INTERNATIONAL TELECOMMUNICATION UNION

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THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

INTEGRATED SERVICES DIGITAL NETWORK (ISDN) GENERAL STRUCTURE AND SERVICE CAPABILITIES

MULTI-LEVEL PRECEDENCE AND PREEMPTION SERVICE (MLPP)

Recommendation I.255.3

Geneva, 1990

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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Recommendation I.255.3 was prepared by Study Group I and was approved under the Resolution No. 2 procedure on 2 July 1990.

CCITT NOTE

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

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MULTI-LEVEL PRECEDENCE AND PREEMPTION SERVICE (MLPP)

1 Definition

The multi-level precedence and preemption (MLPP) service provides prioritized call handling service. This 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.

2 Description

2.1 *General description*

The MLPP 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 service applies to all network resources in the domain that is 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 precedence level subscribed to, on a per call basis.

Precedence calls (MLPP calls 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 favour 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:

- any party whose connection was terminated (whether that resource is reused or not) must receive a distinctive preemption notification;
- 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 (see § 2.2 for definition of *active call*); and
- 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 service is not intended to provide preemption of users that do not subscribe to the MLPP 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 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.

2.2 *Specific terminology*

Precedence is the priority associated with a call.

A *precedence call* is a call with precedence level higher than the lowest level of precedence.

An *MLPP call* is a call that has a precedence level established and is either being set up (i.e. before alerting) or is set up.

User A is a party of the MLPP call and is not the called party of the precedence call.

User B is the other party of the MLPP call and is the called party of the precedence call.

User C is the party who initiates the precedence call to user B.

An *active call* is a call that has the connection established and the calling and called parties are active on the call.

Response timer T_K is started when the service provider notifies the called user of a precedence call (for example, this would be the preemption notification if preemption occurs at the user interface). This timer establishes the time that user B has to accept the precedence call from user C. The length of this timer is in the range of 4-30 seconds.

An *alternate party* is the party to which a precedence call will be diverted. Diversion will occur either when the response timer T_K expires, when the called party is busy on a call of equal or higher precedence, or when the called party is busy with access resources non-preemptable. Alternate party diversion is an optional terminating feature that is subscribed to by the called party; thus, the alternate party to which a precedence call is diverted is specified by the called party at the time of subscription.

2.3 *Qualifications on the applicability to telecommunications 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 Procedures

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.

The service provider should provide the capability of combining 3.1 kHz audio and speech for the purpose of assigning subscription options. Subscriber options are summarized below:

Subscriber options	Value
Maximum authorized precedence level[a)]	– 0 (Flash Override: highest) – 1 (Flash) – 2 (Immediate) – 3 (Priority) – 4 (Routine: lowest)

Alternate party	– No
	– Yes
	  – network operating position
	  – alternate party directory number

Access resource non-preemptable[b)]	– No – Yes

a) A call of higher precedence level can preempt calls of lower precedence. For example, a Flash call can preempt Immediate, Priority, or Routine calls.

b) 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 service provider resources other than the user's own access resources.

3.2 *Normal procedures*

3.2.1 *Activation/deactivation/registration*

(None identified.)

3.2.2 *Invocation and operation*

The precedence level is selected by the subscriber on a per call basis. The subscriber may select any precedence level up to and including his maximum authorized precedence level. The service provider at the subscriber's originating interface ensures that the selected precedence level does not exceed the maximum level assigned to that ISDN number. Once set for a call, this precedence level cannot be changed.

An MLPP call is automatically established with the lowest precedence unless a higher precedence is specified.

3.2.3 *Operation*

During a call set-up, if there is shortage of some resource, then the network can determine if resources are held by calls of lower precedence. The network can then release the lowest lower precedence call(s) and seize the necessary resources that are required to set up the higher precedence call. These resources can include inter-office circuits, channels, conference bridges, and circuit-switched data circuits.

The preemption operation depends on whether the network needs to preempt a common network facility such as an inter-switch trunk which is currently being used by a different subscriber than the intended called subscriber or whether it needs to preempt a channel on the user access of the desired called subscriber.

If a common network facility is preempted, both existing parties concerned are notified of the preemption and the existing connection is immediately disconnected. The new call is then set up using the preempted facility in the normal manner without any special notification to the new called party.

