Figure 1/Q.764, (N), à l’italienne, p.

Figure 2/Q.764, (N), à l’italienne, p.

Figure 3/Q.764, (N), à l’italienne, p.

Notes referring to Figures 1/Q.764 to 3/Q.764

Note 1 — The alerting message may not be given by a called terminal having automatic answer. Under these circumstances the Connect Message will be sent as soon as the Connect Message is received and through-connection of the speech path has been completed.

Note 2 — For telephone calls within the ISDN, ringing tone will be applied by the terminating exchange as soon as it is known that the subscriber is free. In the case of a PABX connected to the access interface there is the option of an early through-connection of the switchpath so that the in-band call arrival indication generated in the PABX is returned to the calling user. For data calls, ringing tone is not applied.

Note 3 — The continuity check may be applicable on an intermediate circuit if analogue circuits are used.

Note 4 — This example assumes that the number length is known at the second transit exchange in order to illustrate the addition of SAMs to the IAM received. This function does not have to be performed in this way.

Note 5 — The call may be rejected by the user at this point following interchanges of user-user data, e.g. as a result of a failed compatibility check.

Note 6 — Charging for the transfer of user-user data requires further study.

Note 7 — Flow control of user-user data is achieved by the originating and destination exchanges by the use of ‘‘receive ready’’ and ‘‘receive not ready’’ messages throughout the conversation/data phase.

Note 8 — Access protocol example is for point-to-point operation only.

Figure 4/Q.764, (N), à l'italienne, p. 4

Figure 5/Q.764, (N), à l'italienne, p. 5

Figure 6/Q.764, (N), à l’italienne, p.

Figure 7/Q.764, (N), à l'italienne, p.

Figure 8/Q.764, (N), à l’italienne, p.

Figure 9/Q.764, (N), à l’italienne, p.

Figure 10/Q.764, (N), à l'italienne, p.

3 End-to-end signalling

3.1 *Introduction*

End-to-end messages contain only information which is relevant for the ‘‘endpoints’’ of a circuit-switched connection. Endpoints are signalling points such as local exchanges and possibly exchanges at network boundaries, e.g. international gateway exchanges within the Signalling System No. 7 network.

Two methods are available for ISDN end-to-end signalling:

— the pass-along method; and

— the signalling connection control part (SCCP) method.

The choice of method is, to some extent, dependent on the size and architecture of the signalling network. Both methods may coexist in a given network.

The pass-along method and the SCCP method are specified for circuit-switched connections.

An end-to-end signalling connection established for end-to-end signalling is called an ‘‘ISDN user part end-to-end signalling connection’’ in this section.

§ 1.5 discusses the use of the end-to-end and link-by-link methods.

3.2 *Pass-along method*

In the pass-along method, use is made of an ISDN user part end-to-end signalling connection which in fact is being set up whenever a physical connection between two endpoints is established.

The ISDN user part end-to-end signalling connection in this case consists of a number of connection sections in tandem which run in parallel with and use the same identification code as the circuits in the physical connection.

The association of incoming and outgoing circuits in a transit exchange also establishes the coupling of the connection sections related to these circuits.

The pass-along method defines, section by section, the appropriate routing label for the message to be passed along via ISDN user part connection; but the content of pass-along messages is only evaluated and possibly changed at the endpoints. The pass-along message group is characterised by a special message type code as specified in Recommendation Q.763. One ISDN user part message to be passed along may be embedded in one pass-along message.

In a signalling connection for which pass-along method is available pass-along messages may be sent in either the forward or backward direction.

A forward pass-along message may not be sent until either a backward pass-along or the first backward set-up message has been received or after the physical connection is released.

Call control path information (see § 3.5) included in the initial address and backward set-up messages is used to indicate to the connection endpoints whether or not the call control path can support pass-along message transfer.

A pass-along message that has been received at a transit exchange and cannot be transferred to the subsequent exchange is discarded without affecting call states and timers in that exchange.

3.3 *SCCP method*

In the SCCP method the ISDN user part employs the services of the signalling connection control part (SCCP) for the transfer of end-to-end signalling information.

3.3.1 *Call reference*

The call reference is a circuit independent information identifying a particular call. It is needed when end-to-end signalling information associated with the call is to be transferred by a connectionless SCCP service. If, in turn, an SCCP connection request for connection-oriented SCCP service is carried embedded in an ISDN-UP message, the call reference is omitted.

