Call Forwarding Unconditional

If the called user has subscribed to the Call Forwarding Unconditional supplementary service, then:

1) If the incoming MLPP call to the called user is a ROUTINE call, the procedure as described in 4/Q.952 shall be followed.

2) If the incoming MLPP call to the called user is a precedence call, then the call shall be forwarded employing the same procedure as in 3.6.10.1, item 2) b).

3.6.10.4 Call Deflection

Not applicable.

3.6.11 Line Hunting

If no interface is available and one or more MLPP calls are of lower precedence than that of the incoming call, the network shall preempt an MLPP call of the lowest precedence, as described in 3.5.2.1.

3.6.12 Three-Party Service

When a three-way conversation is established, each connection shall maintain its assigned precedence level. Each connection of a call resulting from a split operation shall maintain the precedence level that it was assigned upon being added to the three-way conversation. In the Three Party supplementary service, when one of two original calls is preempted, the network shall release the three-way connection and apply normal call clearing procedure to the call being preempted. The DISCONNECT message sent to one of the parties of the preempted call in normal call clearing shall contain the Notification indicator information element with notification description coded to “conference disconnected, preemption”. The network shall also send to the other remote user a NOTIFY message, containing the Notification indicator information element with notification description coded to “conference disconnected, preemption”.

3.6.13 User-to-User Signalling

No impact.

3.6.14 Multiple Subscriber Number

No impact.

3.6.15 Call Hold

The network may preempt a held MLPP call due to a lack of resources in the network to complete a higher precedence MLPP call in the same MLPP Service Domain. In this situation, the clearing of the held MLPP call at the served user’s (Call Hold subscriber’s) interface shall be initiated by the network sending a DISCONNECT message to the served user. The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to “circuitNotReservedForReuse” and cause value #8, “preemption” in order to notify the served user that the held call is preempted.

The network may preempt a held MLPP call as a result of a lack of channels at the held party's (or remote user's) interface when a higher precedence MLPP call in the same MLPP Service Domain needs to be setup over that interface. In this situation, the network shall preempt the held MLPP call at the remote user's interface by employing the normal call clearing procedures as described in 5.3/Q.931, with the first clearing message containing the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitReservedForReuse" (to indicate that the B-channel of the held call is reserved for reuse.) The channel thus reserved at the remote user's interface as a result of above MLPP procedure, may then be reused by the incoming or outgoing higher precedence MLPP call by the network or user sending a SETUP message containing channel id = "reserved channel's id". The clearing of the held MLPP call at the served user's (Call Hold subscriber's) interface shall be initiated by the network sending a DISCONNECT message to the served user. The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitNotReservedForReuse" and cause value #8, "preemption" in order to notify the served user that the held call is preempted.

If a multipoint configuration exists at the served user's (user-network) interface, the network or user may use an "idle" or "active" channel that is reserved for a held MLPP call of the served user (Call Hold subscriber) for the incoming or outgoing higher precedence MLPP call to or from the same or another user on the interface. To accomplish this:

1) For an "idle" channel, the incoming or outgoing higher precedence MLPP call may be completed or continued by the network or user sending a SETUP message with channel id = "idle channel's id".

2) For an "active" channel, the call on that channel shall be preempted following the normal call clearing procedures as described in Recommendation Q.931, with the first clearing message toward the user containing the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitReservedForReuse" (to indicate that the held channel is reserved for reuse) and the first clearing message toward the remote user of the "active" channel containing the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitNotReservedForReuse" and cause value #8, "preemption" (to indicate that the held channel at the remote user's interface is not reserved for reuse). Then, the incoming or outgoing higher precedence MLPP call may be completed or continued by the network or user sending a SETUP message with channel id = "channel id of the cleared call".

In both of the above cases, the held MLPP call shall not be cleared.

3.6.16 Advice of Charge

No impact.

3.6.17 Sub-addressing

No applicable interaction at this time.

3.6.18 Terminal Portability

No applicable interaction at this time.

3.6.19 Completion of Calls to Busy Subscriber

As specified in 3/Q.953.

3.6.20 Malicious Call Identification

No applicable interaction at this time.

3.6.21 Reverse Charging

No impact.

3.6.22 Multi-Level Precedence and Preemption

No impact.

3.7 Interactions with other networks

3.7.1 Interactions with public networks

When a public network employing Signaling System No. 7 (SS No. 7) interacts with the DSS 1, the SS No. 7 shall transport:

1) Cause values #8 and #46, respectively to indicate “preemption” and “precedence call blocked” to the calling, called, preempted users, served user of the Conference Calling supplementary service, or remaining parties of a three way conversation when acall is preempted, as appropriate.

2) Information to indicate whether the called user of an MLPP call is an MLPP subscriber or not for the DSS 1 exchanges and the calling user.

3) Call completion delay indication to the calling user when an LFB query is invoked.

4) Conference floating, served user preempted indication to all conferees when the served user of the Conference Calling supplementary service is preempted.

5) Conference disconnected, preemption indication to the remaining parties of a three way conversation when the conference is disconnected as a result of preemption of one of the two calls.

3.7.2 Interactions with private ISDNs

The procedure at the T reference point to support attached private networks is described in this subclause.

Normal operation without an optional MLPP DSS 1 LFB query is illustrated in Figures 3-5 and 3-6 and described in 3.7.2.1.

3.7.2.1 MLPP DSS 1 procedure without LFB option

3.7.2.1.1 Procedure at originating private ISDN

3.7.2.1.1.1 Normal operation

If the originating exchange in the private ISDN is connected to a local exchange in a public network, it shall follow the procedure in 3.5.2.1.1.1, items 1) through 2) It shall then mark the circuit busy with the precedence level and MLPP Service Domain of the outgoing call and send a CALL PROCEEDING message toward the calling user. Then:

1) If there is an idle circuit to propagate the call to the next exchange, then a SETUP message, containing the Invoke component of the mLPPCallrequest operation in its Facility information element, shall be sent after marking the circuit busy at the precedence level and the MLPP Service Domain of the MLPP call. Then the procedure in item 3) shall be followed.

2) If there are no idle circuits (i.e. congestion is encountered), the following shall occur:

   a) If the call is a ROUTINE call, it shall be cleared backward (toward calling user) employing the RELEASE COMPLETE message with cause value #34, “no circuit/channel available” and the Return Error component of the mLPPCallrequest operation in its Facility information element with Error “resourceUnavailable”.

   b) If the call is a precedence call and a preemptable circuit is located, then the MLPP call on that circuit shall be cleared: (a) forward (toward public network) using a DISCONNECT message containing the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to “circuitReservedForReuse” and (b) backward (toward to be preempted user) using a DISCONNECT message containing the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to “circuitNotReservedForReuse”. The circuit reserved for reuse is marked with the precedence level

and MLPP Service Domain of the preempting call. A timer T_{RR} is started upon sending the DISCONNECT message in case (a) to ensure that the circuit reserved for reuse is unreserved at the expiry of timer T_{RR}. Then:

(1) If the existing MLPP call is cleared within timer T_{RR}, as indicated by the private network receiving RELEASE message, which contains the Return Result component of the mLPPCallpreemption operation in its Facility information element, the timer T_{RR} is stopped and the same (reserved) circuit shall be used to continue the preempting call using a SETUP message, which shall contain the Channel identification of the reserved circuit and the Invoke component of the mLPPCallrequest operation in its Facility information element. Then, the procedure in item 3) shall be followed.

(2) On expiry of timer T_{RR}, the marked circuit is unreserved and the procedure in this subclause (3.7.2.1.1.1, starting with item 2) shall be followed, if this was the first attempt to setup the MLPP call; otherwise, the call shall be cleared backward (toward calling user) employing the DISCONNECT message. The DISCONNECT message shall contain cause value #46, "precedence call blocked" and the Return Result component of the mLPPCallrequest operation in its Facility information element with StatusRequest coded to "failureCaseA", indicating call failure.

c) If the call is a precedence call and a preemptable circuit is not located, it shall be cleared backward (toward calling user) employing the DISCONNECT message. The DISCONNECT message shall contain cause value #46, "precedence call blocked" and the Return Result component of the mLPPCallrequest operation in its Facility information element with StatusRequest coded to "failureCaseA", indicating call failure.

3) Upon receipt of the ALERTING message from the network, which contains the Return Result component of the mLPPCallrequest operation in its Facility information element, the originating exchange shall check the StatusRequest to determine if the called user is an MLPP subscriber. If the called user is *not* an MLPP subscriber (as indicated by StatusRequest coded to "successCalledUserNotMLPPSubscriber"), the originating exchange shall unmark the previously marked circuit for the MLPP call; if the called user is an MLPP subscriber (as indicated by StatusRequest coded to "successCalledUserMLPPSubscriber"), the originating exchange shall retain marking on the previously marked circuit for the MLPP call. Then, in both cases above, the MLPP call setup will continue, as described in 5.1.8/Q.931.

3.7.2.1.1.2 Exceptional procedures

As defined in 3.5.2.1.1.2.

3.7.2.1.2 Procedure at destination private ISDN

3.7.2.1.2.1 Normal operation

Upon receipt of the Setup Indication, the local exchange in the public network connected to a private ISDN shall set appropriate codes for LFB Indication (LFB_Indictn = "lfbAllowed" or "lfbNotAllowed") and MLPP Service Domain (MLPP_Svc_Domn) in the Facility information element, mark the circuit busy with precedence level and MLPP Service Domain, return a Call Proceeding Indication toward the network, and do the following:

1) If there is an idle circuit to propagate the call to the next exchange, then a SETUP message, containing the Invoke component of the mLPPCallrequest operation in its Facility information element, shall be sent after marking the circuit busy at the precedence level and MLPP Service Domain of the incoming MLPP call. Then the procedure in item 3) shall be followed.

2) If there are no idle circuits (i.e. congestion is encountered), the following will occur:

a) If the incoming call is a ROUTINE call, it shall be cleared backward (toward calling user) with an Indication with cause value #34, "no circuit/channel available".

b) If the incoming call is a precedence call and a preemptable circuit is located, then the MLPP call on that circuit shall be cleared: (a) forward (toward called user) using a DISCONNECT message and (b) backward (toward to be preempted user) with an Indication containing cause value #8, "preemption". The DISCONNECT message shall contain the Invoke component of the mLPPCallpreemption operation in its Facility information element with Preempt_params coded to "circuitReservedForReuse". The circuit reserved for reuse is marked with the precedence level and

MLPP Service Domain of the preempting call. A timer T_{RR} is started upon sending the DISCONNECT message in case (a) to ensure that the circuit reserved for reuse is unreserved at the expiry of timer T_{RR}. Then:

(1) If the existing call is cleared within timer T_{RR}, as indicated by the network receiving RELEASE message, which contains the Return Result component of the mLPPCallpreemption operation in its Facility information element, timer T_{RR} is stopped and the same (reserved) circuit shall be used to continue the call using a SETUP message, which shall contain the Channel identification of the reserved circuit and the Invoke component of the mLPPCallrequest operation in its Facility information element. Then, the procedure in item 3) shall be followed.

(2) On expiry of timer T_{RR}, the marked circuit is unreserved and the procedure in this subclause (3.7.2.1.2.1, starting with item 1) shall be followed, if this was the first attempt to setup the MLPP call; otherwise, the call shall be cleared backward (toward calling user) with an Indication containing cause value #46, "precedence call blocked".

c) If the incoming call is a precedence call and a preemptable circuit is not located, it shall be cleared backward (toward calling user) with an Indication containing cause value #46, "precedence call blocked".

3) Upon receipt of the ALERTING message from the called user side, which contains the Return Result component of the mLPPCallrequest operation in its Facility information element, the local exchange shall check the StatusRequest to determine if the called user is an MLPP subscriber. If the called user is *not* an MLPP subscriber (as indicated by StatusRequest coded to "successCalledUserNotMLPPSubscriber"), the local exchange shall unmark the previously marked circuit for the MLPP call; if the called user is an MLPP subscriber (as indicated by StatusRequest coded to "successCalledUserMLPPSubscriber"), the local exchange shall retain marking on the previously marked circuit for the MLPP call. Then, in both cases above, the MLPP call setup will be completed, as described in 5.2.7/Q.931.

3.7.2.1.2.2 Exceptional procedures

1) Upon receipt of the Setup Indication, if the private network does not support the invoked MLPP supplementary service, the local exchange shall continue the MLPP call in the private network as if it were a basic call.

2) An MLPP call may be preempted as a result of preemption in the public network or private network. In this case, upon receipt of the Release Indication or DISCONNECT message with cause value #8, "preemption" the local exchange shall, respectively send the DISCONNECT message toward the private network or an Indication toward the public network with the same Cause to clear the call. The DISCONNECT message shall also contain the Return Result component of the mLPPCallrequest operation in its Facility information element, containing StatusRequest coded to "failureCaseB", indicating call failure.

3.7.2.2 Optional MLPP DSS 1 LFB procedure

When the LFB option is supported by the private ISDN and the LFB Indication in the Invoke component within the Facility information element of mLPPCallrequest operation in the SETUP message or Setup Indication is coded to "lfbAllowed" then the MLPP DSS 1 LFB query shall be invoked in the private ISDN at the preemption initiating exchange when congestion (no idle circuits) is encountered. Note that this query shall also be invoked in the private ISDN to continue the network LFB query. The private ISDN shall employ the Invoke component of the mLPPLFBquery operation contained in the Facility information element of the REGISTER message to invoke the query and the Return Result or Return Error components of the mLPPLFBquery operation contained in the Facility information element of the FACILITY message to return the responses to the query. The signalling association created by the REGISTER message shall be terminated by employing the RELEASE COMPLETE message, as described in 6.3.2/Q.932.

The optional MLPP DSS 1 LFB procedure is illustrated in Figures 3-7 and 3-8 and described in the following.

3.7.2.2.1 Procedure at originating private ISDN

3.7.2.2.1.1 Normal operation

If the originating exchange is in a private ISDN (connected to a Local Exchange in a public network) which encounters congestion (i.e. no idle circuit) upon receipt of a SETUP message and locates a preemptable circuit and if LFB is being invoked on the call for the first time, then the originating exchange shall mark the circuit, as identified by Channel identification (with precedence level, MLPP Service Domain, and Calling party number), for preemption and reserved for use by the preempting call. Otherwise, the procedure in 3.7.2.1.1.1, items 1) through 3), shall be followed. A timer T_{LR} is started to ensure that the marked circuit is unreserved at the expiry of timer T_{LR}. It shall then invoke the MLPP DSS 1 LFB query with a REGISTER message sent towards the called user. The Invoke component of the mLPPLFBquery operation within the Facility information element of the REGISTER message contains the precedence level (Prec_level), LFB Indication (LFB_Indictn), and MLPP Service Domain (MLPP_Svc_Domn). Timer T_L is started when the REGISTER message is sent. At the same time the REGISTER message is sent, a NOTIFY message is sent toward the calling user to indicate delay in call completion. The Notification Description field in the Notification indicator information element within the NOTIFY message shall be coded to indicate "call completion delay". The response to the REGISTER message shall be received in an appropriate component within the Facility information element of the FACILITY message. The following actions then occur:

1) If no FACILITY message is received and the timer T_L expires, LFB Indication is set to "lfbNotAllowed" timers T_L and T_{LR} are stopped, the circuit previously marked as reserved is unreserved, and procedure described in 3.7.2.1.1.1, items 1) through 3) shall be followed.

2) If the FACILITY message is received before the expiry of timer T_L, indicating success of the network LFB query, timer T_L is stopped, LFB Indication is set to "pathReserved", and one of the following will occur:

   a) If the circuit that was previously reserved for use by the preempting call is found and it is not idle, procedure described in 3.7.2.1.1.1, item 2) b) shall be followed.

   b) If the circuit that was previously reserved for use by the preempting call is found and it is idle, procedure described in 3.7.2.1.1.1, item 1) shall be followed.

   c) If the circuit that was previously reserved for use by the preempting call is not found, LFB Indication is set to "lfbNotAllowed", timer T_{LR} is stopped, and the procedure described in 3.7.2.1.1.1, items 1) through 3) shall be followed.

   In cases a) and b) above, timer T_{LR} is stopped when subsequent SETUP for the preempting call is sent.

3) If the FACILITY message is received before the expiry of timer T_L, containing "pathReservationDenied" indication in StatusQuery, the same action as in item 1) above shall take place.

4) If the FACILITY message is received before the expiry of timer T_L, indicating failure of the network LFB query, timers T_L and T_{LR} are stopped, the circuit previously marked as reserved is unreserved, and the incoming precedence call shall be cleared backward (toward calling user) using a DISCONNECT message, which contains cause value #46, "precedence call blocked" and the result of the mLPPCallrequest operation (i.e. StatusRequest coded to "failureCaseA") in the Return Result component of its Facility information element.

In all cases above, the originating exchange shall terminate the signalling association created by the REGISTER message by sending a RELEASE COMPLETE message toward the called user.

3.7.2.2.1.2 Exceptional procedures

1) Upon receipt of the REGISTER message, if the public network does not support the MLPPLFB query, the public network shall return a FACILITY message towards the private network, which contains the Return Error component of the mLPPLFBquery operation in its Facility information element with Error "rejectedByNetwork" and continue the MLPP call as described in 3.7.2.1.1.1, items 1) through 3).

2) Upon receipt of the REGISTER message, if the private network has not subscribed to the MLPPLFBquery, the public network supporting the MLPPLFBquery shall return a FACILITY message toward the private network, which contains the Return Error component of the mLPPLFBquery operation in its Facility information element with Error "userNotSubscribed" and continue the MLPP call as described in 3.7.2.1.1.1, items 1) through 3).

In both cases above, the private network shall terminate the signalling association created by the REGISTER message by sending a RELEASE COMPLETE message.

3.7.2.2.2 Procedure at destination private ISDN

3.7.2.2.2.1 Normal operation

When an LFB option is provided in the private ISDN, upon encountering congestion (i.e. no idle circuit) after the receipt of a Setup Indication and locating a preemptable circuit or upon receipt of the network LFB query Indication, the local exchange in the public network, connected to the private ISDN, will do the following, if LFB is invoked on the call for the first time; otherwise, the procedure in 3.7.2.1.2.1, items 1) through 3) shall be followed:

1) *For network LFB query Indication receipt*, if a preemptable or idle circuit is not located, then an Indication, coded to "failure" shall be launched toward the network.

