



EUROPEAN
TELECOMMUNICATION
STANDARD

ETS 300 124

April 1991

ICS: 33.020

Key words: DTE, PSPDN, Multilink operation

**Attachment requirements for Data Terminal Equipment (DTE)
to connect to Packet Switched Public Data Networks (PSPDN)
using CITT Recommendation X.25 (1984) interface
Requirements applicable to DTEs subscribing to Multilink
operation**

(the text of this ETS may be utilized for the establishment of Annex I of NET 2)

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Terminal Equipment (TE) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS contains attachment requirements applicable to packet mode Data Terminal Equipment (DTEs) which subscribe to the optional application of multilink operation. These attachment requirements are additional to those contained in the main body of NET 2 [1].

The text of this ETS may be utilised for the establishment of Annex I to NET 2 [1]. Copies of NET 2 [1] may be obtained from:

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1 Normative references

This European Telecommunication Standard (ETS) incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] NET 2 (First edition, 1988): "Approval requirements for data terminal equipment to connect to packet switched public data networks using CCITT Recommendation X.25 (1984) interface".
- [2] CCITT Recommendation X.25 (1984): "Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

2 Definitions

For the purpose of this ETS the definitions provided in NET 2 [1] and CCITT Recommendation X.25 [2] shall apply.

3 Symbols and abbreviations

DTE	Data Terminal Equipment
SLP	Single Link Procedure
MLP	Multilink Procedure
LAPB	Link Access Procedure Balanced
PDU	Protocol Data Unit
DM	Disconnected Mode
sut	system under test
SABM	Set Asynchronous Balanced Mode
DISC	Disconnect
FRMR	Frame Reject
RNR	Receive Not Ready
RR	Receive Ready

4 Multilink procedure (MLP)

4.1 General

This subclause contains the additional requirements to be satisfied by a DTE which subscribes to the multilink procedure.

The requirements established for Single Link Procedure (SLP) in section 9 of NET 2 [1] or in the supplement for modulo 128 operation are applicable. The only difference is in respect of the address field of Link Access Procedure Balanced (LAPB) frames where the encoding shall be as reflected in CCITT Recommendation X.25 (1984), paragraph 2.4.2 [2], for multilink operation.

4.2 Tests

To execute a test, the tester shall attempt to force the DTE to an appropriate phase or condition by transmitting a particular Protocol Data Unit (PDU) or a sequence of PDUs. However, some DTEs may initialize the link or send a particular PDU that requires an appropriate answer from the tester to be in accordance with the protocol procedures.

To represent those situations in the test descriptions, the following notation shall be used:

- PDUs within [] denote optional PDUs from the DTE that shall not require a specific answer from the tester;
- PDUs within () denote optional PDUs from the DTE that shall require a specific answer from the tester according to the protocol procedures.

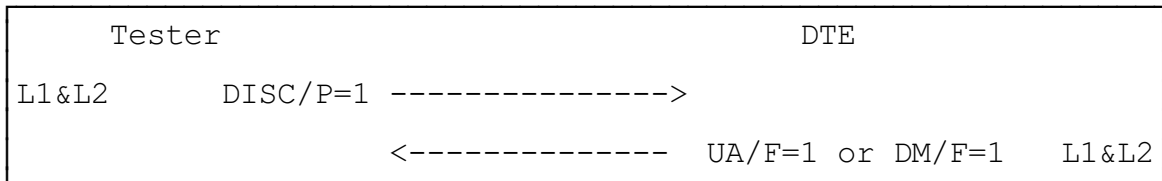
The following requirements shall be applied along the whole section:

- a) in many tests the DTE has to transmit an I-frame. The DTE can be forced to transmit an I-frame, e.g. by receiving:
 - RESTART INDICATION (in state r1),
 - RESET INDICATION on an LC, as assigned as a PVC, in any state except d2 and d3,
 - CLEAR INDICATION on an LC, assigned as an SVC, in any state except p.6 and p.7.

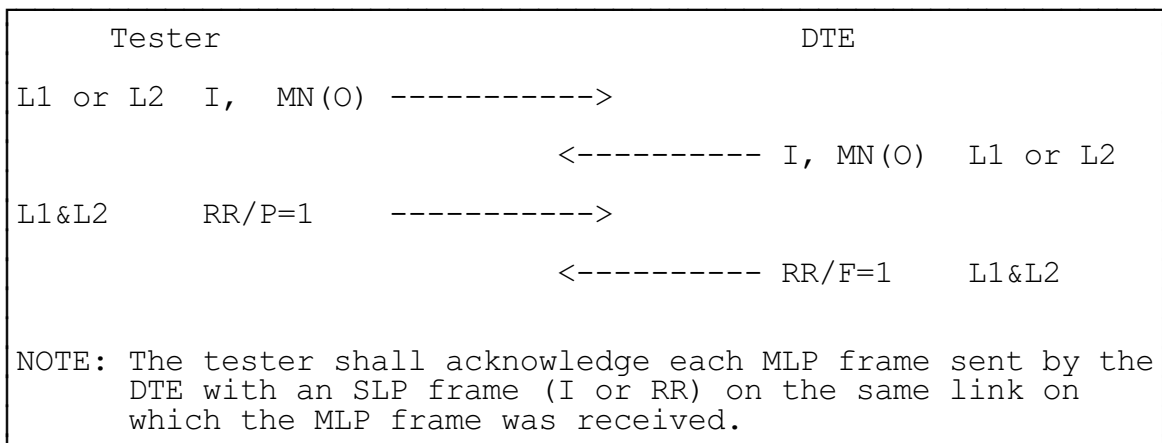
It depends on the characteristics of the DTE what packet should be used;
- b) if for any reason both SLPs become in Disconnected Mode (DM), the MLP resetting can be possible. If MLP were reset then MLP frames to be transmitted by the DTE may be lost.
- c) the following tests are defined under the assumption that both SLPs are configured with the same system parameters.