References for a given call are allocated independently in the two concerned signalling points and are subsequently exchanged. The allocation of call references may be initiated by either side. The call reference consists of a call identity and the point code where the call identity is established. If, e.g. signalling point A initiates the exchange of call references, it selects a call identity CIA and transfers it together with the point code of A, PCA, to signalling point B. Signalling point B then allocates its own identity CIB to the call and returns it together with the signalling point code of B, PCB, to signalling point A. Subsequent call related end-to-end message transferred from signalling point A to signalling point B contain call identity CIB and are routed directly using destination point code PCB. Conversely, end-to-end messages transferred from signalling point B to signalling point A contain call identity CIA and are routed using destination point code PCA.

A linkage of call references at network boundaries has to be provided.

3.3.2 *Coupling of connection sections*

An ISDN user part end-to-end signalling connection may consist of a number of connection sections in tandem. In order to couple two connection sections at the SCCP relay point, linkage of call references 3 (Ref 3) is performed by ISDN user part for connectionless SCCP service and linkage of local references is performed by SCCP for connection-oriented SCCP service.

An SCCP relay point where linkage of call references is performed by the ISDN user part is called an ‘‘intermediate relay node’’ in this section.

3.3.3 *Connectionless service*

For connectionless service, the ISDN user part transfers the data to be transmitted to the SCCP together with a request for the appropriate protocol class of service. The Ref 3 signalling information, transfer and delivery of this data to the distant ISDN user part is controlled entirely by the SCCP. The association between the transferred information and a call is made by the ISDN user part, which transfers the call reference as part of signalling information for this purpose.

The protocol class of service is assumed to be 0. Individual networks may choose class 1 based on the predetermined arrangement.

3.3.4 *Connection-oriented service*

3.3.4.1 *Connection request embedded in an ISDN user part message*

At the exchange initiating the establishment of an ISDN user part end-to-end signalling connection based on connection-oriented SCCP service, the ISDN user part requests the SCCP to provide the necessary information for a connection request for an SCCP end-to-end connection. This connection request is then carried embedded in an ISDN user part message. At the destination exchange the connection request is passed to the SCCP by the ISDN user part. The SCCP at the destination exchange then behaves as if the connection request had been sent directly by the SCCP from the originating exchange: it indicates the connection request to the ISDN user part and upon response from the ISDN user part it returns a connection confirm message to the SCCP at the originating exchange. The SCCP at the originating exchange confirms the set-up of the end-to-end connection to the ISDN user part. The contents in the embedded connection request is not evaluated by the ISDN user part at any exchange.

3.3.4.2 *Protocol class of service*

The protocol class of service is assumed to be 2. If the connection request is of protocol class 3, the ISDN user part connection request parameter must include explicit protocol class and credit indications in addition to the SCCP

source local reference.

3.3.4.3 *Mechanism of coupling*

Although coupling of connection sections may not be appropriate in combination with the embedded method, coupling is necessary at network boundaries. In this case the ISDN user part at the intermediate point has knowledge that a coupling of end-to-end connections sections has to be performed, and therefore connection requests received embedded in an ISDN user part message are passed to the SCCP. The SCCP, in turn, furnishes the ISDN user part with a connection request for the new connection section in order to have it included in the outgoing ISDN user part message.

After the coupling of the connection sections has been successfully initiated by the ISDN user part, end-to-end signalling information passing through an intermediate point is not passed to the ISDN user part.

3.3.4.4 *Release of ISDN user part end-to-end signalling connection*

The SCCP end-to-end connection is released according to the procedures described in the Recommendation Q.714.

The physical connection and the ISDN user part end-to-end signalling connection can be released independently of each other.

Generally, both the ISDN user part end-to-end signalling connection and the physical connection are released simultaneously. However, for certain applications it is possible to maintain the SCCP end-to-end connection although the physical connection has already been released.

3.4 *Chaining of ISDN user part end-to-end signalling connections*

At an exchange where the contents of end-to-end signalling information may need to be evaluated by the ISDN user part, ISDN user part end-to-end signalling connections are chained. Chaining of two ISDN user part end-to-end signalling connections means that one ISUP signalling connection terminates and another ISUP signalling connection associated with it originates with all end-to-end signalling information passing through the ISDN user part. The new ISUP signalling connection may have different characteristics from the previous one. See Figure 22/Q.764.