If a called user access channel is to be preempted, both the called and non-called parties shall be notified of the preemption and the existing MLPP call shall be immediately cleared. The called party must acknowledge the preemption before the higher precedence call is completed. The called party is then notified that a new MLPP call is available.

3.3 *Exceptional procedures*

3.3.1 *Activation/deactivation/registration*

(None identified.)

3.3.2 *Invocation and operation*

If the service provider cannot comply with a precedence call request, the calling party should receive a notification that the precedence call is unsuccessful. Possible causes are:

a) the requested precedence level is not subscribed to;

b) equal or higher precedence calls have prevented completion;

c) the dialled number is non-preemptable; and

d) there are no idle network resources to make a connection to the dialled number and the called subscriber belongs to a network that does not support preemption.

A precedence call should be diverted to a predetermined alternate party, which can be another subscriber or a network operating position, if the called party (user B) does not acknowledge preemption or does not answer a precedence call (a call of precedence level 0-3) before the response timer T_K expires. To prevent infinite diversions, an alternate party diversion is limited to a total of five alternate party diversion attempts. Once this limit is reached, no additional diversion attempts will be made. In the case of preemption at the user interface, if no alternate party has been specified by the called party, an unacknowledged indication will be returned for the precedence call.

In addition, a precedence call should be diverted to a predetermined alternate party if the called party is busy on a call of equal or higher precedence or is busy and non-preemptable. To prevent infinite diversions, an alternate party diversion is limited to a total of five alternate party diversion attempts. Once this limit is reached, no additional diversion attempts will be made. If no alternate party has been specified by the called party, a precedence call blocked notification will be returned to the calling party for the precedence call.

4 Network capability for charging

This Recommendation does not cover charging principles. Future Recommendations in the D-Series are expected to contain that information.

It shall be possible to charge the subscriber accurately for the service.

5 Interworking considerations

In public networks that support the MLPP service, the network shall ensure that only MLPP calls from the same domain as the preempting call are a subject of preemption and that the connections of non-MLPP users are not preempted. The precedence level of a call may not be changed when interworking with other MLPP networks.

A network that does not support the MLPP service is required, if bilaterally agreed, to convey the parameters of the MLPP service intact. If the parameters are received from another network, the network should pass them on with no action taken, if bilaterally agreed, and with no effect on the network that does not support the MLPP service.

6 Interaction with other supplementary services

The following interactions with other supplementary services apply within the MLPP domain.

6.1 *Call Waiting*

a) The incoming call is of the lowest precedence level (precedence level 4):

1) one or more MLPP calls are of the lowest precedence level:

no interaction; call waiting service is invoked.

2) all MLPP calls are precedence calls:

Call Waiting service is invoked. If the in-band call waiting tone is being applied as a network provider option, then the tone should not be provided in this case since it would disrupt a higher precedence call.

b) The incoming call is a precedence call:

1) One or more MLPP calls are of lower precedence than the incoming call:

An MLPP call of the lowest precedence level is preempted unless the called subscriber is non-preemptable. If the called subscriber is non-preemptable, Call Waiting service is invoked and the precedence level of the incoming call is provided to the called user along with call waiting indication.

2) one or more MLPP calls are of the same precedence and the rest of the MLPP calls are of higher precedence than the incoming call:

Call Waiting service is invoked. The precedence level of the incoming call is provided, along with call waiting indication, to the called users on MLPP calls at the same precedence level as the incoming call.

If the called user is on an MLPP call at a higher precedence level, Call Waiting service is invoked. If the in-band call waiting tone is being applied as a network provider option, then the tone should not be provided in this case, since it would disrupt a higher precedence call.

3) All the MLPP calls are of higher precedence:

Call Waiting service is invoked. If in-band call waiting tone is being applied as a network provider option, then the tone should not be provided in this case since it would disrupt a higher precedence call.

6.2 *Call Transfer*

For a single step or a normal call transfer, the precedence level of calls is preserved during the transfer process. For an explicit call transfer (when two calls are involved), each connection of the transferred call maintains the precedence level that it was assigned when that connection of the call was established. Thus, a call that is established through a normal or an explicit call transfer may consist of two connections at different precedence levels.