4.2.1 Verification of MLP setup phase

A preamble verification sequence shall be executed before each test in both lines (L1 and L2) which link the DTE and the Tester:

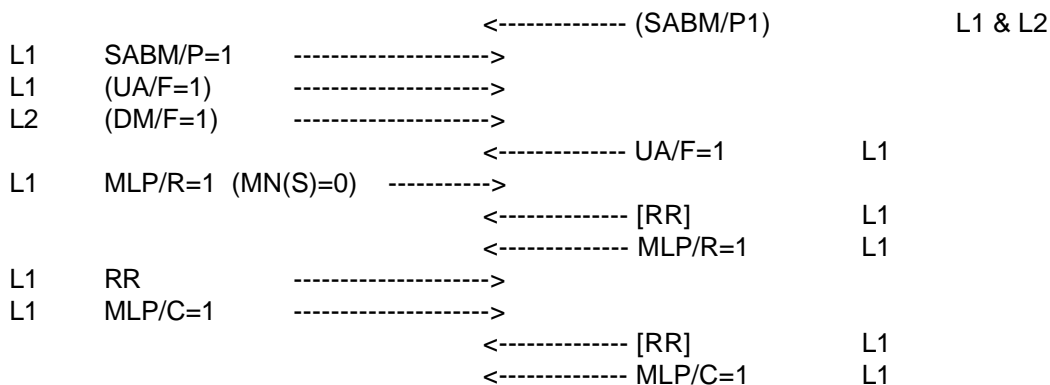


A post-test sequence shall be executed after each test to verify the correct status of the DTE:

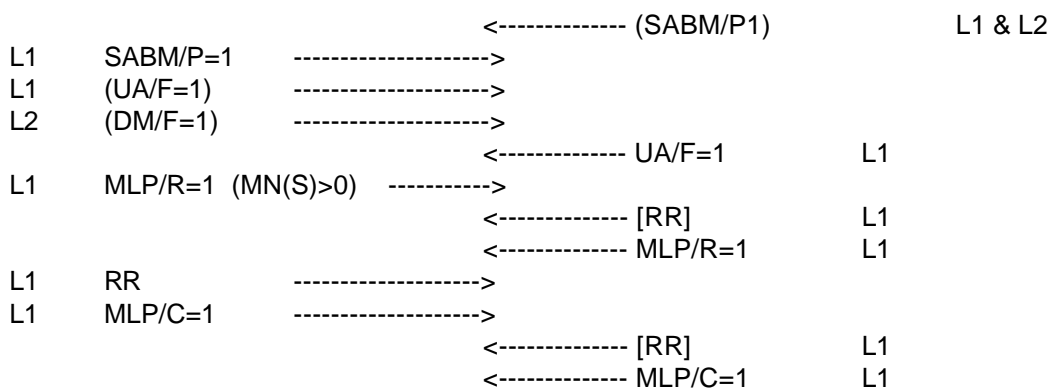


4.2.1.1 The system under test (sut) does not initialize the MLP

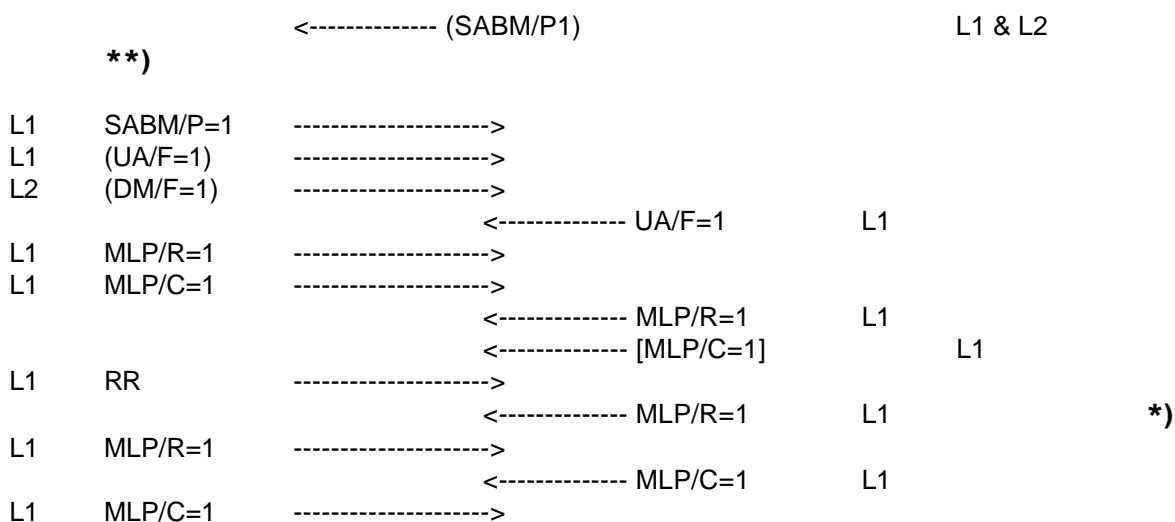
4.2.1.1.1 Initialization through L1, L2 in DM. (MN(S) = 0)



4.2.1.1.2 Initialization through L1, L2 in DM.(MN(S)>0)



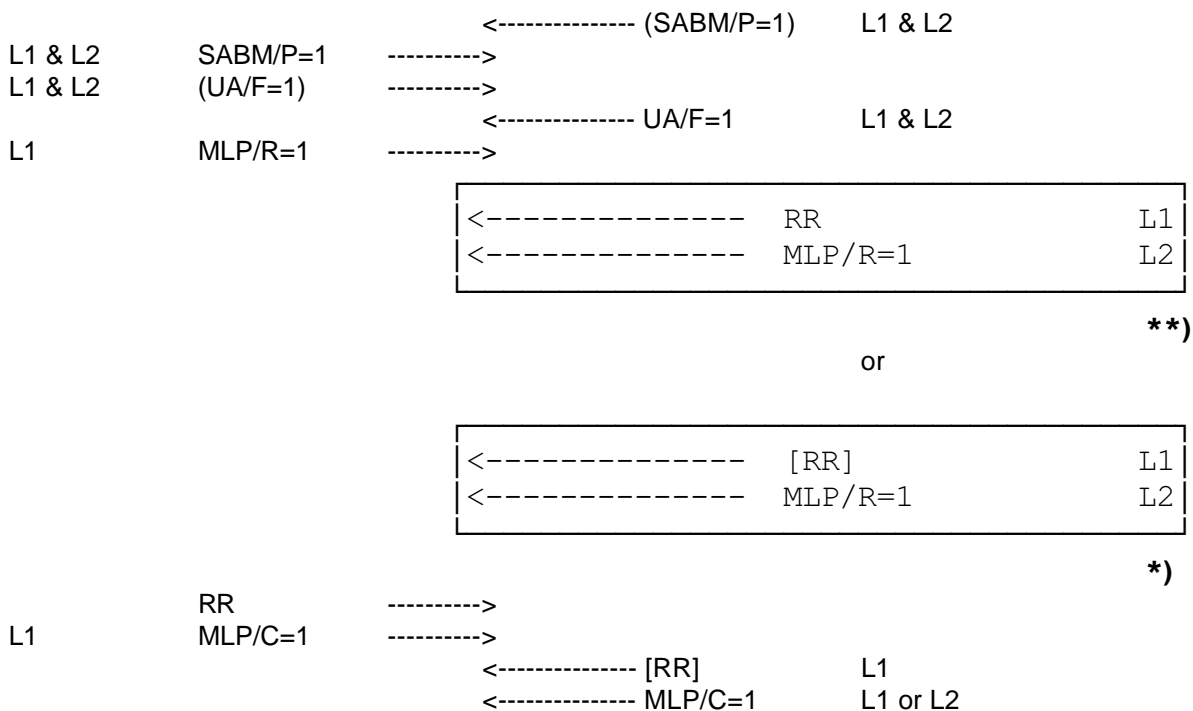
4.2.1.1.3 Initialisation through L1, MLP frame with C=1 is sent immediately after MLP frame when R=1. L2 in DM