2) *For either network LFB query Indication or Setup Indication receipt*, preemptable or idle (for network LFB query only) circuit , as identified by its Channel identification, shall be marked (with precedence level, MLPP Service Domain, and Calling party number) for preemption and reserved for use by the preempting call. A timer T_{LR} is started to ensure that the marked circuit is unreserved at the expiry of timer T_{LR}. It shall then invoke the MLPP DSS 1 LFB query, employing the Invoke component within the Facility information element of the mLPPLFBquery operation in the REGISTER message, which is sent towards the called user. Timer T_L is started when the REGISTER message is sent. For the Setup Indication receipt, at the same time the REGISTER message is sent, a NOTIFY message is sent toward the calling user to indicate delay in call completion. The Notification Description field in the Notification indicator information element within the NOTIFY message shall be coded to indicate "call completion delay". The response to the REGISTER message shall be received in an appropriate component within the Facility information element of the FACILITY message. The following actions then occur:

   a) If no FACILITY message is received and the timer T_L expires, timers T_L and T_{LR} are stopped and the circuit previously marked as reserved is unreserved. Then:

      (1) *For network LFB query Indication receipt*, an Indication, coded to "success" shall be launched toward the network.

      (2) *For Setup Indication receipt*, LFB Indication is set to "lfbNotAllowed" and procedure described in 3.7.2.1.2.1, items 1) through 3) shall be followed.

   b) If the FACILITY message is received before the expiry of timer T_L, indicating success of the LFB query (i.e. StatusQuery coded to "success"), timer T_L is stopped. Then:

      (1) *For network LFB query Indication receipt*, an Indication, coded to "success" shall be launched toward the network. The timer T_{LR} is stopped when subsequent SETUP for the preempting call is sent.

      (2) *For Setup Indication receipt*, LFB Indication is set to "pathReserved" and one of the following will occur:

         (a) If the circuit that was previously reserved for use by the preempting call is found and it is not idle, procedure described in 3.7.2.1.2.1, item 2) b) shall be followed.

         (b) If the circuit that was previously reserved for use by the preempting call is found and it is idle, procedure described in 3.7.2.1.2.1, item 1) shall be followed.

         (c) If the circuit that was previously reserved for use by the preempting call is not found, LFB Indication (LFB_Indictn) is set to "lfbNotAllowed", timer T_{LR} is stopped, and the procedure described in 3.7.2.1.2.1, items 1) through 3) shall be followed.

In cases (a) and (b) above, timer T_{LR} is stopped when subsequent SETUP for the preempting call is sent.

c) If the FACILITY message is received before the expiry of timer T_L, containing StatusQuery coded to "pathReservationDenied" the same action as in item a) above shall take place.

d) If the FACILITY message is received before the expiry of timer T_L, indicating failure of the LFB query (i.e. StatusQuery coded to "failure"), timers T_L and T_{LR} are stopped, and the circuit previously marked as reserved is unreserved. Then:

(1) *For network LFB query Indication receipt*, an Indication coded to "failure" shall be launched toward the network.

(2) *For Setup Indication receipt*, the incoming precedence call shall be cleared backward (toward calling user) with an Indication containing cause value #46, "precedence call blocked".

In all cases above, the local exchange shall terminate the signalling association created by the REGISTER message by sending a RELEASE COMPLETE message toward the private network.

3.7.2.2.2.2 Exceptional procedure

When LFB option is not provided in the private network, then upon receipt of the network LFB query Indication, the local exchange in the public network connected to a private network shall launch an Indication coded to "success" toward the public network so that the preempting call may subsequently be offered when the procedure in 3.7.2.1.2.1 shall be used.

3.8 Signalling flows

This subclause contains the signalling flow diagrams for the MLPP supplementary service. They are as shown in Figures 3-1 through 3-8.

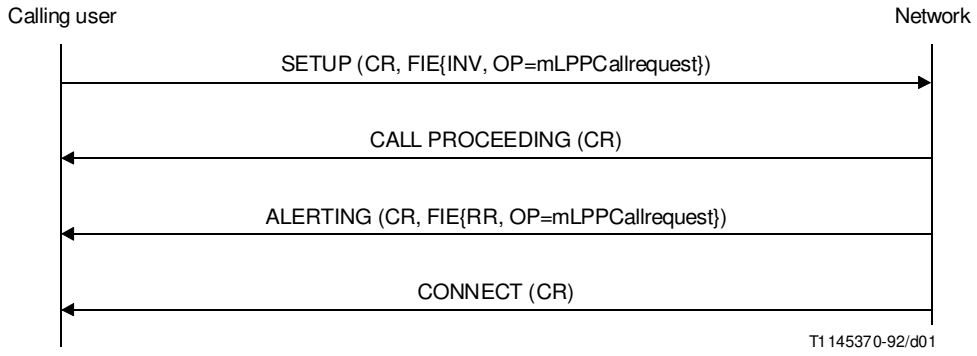
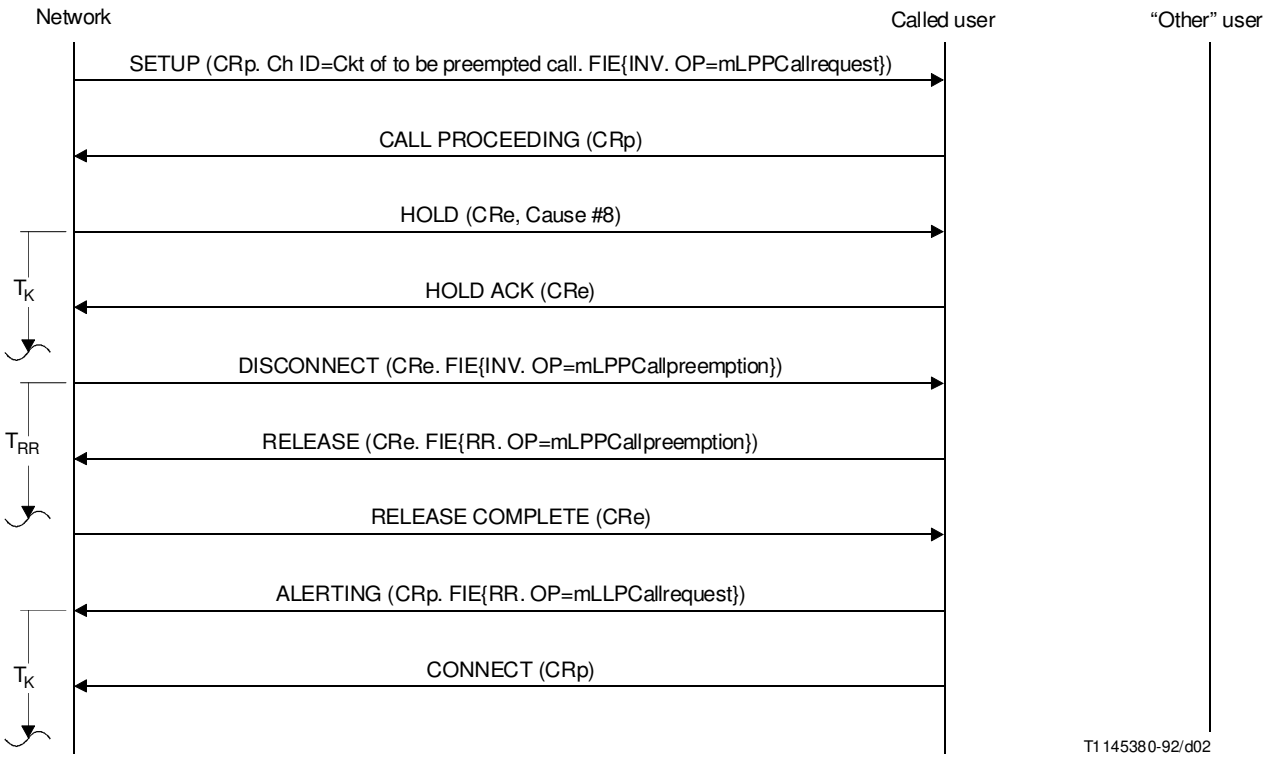


FIGURE 3-1/Q.955

Normal operation for MLPP without LFB option (originating interface)



CRp Call Reference of preempting call
CRe Call Reference of preempted (existing) call

FIGURE 3-2/Q.955

Normal operation for MLPP without LFB option
(destination interface – called user busy)

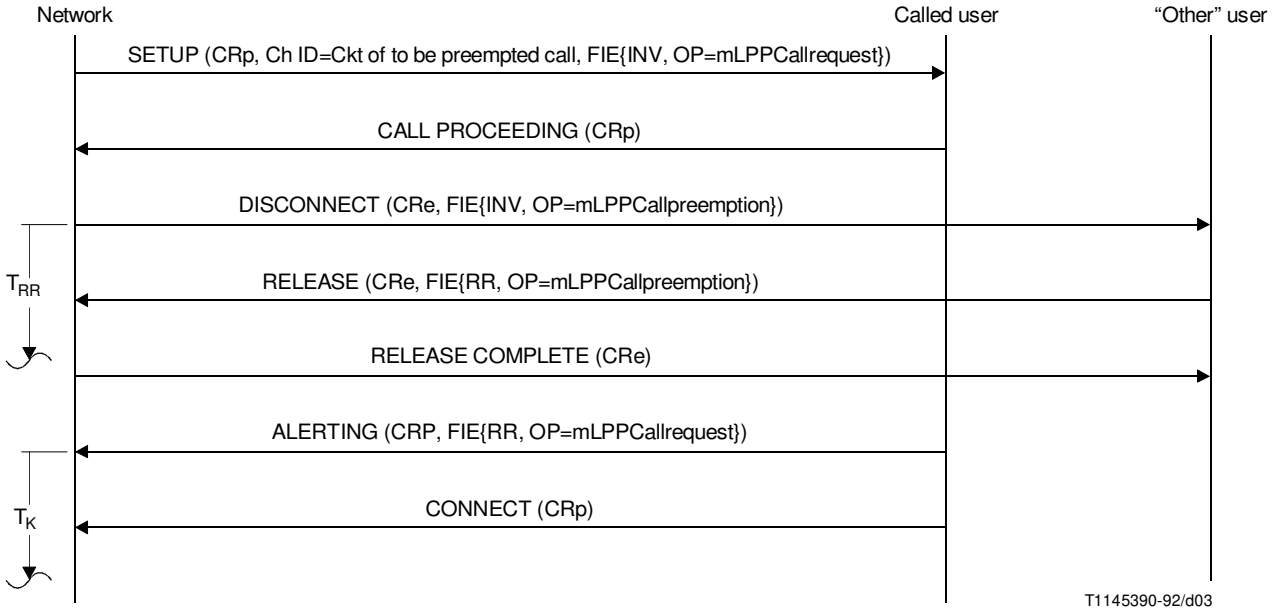


FIGURE 3-3/Q.955

Normal operation for MLPP without LFB option
(destination interface – "other" user busy)

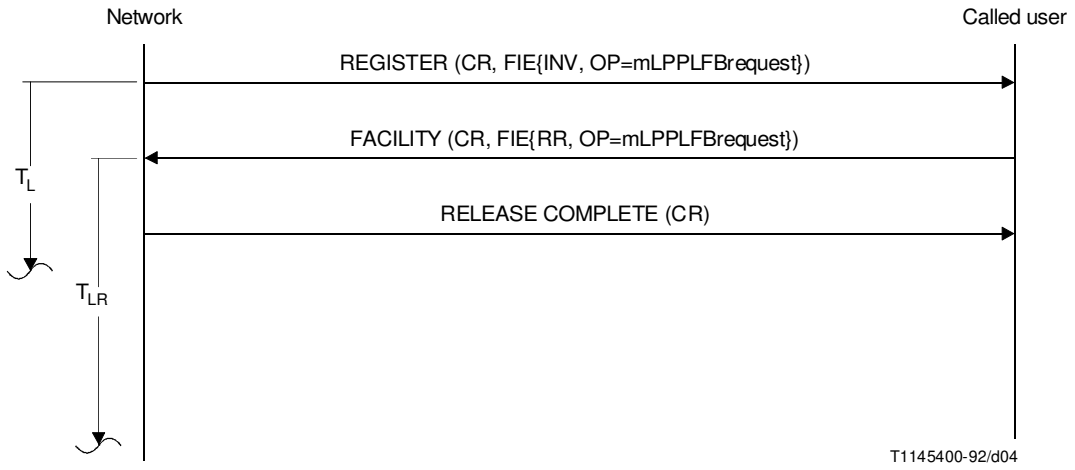


FIGURE 3-4/Q.955

Normal operation for MLPP with LFB option (destination interface)

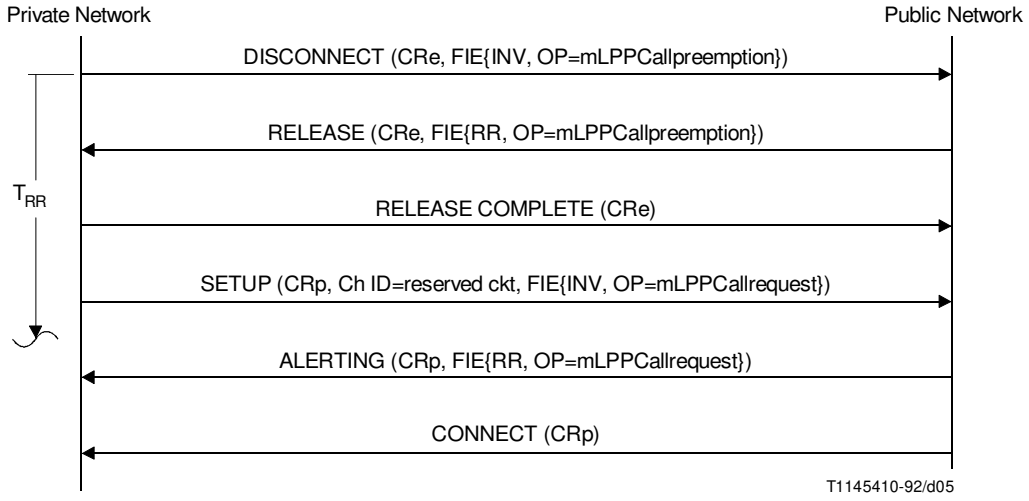


FIGURE 3-5/Q.955

Normal operation for MLPP without LFB option (originating private ISDN – sucessful preemption)

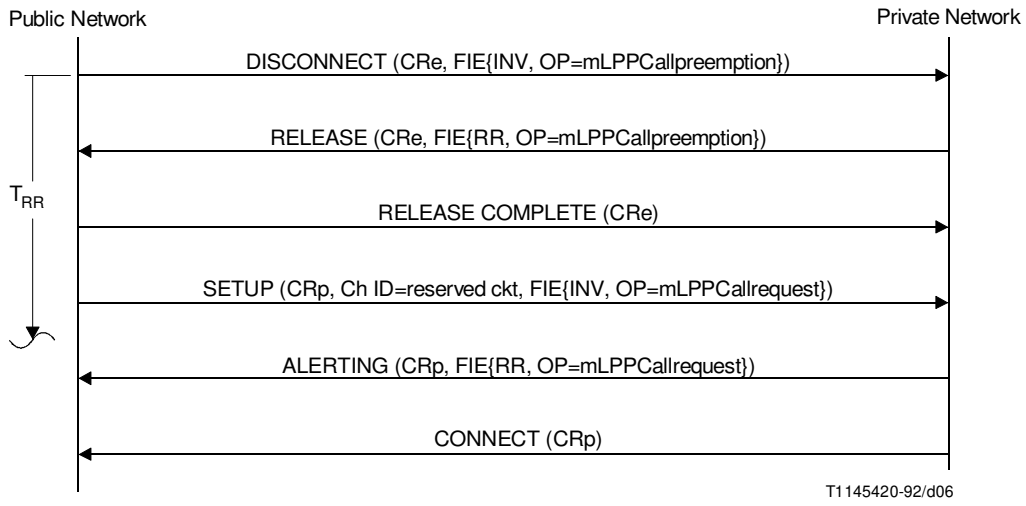


FIGURE 3-6/Q.955

Normal operation for MLPP without LFB option
(destination private ISDN – successful preemption)

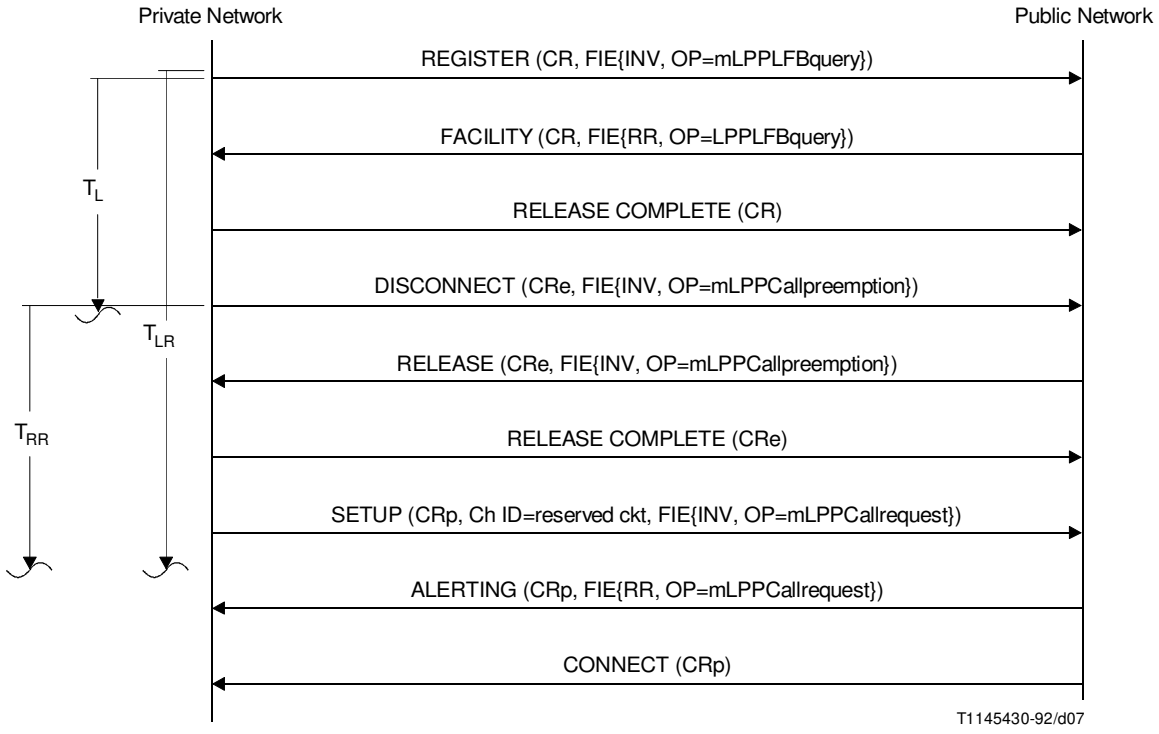


FIGURE 3-7/Q.955

Normal operation for MLPP with LFB option
(originating private ISDN – successful preemption)

