4.2.2.2 *Override Category between ISDN's*

When a call originates in one ISDN network and terminates in another ISDN network and CLIR is applicable, the rules and regulations of the destination (host) network should apply.

For example, if an override category is not available in the originating network but is available in the destination network. The destination network can still override the presentation restriction whenever CLI is available at this network.

As a national option the originating network can restrict the CLI to the destination network if the CLIR is applicable.

4.2.2.3 *Interworking with non—ISDN or via non—ISDN*

On calls to or via non—ISDN networks, it cannot be guaranteed that the CLIR indication will be carried to the destination network.

As a national option the originating network can restrict the CLI to the destination network if CLIR is applicable.

If the destination network receives a Calling Line Identity without any indication of presentation allowed or restricted, the destination network will act according to its rules and regulations.

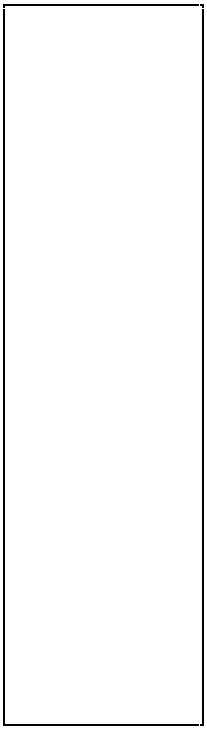
4.2.2.4 *Restriction of Additional Address Information*

Any additional address information provided by the calling party, i.e. sub—address, will also be subject to the CLIR supplementary service as indicated in the Presentation Restriction Indicator in the Calling Party Number Parameter field.

4.2.2.5 *Message Sequence diagrams for CLIR*

Figure 8/Q.730 describes the message flow for CLIR.

Figure 8/Q.730 - T1121510-89



4.3 *Nodal signalling function SDLs for CLIP and CLIR*

Nodal signalling function procedures for CLIP and CLIR are described in Figures 9/Q.730 to 13/Q.730.