6.3 *Connected Line Identification Presentation*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.4 *Connected Line Identification Restriction*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.5 *Calling Line Identification Presentation*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.6 *Calling Line Identification Restriction*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.7 *Closed User Group*

No interaction – MLPP does not override CUG restrictions.

6.8 *Conference Calling*

All connections to the conferees are processed at a precedence equal to the conference precedence selected by the conference controller for all connections to conferees on the conference call. If a conferee is preempted, the conference controller is notified of the preemption. When the controller is preempted, all conferees are notified and the procedure is followed as though the controller issued a "disconnect" request. Each connection of a call resulting from a split operation will maintain the precedence level that it was assigned upon being added to the conference call.

6.9 *Direct Dialling-In*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.10 *Call Diversion services*

6.10.1 *Call Forwarding Busy*

If the incoming call is of higher precedence than one or more calls at user B, a call of the lowest precedence will be preempted and the incoming call will be established, i.e. the Call Forwarding service will not be invoked.

If the incoming call is of equal or lower precedence than the established calls, the Call Forwarding service will be invoked.

If the called subscriber is non-preemptable, the Call Forwarding service will be invoked regardless of the precedence levels of incoming call and established calls.

The precedence level of calls is preserved during the forwarding process, and the forwarded-to user may be preempted.

If call forwarding busy is activated by the called party and the called party has specified an alternate party, the forwarding procedure will be performed prior to the alternate party diversion. If a precedence call is forwarded (including possible multiple forwardings) and is not responded to by any forwarded-to party (e.g. call unanswered or unacknowledged; called party busy with a call of equal or higher precedence; or called party busy and non-preemptable) within a specified period of time (typically 30 seconds), the call will be diverted to the alternate party of the original called subscriber. If no alternate party is specified, the call will be forwarded in the normal manner.

6.10.2 *Call Forwarding No Reply*

The precedence level of calls is preserved during the forwarding process, and the forwarded-to user may be preempted.

Call Forwarding No Reply will not apply to a precedence call if an alternate party is specified by the called party. Unanswered precedence calls will be diverted to the alternate party if that option is subscribed to by the called user. Calls of the lowest level of precedence will be forwarded in the normal manner.

6.10.3 *Call Forwarding Unconditional*

The Call Forwarding Unconditional service takes precedence over the MLPP service.

The precedence level of calls is preserved during the forwarding process, and the forwarded-to user may be preempted.

If Call Forwarding Unconditional is activated by the called party and the called party has specified an alternate party, the forwarding procedure will be performed prior to the alternate party diversion. If a precedence call is forwarded (including possible multiple forwardings) and is not responded to by any forwarded-to party (e.g. call unanswered or unacknowledged; called party busy with a call of equal or higher precedence; or called party busy and non-preemptable) within a specified period of time (typically 30 seconds), the call will be diverted to the alternate party of the original called subscriber. If no alternate party is specified, the call will be forwarded in the normal manner.

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, an MLPP call of the lowest precedence should be preempted.

6.12 *Three-Party service*

In minimal Three-Party service, each call will have its own precedence level. When a three-way conversation is established, each connection maintains its assigned precedence level. Each connection of a call resulting from a split operation will maintain the precedence level that it was assigned upon being added to the three-way conversation. In the full Three-Party service, when one of two original calls is preempted, the remaining parties of the three-way conversation should be alerted of the preemption.

6.13 *User-to-User Signalling*

When a connection is preempted, the service provider should make certain that User-to-User Information (UUI) of the preempted connection is not delivered to the users of the new connection.

6.14 *Multiple Subscriber Number*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.15 *Call Hold*

A held call may be preempted due to lack of network resources or channels at the held party's interface. The call is cleared and the served user, who invoked the Call Hold service, will be notified of the preemption.

For the case of multiple terminals on an interface, an idle channel that is reserved for a call held by another terminal may be seized in order to complete a higher precedence call. In addition, an active channel that is reserved for a held call may be preempted and seized in order to complete a higher precedence call. In both cases, the held call is not preempted and may be retrieved when a channel becomes available.