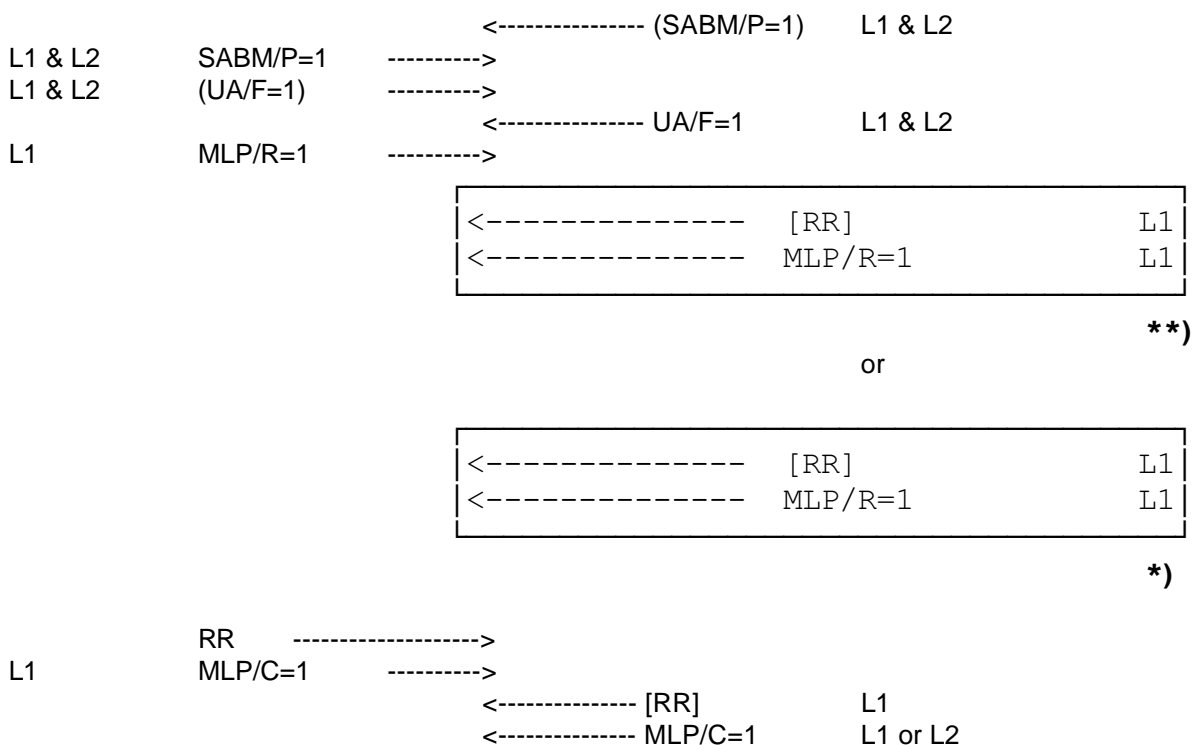
*) MT3 expires.

***) If the DTE reacts on R=1 MLP frame before treating C=1 MLP frame MT3 shall not expire. In that case the test shall be considered successful.

4.2.1.1.4 Initialization through L1, L2 active



4.2.1.1.5 Initialization through L1, confirmation by L2

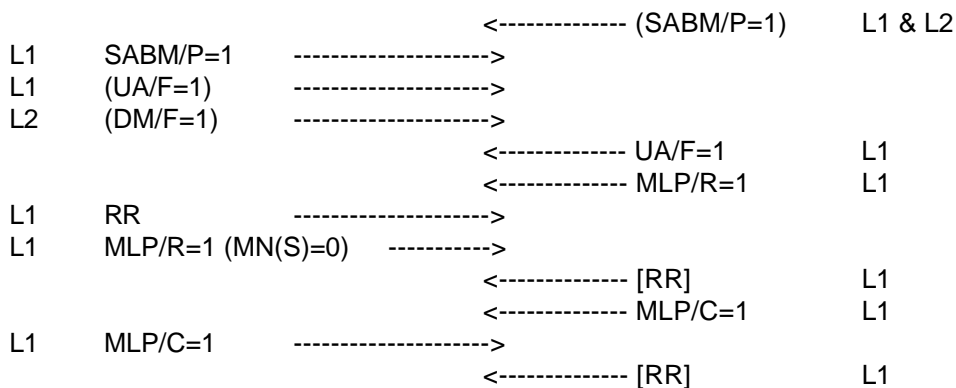


*) The tester sends the frame through the line which received the frame MLP/R=1.

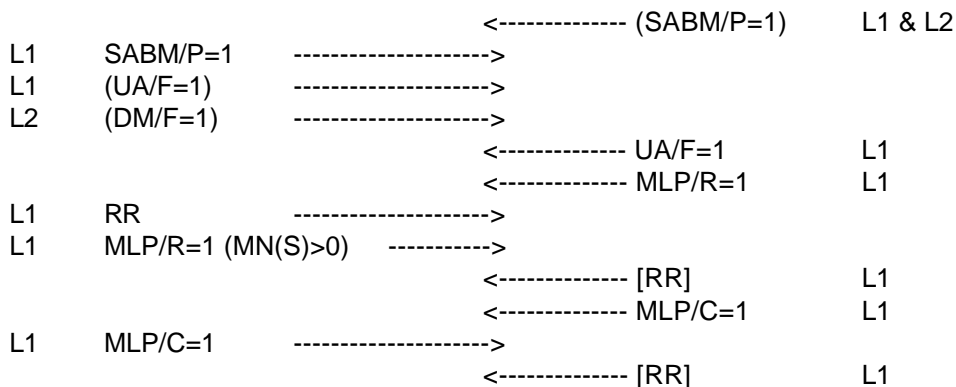
**) The time ordering of both frames can be reversed.