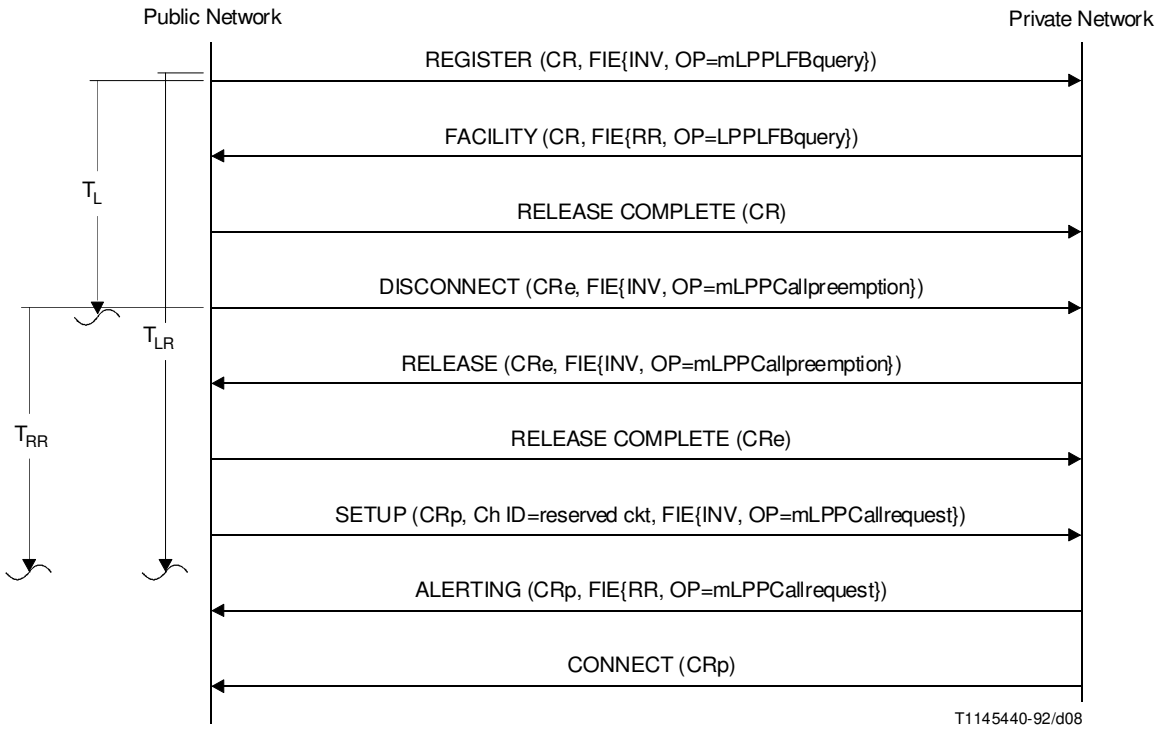


FIGURE 3-8/Q.955

Normal operation for MLPP with LFB option
(destination private ISDN – successful preemption)

3.9 Parameter values – timers

Four additional timers T_K, T_L, T_{LR}, and T_{RR} beyond those specified in Recommendations Q.931 and Q.932, shall be employed with the MLPP operation, as described in this Recommendation.

Network timer T_K is started when the serving exchange notifies a user of a precedence call. This timer has a range of values from 4-30 seconds.

Timer T_L is started when the MLPP DSS 1 LFB query is invoked. This timer has an approximate value of 15 seconds.

Timer T_{LR} is started when the MLPP DSS 1 LFB query successfully locates and marks as reserved a preemptable circuit. This timer has an approximate value of 30 seconds.

Timer T_{RR} is started when the call is released with the DISCONNECT message and the circuit is reserved for reuse. This timer has a value of 12 seconds.

3.10 Dynamic description

This subclause specifies actions within telecommunication equipment associated with the user-network access interface to support MLPP in diagrammatic form. It is shown in Figures 3-9 and 3-12. Figure 3-9 covers the Originating Exchange (OE), Figure 3-10, the calling user, Figure 3-11, the Destination Exchange (DE), and Figure 3-12, the called user.

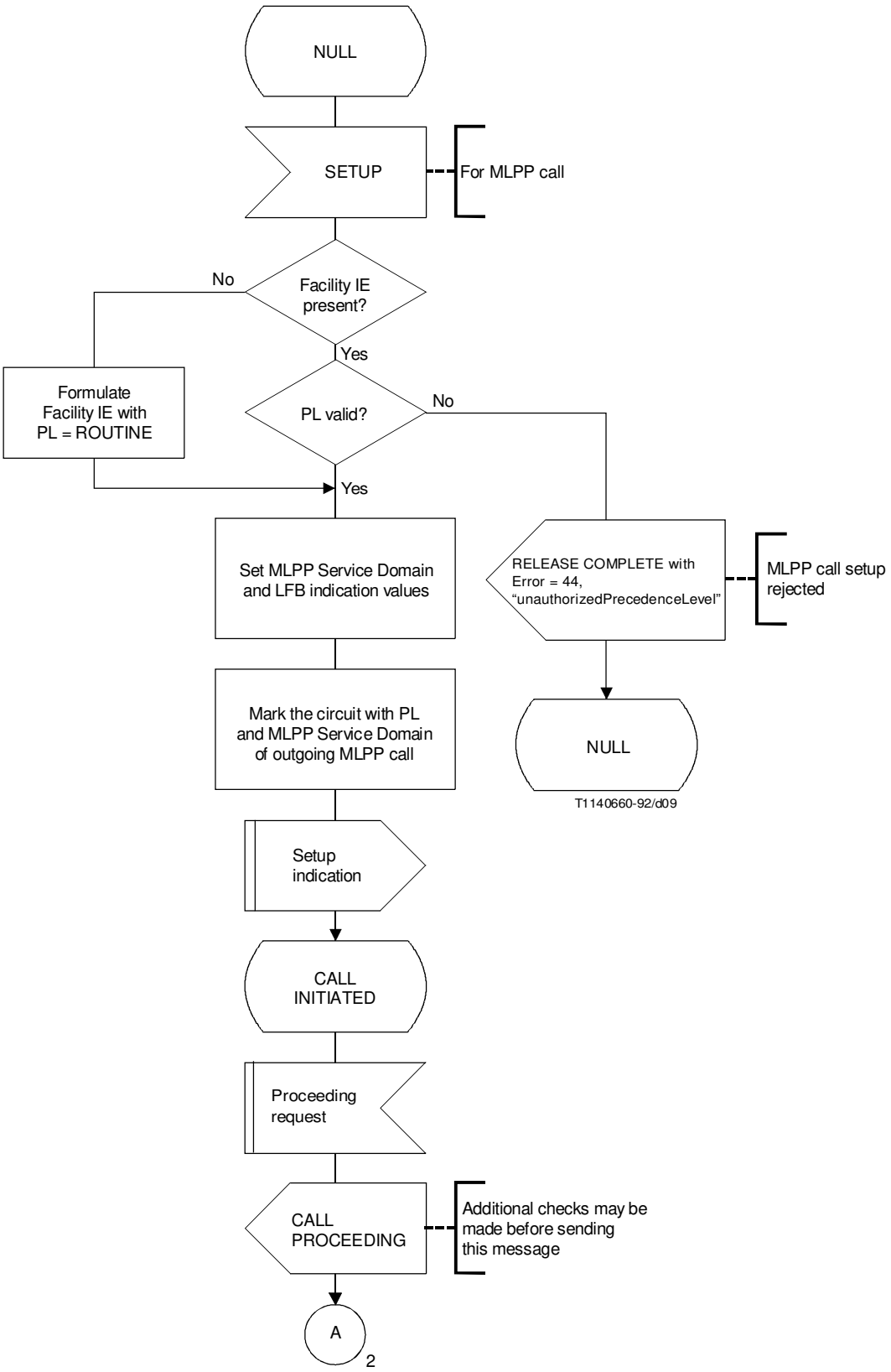


FIGURE 3-9/Q.955 (Sheet 1 of 2)

Originating exchange (OE) – Procedure without DSS 1 LFB query (procedure for outgoing MLPP call)

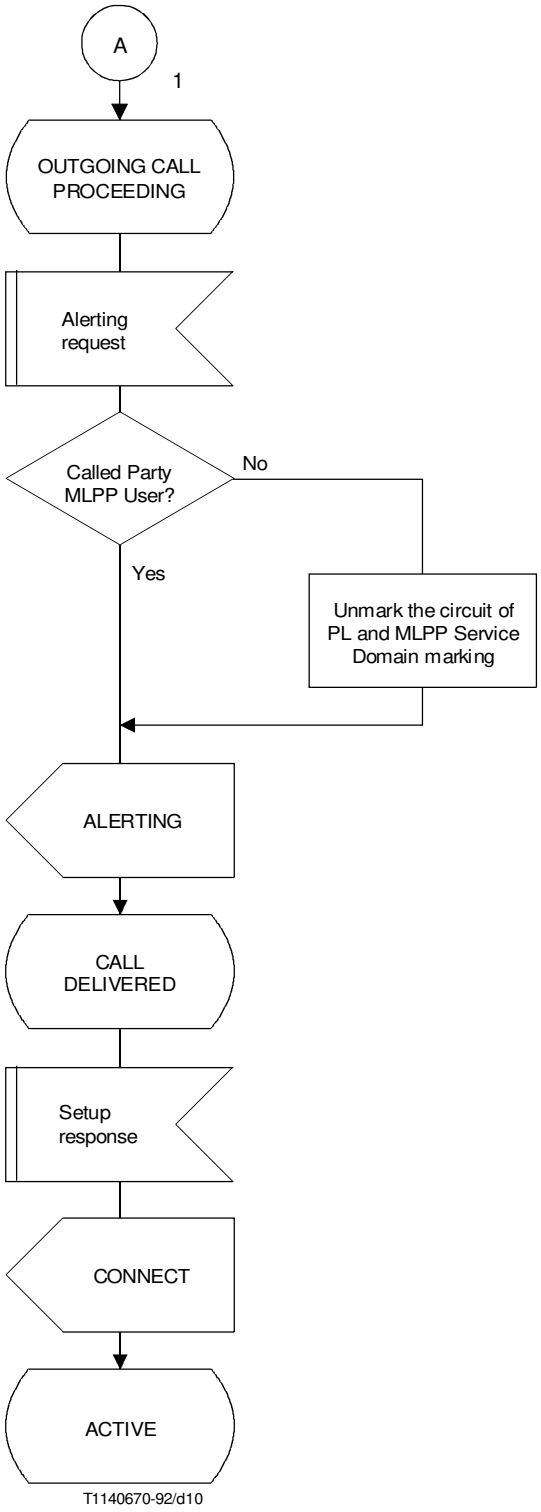


FIGURE 3-9/Q.955 (Sheet 2 of 2)

Originating exchange (OE) – Procedure without DSS 1 LFB query (Procedure for outgoing MLPP call)

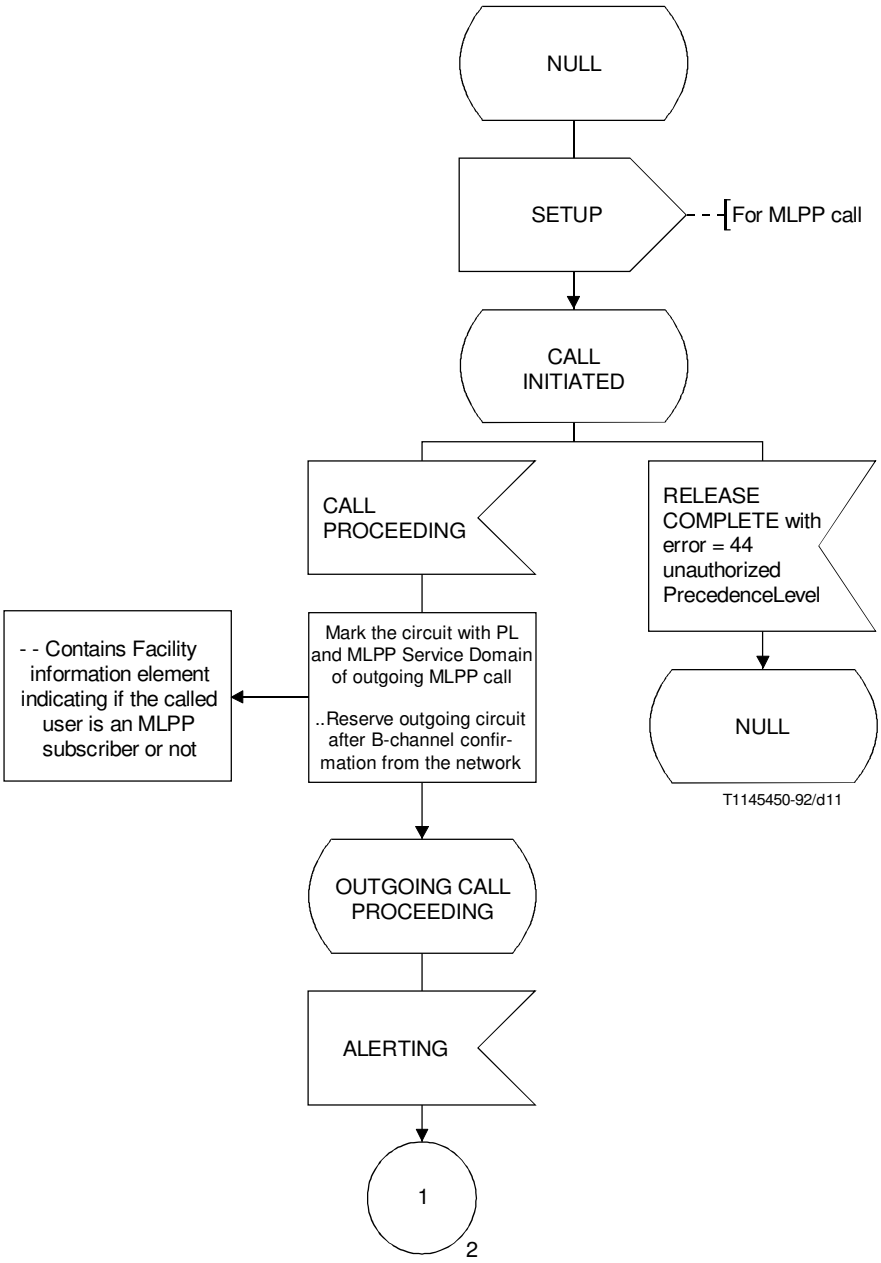


FIGURE 3-10/Q.955 (Sheet 1 of 2)

Calling User – Procedure without DSS 1 LFB query
(procedure for outgoing MLPP call)

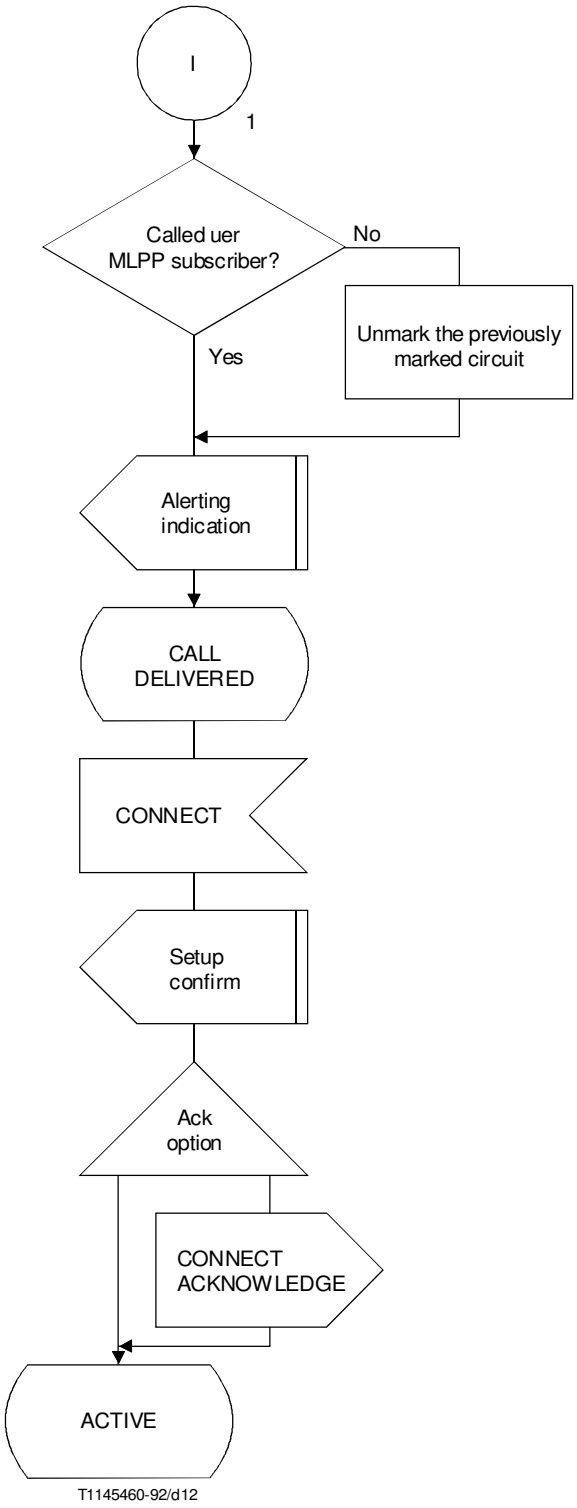


FIGURE 3-10/Q.955 (Sheet 2 of 2)

Calling User – Procedure without DSS 1 LFB query
(procedure for outgoing MLPP call)