6.16 *Advice of Charge*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.17 *Multi-Level Precedence and Preemption Service (MLPP)*

MLPP does not alter the basic call procedures under glare conditions (i.e. the condition when two entities simultaneously attempt to seize the same line).

6.18 *Priority service*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

7 Dynamic description

The overall SDL is shown in Figures 1/I.255.3 and 2/I.255.3.

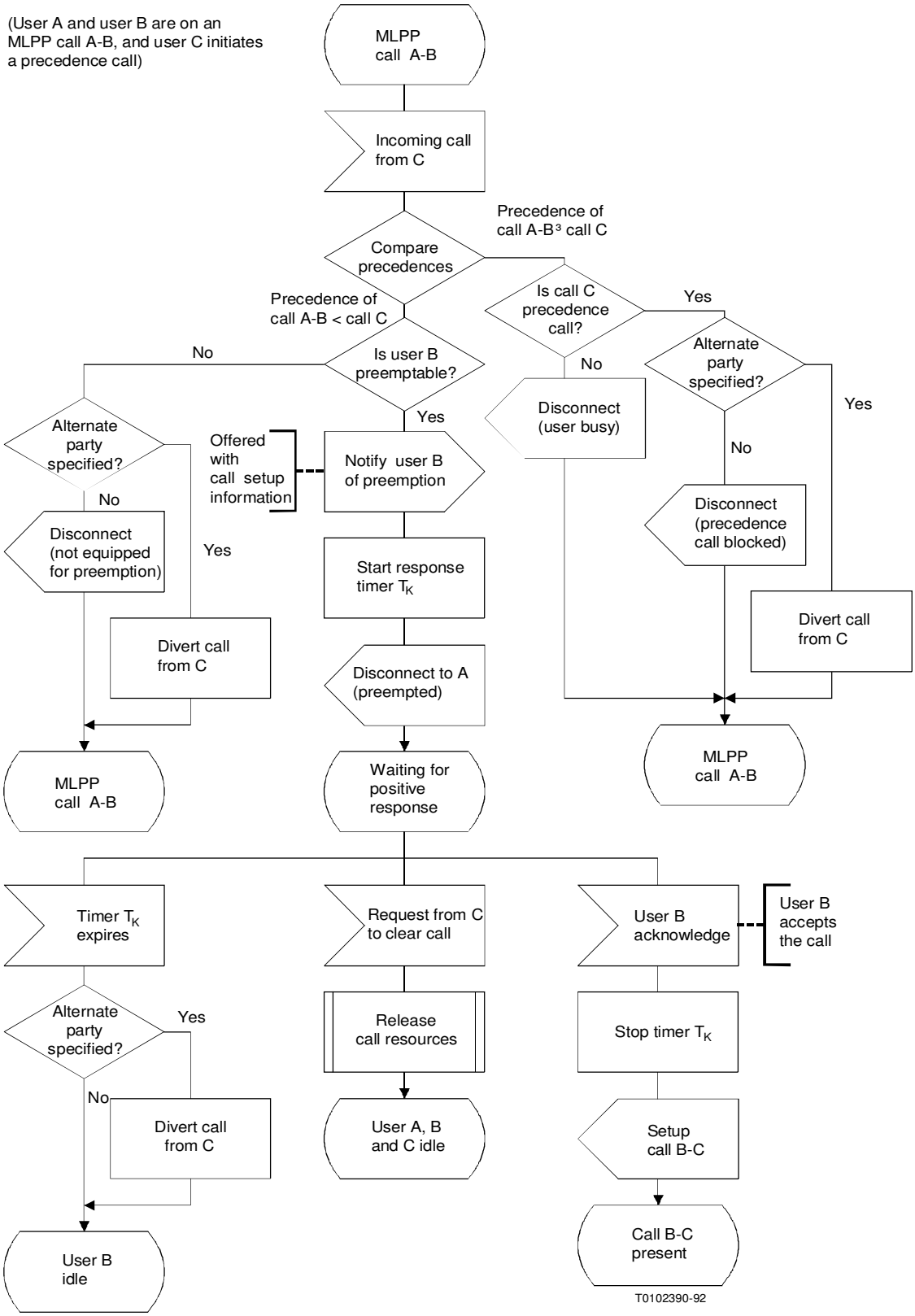

FIGURE 1/I.255.3

SDL diagram of MLPP (preemption at the called user's interface)