4.2.1.2 The sut does not initialize the MLP

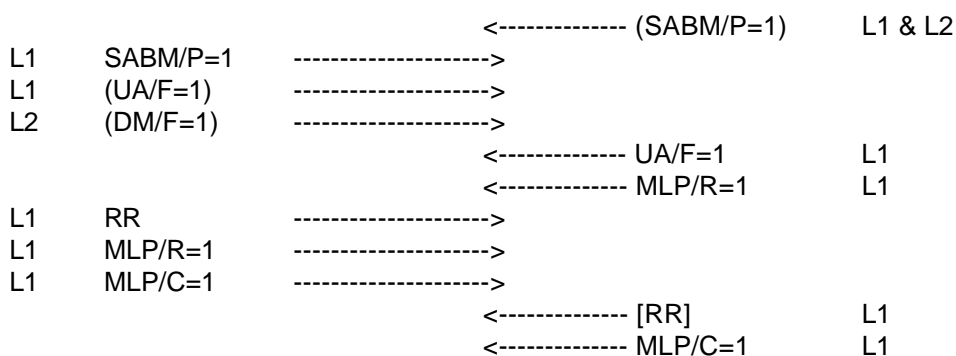
4.2.1.2.1 Initialization through L1, L2 in DM. (MN(S) = 0)



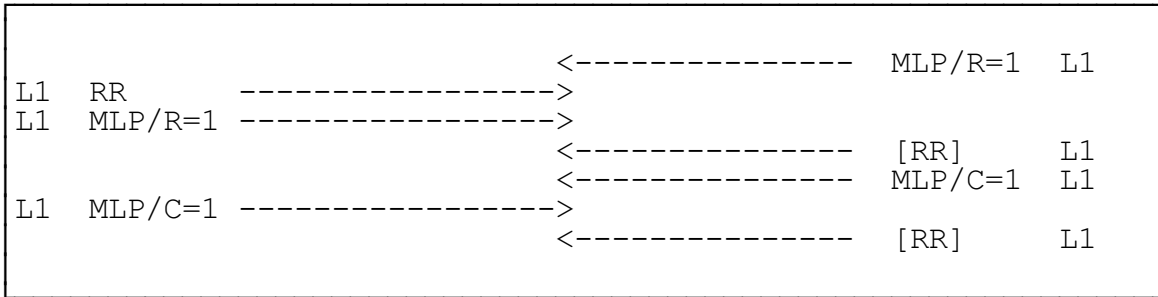
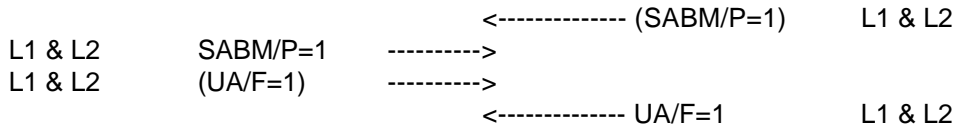
4.2.1.2.2 Initialization through L1, L2 in DM. (MN(S)>0)



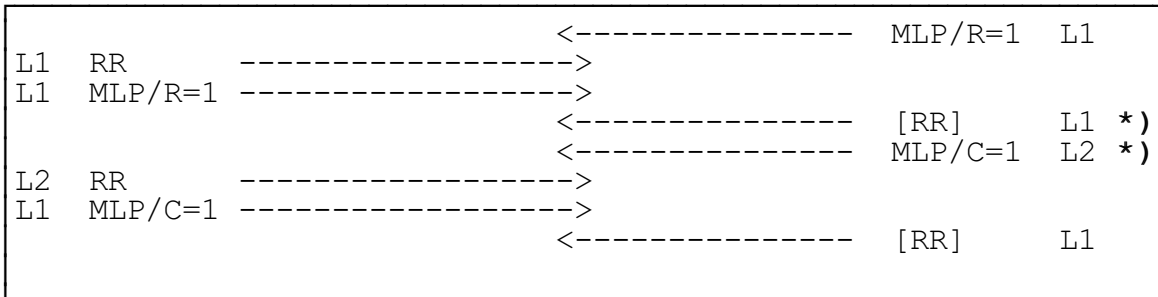
4.2.1.2.3 Initialization through L1, MLP frame when C=1 is sent immediately after MLP frame when R=1. L2 in DM



4.2.1.2.4 Initialization through L1, L2 active



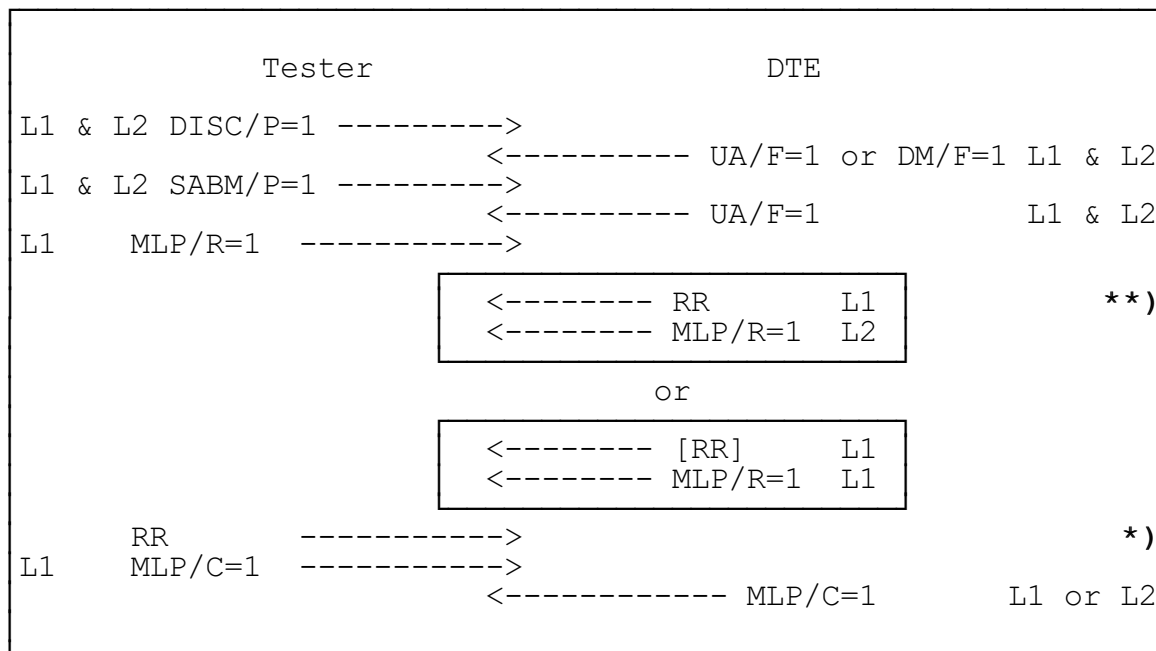
or



*) The time ordering of both frames could be reversed.