Figure 9/Q.730 - T1121520-89

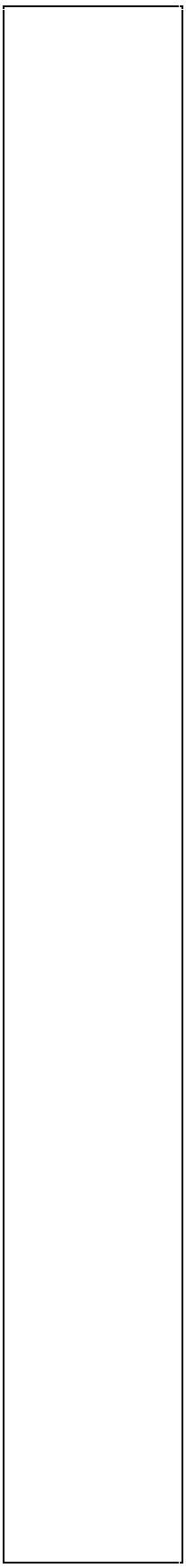


Figure 10/Q.730 - T1121530-89

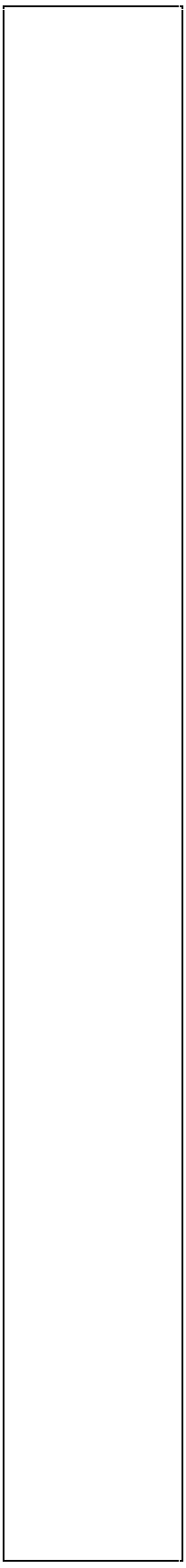


Figure 11/Q.730 - T1115781-89

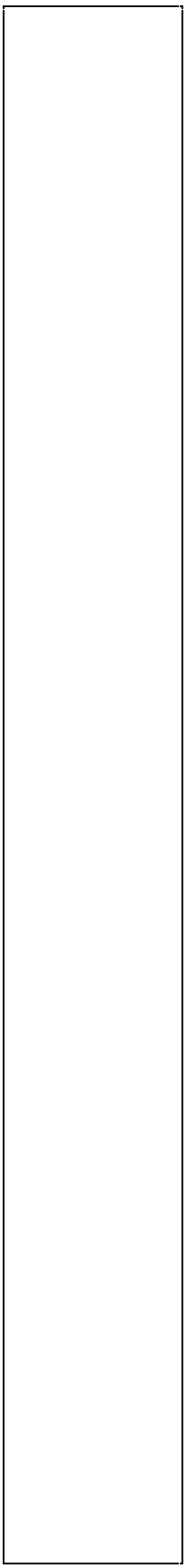


Figure 12/Q.730 - T1116220-88

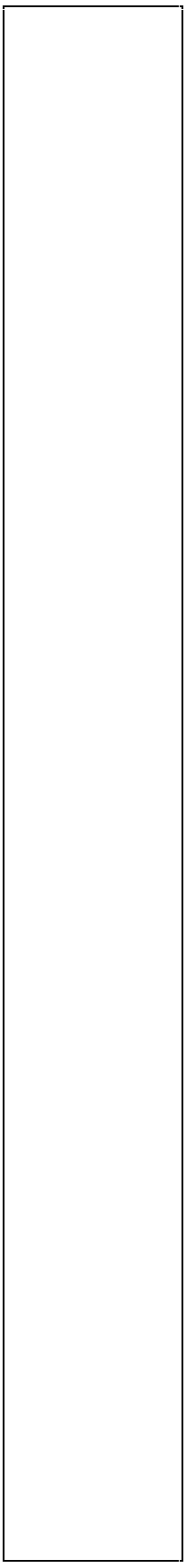
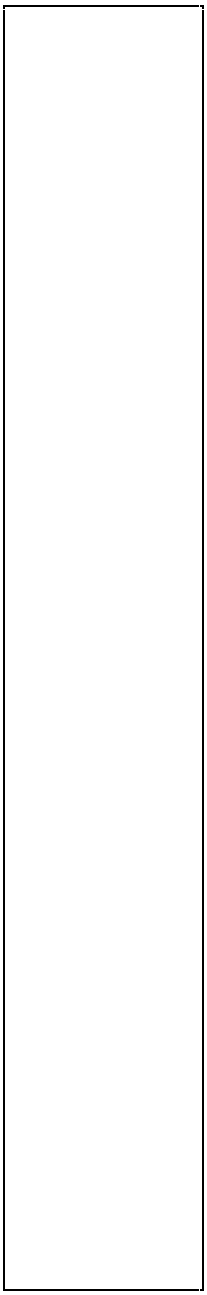


Figure 13/Q.730 - T1115790-88



4.4 *Interaction of CLIP with other supplementary services*

4.4.1 *Calling Line Identification Restriction*

The calling line identification will not be present if the calling user has an arrangement to inhibit the presentation of his number to the called party.

4.4.2 *Call Forwarding*

If the call has been redirected the CLI presented to the user will be the originating CLI.

4.4.3 *Call Waiting*

No interaction.

4.4.4 *Closed User Group*

No interaction.

4.4.5 *Direct Dialling In*

No interaction.

4.4.6 *User to User Information*

No interaction.

4.5 *Interaction of CLIR with other supplementary services*

4.5.1 *Calling Line Identification Presentation*

Calling Line Identification Restriction will take precedence over Calling Line Identification Presentation.

The only occasion when a user subscribing to Calling Line Identification Presentation can take precedence over Calling Line Identification Restriction is when the user has override category. This is a national option.

4.5.2 *Call Forwarding*

If the call has been re—directed the CLI presented to the user will be the originating CLI. When Calling Line Identification Restriction is applicable and activated, the calling party's ISDN number will not be presented to the "forwarded to" user unless this user has an override category. The latter is a national option.

4.5.3 *Call Waiting*

When Calling Line Identification Restriction is applicable and activated, no number will be presented to a called user subscribing to Call Waiting.

4.5.4 *Closed User Group*

It is an option to allow invocation of Calling Line Identification Restriction in connection with a CUG call.

4.5.5 *Direct Dailling In*

No interaction.

4.5.6 *User to User Information*

No interaction.

5 Direct Dialling In (DDI)

5.1 *Definitions*

Direct Dialling In (DDI) enables a user to call directly another user on a PABX or other private system without attendant intervention, the DDI digit(s) being the least significant digit(s) of the called ISDN number.

The stage 1 definition of DDI is to be found in Recommendation I.251, § A. The stage 2 description is included in Recommendation Q.81, § 1. This stage 3 description of DDI compliments the ISDN User Part protocol as defined in Recommendations Q.761—Q.764 and Q.766.