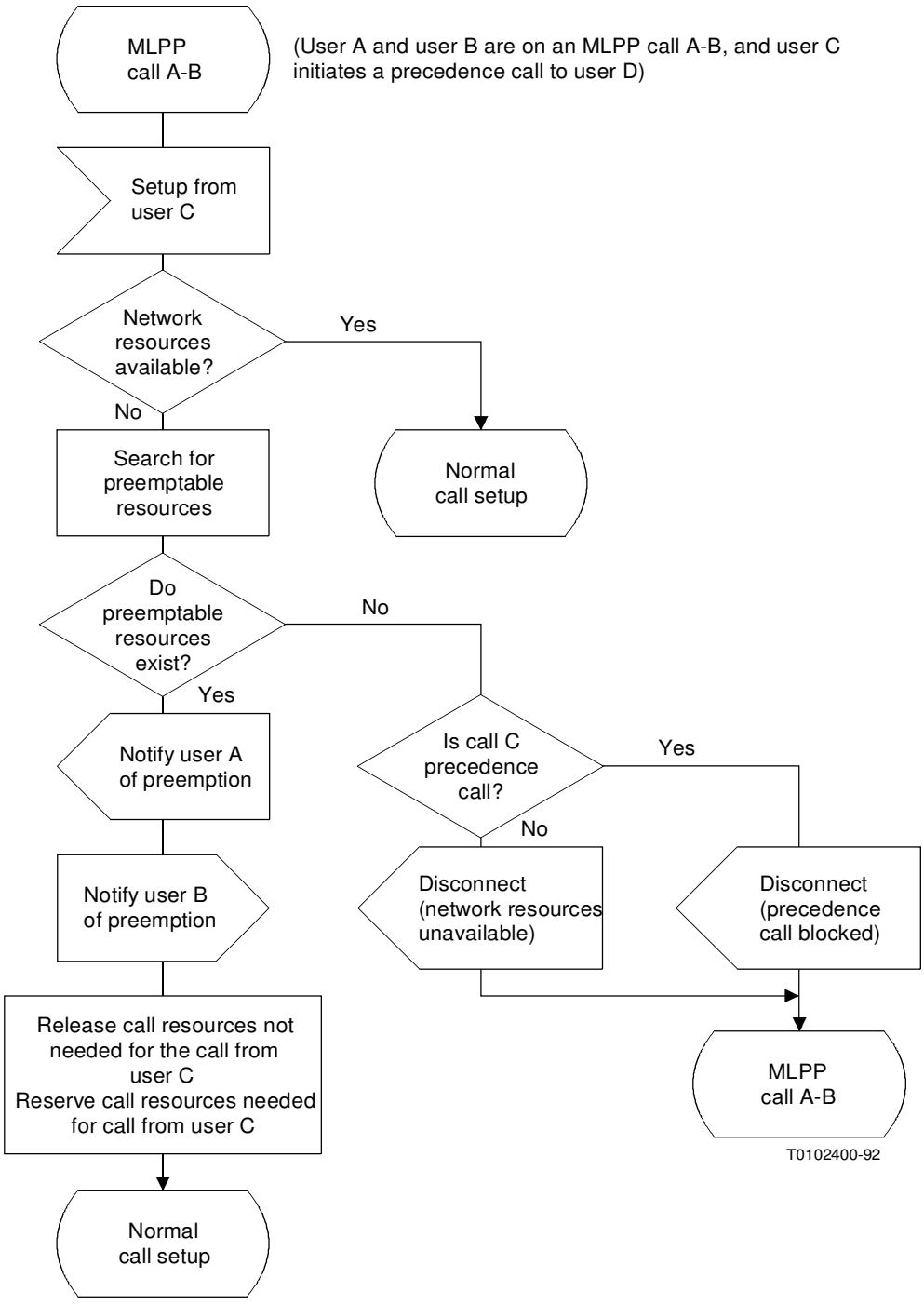

FIGURE 2/I.255.3

SDL diagram of MLPP (preemption in the network)