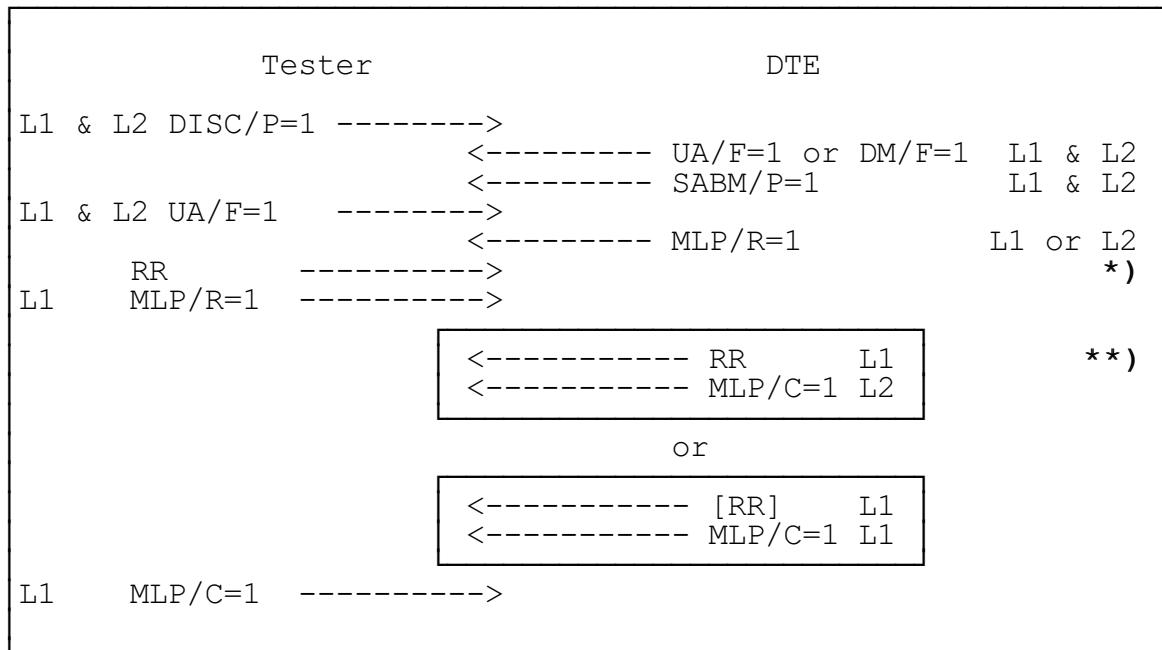
4.2.2 Verification of MLP re-routing conditions

A preamble sequence such as one of the following shall be executed before each test. The objective is to get the DTE into the Information Transfer Phase, with the two links L1 & L2 active, and then produce the re-routing conditions.



- *) The tester sends the frame through the line which received the frame MLP/R=1.
- ***) The time ordering of both frames may be reversed.

or

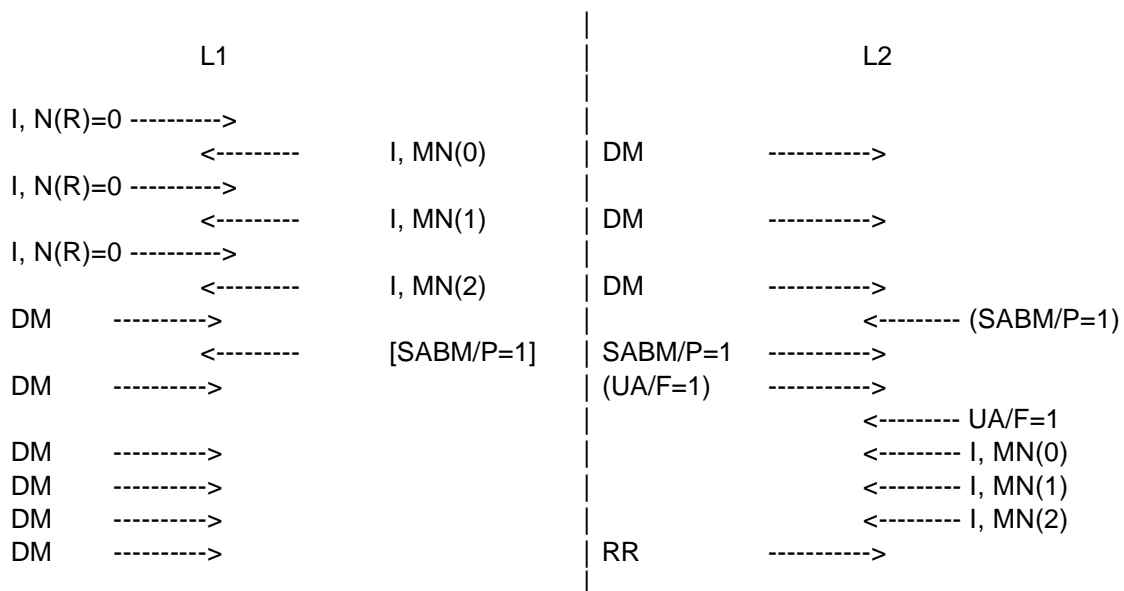


*) The tester sends the frame through the line which received the frame MLP/R=1.

