Telecommunication Standardisation Sector
Study Group 15
Experts Group for Video Coding and Systems in
ATM and Other Network Environments

Document AVC-818
LBC-95-266.
22 September 1995

SOURCE : Stuart Dunstan, Siemens Ltd
TITLE : Informative appendix on H.245 procedures
PURPOSE : Proposal

The following is proposed as an informative appendix in H.245. The purpose of the appendix is to illustrate examples of H.245 procedures, which are formally defined in section 8/H.245.

APPENDIX III

Illustration of H.245 procedures

(This appendix does not form an integral part of this Recommendation)

1. Introduction

This appendix illustrates examples of the procedures defined in 8/H.245.

Figure III.1-1 shows the key to diagrams used in this appendix.

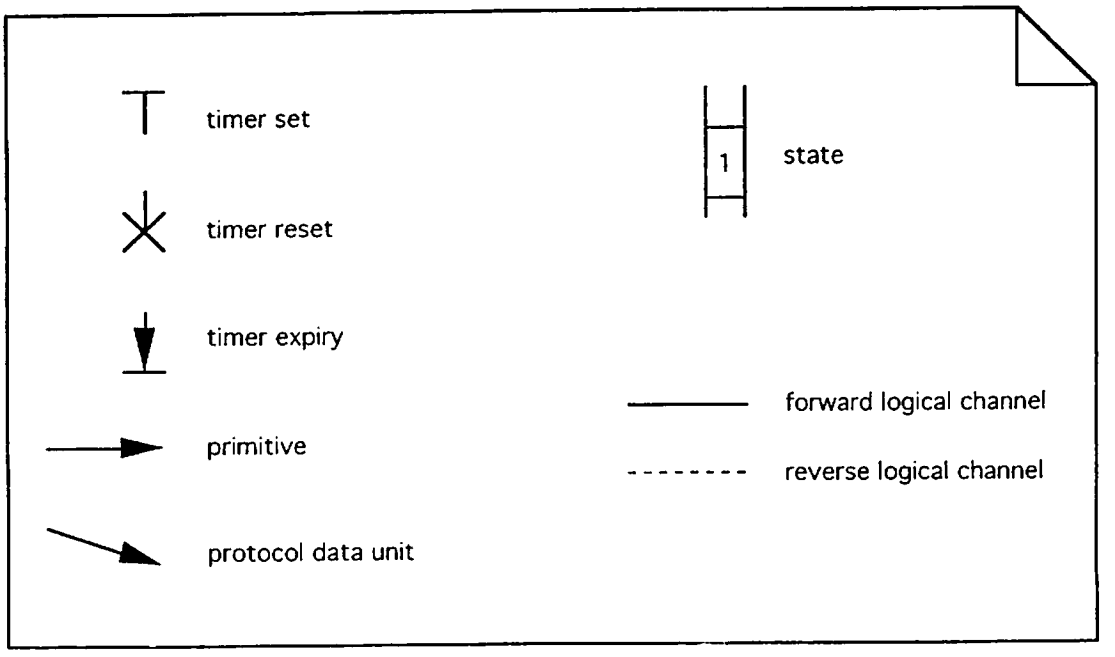

Figure III.1-1

Key to examples

2. Master slave determination procedure

The primitives and messages for the major state transitions in the MSDSE are summarised in Figures III.2-1.

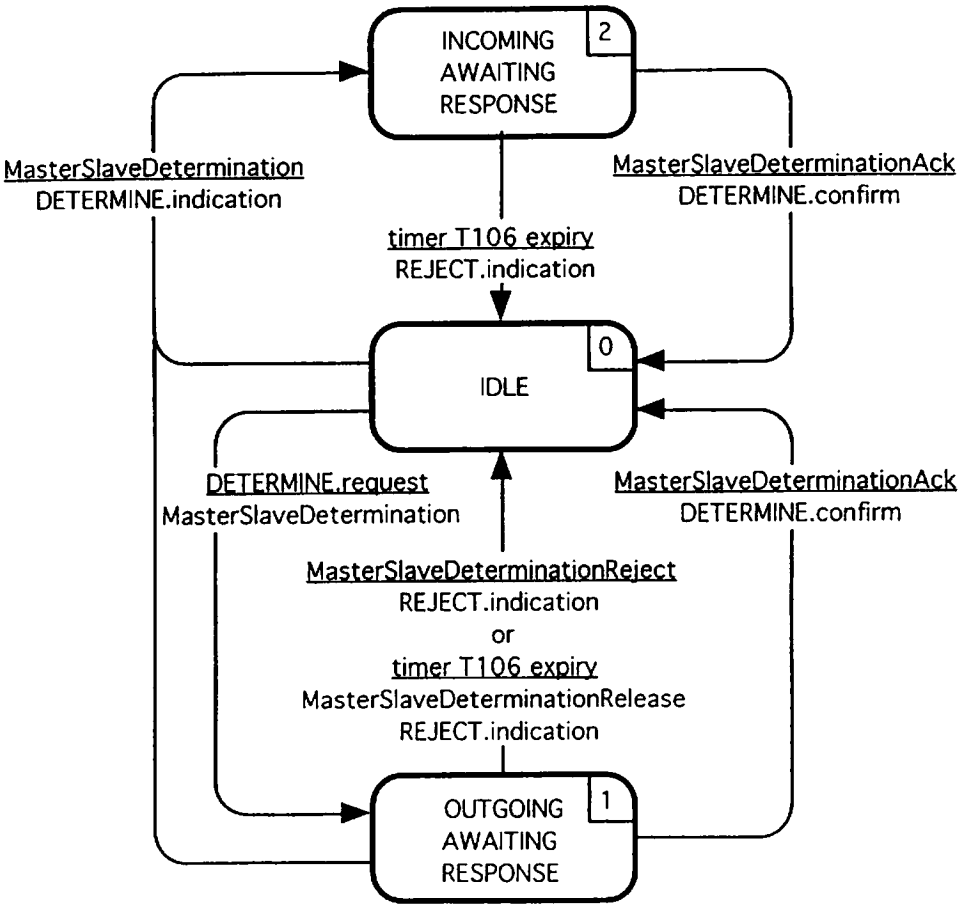

Figure III.2-1

Master slave determination signalling entity major state transitions

Illustrations of the Master-Slave Determination Signalling Entity (MSDSE) are given in the following figures. Figures III.2-2 and III.2-3 show normal determination procedures. Figure III.2-4 shows the case of equal statusDeterminationNumbers. Figure III.2-5 shows the case of determination procedures initiated simultaneously from both ends. Figures III.2-6 to III.2-9 show exception conditions, with expiry of timer T106.

{SD: The following figures come from AVC-819/LBC-95-248 with the exception that proper ANSI message names are used, rather than the shorthand names. The figures illustrate the procedures in AVC-819/LBC-95-248 which are modifications of those in H.245, and are subject to approval}.

The MSDSE state numbers are used in the following diagrams to indicate the state names shown in Figure III.2-1.