5.2 *Procedures*

The procedures to set up a call are in general the same as the basic procedures. A distinction is made whether DDI is applied to an analogue or an ISDN PABX and whether the destination local exchange is aware of the number of DDI digits required by the called PABX.

Besides sending the Address Complete Message and possibly Call Progress Message(s) the subsequent messages will be the same as for a normal call without DDI.

5.2.1 *Analogue PABX*

An Address Complete Message is sent as soon as the destination local exchange has received the complete called party number and has selected a free circuit to the PABX. The Called Line Status is set to "no indication".

If the destination local exchange has no knowledge about the number of DDI digits required to set up the call it selects a free circuit, sends the received DDI digits to the PABX and returns an Address Complete Message as soon as it has received a signal to that effect from the PABX. The Called Line Status is set to either "no indication" or "subscriber free" according to the signal received from the PABX.

5.2.2 *ISDN PABX*

An Address Complete Message is sent as soon as the destination local exchange has received the complete called party number with the Called Line Status set to "no indication".

If the destination local exchange has no knowledge about the number of DDI digits required to set up the call it sends an Address Complete Message as soon as it has received the relevant information (Call Proceeding) from the PABX. The Called Line Status is set to "no indication".

On receipt of an "alerting" indication from the PABX the destination local exchange sends a Call Progress Message with the Called Line Status set to "subscriber free".

If tones and/or announcements are provided from the destination local exchange the transmission path is through connected on receipt of the relevant information (Connect) from the PABX before sending the Answer Message to the preceding exchange. If tones and/or announcements are provided from the PABX the destination local exchange connects the backward path on receipt of an indication to that effect from the PABX and sends a Call Progress Message to the preceding exchange. The transmission path is fully through connected on receipt of the relevant information (Connect) from the PABX.

5.3 *Interactions with sub—addressing*

The use of DDI has no impact on the use of sub—addressing and vice versa.

6 Call Forwarding services

6.1 *General description of Call Forwarding services*

The Call Forwarding services involve the redirection of a call originally intended for one destination, towards another destination. The stage 1 definitions for the Call Forwarding services are given in Recommendation I.252 and the stage 2 descriptions are contained in Recommendation Q.82, § 2.

This section gives the ISDN User Part procedures to support the Call Forwarding Unconditional, Call Forwarding Busy, and Call Forwarding No Reply services. The functional description, formats and codes and general procedures for the ISDN User Part are contained in Recommendations Q.761—764 and Q.766. This section does not cover the optional validation procedure of Recommendation I.252. One possible method of performing this validation is to use a courtesy call at call forwarding activation time.

6.2 *Definition of Call Forwarding services*

The **Call Forwarding Unconditional service** permits a served user to have the network send all incoming calls, or just those associated with a specified basic service, addressed to the served user's ISDN number to another Number. This forwarding occurs regardless of the condition of the termination (busy or idle) and without the subscriber being given the opportunity to answer the call.

The **Call Forwarding Busy service** permits a served user to have the network send all incoming calls, or just those associated with a specified basic service, addressed to the served user's ISDN number, to another Number if the served user is in the busy state (user busy, either Network Determined User Busy (NDUB) or User Determined User Busy (UDUB). Recommendation I.252 contains the definitions for busy in an ISDN environment (NDUB occurs when both B—channels are busy for example).

The **Call Forwarding No Reply service** permits a served user to have the network send all incoming calls, or just those associated with a specified bearer service, addressed to the served user's ISDN number to another Number if the served user does not respond to the alerting within a specified time period.

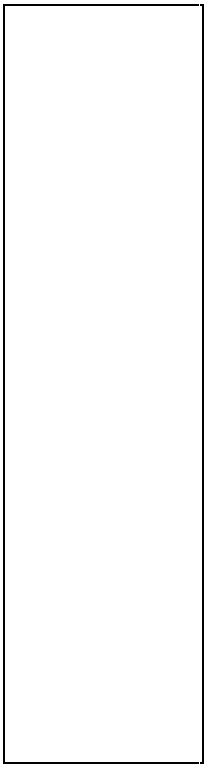
A terminating exchange that determines that Call Forwarding may occur will not discard the setup information until the exchange determines that Call Forwarding will not occur in this particular instance.

6.3 *Procedures for Call Forwarding*

The following three sections detail the ISDN—User Part procedures associated with the Call Forwarding services. The first section gives a high level view of ISDN User Part Call Forwarding procedures. The section consists of a figure that demonstrates the parameters and parameter values that occur in an Initial Address Message as a call undergoes a series of call forwardings. The second section gives the procedures for an exchange that determines that a call it has received should be forwarded. The third section gives the procedures for notification of the calling user.