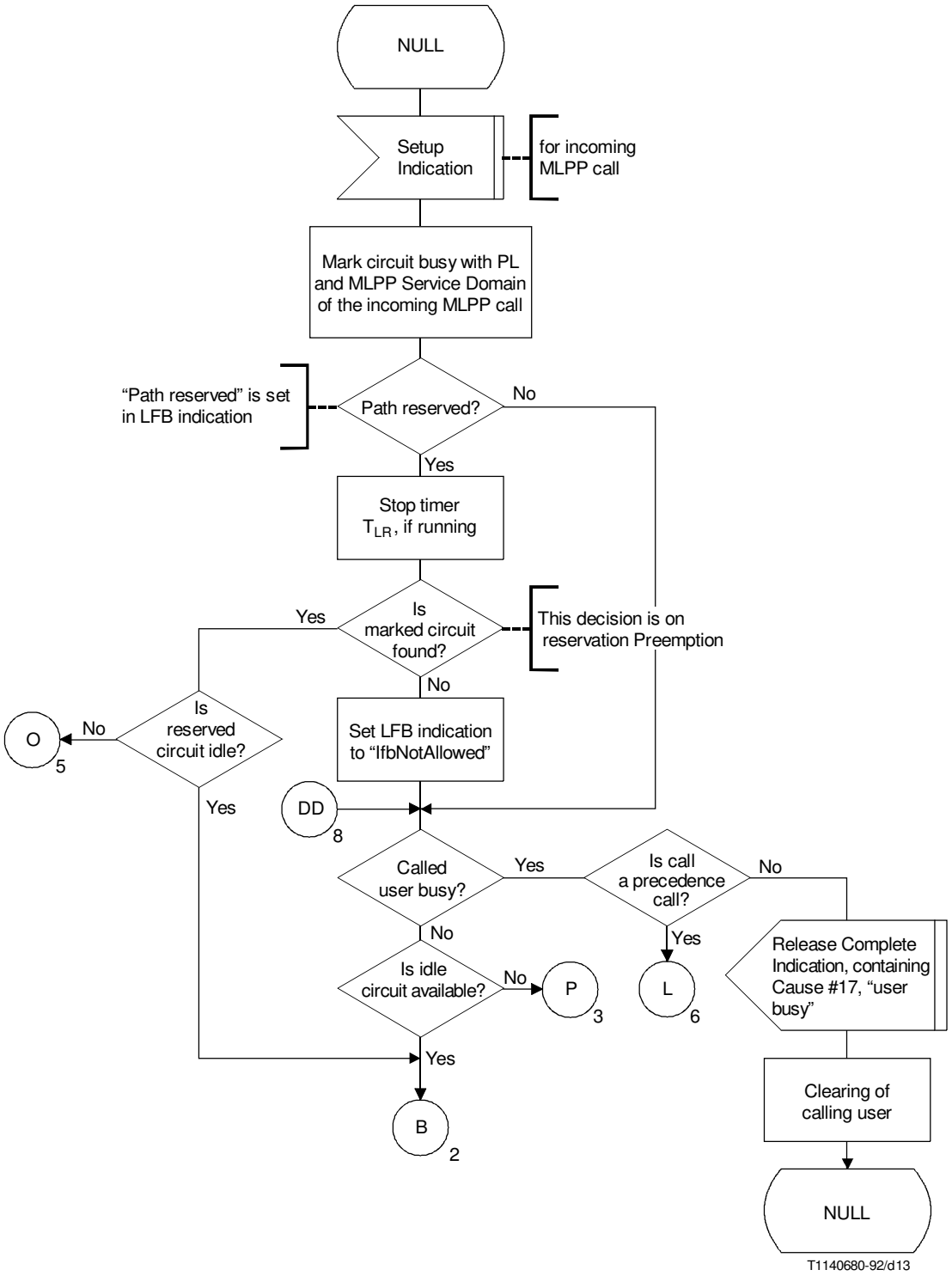


FIGURE 3-11/Q.955 (Sheet 1 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (procedure for incoming MLPP call)

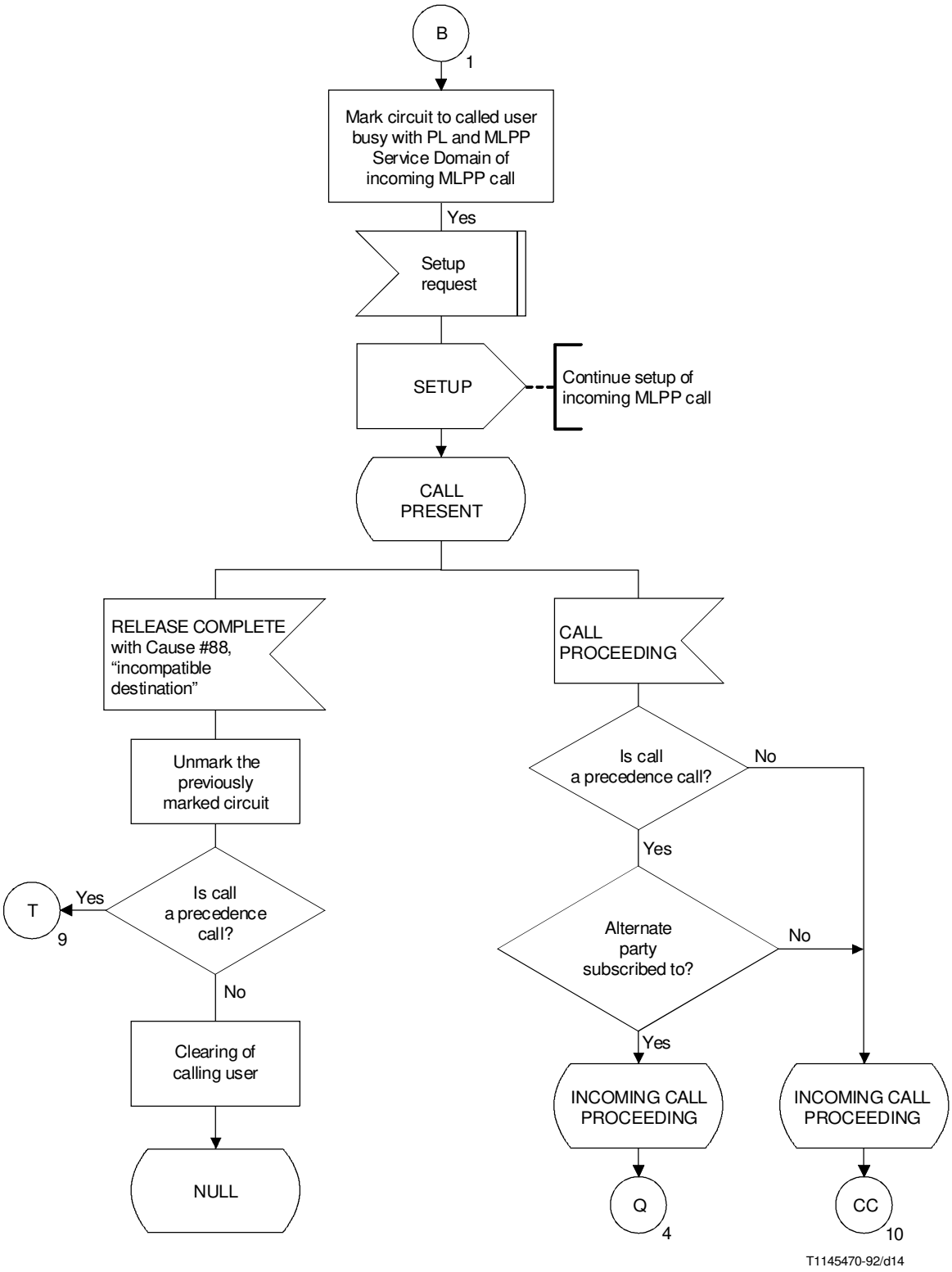


FIGURE 3-11/Q.955 (Sheet 2 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (procedure for incoming MLPP call)

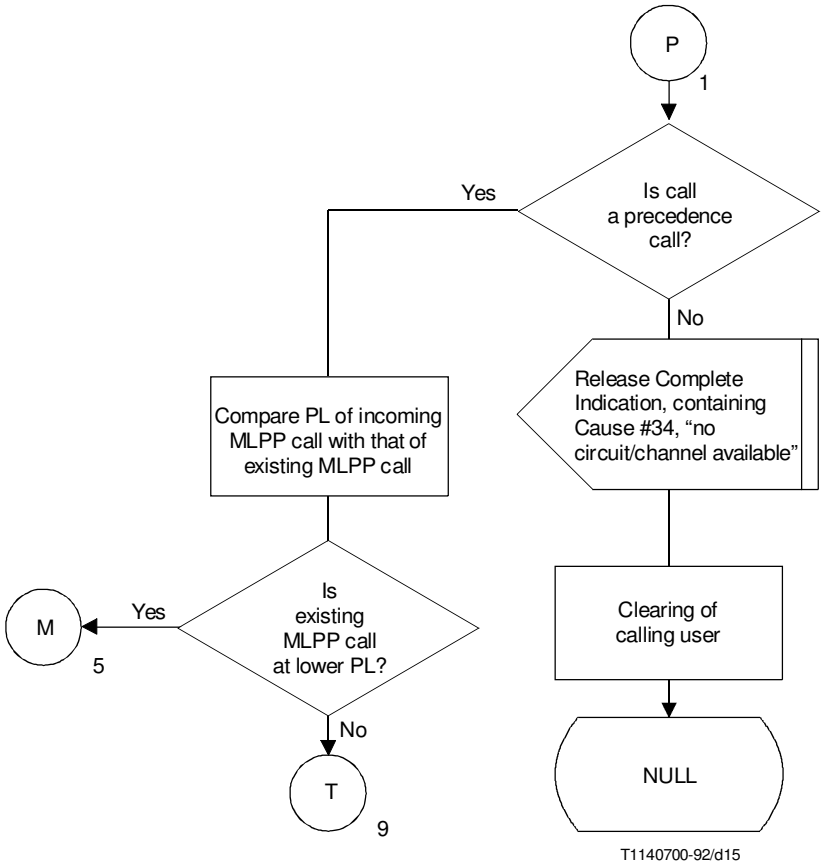


FIGURE 3-11/Q.955 (Sheet 3 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (procedure for incoming MLPP call)

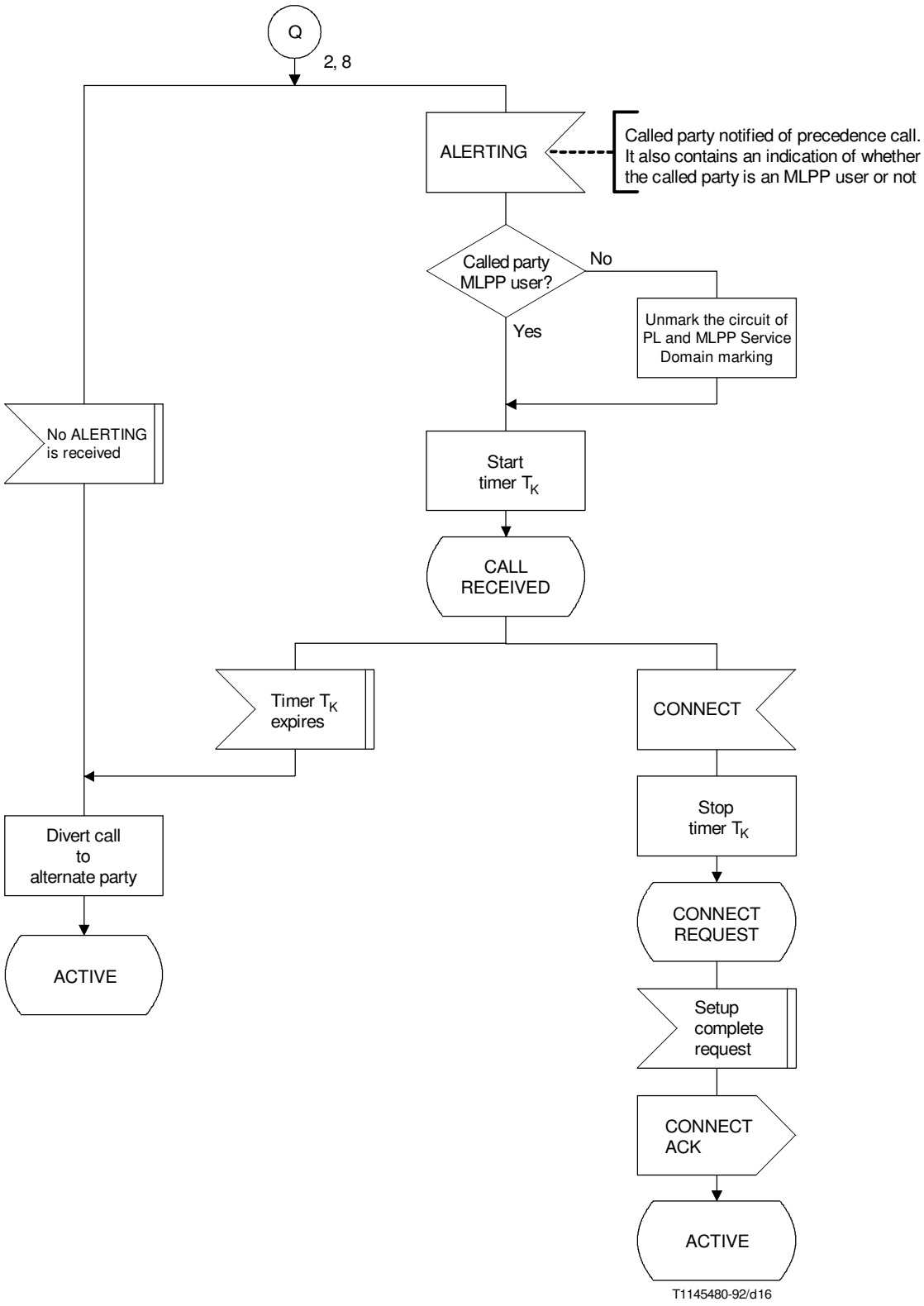


FIGURE 3-11/Q.955 (Sheet 4 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (procedure for incoming MLPP call)

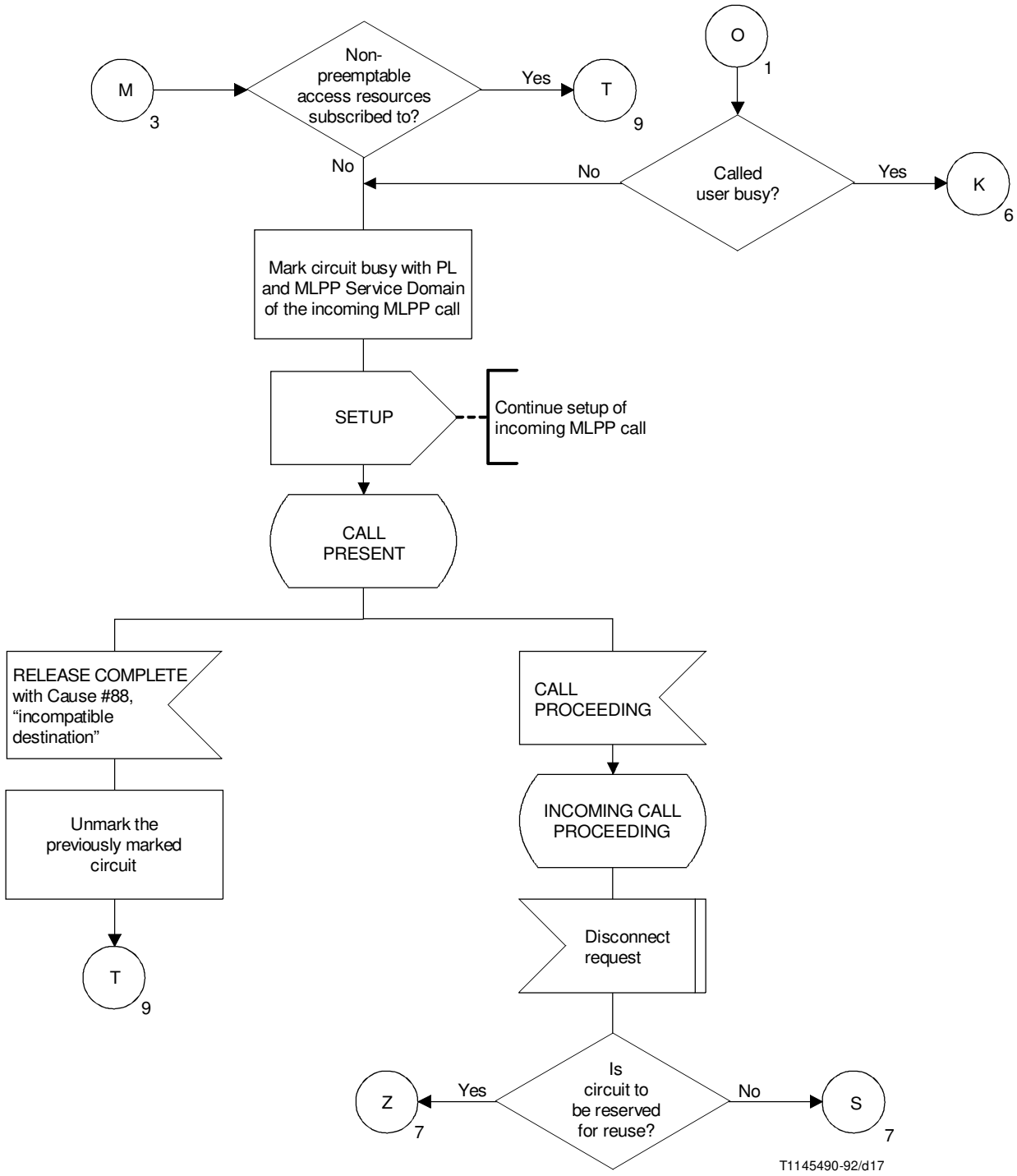


FIGURE 3-11/Q.955 (Sheet 5 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (release and preemption of existing MLPP call)