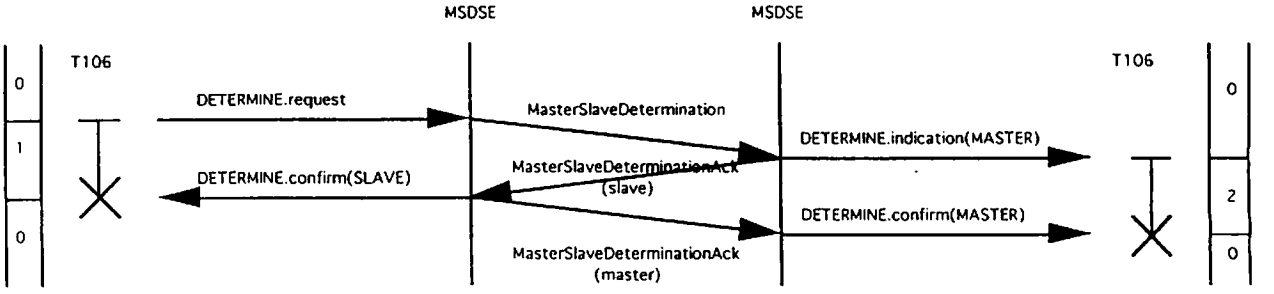

Figure III.2-2

Master slave determination - master at remote MSDSE

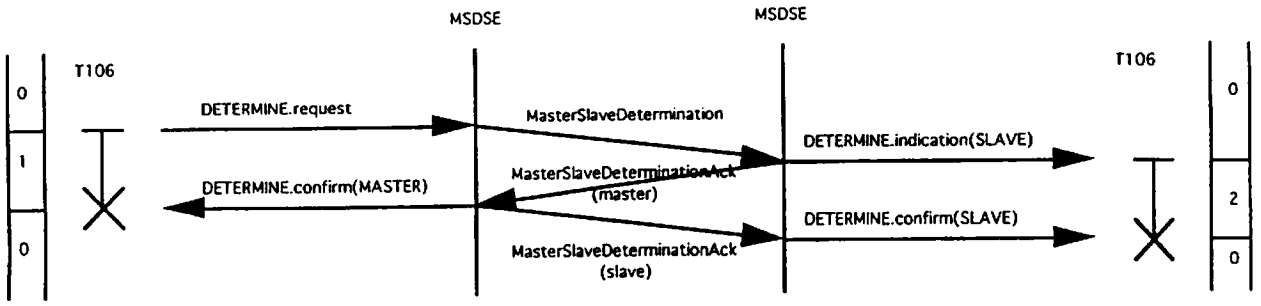

Figure III.2-3

Master slave determination - slave at remote MSDSE

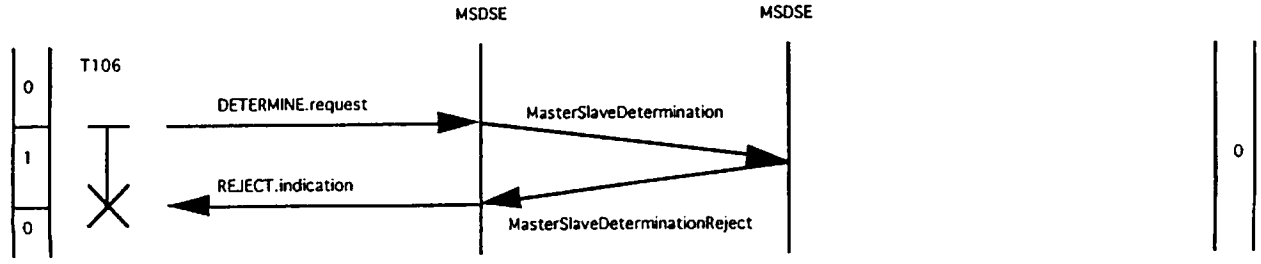

Figure III.2-4

Master slave determination - unsuccessful result

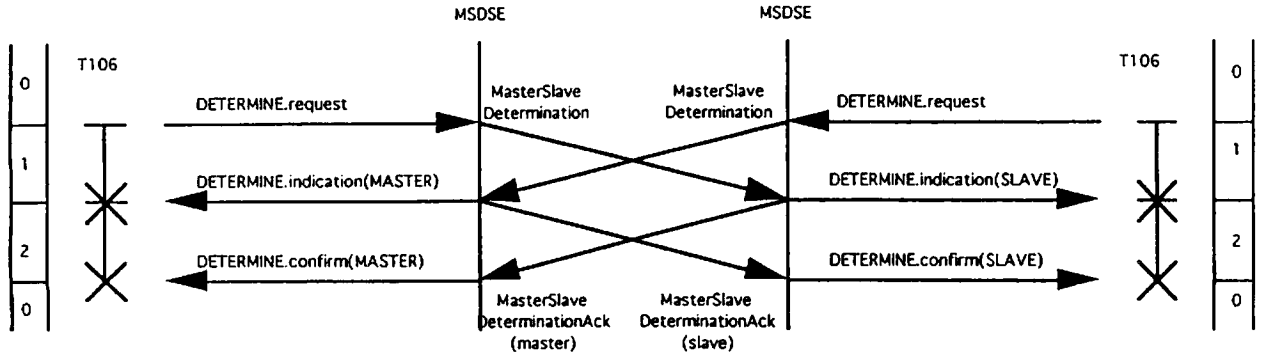

Figure III.2-5

Master slave determination - simultaneous determination

In Figure III.2-6 local timer T106 has expired. Only the terminal on the right knows its status. The terminal on the right is able to receive new commands e.g openLogicalChannel (bi-directional), but may not request anything of the master terminal e.g open bi directional logical channel. The terminal on the left can neither accept nor initiate new procedures. A second status determination procedure should be initiated.

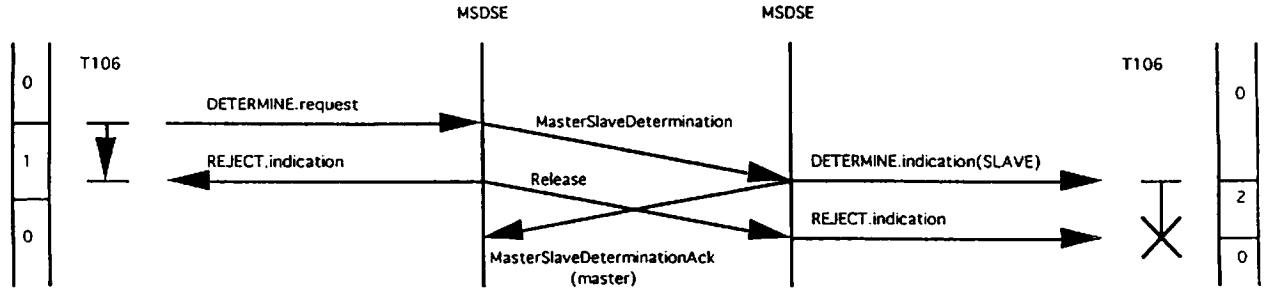

Figure III.2-6

Master slave determination - local timer T106 expiry with slave at remote end.

In Figure III.2-7 remote timer T106 has expired during INCOMING AWAITING ACKNOWLEDGEMENT. Both terminals know their status. The terminal on the left may receive and issue commands. However the remote terminal does not know if the local terminal is ready to receive, and can not issue commands. A second status determination procedure should be initiated.

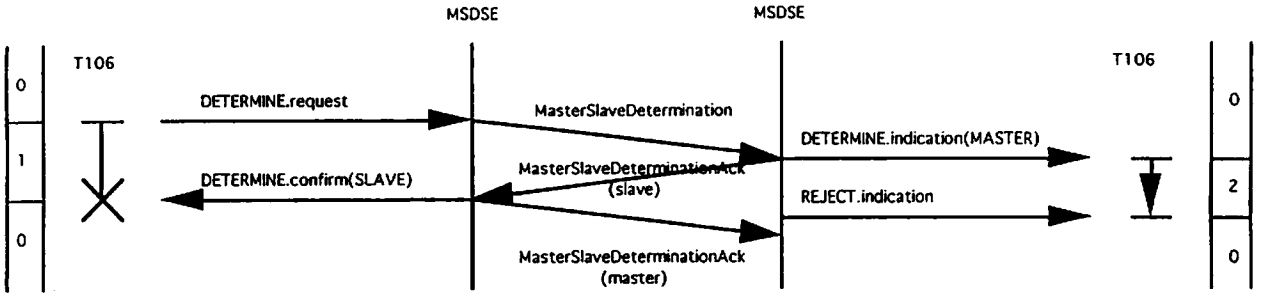

Figure III.2-7

Master slave determination - remote timer T106 expiry with master at remote end.

In Figure III.2-8 remote timer T106 has expired during OUTGOING AWAITING ACKNOWLEDGEMENT during a simultaneous determination procedure. Both terminals know their status. The terminal on the right can receive and issue commands. However the terminal on the left does not know if the other terminal is ready to receive, and can not issue commands. It may receive commands. A second status determination procedure should be initiated.

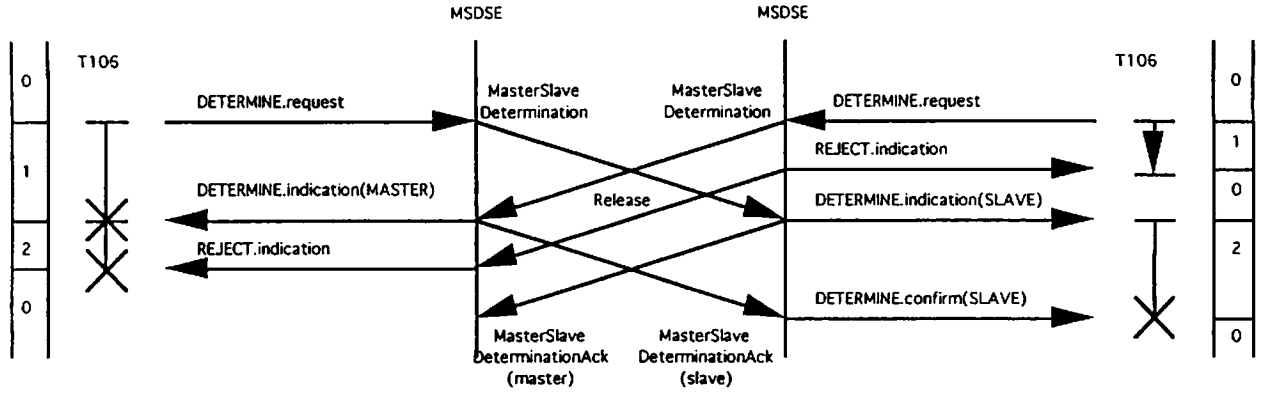

Figure III.2-8

Master slave determination - simultaneous determination procedures with timer T106 expiry at slave.

In Figure III.2-9 remote timer T106 has expired during INCOMING AWAITING ACKNOWLEDGEMENT, during a simultaneous determination procedure. Both terminals know their status. The terminal on the left can receive and issue commands. However the terminal on the right does not know if the other terminal is ready to receive, and can not issue commands. It may receive commands. A second status determination procedure should be initiated.

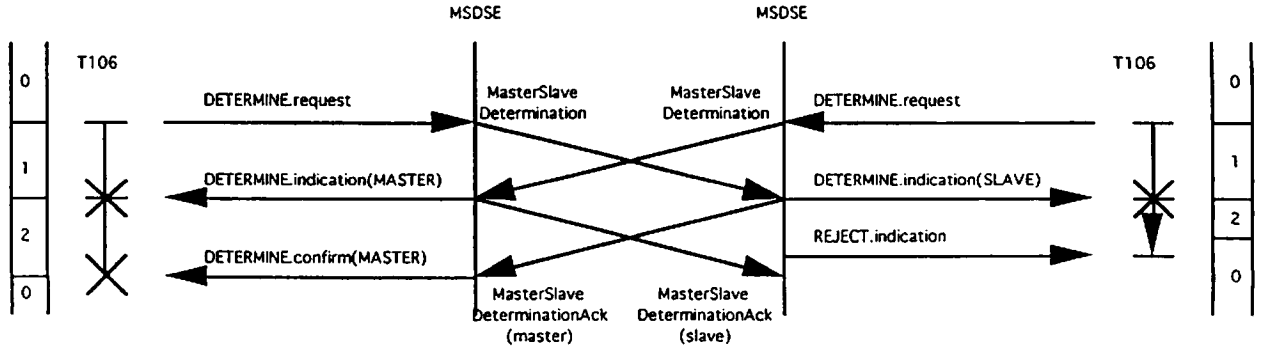

Figure III.2-9

Master slave determination - simultaneous determination procedures with timer T106 expiry during INCOMING AWAITING ACKNOWLEDGMENT.