6.3.1 *Call Forwarding related parameters in the Initial Address Message during Multiple Forwardings*

Figure 14/Q.730 - T1121540-89



6.3.2 *Procedures for an exchange that determines that a call it has received should be forwarded*

6.3.2.1 *General overview*

When an exchange determines that it must forward a call, it first checks to see if forwarding the call would result in the call exceeding the number of forwardings allowed within the network. The second action that needs to be undertaken, given that the limit was not exceeded, is the setting of the parameters that would be used in an Initial Address Message for the forwarded call. Even if the forwarding is intra—exchange this parameter information is set and retained. The reason for the retention is that, if subsequent forwarding occurs, the information is required to guarantee that the forwarding completes correctly. Finally the exchange attempts to set up the forwarded call. Any parameters received in the Initial Address Message not associated with forwarding (e.g., Calling Number, Higher Layer Compatibility etc.) are included unchanged in the Initial Address Message used to set up the forwarded call.

6.3.2.2 *Checking the forwarding limit*

If the call has already undergone forwarding, the redirection counter is examined to see if another forwarding would take the counter above the network specified limit. If it would, but the reason for the forwarding is Call Forwarding No Reply, the call should be left in its current state with the calling party continuing to receive ringing (the call is not cleared as the calling user would get a confusing sequence of tones and announcements e.g. ringing to network busy). In all other cases the call is cleared. The cause value used in the Release message depends upon which of the Call Forwarding services it is that would take the call over the limit. The mapping is as follows:

a) Call Forwarding Busy, the cause value “user busy” is used;

b) Call Forwarding No Reply, the cause value “no answer from user” is used;

c) Call Forwarding Unconditional, the cause value “no user responding” is used.

6.3.2.3 *Setting the parameters associated with call forwarding*

The parameters to be set depend upon the number of forwardings that the call has undergone. The following three sections give the procedures for the case where this is the first forwarding, the second forwarding and the third or greater forwarding that the call has undergone.

6.3.2.3.1 *This is the first forwarding that the call has undergone*

There are three parameters to set: the redirection information, the called party number and the original called number. Their values are set as follows:

1) Redirection information. The redirection counter is one. The redirecting reason and redirecting indicator are set according to the forwarding conditions.

2) Original called number. This is equal to the first number that was called.

3) Called party number. This is equal to the number that the call is to be forwarded to.

6.3.2.3.2 *This is the second forwarding that the call has undergone*

There are three parameters to set: the redirection information, the called party number, and the redirecting number. Their values are set as follows:

1) Redirection information. The redirection counter is two. The redirecting reason and redirecting indicators are set according to the forwarding conditions.

2) Redirecting number. This is equal to the number that is doing the redirecting.

3) Called number. This is equal to the number that the call is to be forwarded to.

6.3.2.3.3 *This is the third or greater forwarding that the call has undergone*

There are three parameters that must be set: the redirection information, the called party number and the redirecting number. Their values are set as follows:

1) Redirection information. The redirection counter is incremented. The redirecting reason and redirecting indicators are set according to the forwarding conditions.

2) Redirecting number. This is equal to the number that is doing the redirecting.

3) Called number. This is equal to the number that the call is to be forwarded to.

6.3.2.4 *Forwarding procedures at the forwarding exchange*

The exchange continues based on the service that is causing the forwarding. The procedures to be followed if the cause of the forwarding was either Busy (Network Determined) or Unconditional are given below. These are followed by the procedures for No Reply. Lastly the procedures for Busy (User Determined) are given.

6.3.2.4.1 *Call Forwarding Unconditional or Busy (Network Determined)*

The exchange continues in the following fashion:

1) If the number that the call is to be forwarded to resides at another exchange, an Initial Address Message is sent to continue the call on to that exchange. The incoming trunk or line should be connected to the chosen outgoing trunk immediately. The Initial Address Message includes the parameter information as shown in § 6.3.1.

2) If the number resides in the same exchange, the exchange tries to set up a call to that number. If the attempt is successful and neither Call Forwarding Busy or Call Forwarding Unconditional occurs, the incoming line or trunk should be connected to the destination line. If Call Forwarding Busy or Call Forwarding Unconditional occurs when the attempt is made, the Call Forwarding procedures should be re—entered.