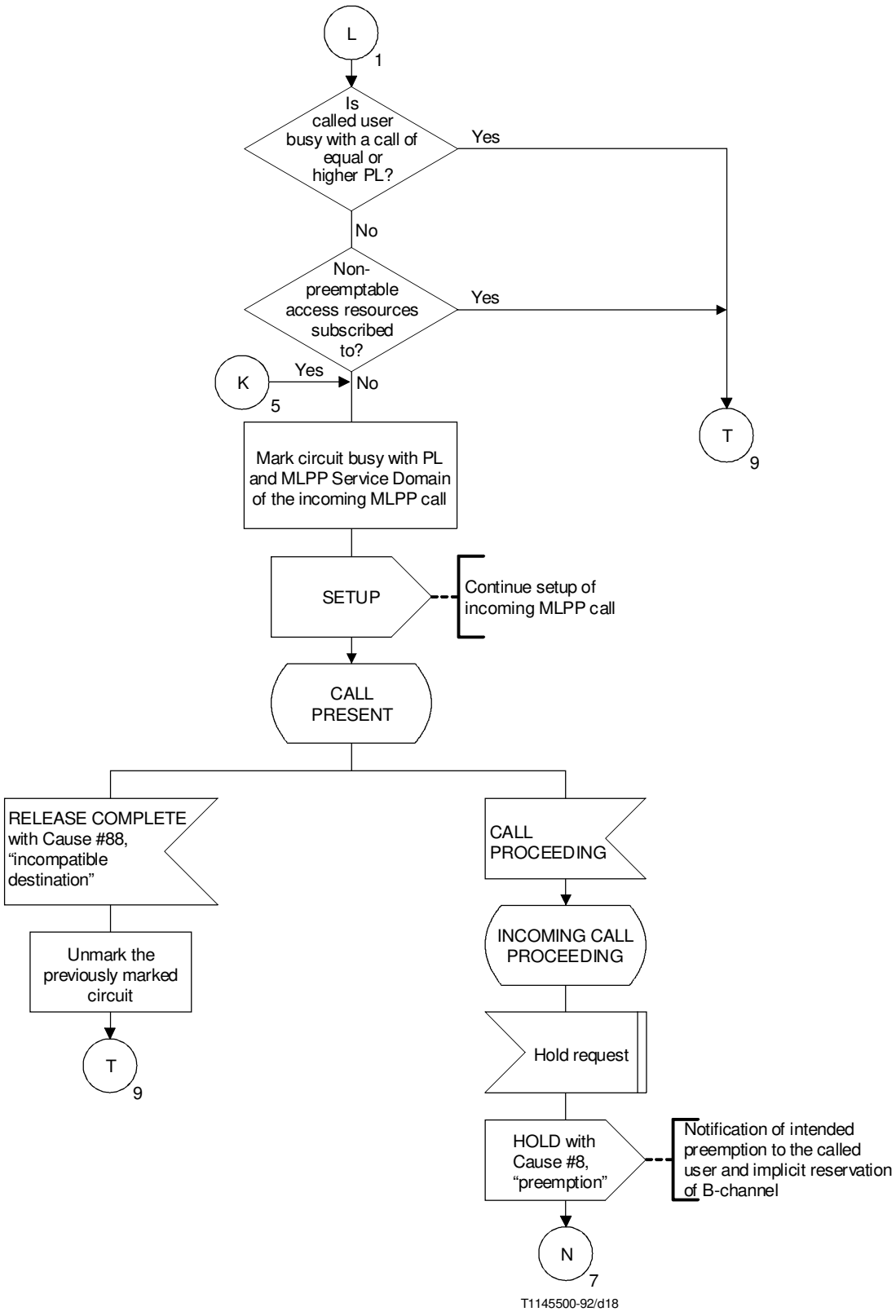


FIGURE 3-11/Q.955 (Sheet 6 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (release and preemption of existing MLPP call)

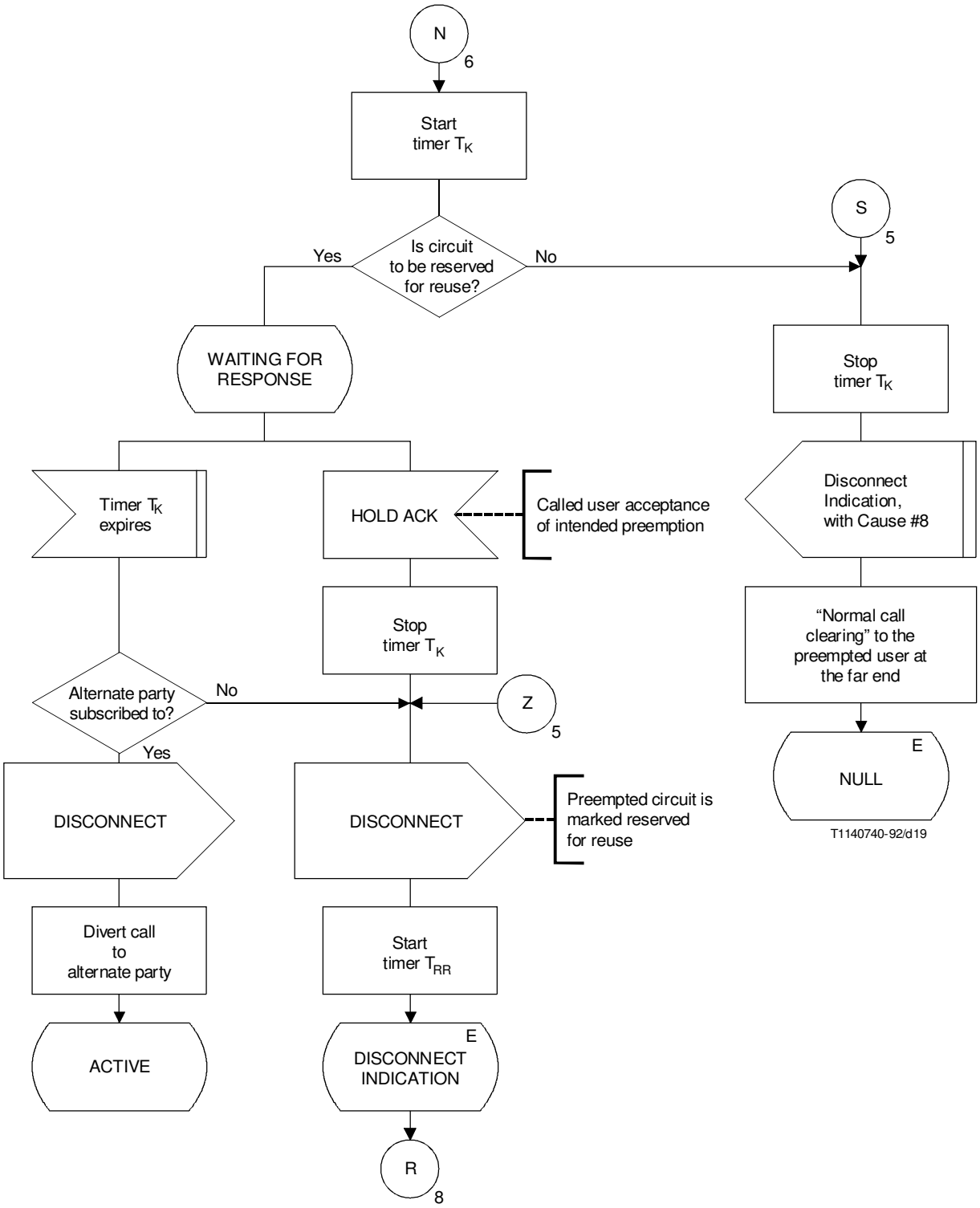


FIGURE 3-11/Q.955 (Sheet 7 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (release and preemption of existing MLPP call)

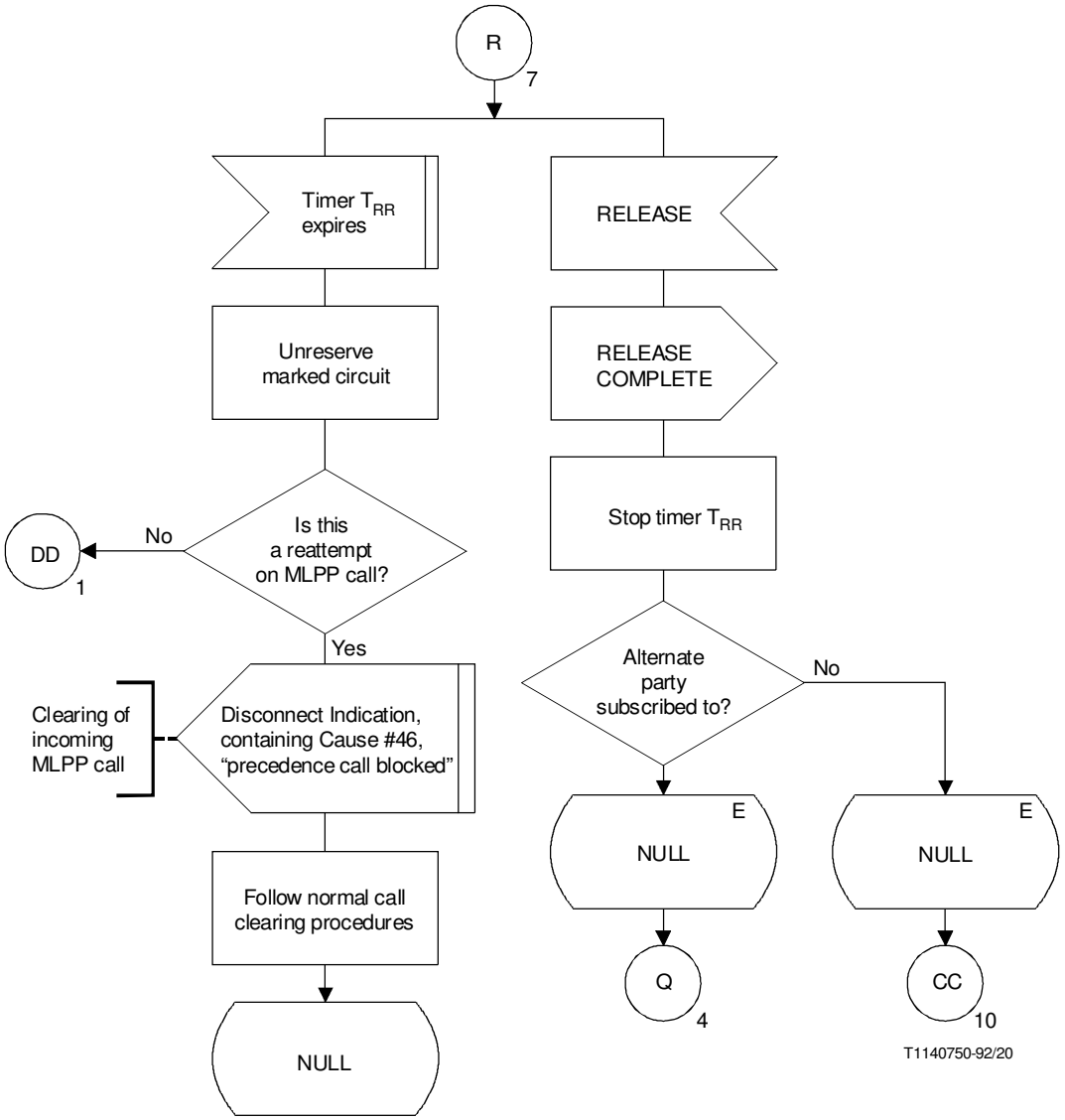


FIGURE 3-11/Q.955 (Sheet 8 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (release and preemption of existing MLPP call)

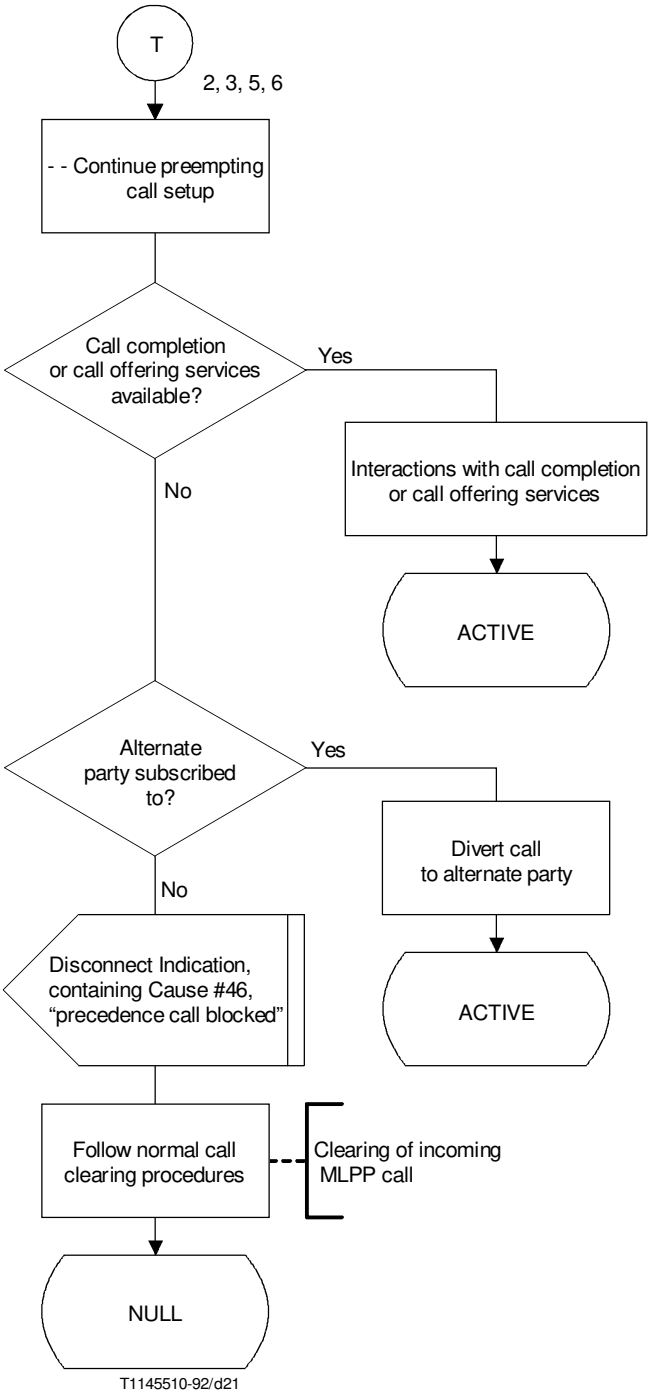


FIGURE 3-11/Q.955 (Sheet 9 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (MLPP call completion options)

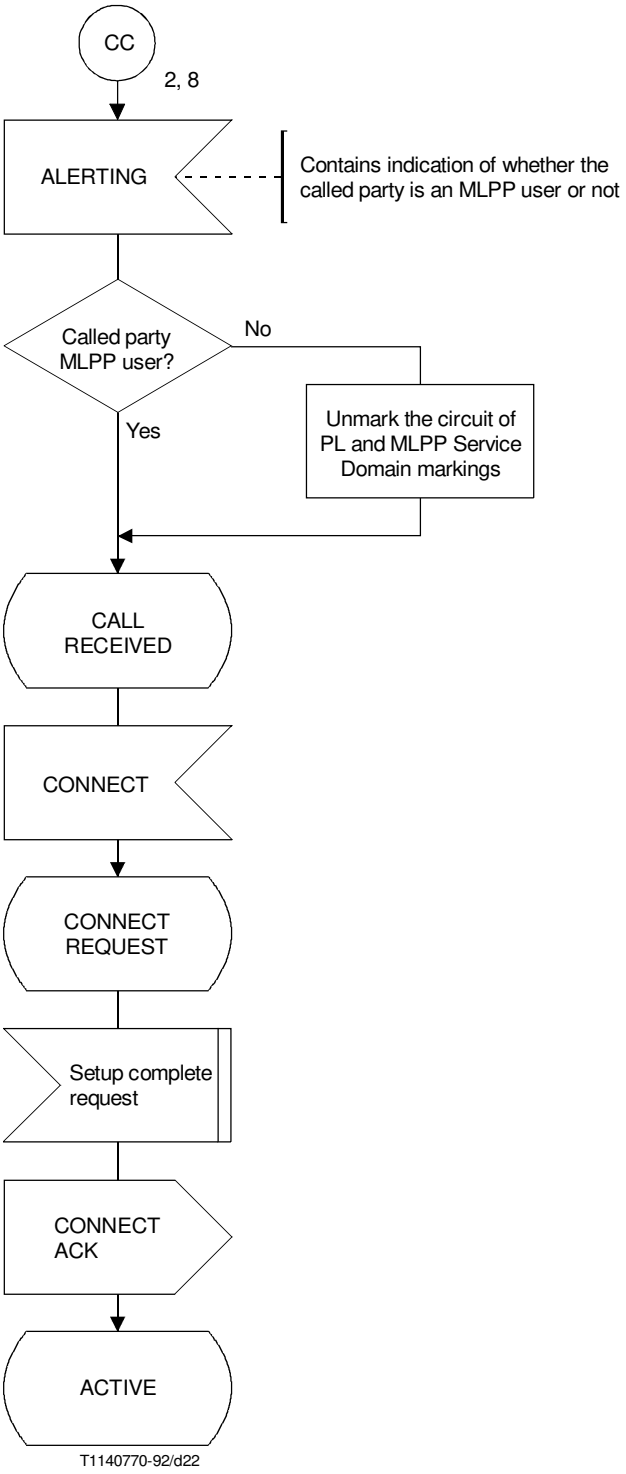


FIGURE 3-11/Q.955 (Sheet 10 of 14)

Destination exchange (DE) – Procedure without DSS 1 LFB query (call completion for MLPP call)