3. Capability exchange signalling entity

The primitives and messages for the major state transitions in the Capability Exchange Signalling Entity (CESE) are summarised in Figures III.3-1 and Figures III.3-2.

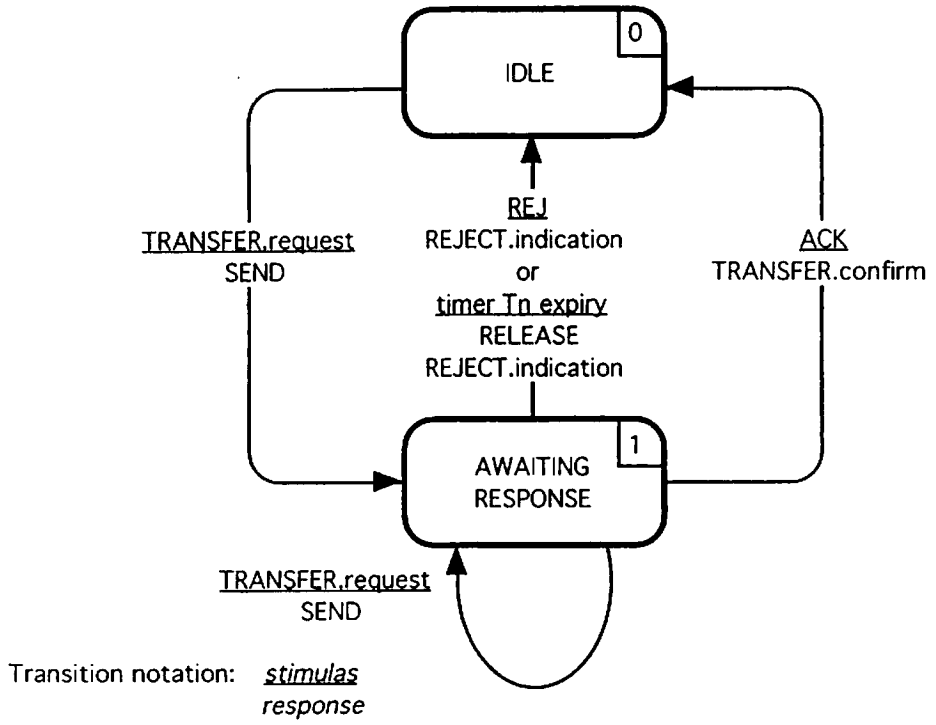

Figure III.3-1

Capability exchange signalling entity major state transitions - master

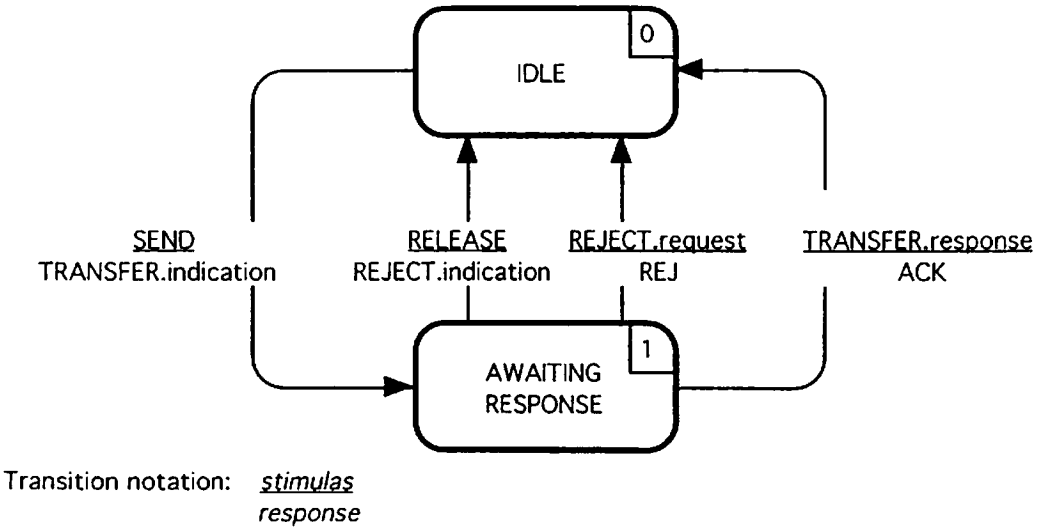

Figure III.3-2

Capability exchange signalling entity major state transitions - slave

Note that the procedures defined for the CESE also apply to the following;

- Close Logical Channel Signalling Entity
- Open Bi-directional Logical Channel Signalling Entity
- Multiplex Table Signalling Entity
- Mode Request Signalling Entity

{SD: One set of SDLs have been used to describe five different procedures. The procedures all use different message names. In this section all message names are mapped to a generic name as indicated in the following table. Please confirm that this is appropriate. Is there a better way to illustrate the operation of these five procedures? }

entity	*mapping between message and generic name used in following figures*			
	SEND	*ACK*	*REJ*	*RELEASE*
Capability Exchange Signalling Entity	*TerminalCapability Set*	*TerminalCapability Ack*	*TerminalCapability Reject*	*TerminalCapability Release*
Close Logical Channel Signalling Entity	*RequestChannelClose*	*RequestChannelClose Ack*	*RequestChannelClose Reject*	*RequestChannelClose Release*
Open Bi-directional Logical Channel Signalling Entity	*OpenBiDirectional ChannelRequest*	*OpenBiDirectional ChannelAck*	*OpenBiDirectional ChannelReject*	*OpenBiDirectional ChannelRelease*
Multiplex Table Signalling Entity	*MultiplexEntry Send*	*MultiplexEntrySend Ack*	*MultiplexEntrySend Reject*	*releaseMultiplexEntry Send*
Mode Request Signalling Entity	*RequestMode*	*RequestModeAck*	*RequestModeReject*	*RequestModeRelease*

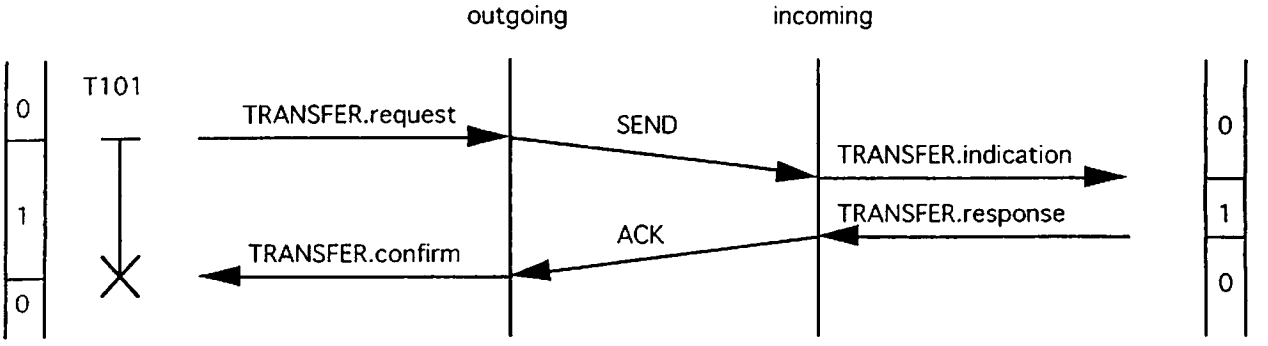

Figure III.3-3

Capability exchange

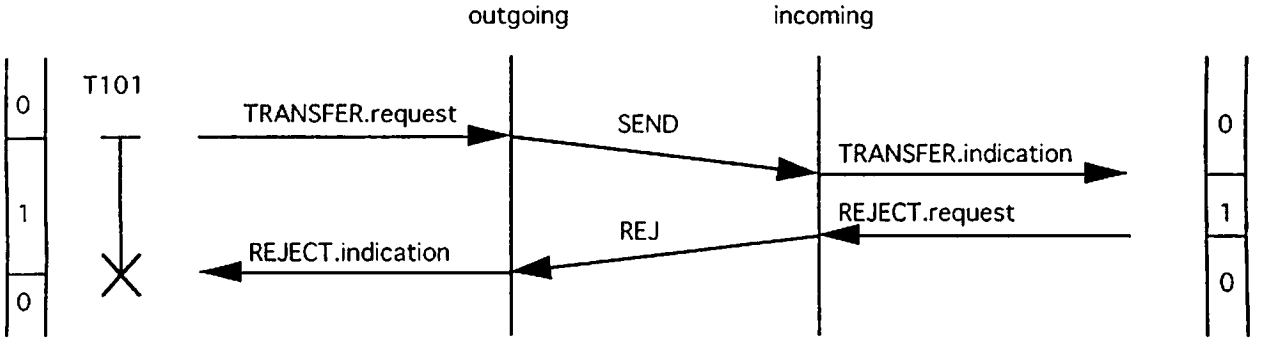

Figure III.3-4

Capability exchange with rejection from peer incoming LCSE user.