If chaining is not appropriate for the associated call when the service requirements cannot be satisfied because of it, the call may be released. In addition, if any of the ISDN user part end-to-end signalling connections under chaining cannot be established or is abnormally disconnected the associated call may be released if the required service cannot be completed without it.

3.5 *Use of the Protocol Control Indicator (PCI)*

The protocol control indicator is control information concerning the end-to-end signalling procedures. It is contained in the forward call indicator and the backward call indicator, respectively, and has to be examined to determine which end-to-end signalling method should be used if any (when an embedded connection request is not included in the appropriate message) for the end-to-end transfer of messages.

The following indications are provided:

a) available information that could be transmitted (end-to-end) to the other endpoint;

b) Signalling System No. 7 path between the two endpoints, no interworking along the route;

c) pass-along method available;

d) SCCP connection-oriented class available;

e) SCCP connectionless class available;

f) ISDN user part used all the way.

3.6 *Operation of the pass-along method*

Figure 11/Q.764 illustrates the operation of the pass-along protocol. In this Figure the PCI is the protocol control indicator in the IAM. ‘‘Interworking’’ in the IAM or ACM indicates that the control path is not wholly Signalling System No. 7.

Figure 11/Q.764, (N), p.

3.7 *Operation of the SCCP method - connectionless services*

3.7.1 *Successful set-up of the ISDN user part end-to-end signalling connection*

3.7.1.1 *Simultaneous establishment of an ISDN user part end-to-end signalling connection and a physical connection*

In the case of simultaneous establishment of a signalling connection with a physical connection, the initial address message from the originating exchange of a call contains the call reference consisting of the point code of the originating exchange and the call identity. The inclusion of the call reference implicitly indicates that the establishment of a signalling connection is requested. When the terminating exchange receives an IAM with a call reference in it and a signalling connection can be established, it responds to that with its own call reference included in the first backward message (e.g. an address complete message).

At an intermediate relay node where SCCP is terminated, its own call reference is allocated to the signalling connection and the coupling of call references is made. When the first backward message contains a call reference, an intermediate relay node replaces that with its own call reference and relays this message towards the originating exchange.

When the originating exchange receives the destination call reference from the exchange at the other end of the connection section the signalling connection is regarded as in a ready state and end-to-end signalling information can be transferred over this connection.

Figure 12/Q.764 shows the procedure for this case.

Figure 12/Q.764, (N), p.

3.7.1.2 *Establishment of a signalling connection when the circuit-associated signalling path has been established*

When the circuit-associated signalling path has already been established, the establishment of a signalling connection can be initiated either by the originating or the terminating exchange of a call. In this case, an Information Request message (INR) is transferred from the initiating exchange to the other end. This INR message contains a call reference

as in the case of an IAM as described in § 3.6.1.1 above.

An information message (INF) containing a call reference as in the case of the first backward message in § 3.6.1.2 is returned to the initiating exchange and a signalling connection is successfully established.

Figure 13/Q.764 shows the procedure for this case.

Figure 13/Q.764, (N), p.

3.7.2 *Unsuccessful set-up of a signalling connection*

In a case where a signalling connection cannot be established, e.g. due to interworking with a PSTN, the first backward message in response to the initial address message containing the originating call reference includes no call reference.

The procedure for this case is shown in Figure 14/Q.764.

Figure 14/Q.764, (N), p.

In a case where the establishment for a signalling connection is requested by an INR message as shown in Figure 13/Q.764 the initiating exchange usually knows the end-to-end signalling capability for the call concerned and a signalling connection can successfully be established. However, if a signalling connection cannot be established for some reason, an INF message containing no call reference is returned to the initiating exchange.

In these situations, the call may be released if the ISDN user part end-to-end signalling connection is essential to satisfy the service requirements of the call.

In these cases, the call reference(s) is frozen for the time ($T_{3\d1}$) as described in § 3.7.4.

3.7.3 *Abnormal situations*

If no response to the INR message containing the originating call reference is received for the time $T_{3\d3}$ at the initiating exchange and if necessary (e.g. in the case of an interworking exchange of different end-to-end signalling schemes) at an intermediate relay node, the call is released (see § 2.9.7).

In this case, the call reference(s) is frozen for the time $T_{3\d1}$ as described in § 3.7.4.