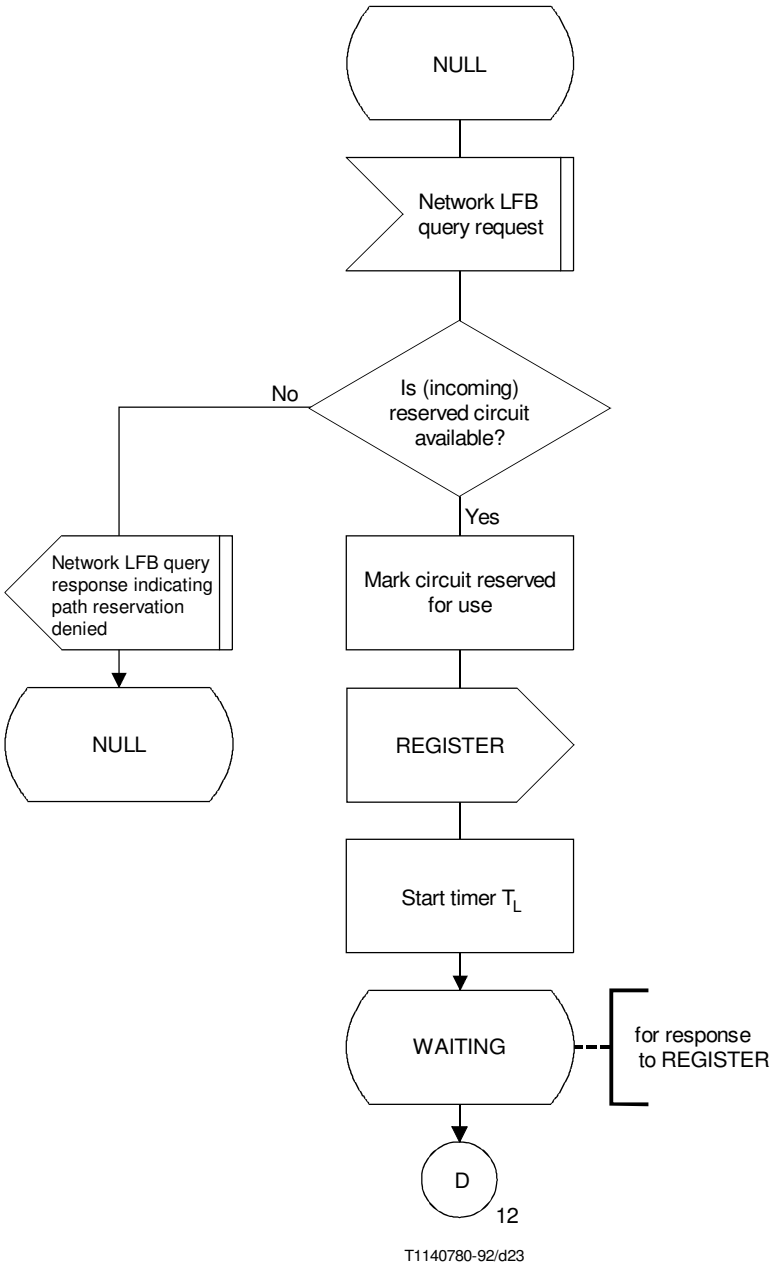


FIGURE 3-11/Q.955 (Sheet 11 of 14)

Destination exchange (DE) – DSS 1 LFB procedure for MLPP call

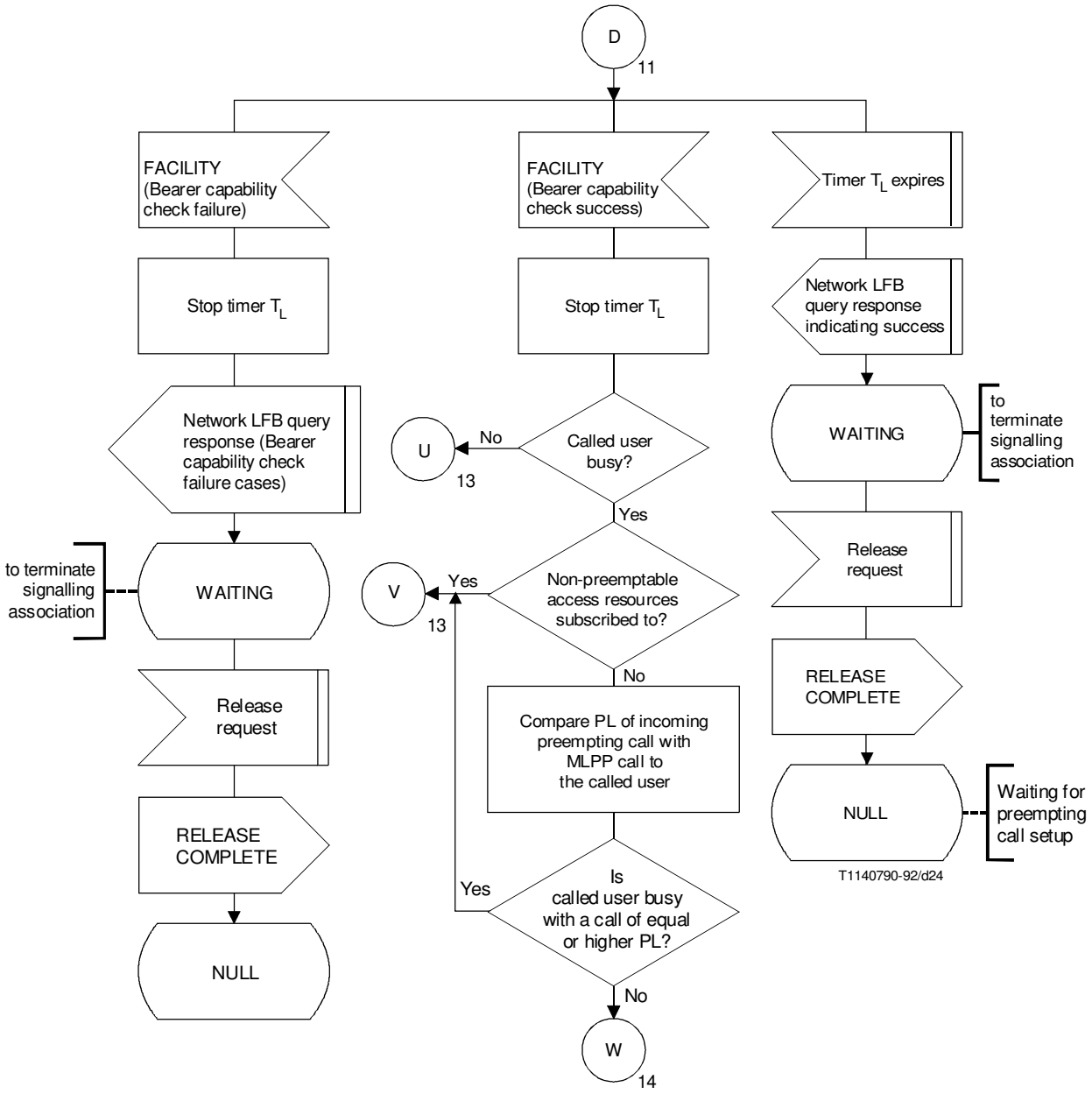


FIGURE 3-11/Q.955 (Sheet 12 of 14)

Destination exchange (DE) – DSS 1 LFB procedure for MLPP call

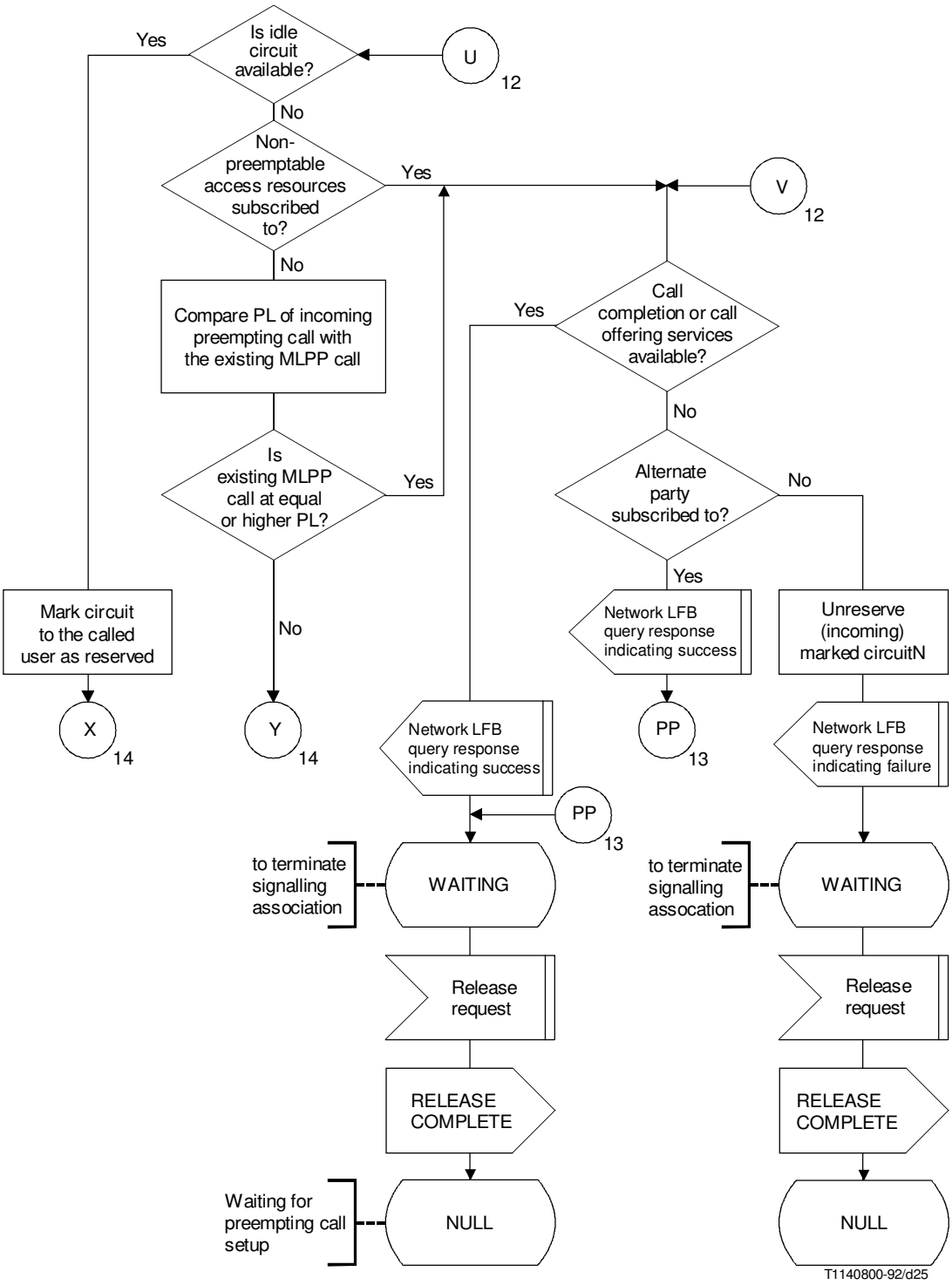


FIGURE 3-11/Q.955 (Sheet 13 of 14)

Destination exchange (DE) – DSS 1 LFB procedure for MLPP call

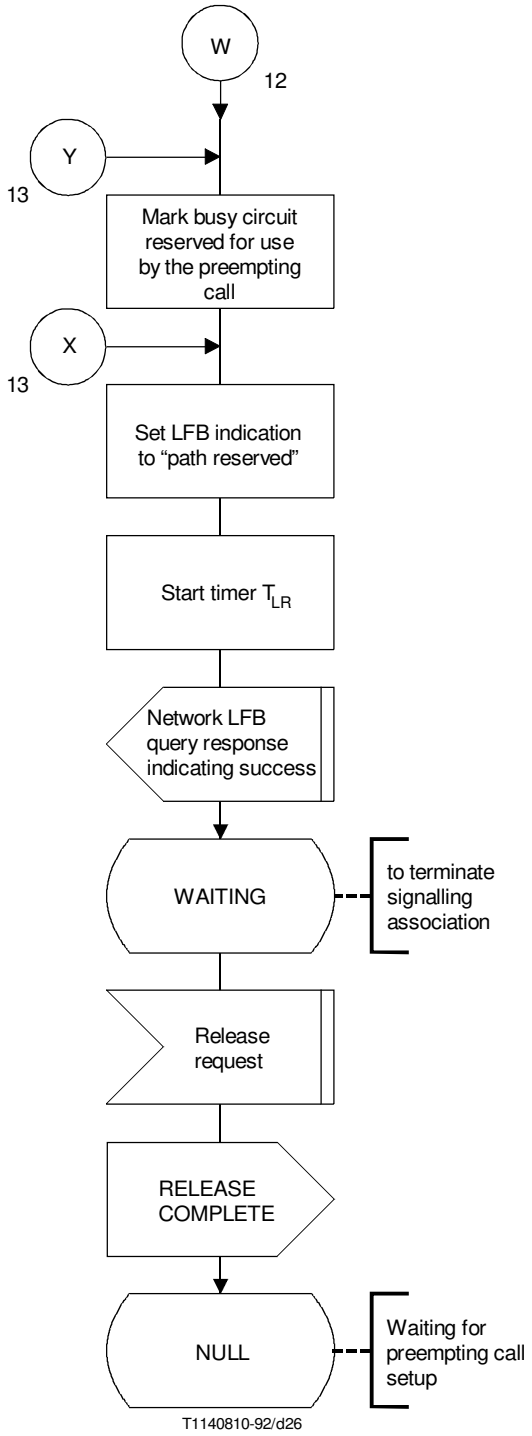


FIGURE 3-11/Q.955 (Sheet 14 of 14)

Destination exchange (DE) – DSS 1 LFB procedure for MLPP call

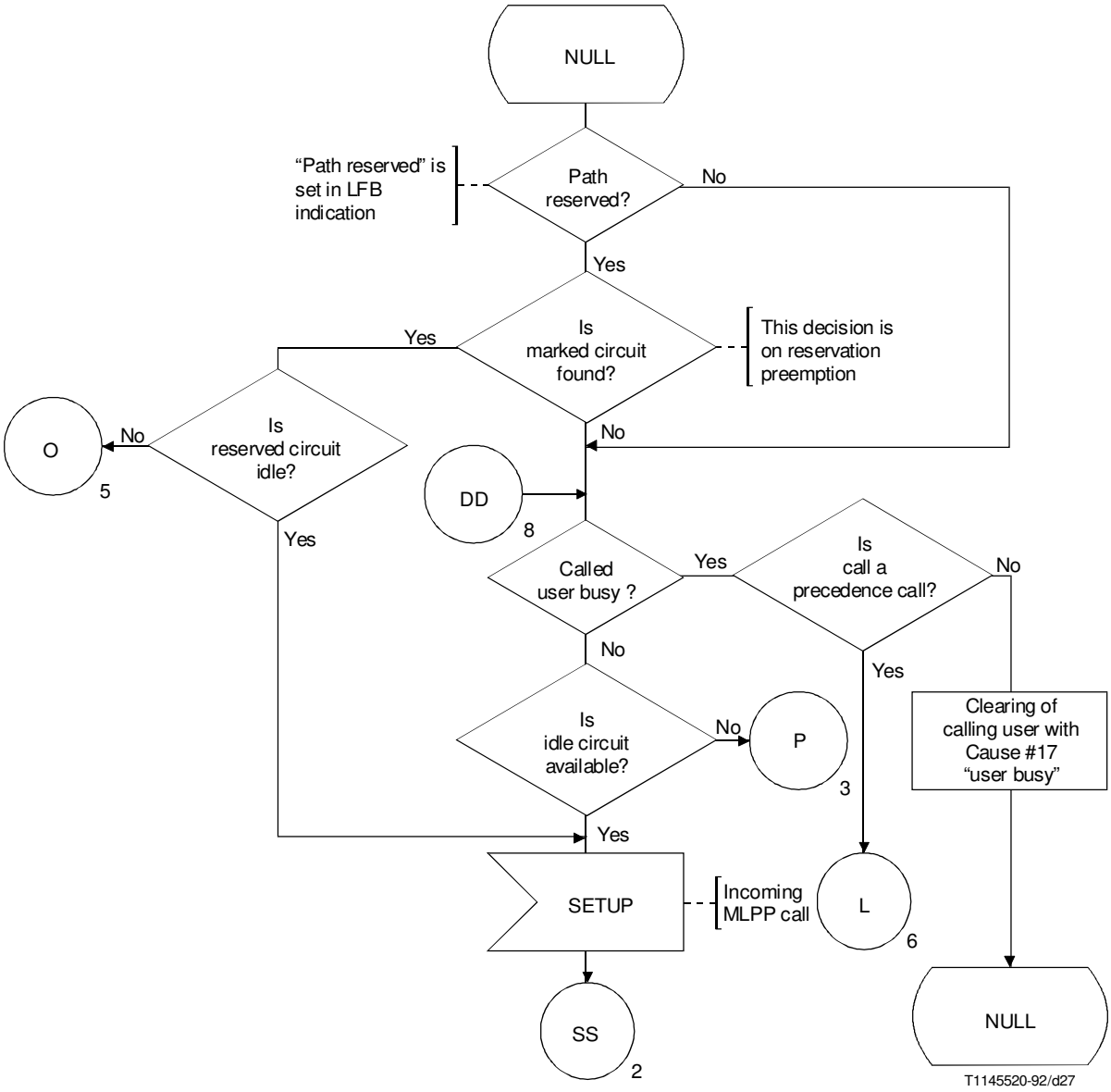


FIGURE 3-12/Q.955 (Sheet 1 of 12)

Called User – Procedure without DSS 1 LFB query
(procedure for incoming MLPP call)

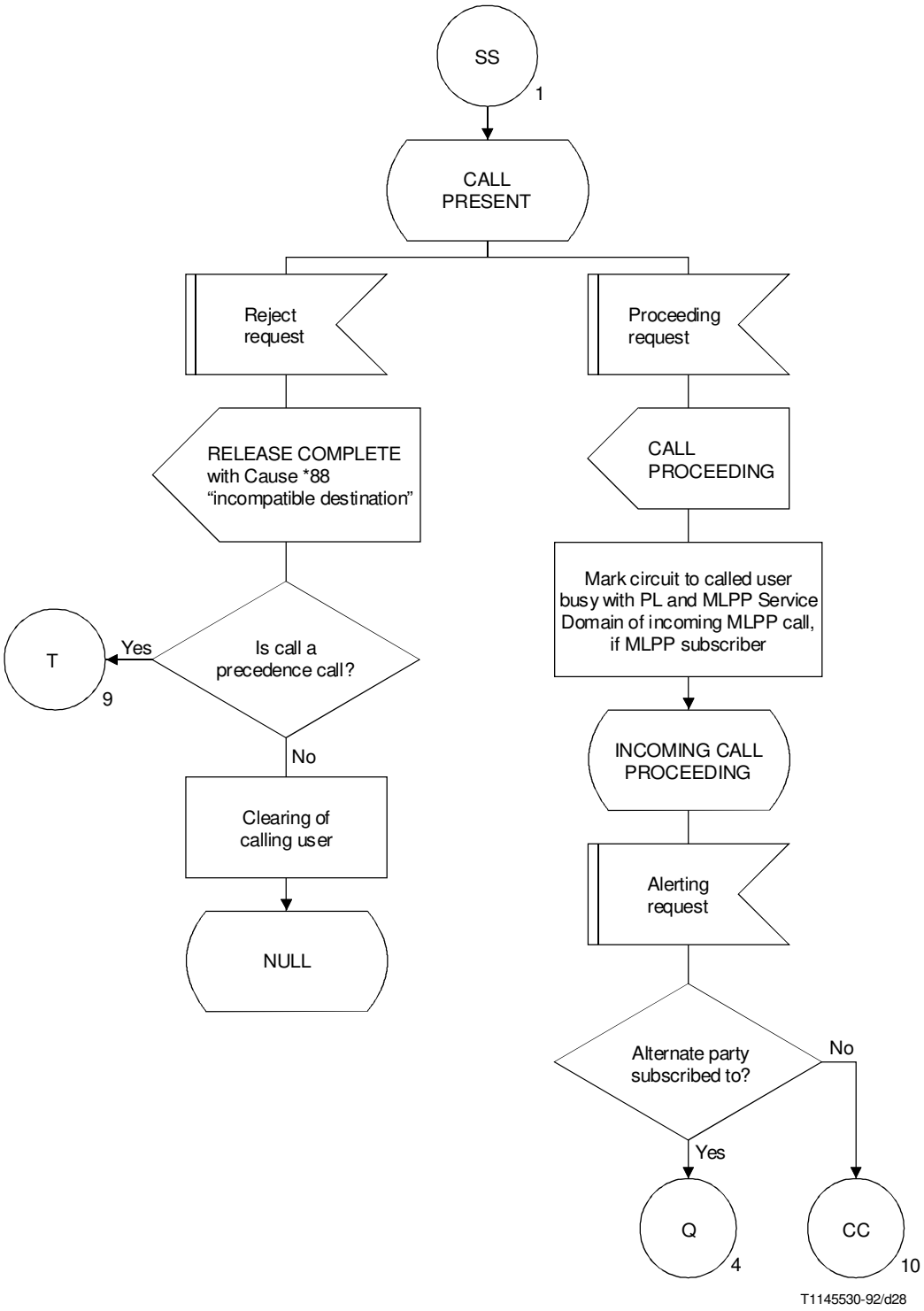


FIGURE 3-12/Q.955 (Sheet 2 of 12)