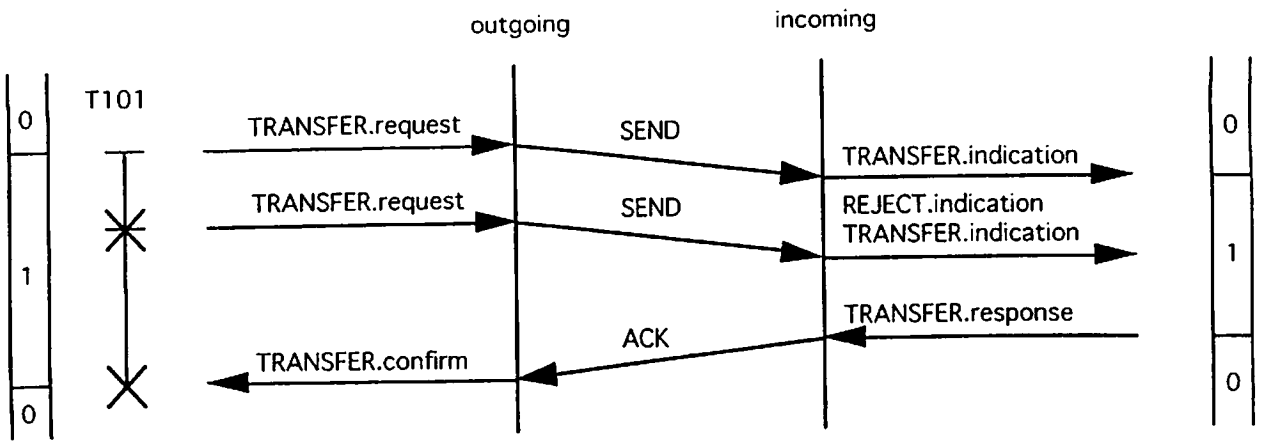

Figure III.3-5

Capability exchange while there is an outstanding unacknowledged capability exchange. The second SEND PDU arrives at the incoming side before response from the incoming side user. The second capability exchange overrules the first capability exchange.

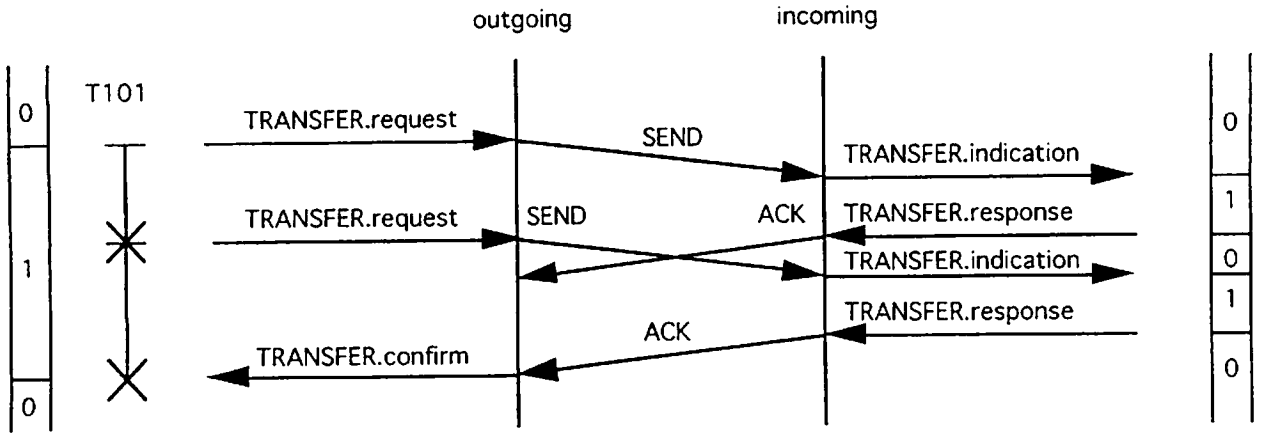

Figure III.3-6

Capability exchange while there is an outstanding unacknowledged capability exchange. The second SEND PDU arrives at the incoming side after response from the incoming side user. The second capability exchange overrules the first capability exchange.

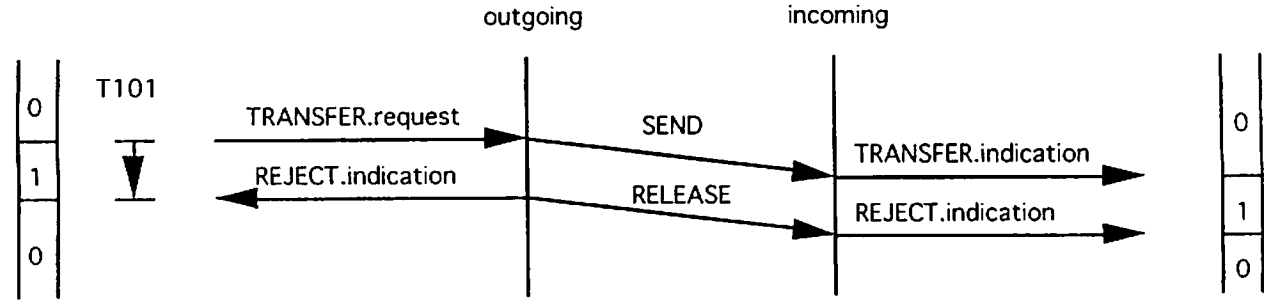

Figure III.3-7

Capability exchange with timer T101 expiry. The RELEASE PDU arrives at the incoming side before response from the incoming side user.

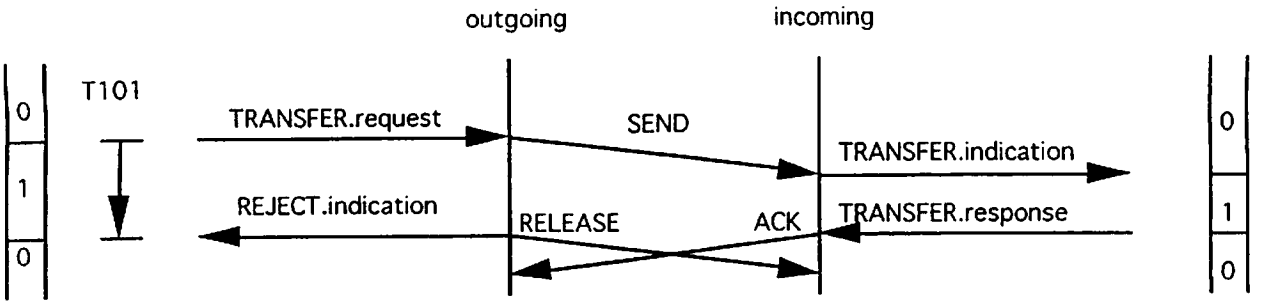

Figure III.3-8

Capability exchange with timer T101 expiry. The RELEASE PDU arrives at the incoming side after response from the incoming side user.

4. Logical Channel Signalling Entity

The primitives and messages for the major state transitions in each of the master and slave LCSEs are summarised in Figures III.4-1 and III.4-2 respectively.