The procedure for this case is shown in Figure 15/Q.764.

Figure 15/Q.764, (N), p.

3.7.4 *Release of a signalling connection*

3.7.4.1 *Simultaneous release of a physical connection and a signalling connection*

When the call is released, the ISDN user part end-to-end signalling connection is considered to be released simultaneously. Call references allocated at local exchanges and intermediate relay node(s) are frozen for time $T_{3\d1}$ as described in § 3.7.4.2 below.

The procedure for this case is shown in Figure 16/Q.764.

Figure 16/Q.764, (N), p.

3.7.4.2 *Frozen call reference*

When an ISDN user part end-to-end signalling connection is released, call references allocated for this signalling connection are frozen for time $T_{3\d1}$. These references will not be used for another signalling connection during the frozen period. $T_{3\d1}$ is chosen to sufficiently reduce the probability of erroneously associating a message with the previously used call reference. Optionally call identities may be allocated to individual signalling connections in a cyclic manner so that a previously used call identity is not to be used again for sufficient amount of time.

If an end-to-end message containing a frozen call reference is received, it is discarded.

3.7.5 *End-to-end message transfer*

An end-to-end message is transferred in an SCCP unitdata (UDT) message according to the procedures defined in Recommendation Q.714. ISDN user part interfaces with SCCP via the primitives are defined in Recommendation Q.711 for this transfer. The unit-data request/indication primitive includes in its user data parameter an ISDN user part message beginning with the message type and ending with the parameters.

At the local exchange which has responded to the request of establishment of an ISDN user part end-to-end signalling connection from the other local exchange, an end-to-end message cannot be transferred for time $T_{3\d2}$ or until the first end-to-end message has been received from the other end. $T_{3\d2}$ is chosen to sufficiently reduce the probability that an end-to-end message from the responding local exchange is received at the initiating local exchange or the intermediate relay node, before the ISDN user part message which contains the response to the signalling connection establishment request.

If a relay exchange receives an end-to-end message in a UDT, in any case the UDT will be forwarded to the succeeding exchange if possible.

The procedure for this case is shown in Figure 17/Q.764.

Figure 17/Q.764, (N), p.

3.8 *Operation of the SCCP method — connection-oriented service*

The initial address message, the facility request message and the information message may be used for the embedded transfer of the connection request. The procedures described and the figures refer to the case where the connection request is sent in the forward direction. In principle, they also apply when the connection request is sent in the backward direction in the facility request or the information message.

For the connection request embedded in an ISDN user part message an additional interface is used. This functional interface is described in Recommendations Q.711 and Q.714 (signalling connection control part of Signalling System No. 7). The interface elements are listed in § 3.9.

Procedures concerning the SCCP are in accordance with those described in Recommendation Q.714 (signalling connection control part of Signalling System No. 7) and are described here only for illustrative purposes.

3.8.1 *Successful set-up of the ISDN user part end-to-end signalling connection*

The following actions are performed at the originating exchange and at the destination exchange for the set up of an SCCP end-to-end connection using embedded transfer of the connection request in an ISDN user part message (the numbers in the text correspond to the numbers in Figure 18/Q.764):

1) The ISDN user part (ISUP) at the originating exchange requests the SCCP to provide the necessary information for a connection request to the called address using the REQUEST type 1 interface element.

2) The SCCP at the originating exchange generates a connection request and transfers it to the ISDN user part using the REPLY interface element.

3) The ISDN user part at the originating exchange transmits the connection request embedded in an ISDN user part message to the ISDN user part at the destination exchange.

7) Upon receiving an embedded connection request in an ISDN user part message, the ISDN user part at the destination exchange transfers the received connection request to the SCCP using the REQUEST type 2 interface element.

8) The SCCP at the destination exchange informs the ISDN user part of a request to establish an end-to-end connection using the N-CONNECT indication primitive.

9) The ISDN user part responds to the request using the N-CONNECT response primitive.

10) Upon receiving the N-CONNECT response primitive from the ISDN user part, the SCCP at the destination exchange sends a connection confirm message into the backward direction.

12) Upon receiving a connection confirm message the SCCP at the originating exchange informs the ISDN user part using the N-CONNECT confirmation primitive.

At those transit exchanges which are not SCCP relay-points, the connection request embedded in an ISDN user part message is left unchanged by the ISDN user part and transferred into the forward direction.