**) The time ordering of both frames can be reversed.

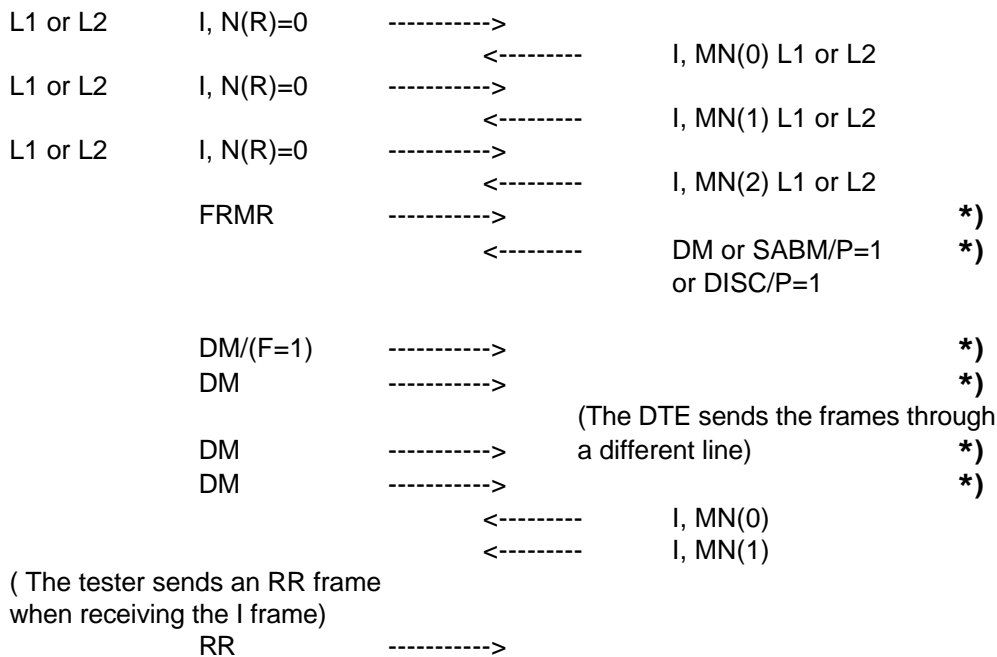
4.2.2.1 Disconnect Mode (DM) condition

The tester sends a DM frame. This test requires that the DTE transmits I frames.



4.2.2.2 Frame reject (FRMR) condition

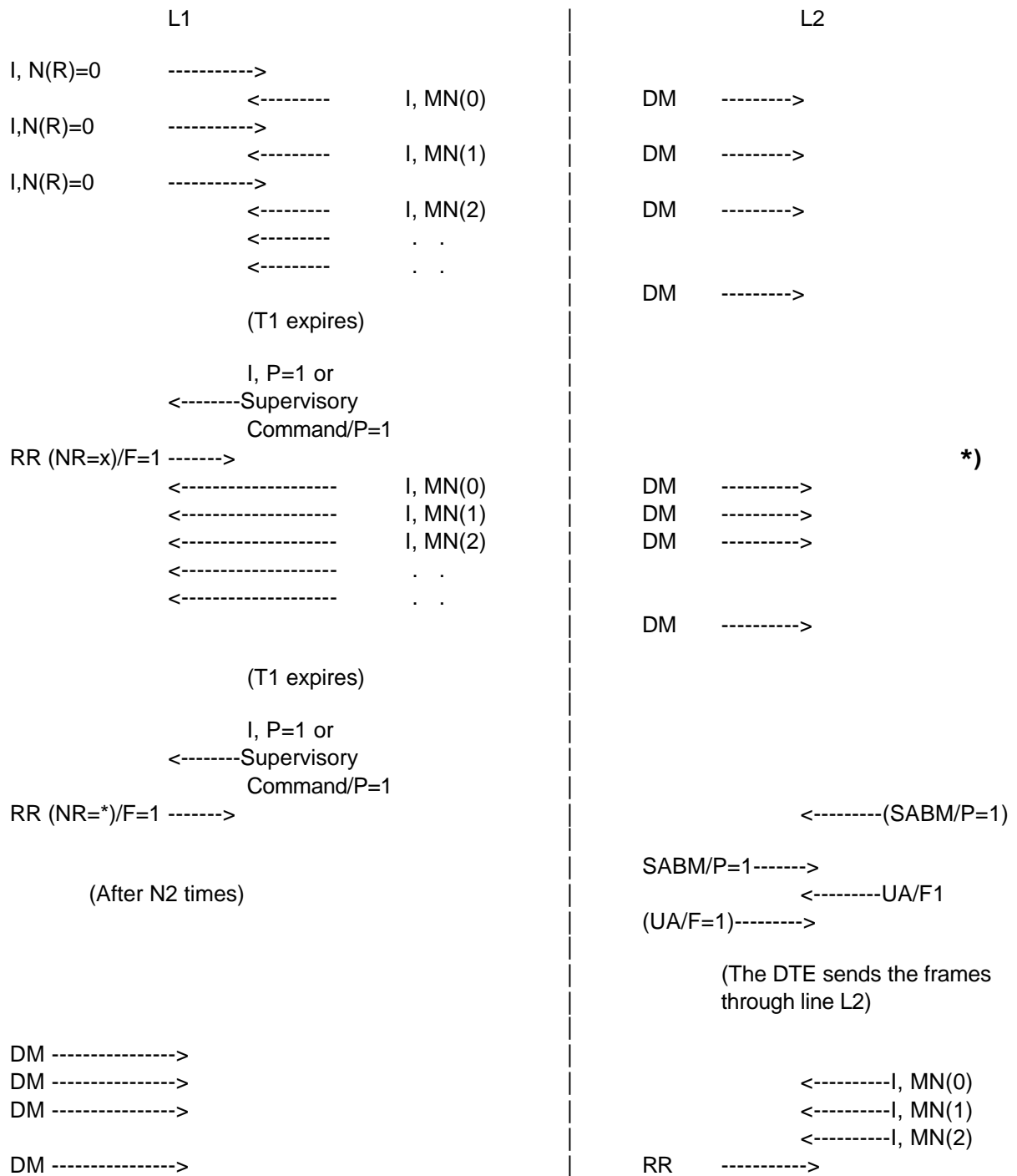
The tester sends a FRMR frame. This test requires that the DTE transmits I frames through L1 and L2.



*) The tester/DTE sends the frames through the line which received/transmitted the frame I, MN(0).