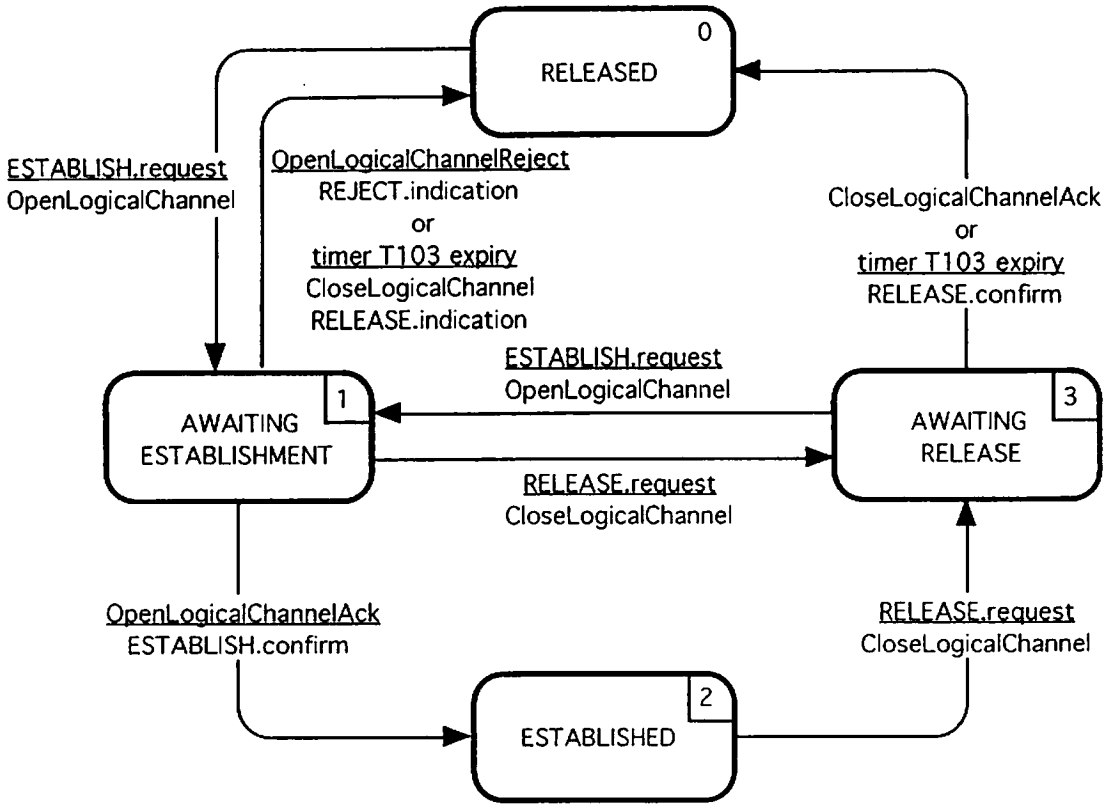

Figure III.4-1

Logical channel signalling entity major state transitions - master

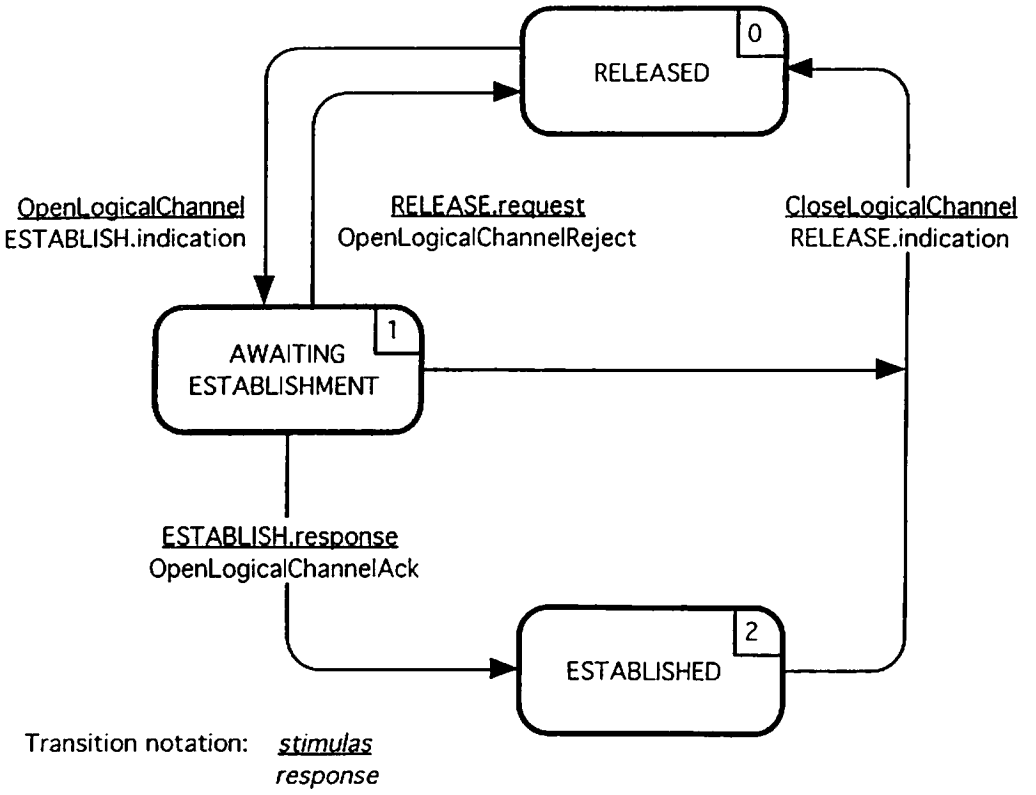

Figure III.4-2

Logical channel signalling entity major state transitions - slave

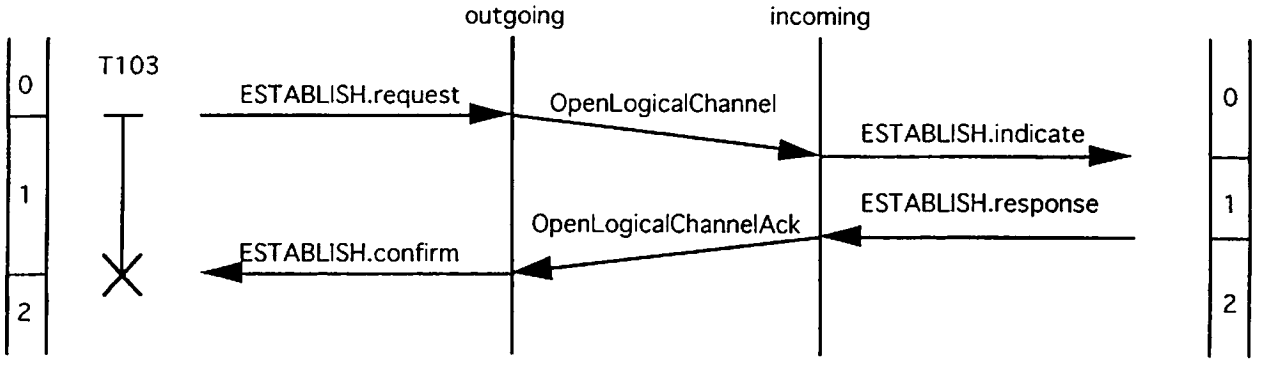

Figure III.4-3

Logical channel establishment

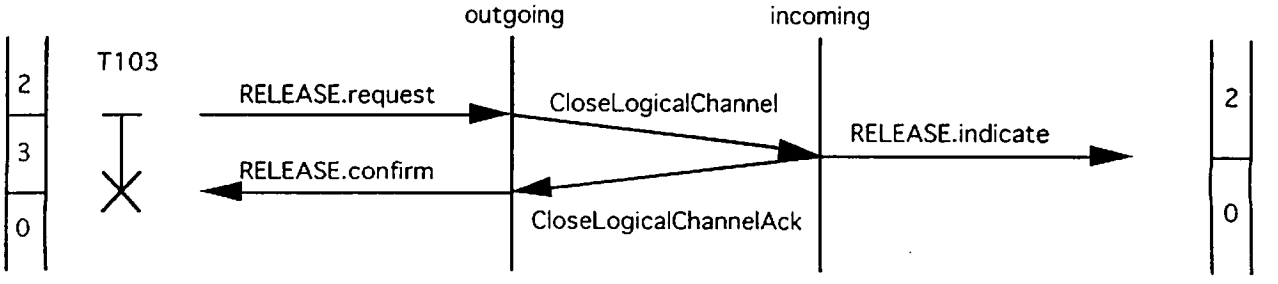

Figure III.4-4

Logical channel release

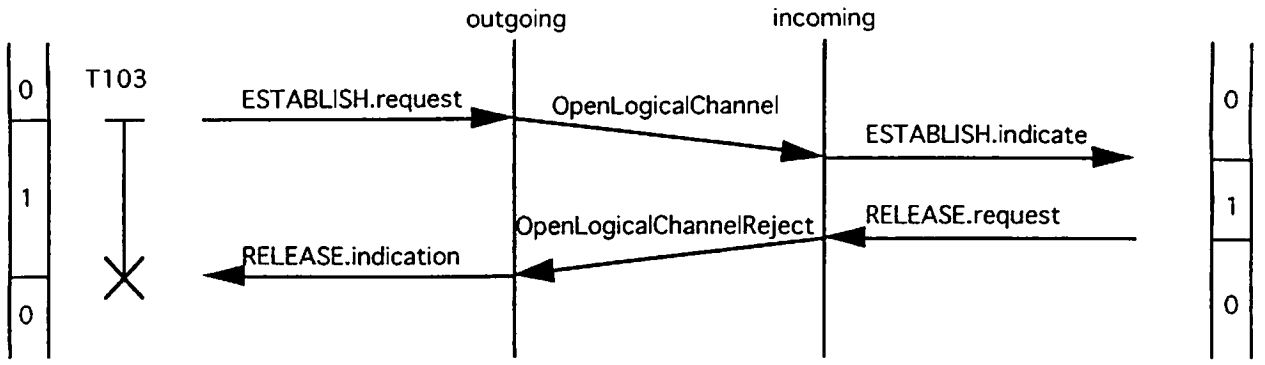

Figure III.4-5

Logical channel establishment rejection by peer LCSE

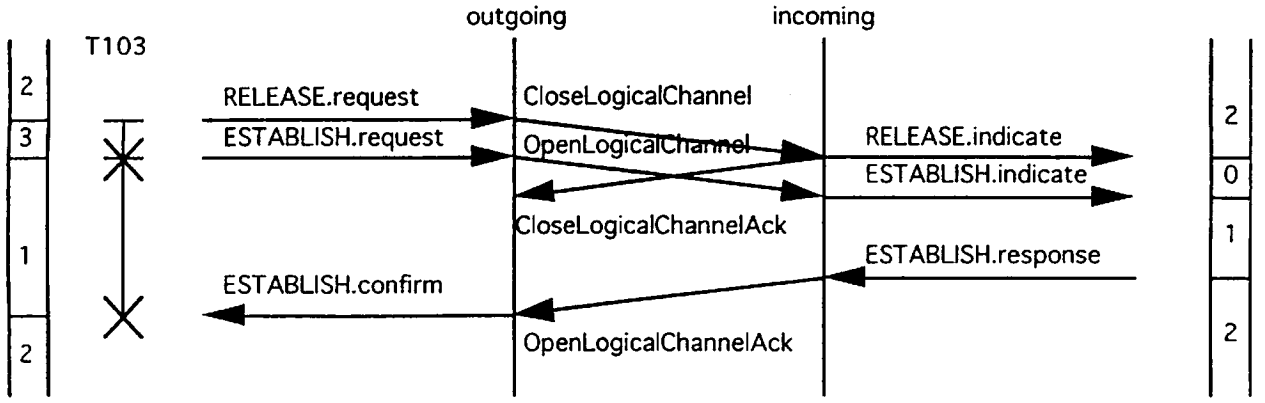

Figure III.4-6

Logical channel release followed by immediate re establishment

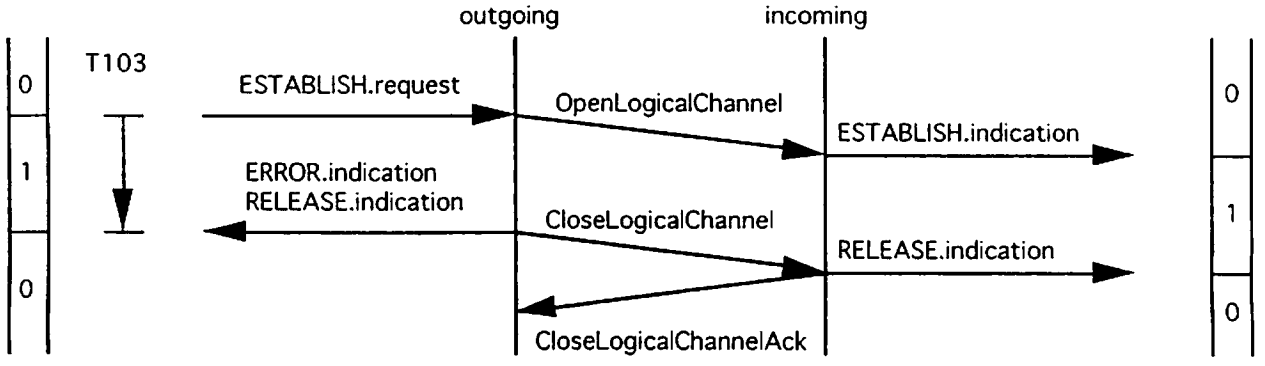

Figure III.4-7

Logical channel establishment request with expiry of timer T103 due to slow response from peer incoming LCSE user.