An SCCP relay-point is an exchange where two connection sections belonging to the same end-to-end connection are coupled.

The following actions are performed at an SCCP relay-point for the coupling of two connection sections (the numbers in the text correspond to the numbers in Figure 18/Q.764):

4) Upon receiving an embedded connection request in an ISDN user part (ISUP) message, the ISDN user part at the SCCP relay-point transfers the received connection request to the SCCP using the REQUEST type 2 interface element with the reply request set.

5) The reply request in the REQUEST type 2 interface element causes the SCCP at the SCCP relay-point to provide a connection request for a new connection section. The new connection request is provided to the ISDN user part using the REPLY interface element.

Note — The SCCP allocates an outgoing local reference and associates the incoming and outgoing local references and their corresponding point codes.

6) The ISDN user part at the SCCP relay-point transmits the connection request embedded in an ISDN user part message.

11) Upon receiving a connection confirm message, the SCCP at the SCCP relay-point sends a connection confirm message into the backward direction.

Figure 18/Q.764, (N), p.

3.8.2 *Unsuccessful set-up of the SCCP end-to-end connection*

If the ISDN user part end-to-end signalling connection cannot be extended beyond a transit exchange because (for instance) interworking occurs, the ISDN user part at this transit exchange initiates the refusal of the connection request which is then performed by the SCCP. The set-up of the physical connection may be continued.

If the ISDN user part initiates the refusal of a connection request received embedded in the initial address message, in general the following actions are performed. The numbers in the text correspond to the numbers in Figure 19/Q.764:

1) Upon receiving an embedded connection request, the ISDN user part transfers the received connection request to the SCCP using the REQUEST type 2 interface element with the refusal indicator set.

2) Upon receiving the REQUEST type 2 interface element with the refusal indicator set, the SCCP sends a connection refused message (CREF) into the backward direction.

3) Upon receiving a connection refused message, the SCCP at the originating exchange informs the ISDN user part using the N-DISCONNECT indication primitive.

If the SCCP at an SCCP relay-point receives a connection refused message instead of a connection confirm message, the incoming connection section is also released by sending a connection refused message into the backward direction.

If the SCCP at the destination exchange fails to set up the requested end-to-end connection, the following actions are performed to refuse the connection request received in a REQUEST type 2 interface element (the numbers in the text correspond to the numbers in Figure 20/Q.764):

1) The SCCP at the destination exchange sends an N-DISCONNECT indication primitive to the ISDN user part.

2) At the same time the SCCP sends a connection refused message into the backward direction.

In these situations, the call may be released if the ISDN user part end-to-end signalling connection is essential to satisfy the service requirements of the call.

Figure 19/Q.764, (N), p.

Figure 20/Q.764, (N), p.

3.8.3 *Unsuccessful set-up of the physical connection*

If the physical connection cannot be set up at a transit exchange, in addition to releasing the physical connection so far established the ISDN user part initiates the refusal of the connection request. The same actions are performed as at a transit exchange beyond which a logical connection cannot be extended.

If the physical connection cannot be set up at the destination exchange, the ISDN user part can initiate either the refusal or the confirmation of the connection request depending on supplementary services. It may be preferred to always confirm the connection request to allow for the initiation of supplementary services by the calling subscriber.

3.8.4 *Release of the ISDN user part (ISUP) end-to-end signalling connection*

3.8.4.1 *Simultaneous release of the physical and ISUP signalling connections*

The release of the ISDN user part end-to-end signalling connection is initiated from the exchange which initiates the release of the call concerned. At the initiating exchange of call release, when the ISDN user part release message (REL) is transmitted, ISDN user part requests SCCP to transmit a released message (RLSD). This RLSD message contains a cause value of ‘‘end user originated’’ in its cause parameter, if a normal call release initiated by a user is taking place.

Figure 21/Q.764 shows the procedure for this case.

In the case where no application requires the ISDN user part end-to-end signalling connection to be maintained, the ISDN user part at a local exchange, or an exchange performing chaining, requests the SCCP to release the SCCP end-to-end connection if it receives a release message (REL) and the SCCP has not yet received a released (RLSD) message at that time (see Figure 22/Q.764).

Figure 21/Q.764, (N), p.

Figure 22/Q.764, (N), p.