6.3.2.4.2 *Call Forwarding No Reply*

The exchange continues in the following fashion:

1) If the number that the call is to be forwarded to resides at another exchange, an Initial Address Message is sent to continue the call on to that exchange. The incoming trunk or line is not connected to the chosen outgoing trunk yet as it could result in confusing sequences of in band tones or announcements (e.g., ringing going to busy). The Initial Address Message includes the parameter information as shown in § 6.3.1. If the exchange receives an alerting indication it should connect the incoming trunk or line to the outgoing trunk, in at least the backward direction. If the exchange receives an answer indication it should connect in both directions. If the exchange receives a release indication — called party busy for instance, the current connections should simply be left intact, until timer expiry or calling user disconnect.

2) If the original called user answers prior to receipt of alerting indication from the forwarded—to exchange, this user is awarded the call and the connection toward the forwarded—to exchange is released.

3) If the number resides in the same exchange, the exchange tries to set up a call to that number. If the attempt is successful and neither Call Fowarding Busy or Call Forwarding Unconditional occurs, the incoming line or trunk is connected to the destination line. If Call Forwarding Busy or Call Forwarding Unconditional occurs when the attempt is made, the Call Forwarding procedures should be re—entered. If the exchange cannot complete the call (e.g., destination is busy and No Call Forwarding on Busy active), the current connections are left intact.

6.3.2.4.3 *Call Forwarding Busy (User Determined)*

The exchange continues in the following fashion:

1) An Address Complete Message with no indication of the called party's status in the backward call indicators parameter should be returned to the calling party's exchange.

2) If the number that the call is to be forwarded to resides at another exchange, an Initial Address Message is sent to continue the call on to that exchange. The Initial Address Message includes the parameter information as shown in § 6.3.1. If the exchange receives an alerting indication it should connect the incoming trunk or line to the outgoing trunk. If the exchange receives a release indication — called party busy for instance, the call should be released with the cause value “user busy”.

3) If the number resides in the same exchange, the exchange tries to set up a call to that number. If the attempt is successful and neither Call Forwarding Busy or Call Forwarding Unconditional occcurs, the incoming line or trunk is connected to the destination line. If call Forwarding Busy or Call Forwarding Unconditional occurs when the attempt is made, the Call Forwarding procedures should be re—entered. If the exchange cannot complete the call (e.g., destination is busy and no Call Forwarding on Busy active) the call should be released with the cause value “user busy”.

6.3.3 *Notification procedures for the forwarding exchange*

An exchange forwarding a call sends a call progress message in the backward direction if the forwarding (served) user does not subscribe to notification (to the calling party) of the forwarded—to number. Procedures for users subscribing to the notification of forwarded—to number are for further study.

6.3.3.1 *Forwarding user subscribes to redirection information presentation restricted*

The call progress message contains an event indicator of the "Event Information Presentation Restricted Type". The value is set according to the redirecting reason.

6.3.3.2 *Forwarding user does not subscribe to redirection information presentation restricted*

The call progress message contains an event indicator that is not of the "Event Information Presentation Restricted" type. The value is set according to the redirecting reason.

6.3.3.3 *Nofitification for Call Forwarding No Reply*

If Call Forwarding No Reply is in effect, and the exchange alerts the called party, the Address Complete message sent including the Backward and Optional Backward Call indicators set to the appropriate values. In this case, the Call Progress message is delayed until receipt of an alerting indication from the forwarded—to exchange.

6.4 *Interactions with other Supplementary Services where interaction has ISDN User Part impact*

6.4.1 *User—to—User Signalling*

6.4.1.1 *Description of interaction*

6.4.1.1.1 *Call Forwarding Busy (Network Determined) or Call Forwarding Unconditional*

If the forwarding party does not subscribe to a Service requested as "essential" the call is cleared. If the forwarding party inhibits User to User on Forwarded calls and one or more User to User service was requested as "essential", the call is cleared. The cause is "no user responding" in the case of Call Forwarding Unconditional and "user busy" in the case of Call Forwarding Busy.

If call clearing does not occur above and the forwarding party inhibits User to User on Forwarded calls, the forwarding exchange will not include a User to User indicators parameter in the Initial Address Message used to set up the forwarded leg of the call. If the forwarding party does not subscribe to any of the User to User services requested by the calling user, the forwarding exchange will again not include a User to User indicators parameter in the Initial Address Message used to set up the forwarded leg of the call. In both of these cases the normal User to User procedures will ensure that the calling user is informed of the lack of User to User signalling capability.