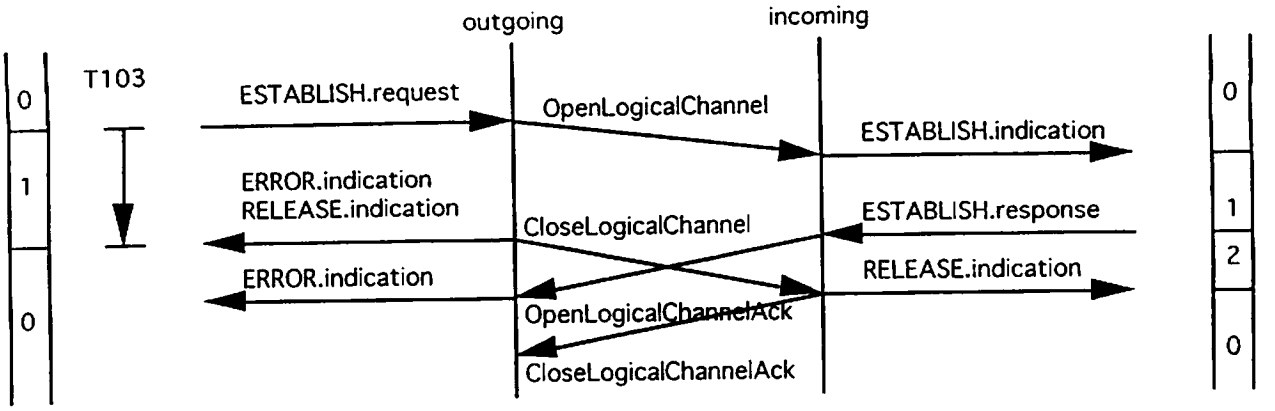

Figure III.4-8

Logical channel establishment request with expiry of timer T103. Timer T013 has expired after transmission of the OpenLogicalChannelAck message at the incoming LCSE, but before reception of the OpenLogicalChannelAck message at the outgoing LCSE.

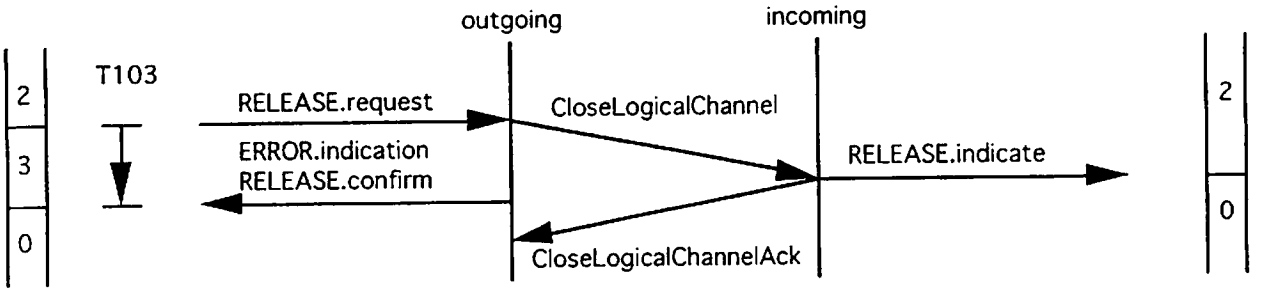

Figure III.4-9

Logical channel release request with expiry of timer T103.

5. Bi-directional logical channel signalling entity

Each of the master and slave bi-directional logical channel signalling entities (B-LCSE) use the services of an out-going LCSE and an in-coming LCSE. The state of the B-LCSE is specified by a compound state which consist of the state of the outgoing and incoming LCSE. The LCSE states as shown in Table III.4-1 apply to the following figures.

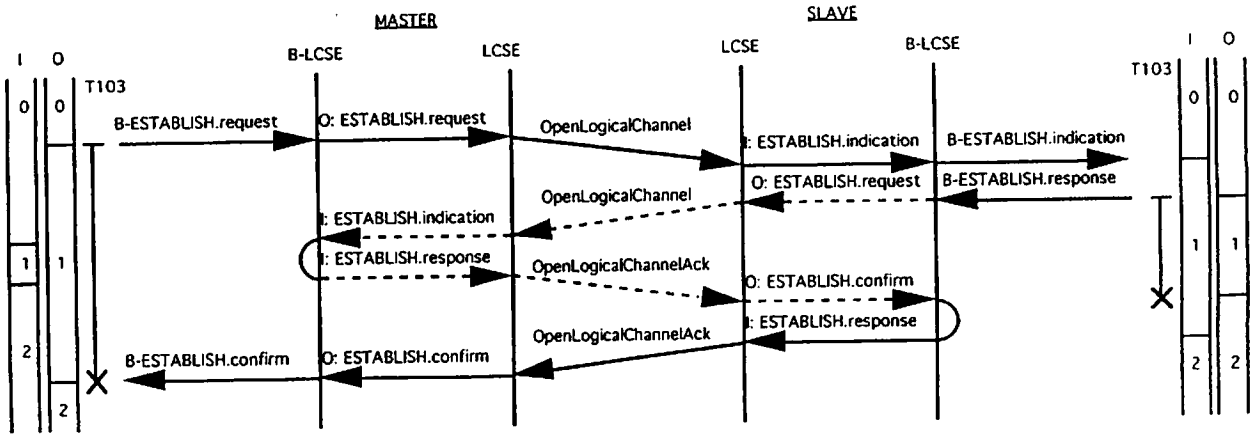

Figure III.5-1

Bi-directional logical channel establishment

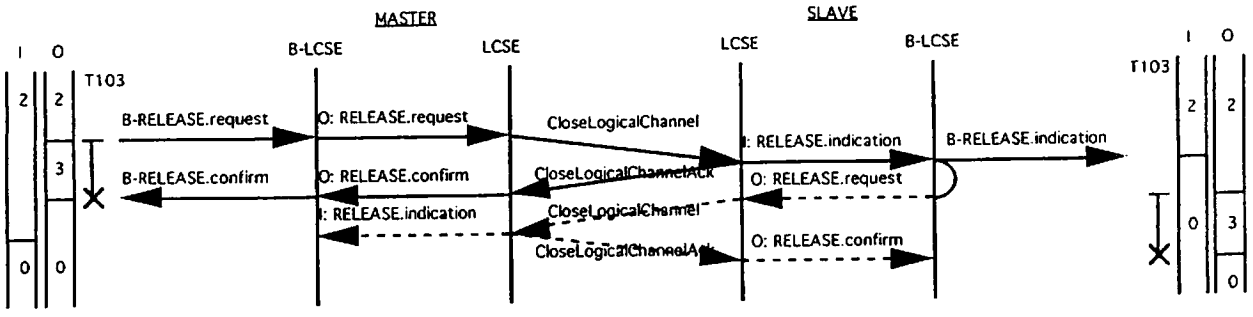

Figure III.5-2

Bi-directional logical channel release

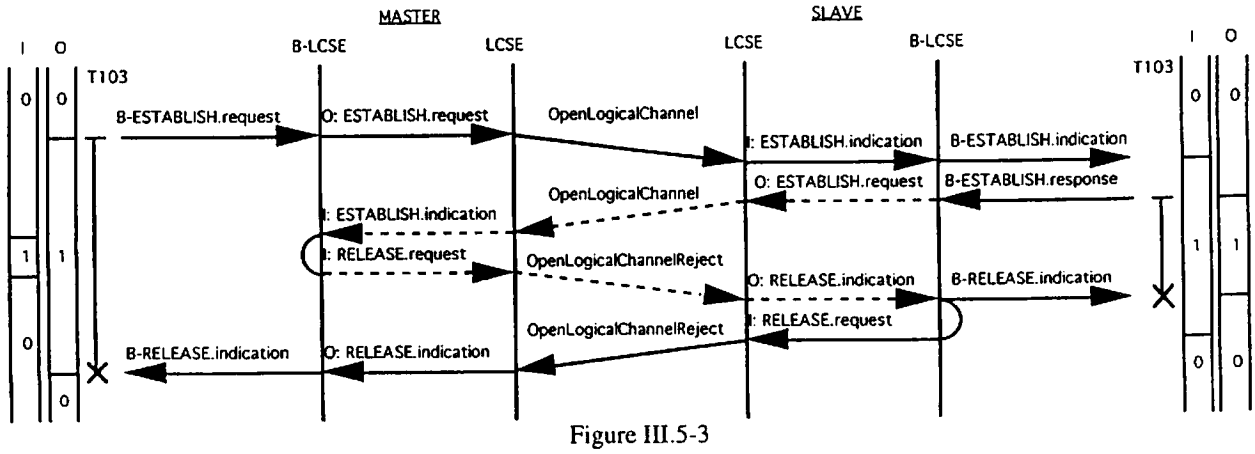

Figure III.5-3

Rejection at master B-LCSE incoming LCSE of bi-directional logical channel establishment.