4.2.2.3 Retransmission condition

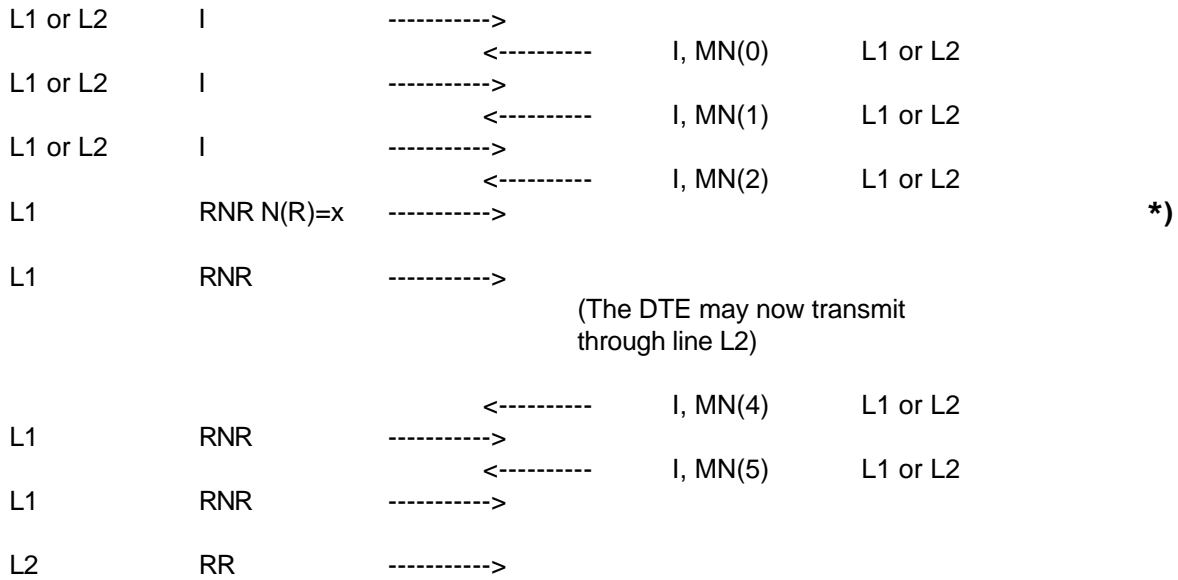
The tester forces retransmission of I frames N2 times. The test requires that the DTE transmits I frames.



*) The value of N(R) corresponds to the I, MN(0)

4.2.2.4 Busy condition

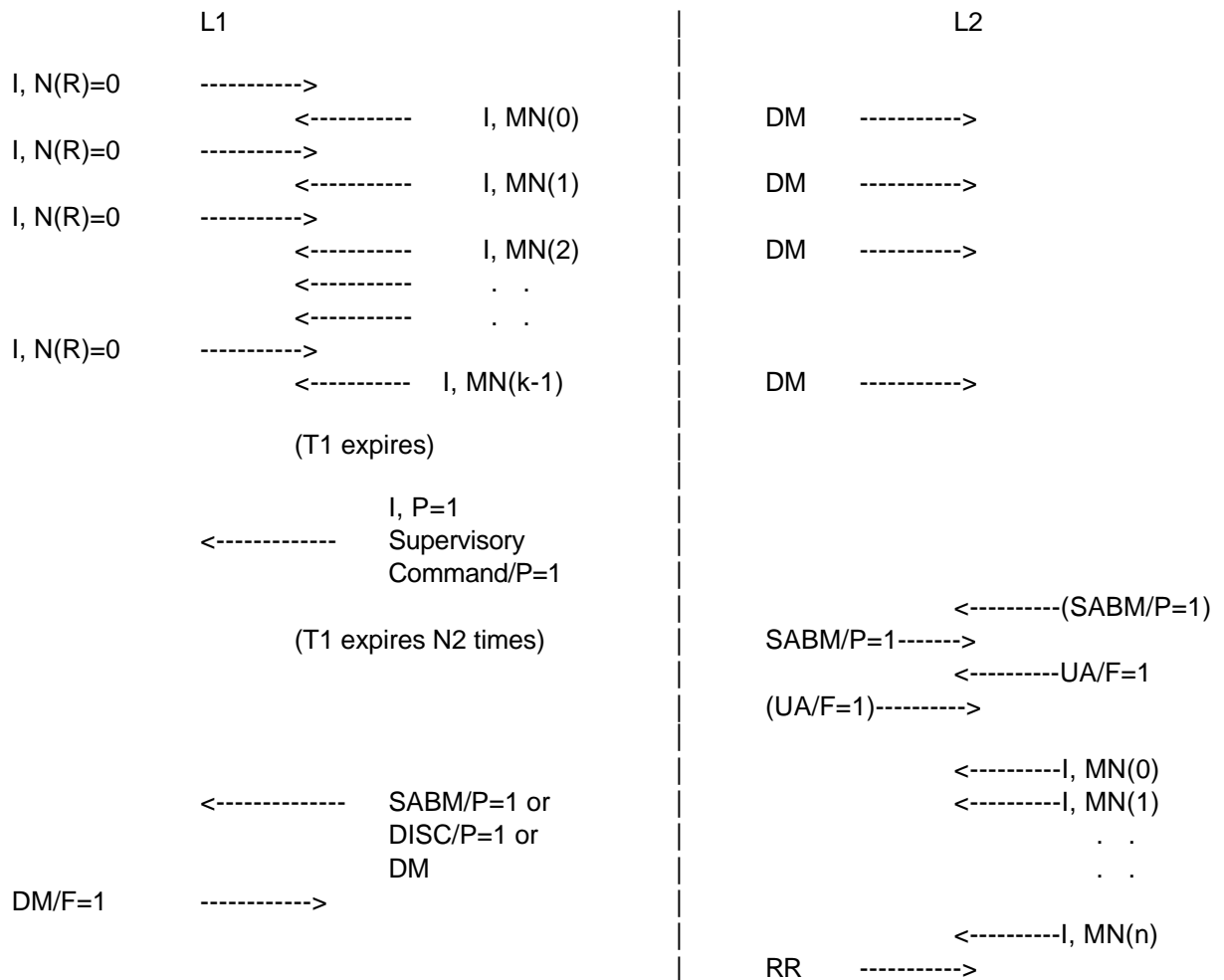
The tester sends Received Not Ready (RNR). This test requires that the DTE transmits I frames.



*) The value of N(R) corresponds to the next I frame.

4.2.2.5 Waiting acknowledgement condition

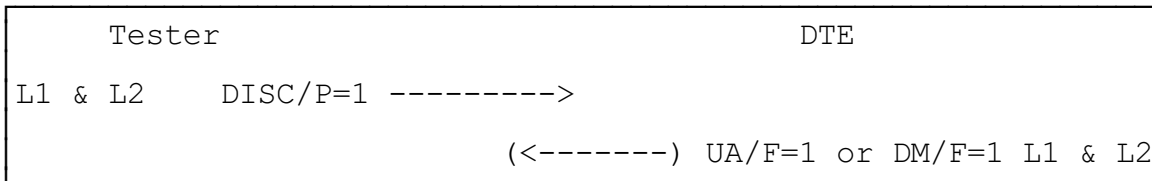
This test requires that the DTE transmits I frames to reach the k value.