If the forwarding user subscribes to a requested user to user service and does not inhibit it on forwarded calls, the forwarding exchange will try to supply the user to user service requested. This will be accomplished by requesting the user to user service in the outgoing Initial Address Message using the same request information that was contained in the original Initial Address Message. If the attempt is successful, user to user transfer will be available between the calling user and forwarded to user.

6.4.1.1.2 *Call Forwarding No Reply*

Call Forwarding No Reply subscribers with Call Forwarding No Reply activated can also be User to User Subscribers. They cannot however use the Alerting (Address Complete) indication to indicate acceptance or rejection of User to User Service requests. The Alerting (Address Complete) indication must show a “no indication” response to any User to User service requests. Any other response is a protocol error. Acceptance or rejection of User to User service requests occurs in the Connect (Answer) indication.

If a Call is Forwarded No Reply and one or more of any requested User to User services are essential and the forwarding user inhibits user to user on the forwarding leg, then the call is cleared. If the forwarding party does not subscribe to a Service requested as “essential” the call is cleared. The cause used in both cases is “no answer from user”.

Services 1 and 2 are not extended to the forwarded to party in the case of Call Forwarding No Reply. Service 3 may be extended to the forwarded to party if the forwarding user subscribes to User to User Service 3 and does not inhibit User to User on the forwarded leg. The User to User indicators parameter for service 3 in the Forwarding Initial Address Message should be set identically to the values received in the Original Initial Address Message. If the Address Complete Message received on the forwarded leg of the call indicates that service 3 was not provided, the call Forwarding No Reply exchange should retain this indicator and insert it in the Answer Message when it is received. If the Address Complete Message received on the forwarded leg of the call indicates that servive 3 is provided, the Call Forwarding No Reply exchange should retain this indicator and insert it in the Answer Message when it is received.

6.4.1.1.3 *Call Forwarding Busy (User Determined)*

Call Forwarding Busy (User Determined) subscribers can also be User to User Subscribers. The Address Complete Message sent back upon receipt of the release from the originally called party should give “no information” in response to any received User to User requests.

If a Call is Forwarded Busy (User Determined) and one or more of any requested User to User services are essential and the forwarding user inhibits user to user on the forwarding leg, then the call is cleared. If the fowarding party does not subscribe to a Service requested as “essential” the call is cleared. The cause used in both cases is “user busy”.

Services 1 and 2 are not extended to the forwarded to party in the case of Call Forwarding Busy (User Determined). Service 3 may be extended to the forwarded to party if the forwarding user subscribes to User to User Service 3 and does not inhibit User to User on the forwarded leg. The User to User indicators parameter for service 3 in the Forwarding Initial Address Message should be set identically to the values received in the Original Initial Address Message. If the Address Complete Message received on the forwarded leg of the call indicates that service 3 was not provided, the Call Forwarding Busy (User Determined) exchange should retain this indicator and insert it in the Answer Message when it is received. If the Address Complete Message received on the forwarded leg of the call indicates that service 3 is provided, the Call Forwarding Busy (User Determined) exchange should retain this indicator and insert it in the Answer Message when it is received.

6.4.1.1.4 *Message length*

There is a further implication in that multiple forwarding adds to the length of the Initial Address Message. If the Initial Address Message that is to be used on a call setup is within 32 octets of the 272 octet message length limit, the user to user information should be dropped. This will result in a guarantee that the Initial Address Message will not subsequently exceed the length limit.

6.4.2 *Closed User Group*

6.4.2.1 *Description of interaction*

Closed User Group restrictions must be met on each leg of the call. In addition, CUG restrictions must be met end—to—end. If the call is forwarded multiple times, CUG restrictions have to be met between the calling user and every intermediate forwarding user.

Calling User/Forwarded—to User: When a call is forwarded a new check of the CUG restrictions is made at the forwarded—to destination. The CUG information sent to the forwarded—to destination is the same CUG information that was sent from the originating exchange.

6.4.2.2 *Actions at a forwarding exchange*

For a subscriber who has both CUG interlock and Call Forwarding services, checks will have to be made prior to entering the Call Forwarding procedures. The forwarding users CUG interlock code(s) will have to be checked against the calling user CUG interlock code. The check would be done at the exchange for the decentralized case and at a database after a TCAP query response sequence for the centralized case. If the check is passed, the Call Forwarding procedures may be entered. If the call proceeds onwards from the forwarding exchange the CUG interlock code and outgoing access indication, which was included in the Initial Address Message received, is included in the Initial Address Message transmitted.