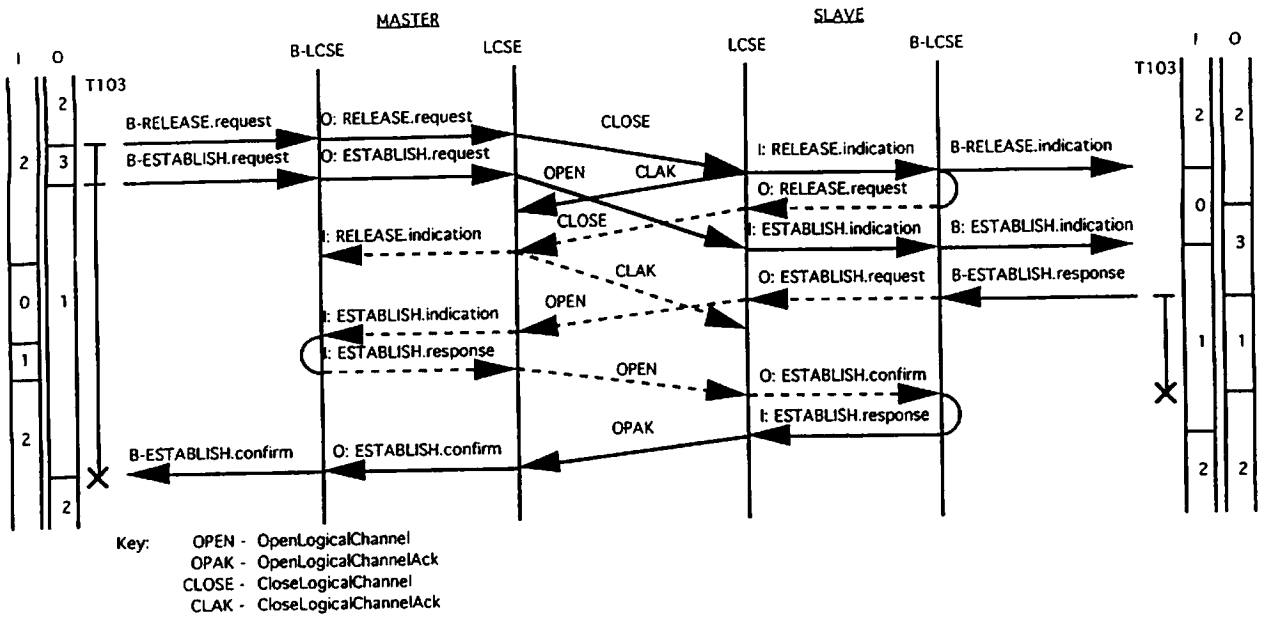

Figure III.5-4

Bi-directional logical channel release followed immediately by re establishment.

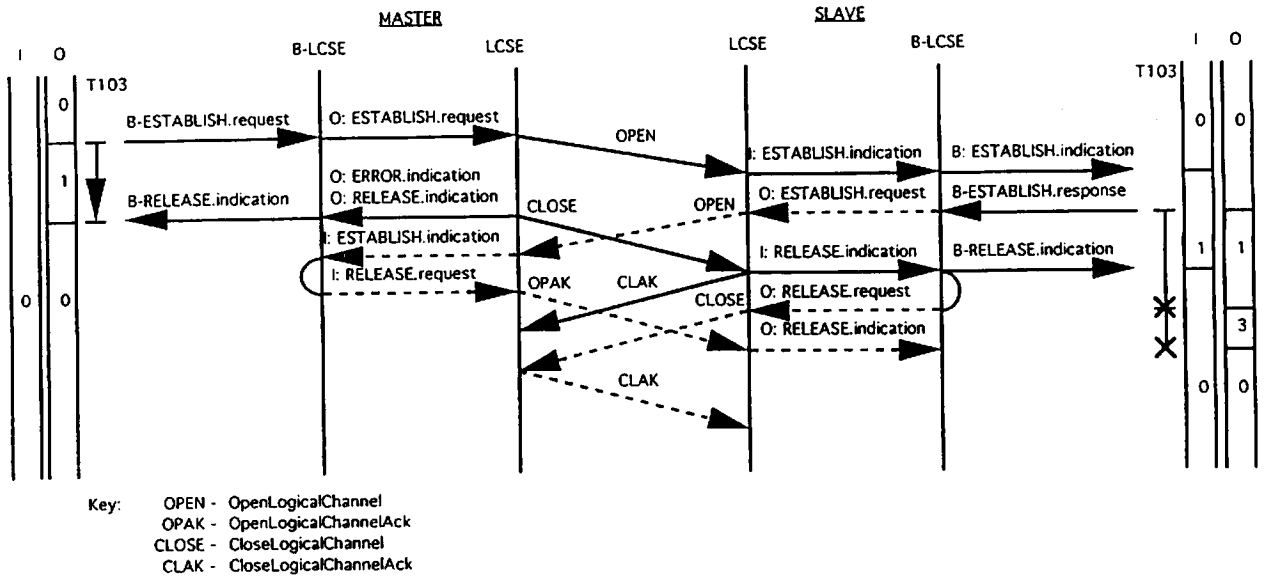

Figure III.5-5

Bi-directional logical channel establishment request with timer T103 expiry at master B-LCSE outgoing LCSE, after transmission of slave B-LCSE outgoing OpenLogicalChannel message, but before reception of the OpenLogicalChannel message at the master B-LCSE incoming LCSE.

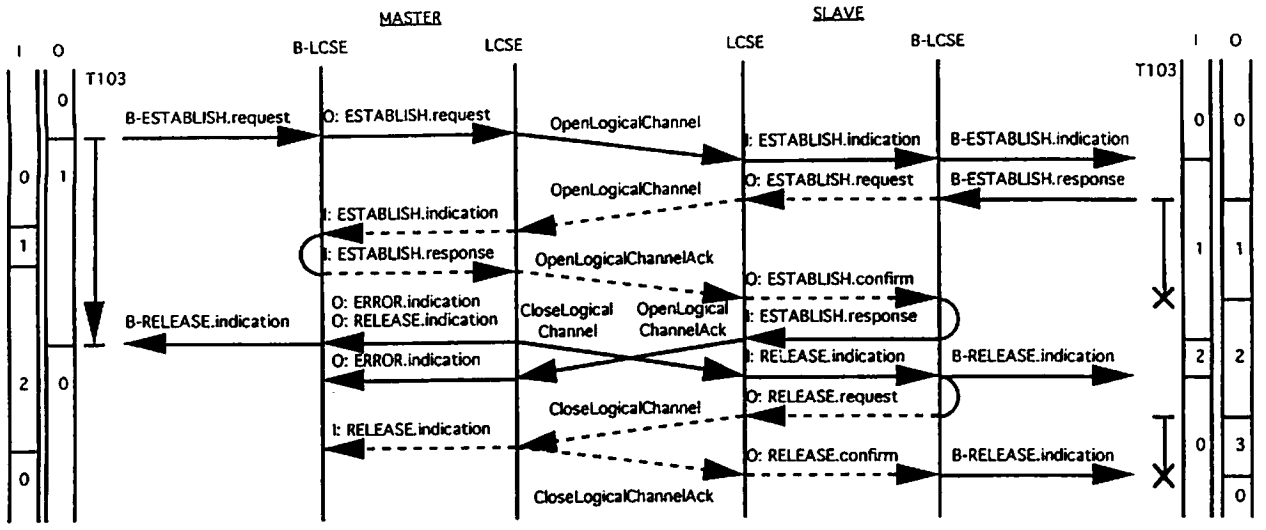

Figure III.5-6

Bi-directional logical channel establishment request with timer T103 expiry at master B-LCSE outgoing LCSE, after transmission of slave B-LCSE incoming LCSE OpenLogicalChannel message, but before reception of the OpenLogicalChannel message at the master B-LCSE outgoing LCSE.

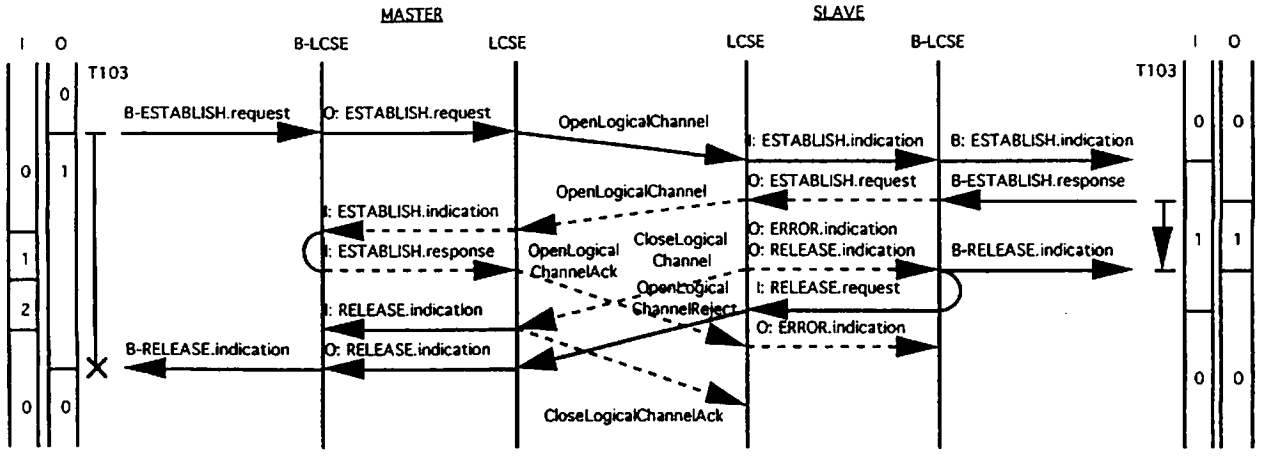

Figure III.5-7

Bi-directional logical channel establishment request with timer T103 expiry at slave B-LCSE outgoing LCSE.