Called User – Procedure without DSS 1 LFB query
(procedure for incoming MLPP call)

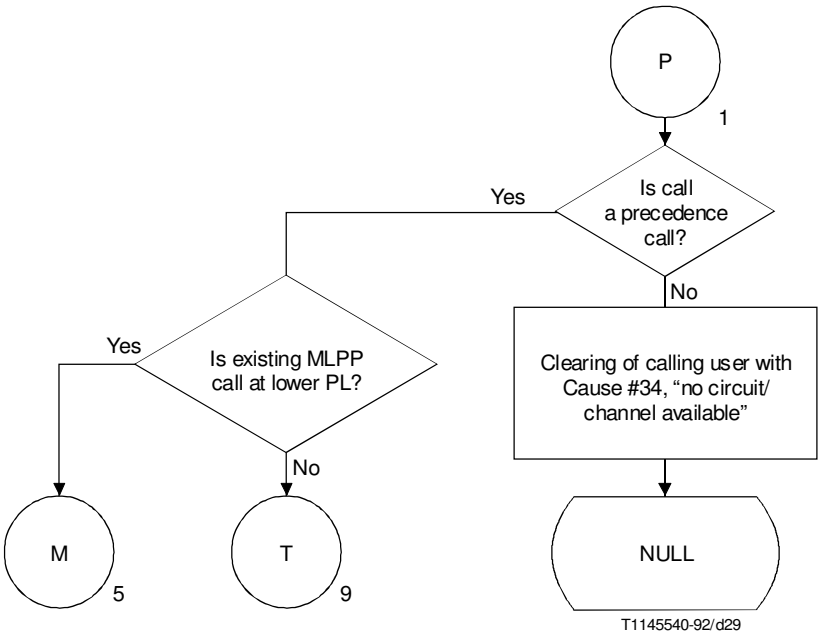


FIGURE 3-12/Q.955 (Sheet 3 of 12)

Called User – Procedure without DSS 1 LFB query (procedure for incoming MLPP call)

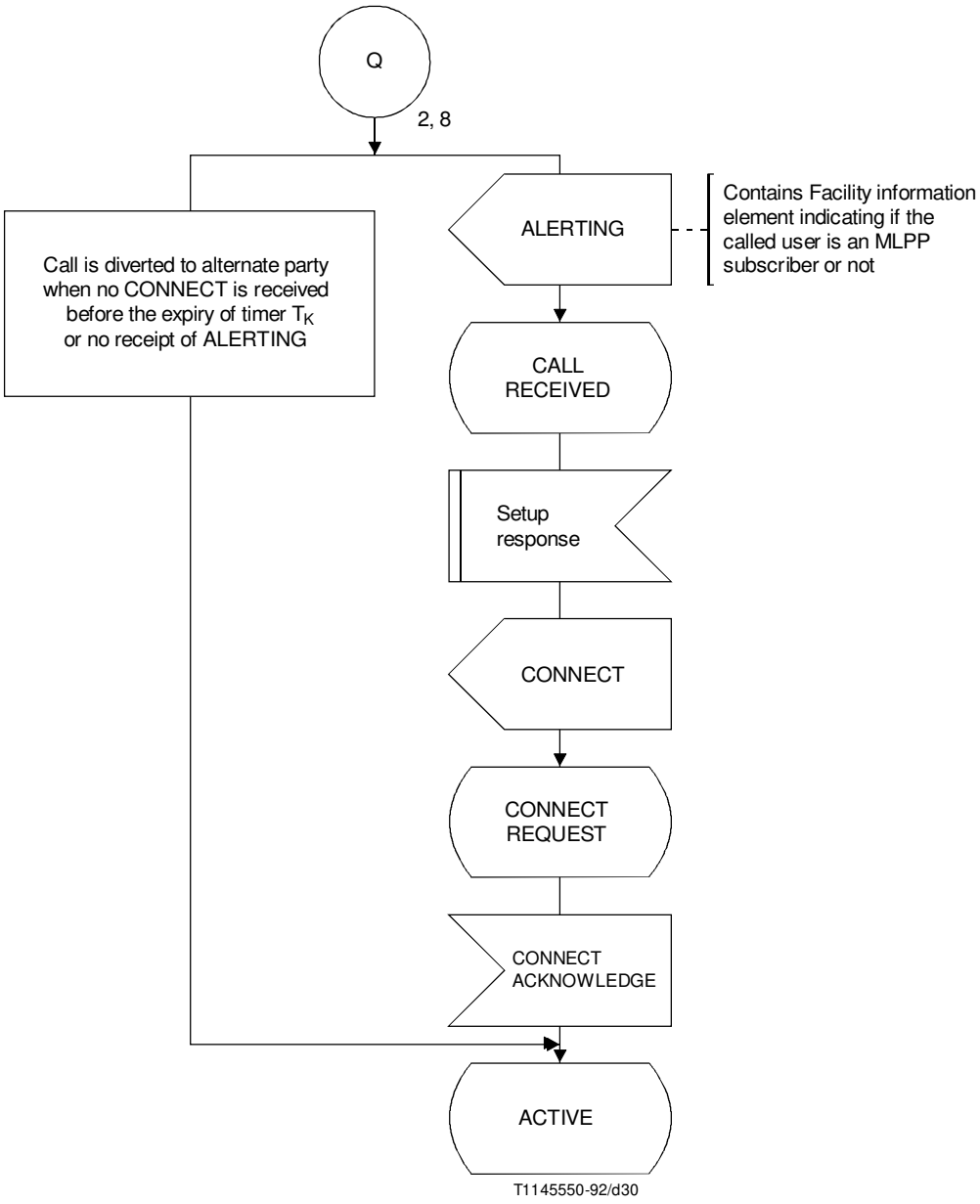


FIGURE 3-12/Q.955 (Sheet 4 of 12)

Called User – Procedure without DSS 1 LFB query
(procedure for incoming MLPP call)

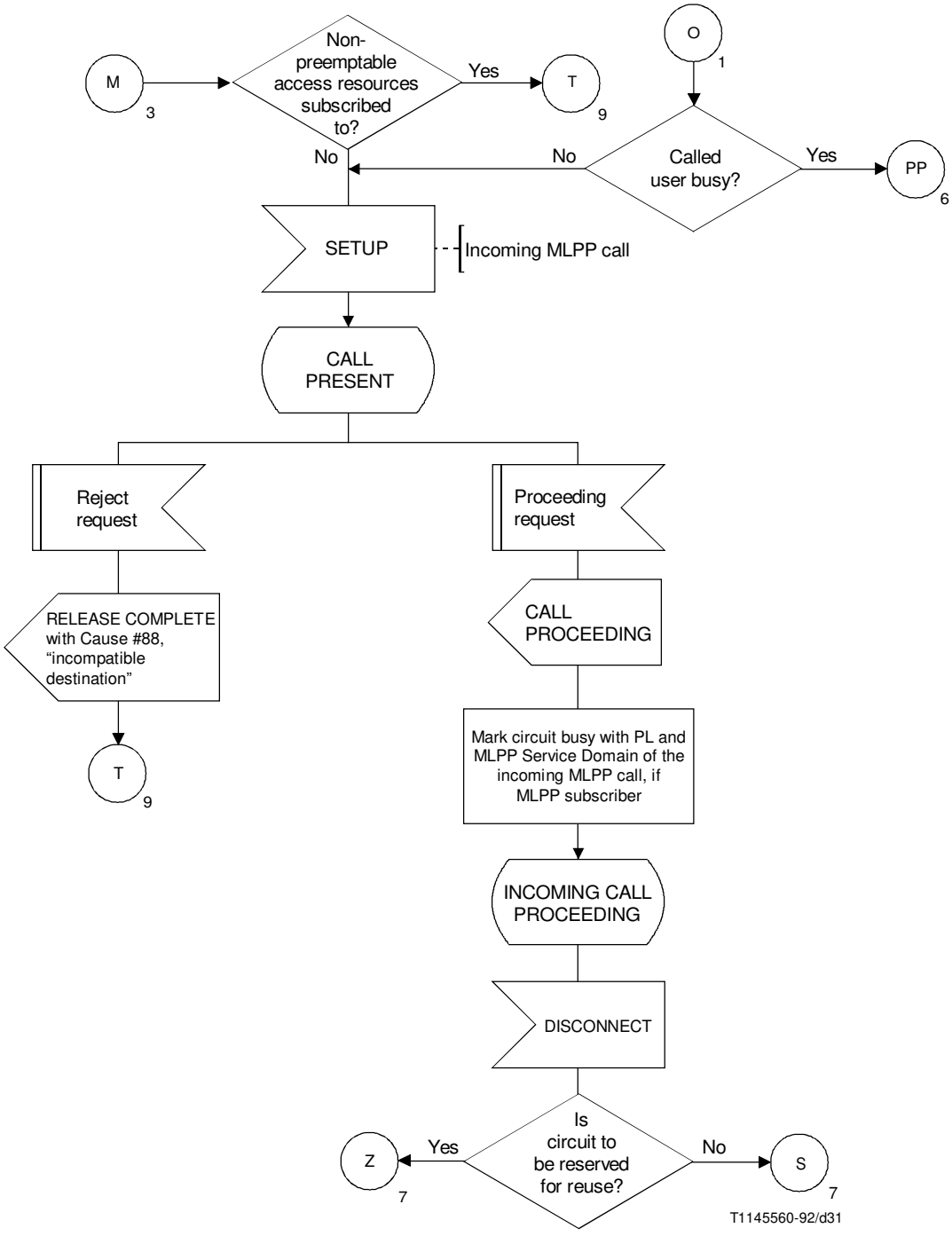


FIGURE 3-12/Q.955 (Sheet 5 of 12)

Called User – Procedure without DSS 1 LFB query (release and preemption of existing MLPP call)

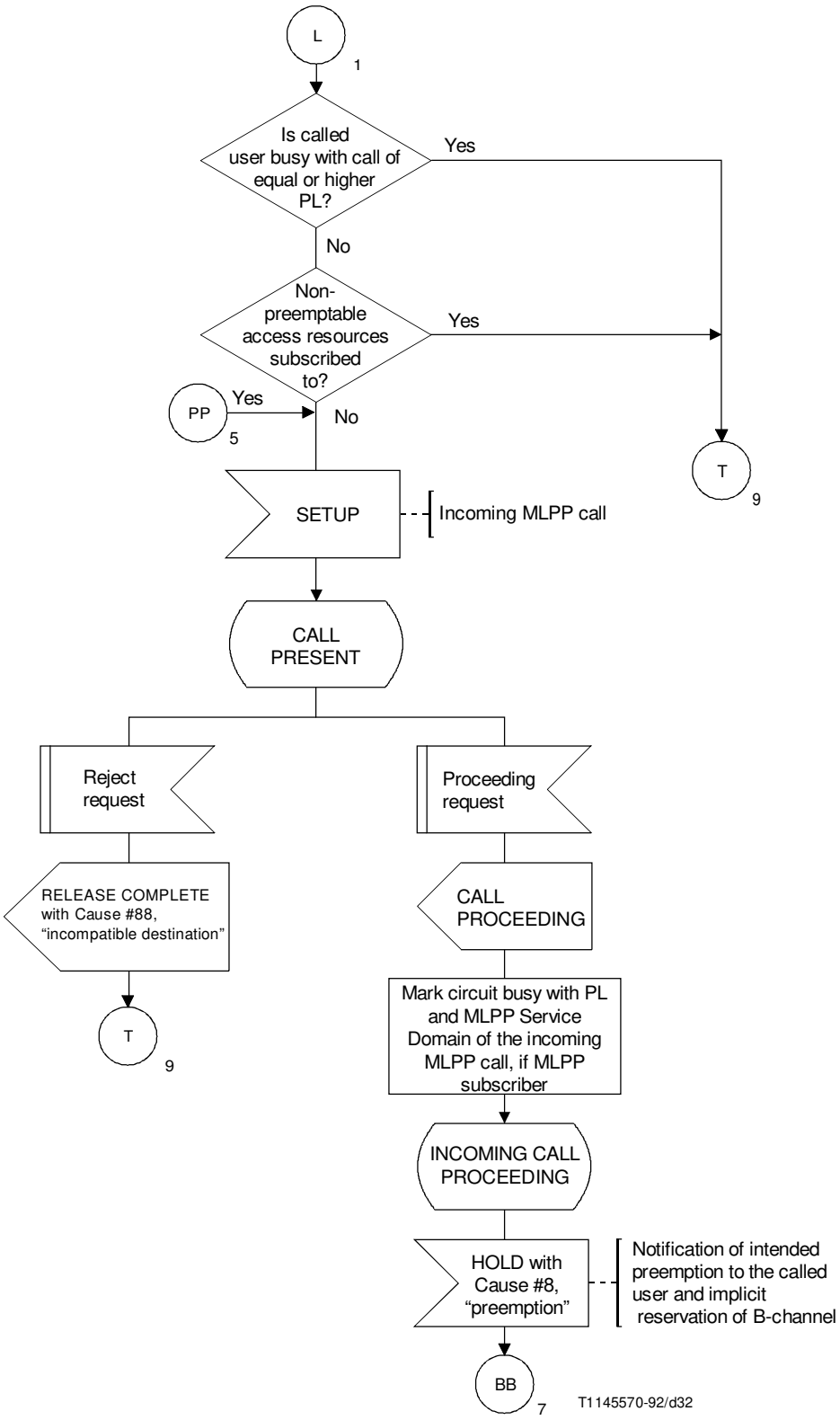


FIGURE 3-12/Q.955 (Sheet 6 of 12)

Called User – Procedure without DSS 1 LFB query
(release and preemption of existing MLPP call)

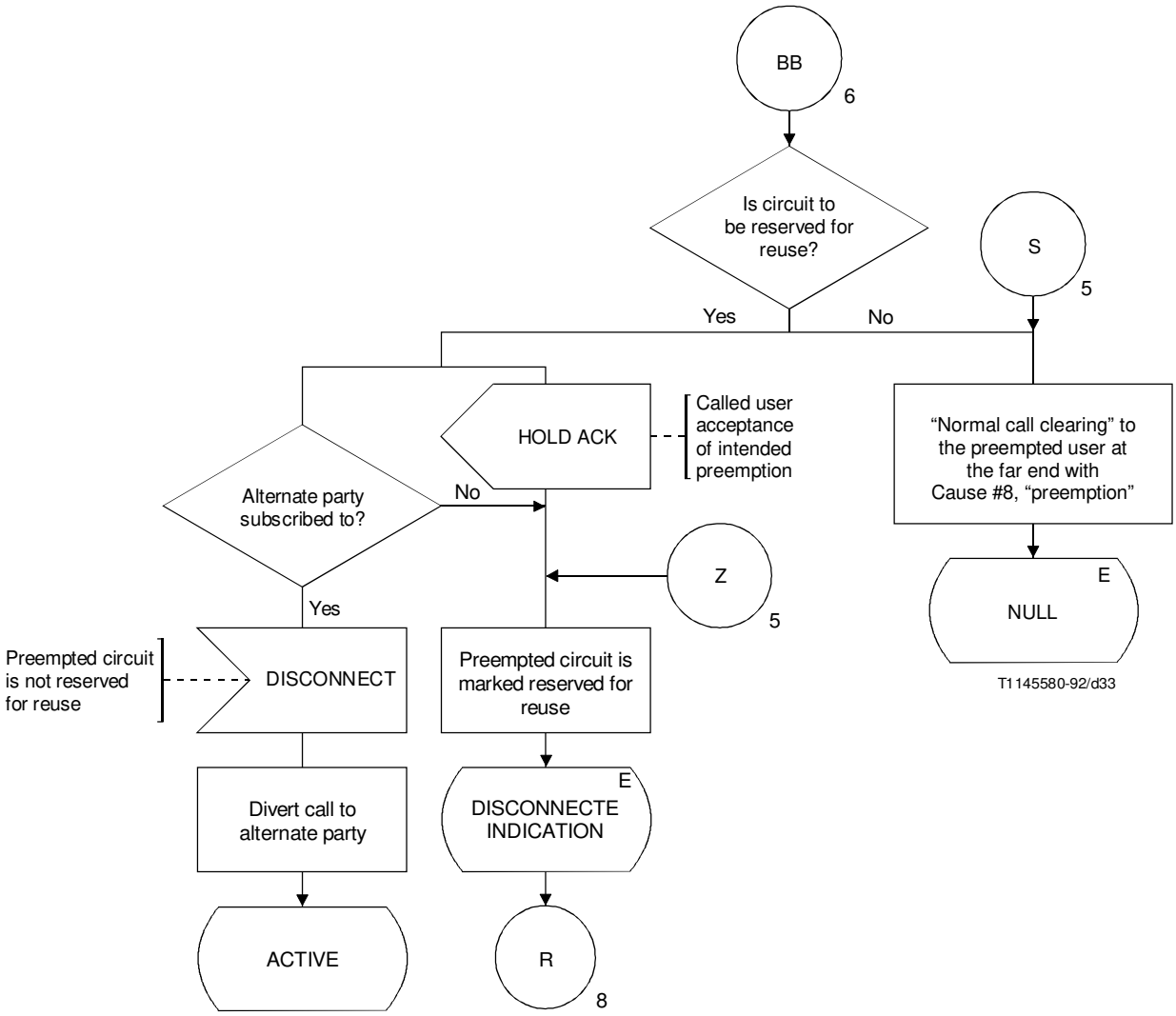


FIGURE 3-12/Q.955 (Sheet 7 of 12)