3.8.4.2 *Non-simultaneous release of the physical and the ISDN user part end-to-end signalling connections*

Procedures for non-simultaneous release of the physical and the ISDN user part end-to-end signalling connections are to be defined in appropriate supplementary services procedures.

3.8.5 *End-to-end message transfer*

An end-to-end message is transferred in an SCCP data (DT1/DT2) message according to the procedures defined in Recommendation Q.714. ISDN user part interfaces with SCCP via the primitives as defined in Recommendation Q.711 for this transfer. The data request/indication primitive includes in its user data parameter an ISDN user part message beginning with the message type code and ending with the parameters.

3.9 *Interface elements between ISDN user part and SCCP (embedded transfer)*

The ISDN user part may use the functional interface as defined in Recommendation Q.711.

Three interface elements are defined for this functional interface:

a) the REQUEST type 1

b) the REQUEST type 2

c) the REPLY

The contents of these three interface elements are shown in Appendix I.

Figures 18/Q.764, 19/Q.764 and 21/Q.764 indicate the usage of the interface elements during set up of a circuit-switched connection together with an SCCP connection.

ANNEX A
(to Recommendation Q.764)

H.T. [1T3.764]

{
Timers used in Recommendation Q.764
(Sheet 1 of 6)
}

Symbol	Time-out value	Significance	Cause for initiation	Norm
T 1 At the receipt of release complete message } Retransmit release message and reinitialize timer T 1 }	4-15 s { Same as the first expiry	Local	When release message is sent	{
T 2 When controlling exchange receives suspend (user) message } At the receipt of resume (user) message at controlling exchange }	3 min { Initiate release procedure	Dual ——	{	
T 3 When local exchange sends delayed release message } When hold condition is removed }	3 min { Initiate release procedure	Dual ——	{	
T 4 When local exchange sends call modification request message } At the reception call modification complete message }	4-15 s {	Dual ——	{	
T 5↓**0** When initial release message is sent } At receipt of release complete message } Send reset circuit message, alert maintenance personnel, and remove the circuit from service } The sending of the de reset circuit message should continue at 1-min intervals until maintenance intervention occurs }	1 min { { {	Local	{	
T 6↓**0** When controlling exchange receives suspend (network) } At the receipt of resume (network) message }	Covered in Q.118 { Initiate release procedure	Dual ——	{	

Tableau [1T3.764], A L'ITALIENNE, p. 23

H.T. [2T3.764]

{
Timers used in Recommendation Q.764
(Sheet 2 of 6)
}

Symbol	Time-out value	Significance	Cause
T 7↓**0** When the latest address message is sent } When the condition for normal release of address and routing informations is met (receipt of ACM, CON, messages) } Release all equipment and connection (Send release message) }	20-30 s { { —	Dual	{
T 8↓**0** When transit of incoming international exchange receives initial adress message } At receipt of continuity message } Release all equipment and connection into national network (Send release message) }	10-15 s { { —	Local	{
T 9↓**0** When national controlling or outgoing international exchange sends latest address message after the receipt of ACM } Release connection send back release message }	Interval specified in Q.118 At the receipt of answer —	Dual {	{
T 1 0 When last digit is received in interworking situations } At the receipt of fresh information }	4-6 s { Send address complete message	Dual —	{
T 1 1 When latest address message is received in interworking situations }	15-20 s Send ACM	Dual Send address complete message	{ —

Tableau [2T3.764], A L'ITALIENNE, p. 24

{
Timers used in Recommendation Q.764
(Sheet 3 of 6)
}

Symbol	Time-out value	Significance	Cause for initiation	Normal te
T 1 2 At receipt of blocking acknowledgement } Retransmit blocking message and initiate T 1 2 } Same as the left until T 1 3 expires }	4-15 s { {	Local	When blocking message is sent	{
T 1 3 When initial blocking message is sent } At receipt of blocking acknowledgement } Retransmit blocking message and alert maintenance personnel and start T 1 3. Stop T 1 2 } The reception of message should be continued until maintenance intervention occurs and circuit taken out of service as appropriate }	1 min { { {	Local	{	
T 1 4 When unblocking message is sent } At receipt of unblocking acknowledgement } Retransmit unblocking message and initiate T 1 4 timer } Same as the left until T 1 5 expires }	4-15 s { { {	Local	{	
T 1 5 When initial unblocking message is sent } At receipt of unblocking acknowledgement } Retransmit unblocking message alert maintenance personnel, start T 1 5 timer and stop T 1 4 } The repetition of message should be continued until maintenance intervention occurs and circuit taken out of service as appropriate }	1 min { { {	Local	{	
T 1 6 When reset circuit message is sent } At the receipt of the acknowledgement (RLC message) }	4-15 s { {	Local	{	