6. Round trip delay signalling entity

The primitives and messages for the major state transitions in the RTDSE are summarised in Figures III.6-1.

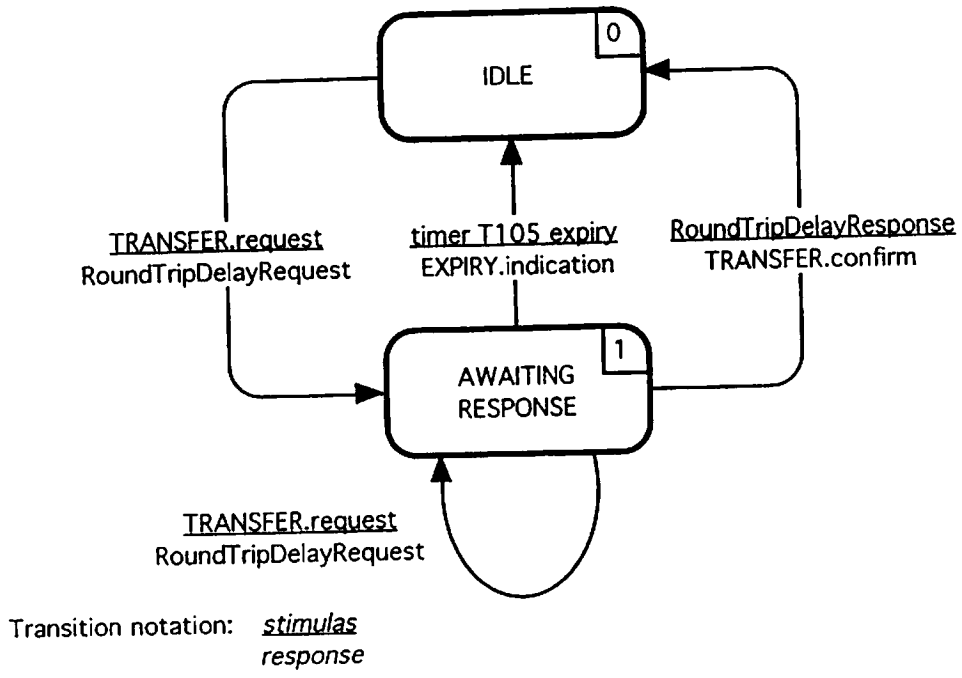

Figure III.6-1

Round Trip Delay Signalling Entity major state transitions

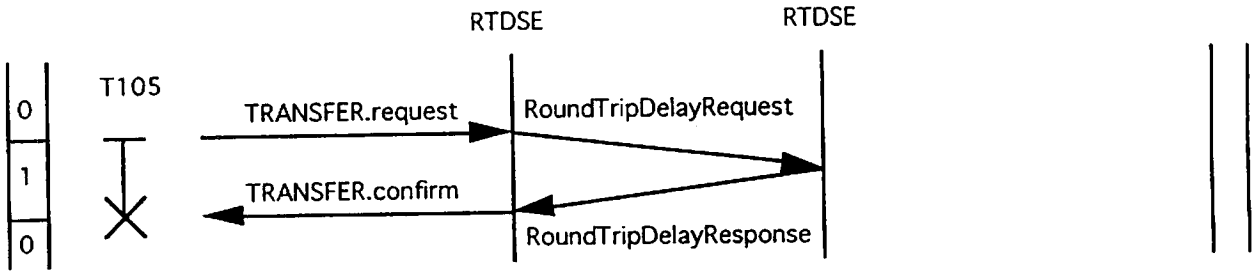

Figure III.6-2

Round trip delay determination procedure

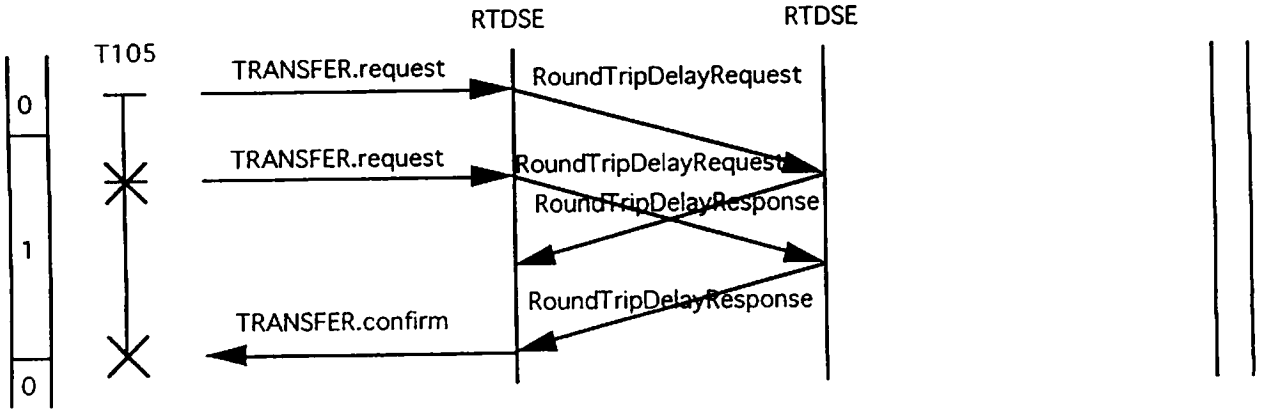

Figure III.6-3

Round trip delay determination procedure with an earlier unacknowledged round trip delay procedure outstanding.

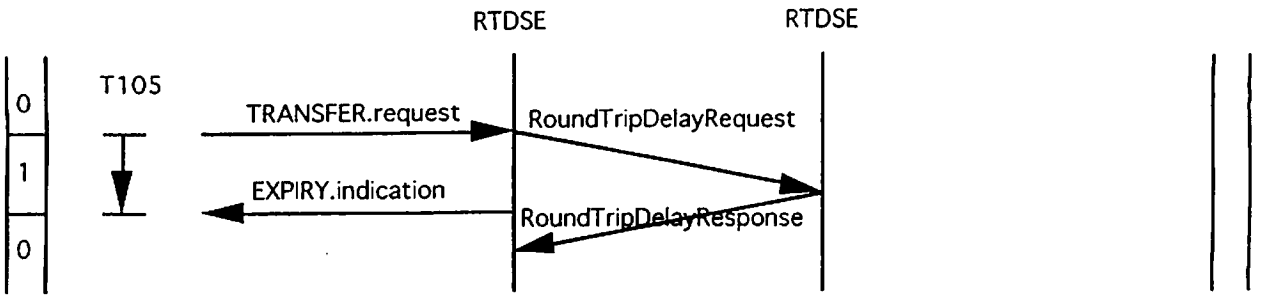

Figure III.6-4

Round trip delay determination procedure with timer T105 expiry.

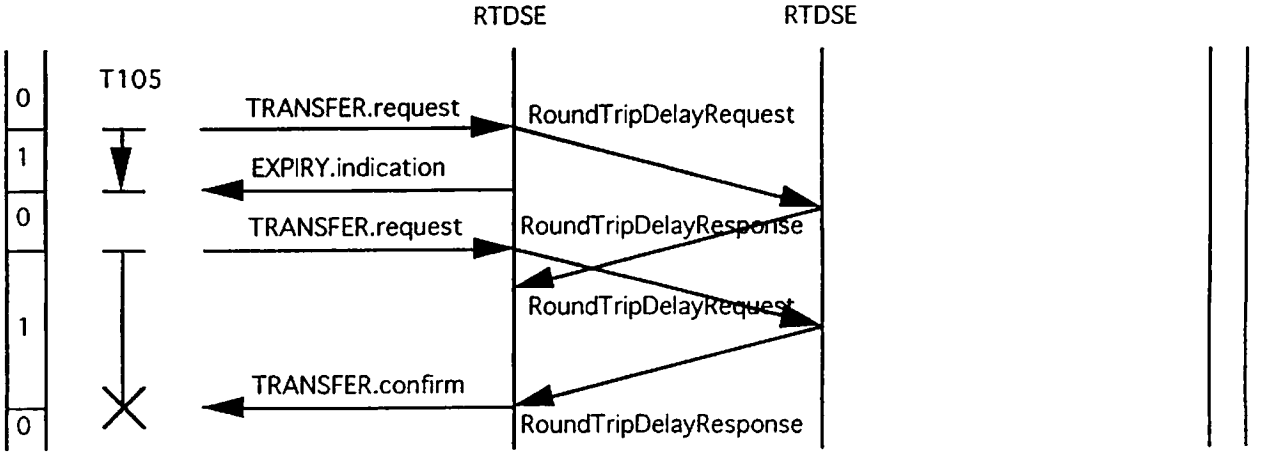

Figure III.6-5

Round trip delay determination procedure with timer T105 expiry, followed by a second round trip delay determination procedure. The RoundTripDelayResponse message from the first procedure arrives during the second procedure.

- end -