6.4.2.3 *Actions at a destination exchange*

If an exchange receives a call for a CUG member it will have to check against the calling user CUG code. The check would be done at the exchange for the decentralized case and at a database after a TCAP query response sequence for the centralized case. The check would have to be passed for the call to complete.

6.4.3 *Calling Line Identification Presentation*

When an exchange receives a call for a Call Forwarding No Reply Subscriber, Address Complete is not returned until alerting is received from the called party. Address Complete messages returned for Call Forwarding No Reply or Call Forwarding (user determined) Busy. Subscribers contain an optional backwards call indicators parameter. The value of this parameter should indicate “Call Forwarding may occur”. This indication alerts the transit and originating exchanges that the call is not yet in a stable state as Call Forwarding No Reply may occur. This is used to allow the request/response cycle to be used to obtain the calling number for the forwarded to party if Call Forwarding No Reply occurs.

6.5 *Message flow diagrams*

The messages over the access are included as examples only and are not exhaustive.

Call release procedures are as per normal call.

Abbreviations used in Figures 15/Q.730 to 22/Q.730 are the following:

IAM Initial Address Message

CPG Call Progress Message

ACM Address Complete Message

ANM Answer Message

REL Release

RLC Release Complete

LE Local Exchange

TE Terminal Entity

TR Transit Exchange

Figure 15/Q.730 - T1115800-88

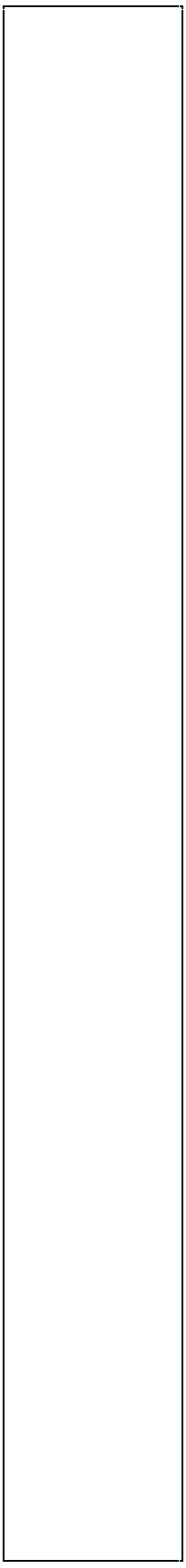


Figure 16/Q.730 - T1115810-88

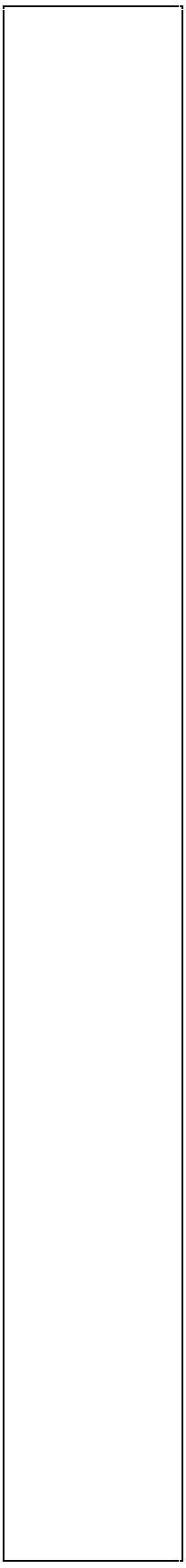


Figure 17/Q.730 - T1115820-88

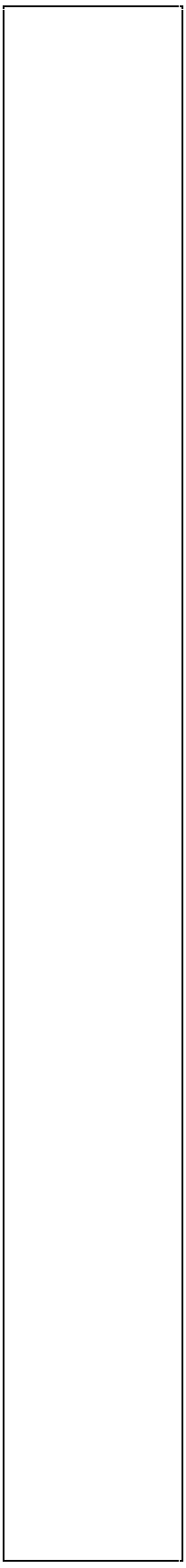


Figure 18/Q.730 - T1115830-88

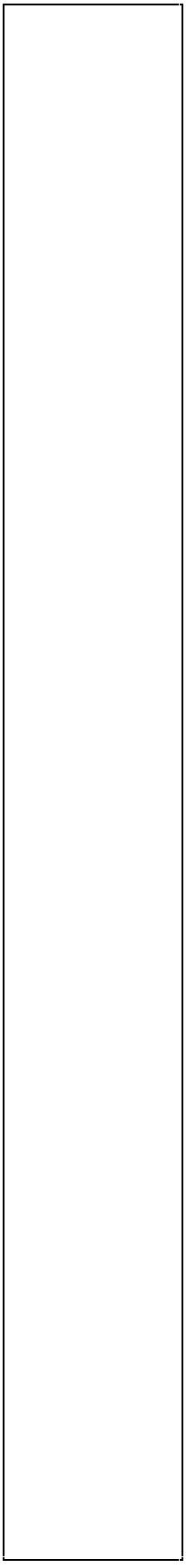


Figure 19/Q.730 - T1115840-88

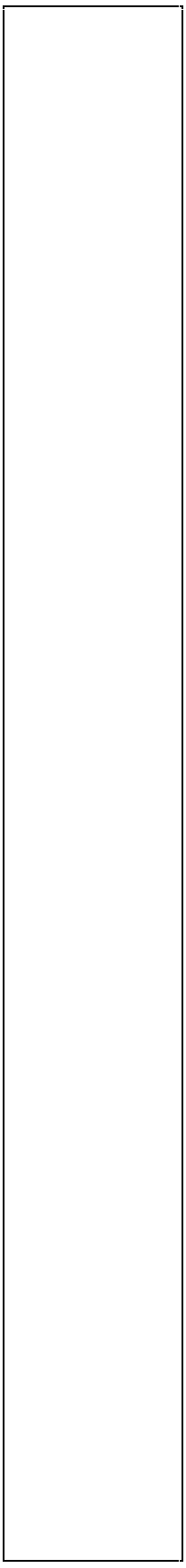


Figure 20/Q.730 - T1115850-88

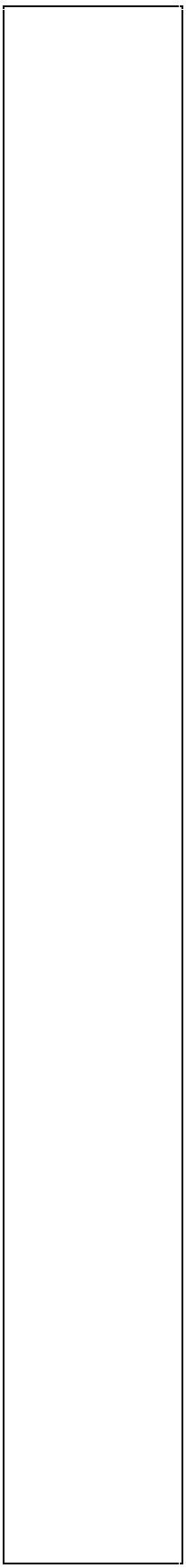


Figure 21/Q.730 - T1115860-88

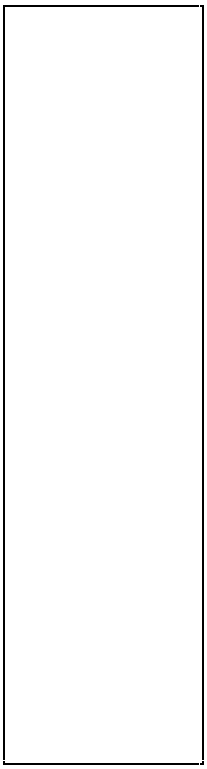
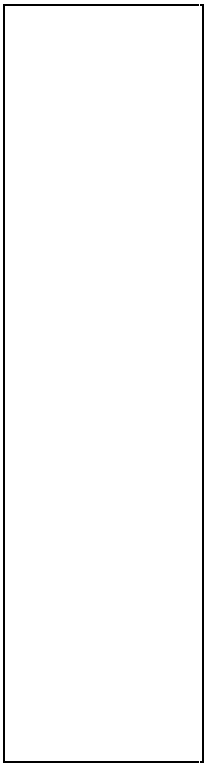


Figure 22/Q.730 - T1115870-88



7 Time—out table

Table 5/Q.730 specifies the timers to be used in conjunction with the supplementary services defined in this Recommendation. (This requires further study.)

TABLE 5/Q.730

Symbol	Time—out value	Significance	Cause for initiation	Normal termination	At the first expiry	At the following expiry	Section
T_3		U—U facility request	Receipt of facility Acceptance or reject message	"Protocol error" passed to call control			