Retransmit reset circuit message and restart T 1 6 } Same as the left until T 1 7 expires }	{ 			
T 1 7 When initial reset circuit message is sent } At receipt of the acknowledgement } Alert maintenance personnel retransmit reset circuit message, restart T 1 7 and stop T 1 6 } The repetition of message should be continued until maintenance intervention occurs }	1 min { { {	Local	{	

Tableau [3T3.764], A L’ITALIENNE, p. 25

{
Timers used in Recommendation Q.764
(Sheet 4 of 6)
}

Symbol	Time-out value	Significance	Cause for initiation	Normal termination	A
T 1 8 When group blocking message is sent } At receipt of group blocking acknowledgement } Retransmit group blocking message and initiate T 1 8 } Same as the left until T 1 8 expires }	4-15 s { { {	Local	{		
T 1 9 When initial group blocking message is sent } At receipt of group blocking acknowledgement } Retransmit group blocking message, alert maintenance personnel, initiate T 1 9 and stop T 1 8 } The repetition of message should be continued until maintenance intervention occurs and circuits taken out of service as appropriate }	1 min { { {	Local	{		
T 2 0 When group unblocking message is sent } At receipt of group unblocking acknowledgement } Retransmit group unblocking message and initiate T 2 0 } Same as the left until T 2 0 expires }	4-15 s { { {	Local	{		
T 2 1 When initial group unblocking message is sent } At receipt of group unblocking acknowledgement } Retransmit group unblocking message, alert maintenance personnel, initiate T 2 1 and stop T 2 0 } The repetition of message should be continued until maintenance intervention occurs and circuits taken out of service as appropriate }	1 min { { {	Local	{		
T 2 2 When circuit group reset message is sent }	4-15 s {	Local	{		

At the receipt of the acknowledgement } Retransmit circuit group reset message and restart T 2 2 } Same as the first expiry until T 2 3 expires }	{ {				

Tableau [4T3.764], A L’ITALIENNE, p. 26

H.T. [5T3.764]

{
Timers used in Recommendation Q.764
(Sheet 5 of 6)
}

Symbol	Time-out value	Significance	Cause for initiation	Normal terminat
T 2 3 When initial circuit group reset message is sent } At the receipt of the acknowledgement } Alert maintenance personnel and restart Timer T 2 3. Retransmit circuit group reset message. Stop timer T 2 2 } The reception of message should be continued until maintenance intervention occurs }	1 min { { {	Local	{	
T 2 4 At the receipt of backward check tone }	< 2 s Report failure	Local —	When check tone is sent	{
T 2 5 When continuity check failure is detected (on receipt of continuity recheck request) }	1-10 s —	Local Send CCR message	{ —	
T 2 6 When second continuity check failure is detected }	1-3 min —	Local Send CCR message	{ —	
T 2 7 When continuity recheck request is requested } At receipt of continuity check request message }	4 min { Return to idle	Local —	{ 	
T 2 8	10 s	Local	When send CQM	At receipt of CQ

Tableau [5T3.764], A L'ITALIENNE, p. 27

H.T. [6T3.764]

{
Timers used in Recommendation Q.764
(Sheet 6 of 6)
}

Symbol	Time-out value	Significance	Cause for initiation	Normal term
T 2 9 First congestion/first congestion indication after T 3 0 expires }	300-600 ms —	Local —	{ —	
T 3 0	5-10 s	Local	First congestion indication	—
T 3 1 Release of ISDN User part signalling connection based on CO SCCP }	> 6 min On expiry	Local —	{ Call reference reusable	
T 3 2 On receipt of end-to-end message } End-to-end message to be sent }	3-5 s On expiry	Local —	{ {	
T 3 3	12-15 s	Local	When send INR	On receipt o
T 3 4 When send circuits group query } On receipt of circuits group query response }	12-15 s { Maintenance action	Local —	{	

Tableau [6T3.764], A L'ITALIENNE, p. 28