Called User – Procedure without DSS 1 LFB query
(release and preemption of existing MLPP call)

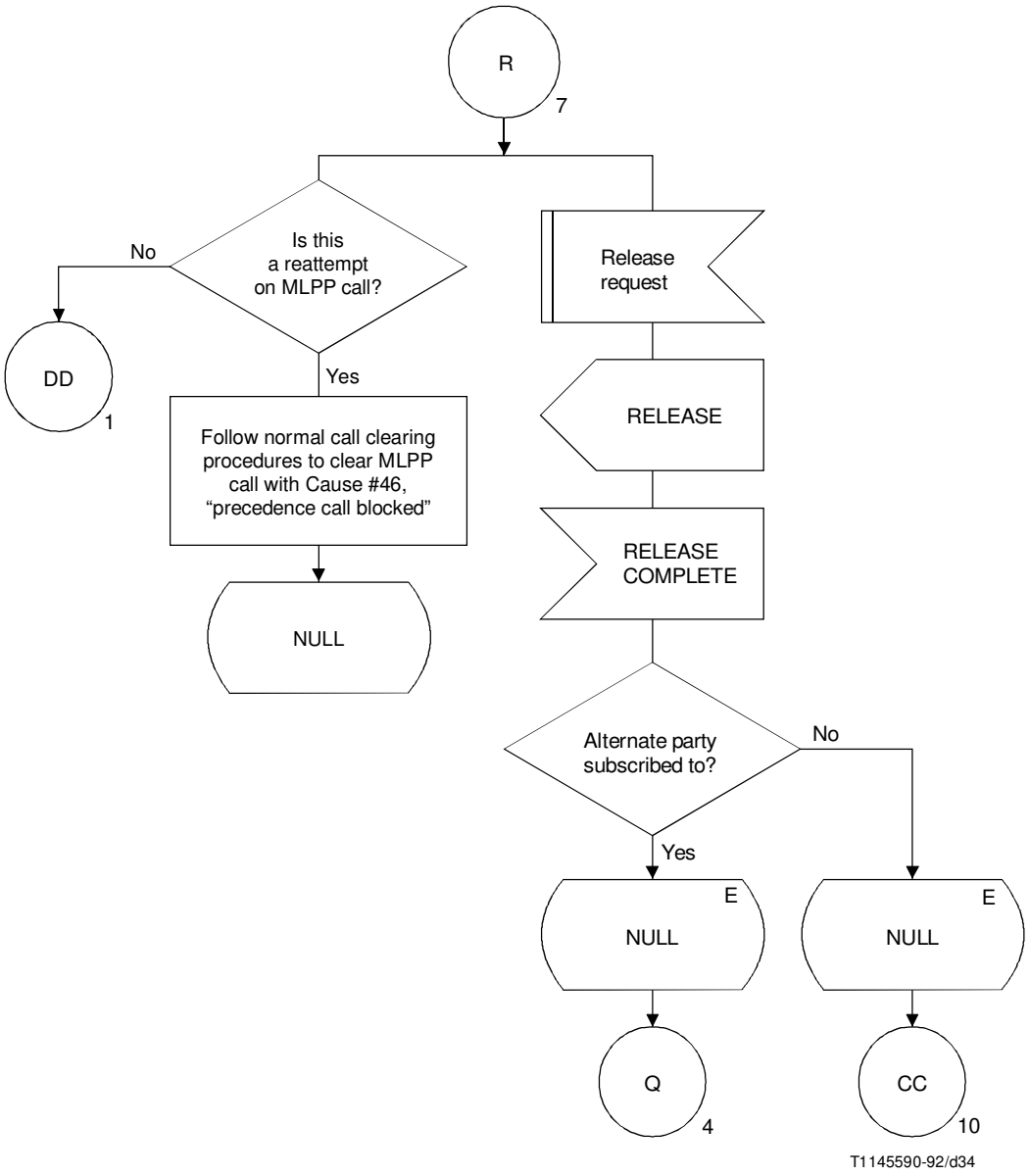


FIGURE 3-12/Q.955 (Sheet 8 of 12)

Called User, – Procedure without DSS 1 LFB query
(release and preemption of existing MLPP call)

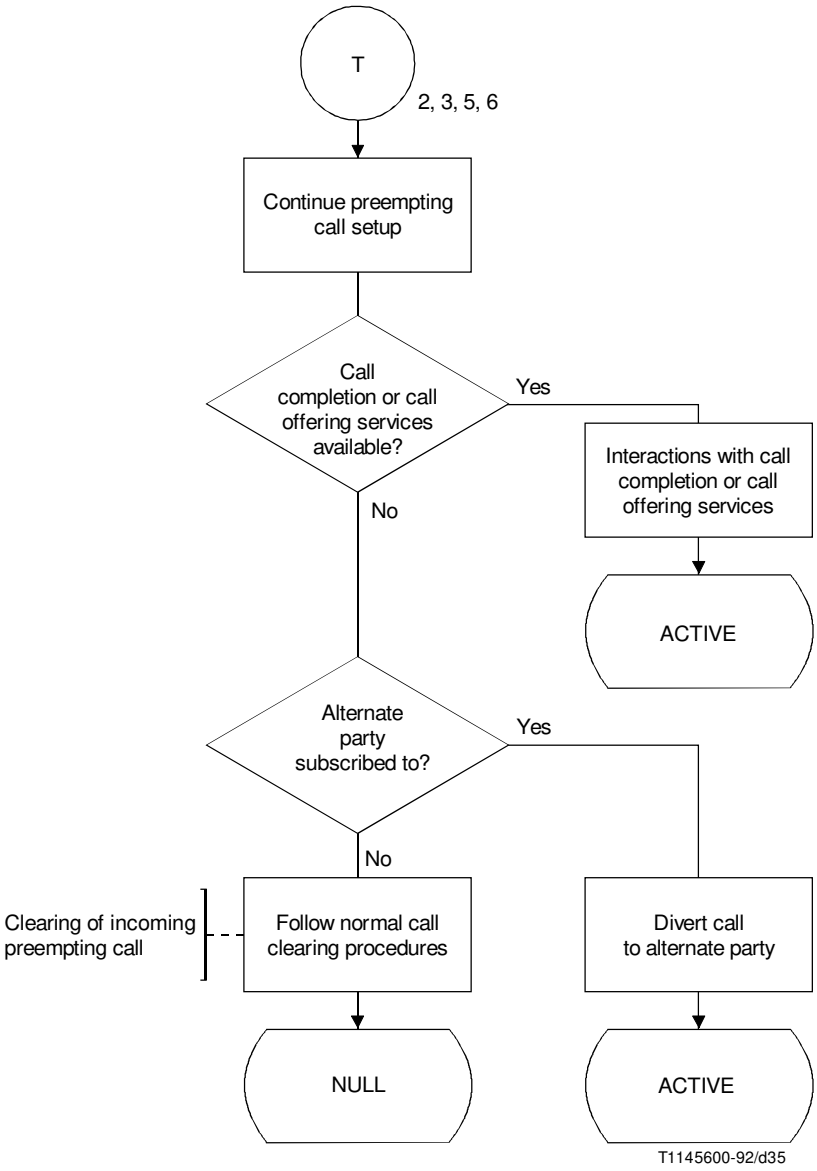


FIGURE 3-12/Q.955 (Sheet 9 of 12)

Called User – Procedure without DSS 1 LFB query (MLPP call completion options)

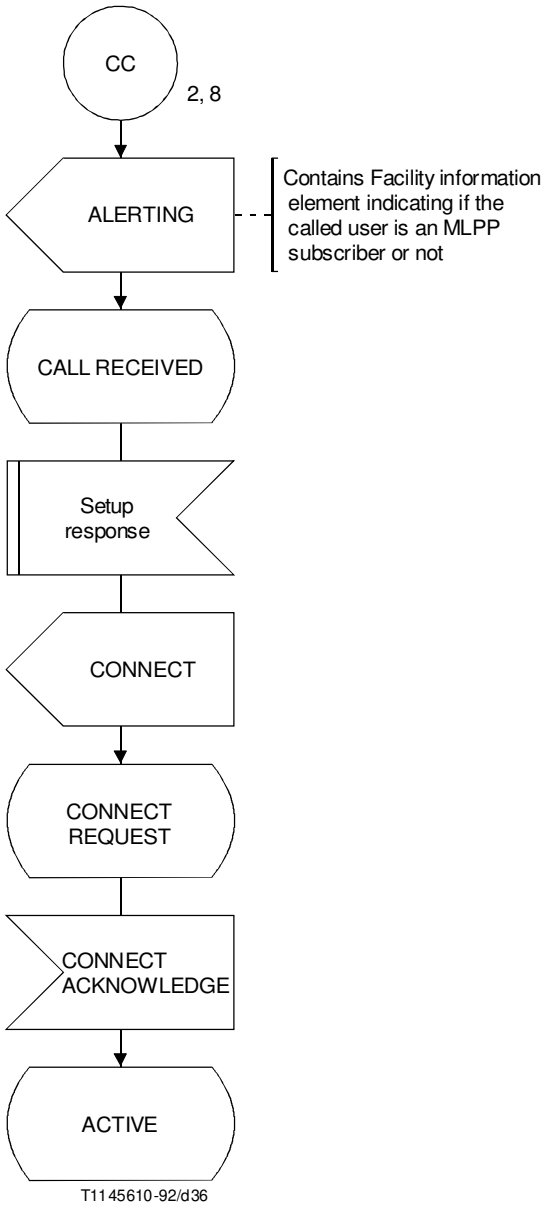


FIGURE 3-12/Q.955 (Sheet 10 of 12)

Called User – Procedure without DSS 1 LFB query (call completion for MLPP call)

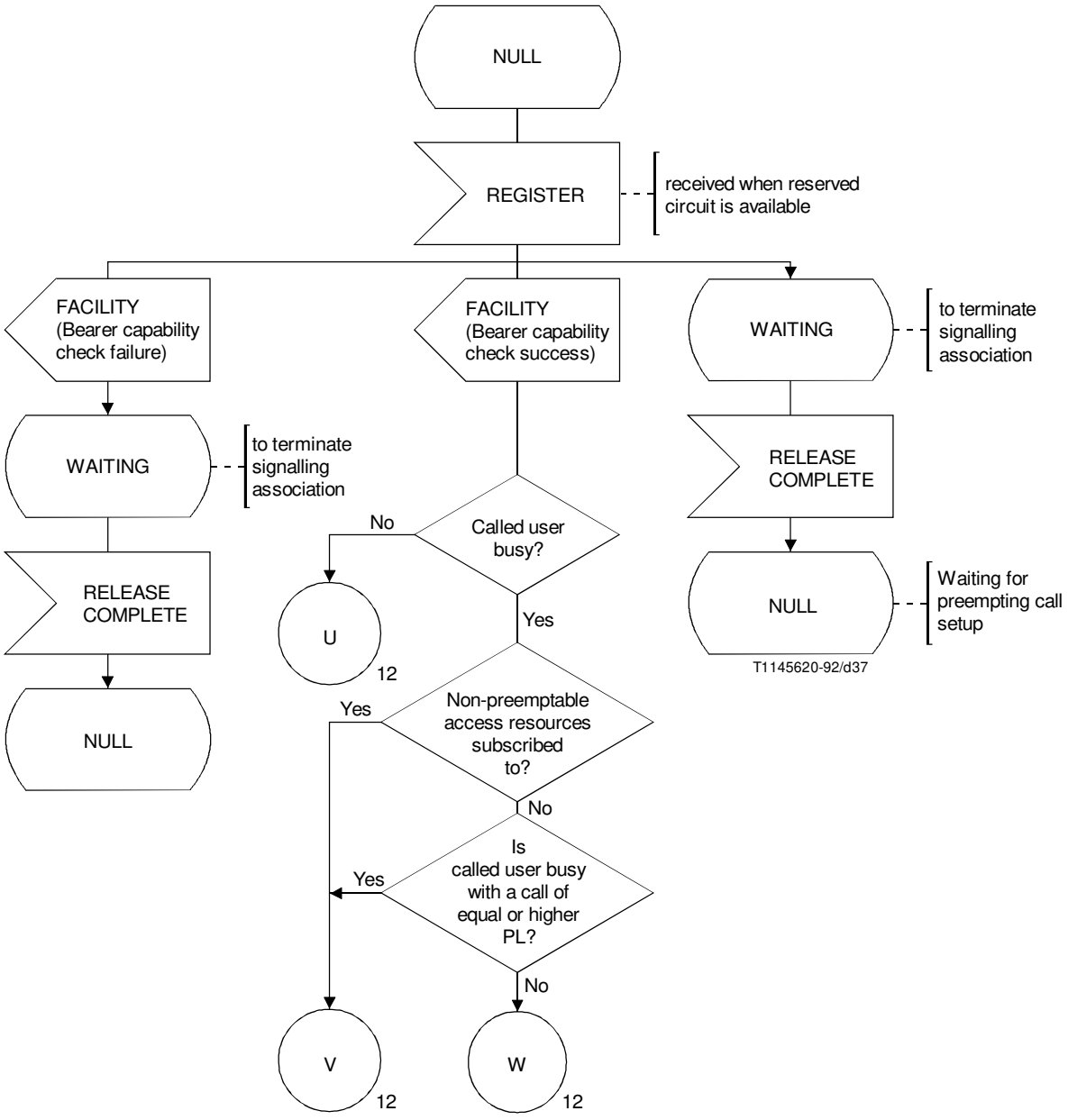


FIGURE 3-12/Q.955 (Sheet 11 of 12)

Called User – DSS 1 LFB procedure for MLPP call

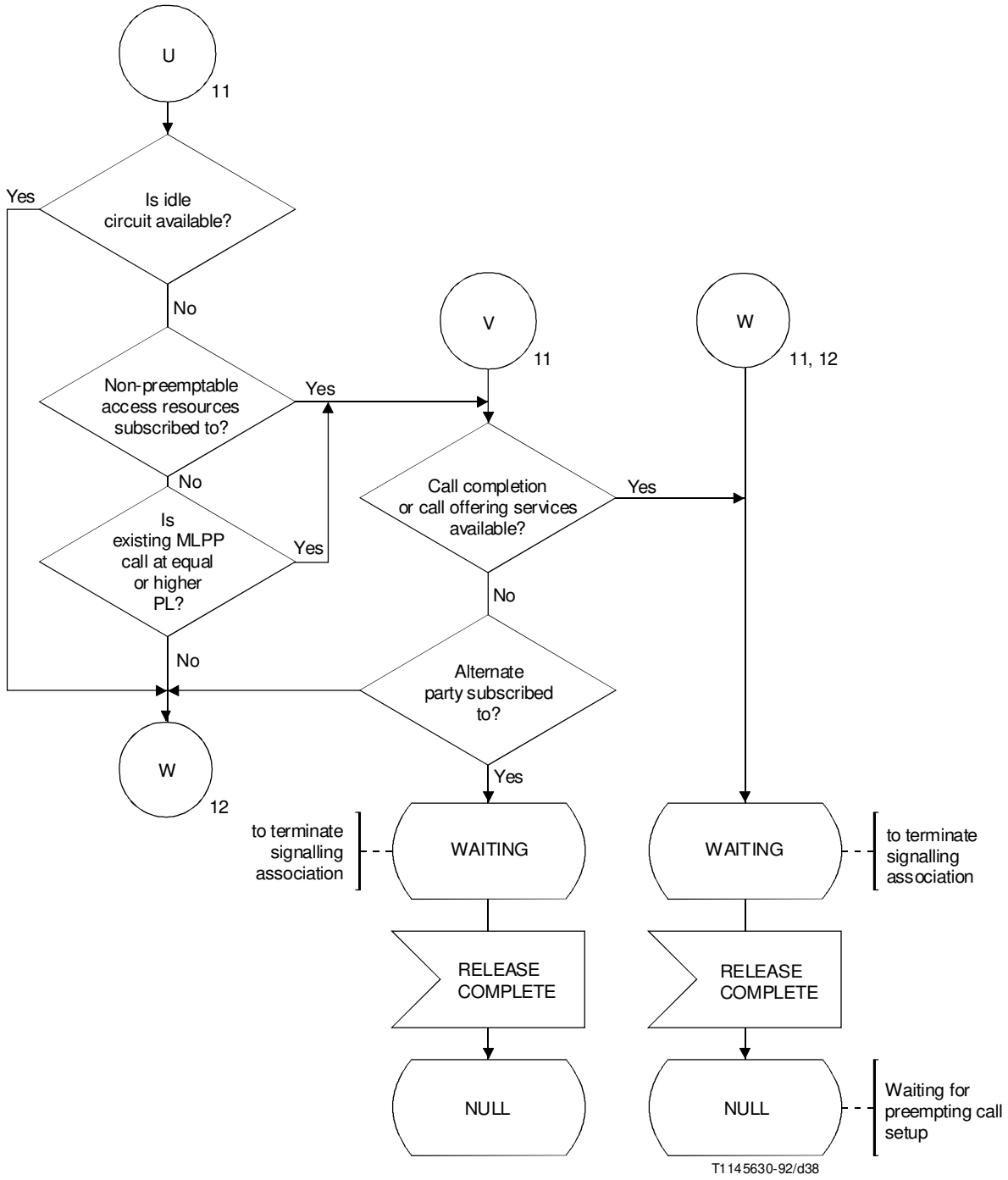


FIGURE 3-12/Q.955 (Sheet 12 of 12)

Called User – DSS 1 LFB procedure for MLPP call