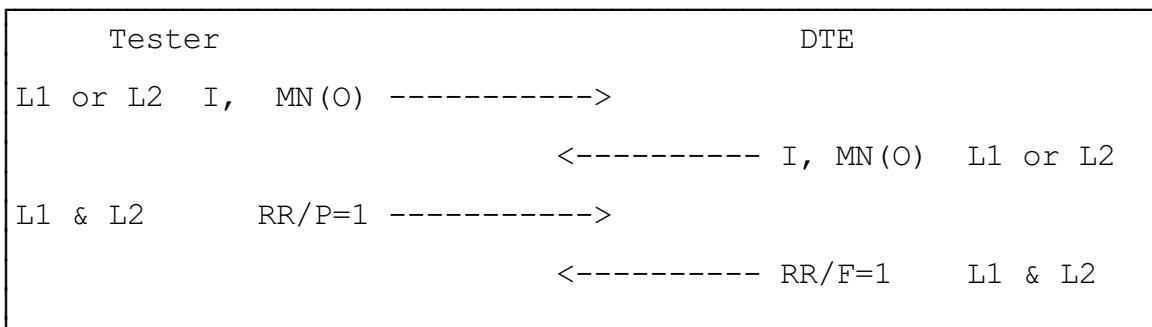
NOTE: $n \cdot k-1$

4.2.3 Verification of MLP timers

A preamble verification sequence shall be executed before each test in both lines (L1 and L2) which link the DTE and the Tester:

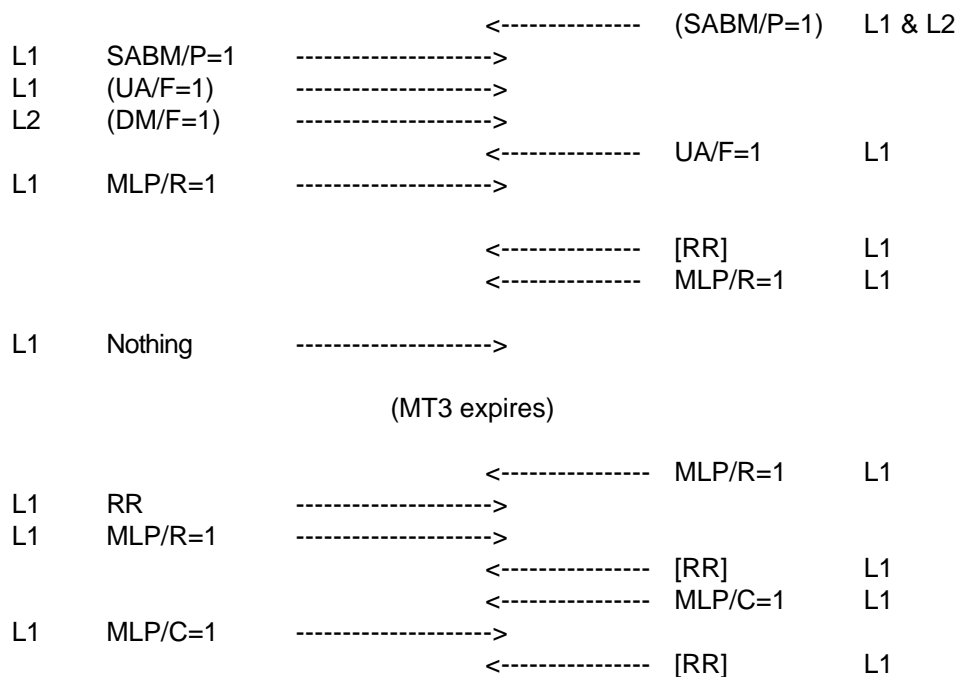


A post-test sequence shall be executed after each test to verify the correct status of the DTE



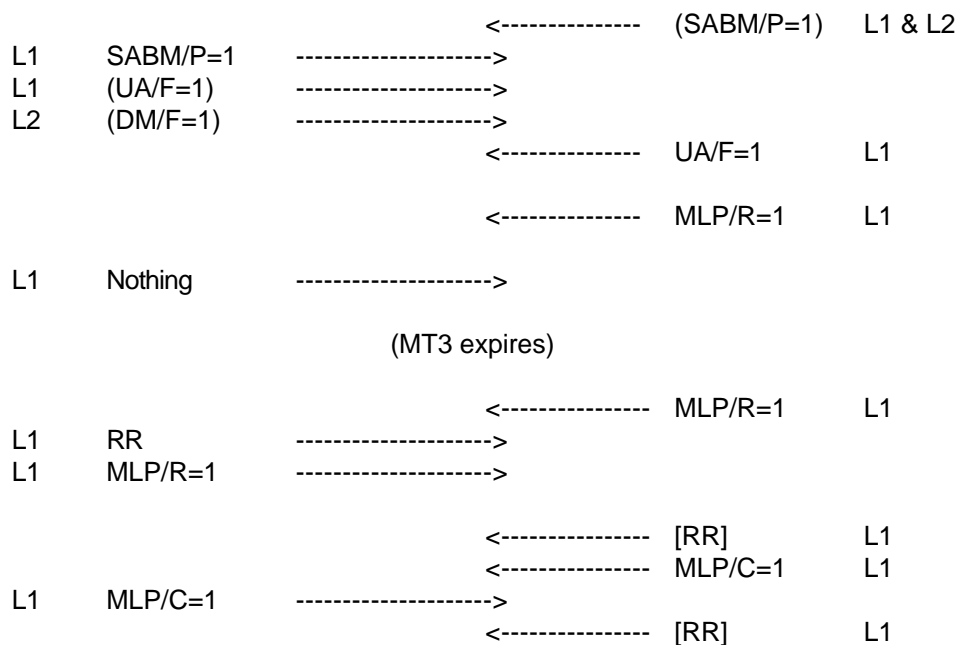
4.2.3.1 The DTE does not initialise the MLP

Timer MT3, L2 in DM



4.2.3.2 The DTE does initialise the MLP

Timer MT3, L2 in DM



History

Document history	
April 1991	Version 1
February 1996	Converted into Adobe Acrobat Portable Document Format (PDF)