

TEST AND MAINTENANCE

CONTENTS

Contents	i
List of Figures	ii
1. GENERAL	1
2. TESTING	1
2.1 Signalling Data Link Test	1
2.2 Signalling Link Test	1
2.3 Signalling Route Test	2
3. FAULT LOCATION	2
4. SIGNALLING NETWORK MONITORING	2
5. FORMATS AND CODES OF SIGNALLING NETWORK TESTING AND MAINTENANCE MESSAGES	2
5.1 General	2
5.2 Label	3
5.3 Heading Code H0	3
5.4 Signalling Link Test Messages	3
6. STATE TRANSITION DIAGRAM	4
7. REFERENCE AND SOURCE MATERIAL	4
7.1 Recommended International Standards	4

LIST OF FIGURES

Figure 1/Q.707 - Signalling Link Test Messages	3
Figure 2/Q.707 - Signalling Link Test Control	5

TEST AND MAINTENANCE

1. GENERAL

In order to realize the performance requirements described in Recommendation Q.706, means and procedures for signalling network testing and maintenance are required, in addition to the means defined in Recommendations Q.703 and Q.704.

2. TESTING

2.1 Signalling Data Link Test

As defined in Recommendation Q.702, Section 1, the signalling data link is a bidirectional transmission path for signalling. Testing and maintenance functions can be initiated independently at either end.

The signalling data link and its constituent parts are described in Recommendation Q.702, Section 1. *

They must be tested before being put into service to ensure that they meet the requirements of Recommendation Q.702, Section 3.

Since interruptions of the signalling data link will affect many transactions, they must be treated with the utmost care. Appropriate special measures should be taken to prevent unauthorized maintenance access which could result in interruptions to service. These special measures may include marking or flagging the equipment, and indications on distribution frames or test bays where access is possible. The signal unit error rate monitor and the alignment error rate monitor, described in Recommendation Q.703, Section 10 also provide means for detecting deterioration of a signalling data link (for further study). *

Further studies are required with reference to Recommendation V.51 (Section 7.1). *

2.2 Signalling Link Test

As defined in Recommendation Q.703, Section 1.1.1, and illustrated in Figure 1/Q.701, the signalling link comprises a signalling data link with signalling link functions at either end. *

In the following, an on-line signalling link test procedure is specified which involves communication between the two ends of the concerned signalling link. This procedure is to be used when a signalling link is activated. The signalling link becomes available only if the test is successful. This procedure is intended for use while the signalling link is in service. In addition, local failure detection procedures should be performed at either end; these are not specified in this Recommendation. *

The test procedure is intended to be applied periodically on each operational signalling link with a sufficient frequency (for further study) to ensure that the signalling link performance requirements are met. The signalling link test message is sent at regular intervals.¹ The testing of a signalling link is performed independently from each end. Other possible uses of the signalling link test procedure such as detection of looped links, verification of physical link assignments and the format and codes of such messages are for further study. *

The ability to send a signalling link test acknowledgement, defined below, must always be provided at a signalling point, but the provision for transmission of the signalling test message is at the discretion of the signalling points.

A "*" indicates a change from the CCITT Red Book Vol. VI which is specific U. S. Networks.

A "†" indicates a change from the previous issue.

1. The definition of the lower limit of these intervals is for further study. This must be defined, taking into account the need to ensure that a received signalling link test acknowledgement is in response to the last sent signalling link test message.

TEST AND MAINTENANCE

The signalling point initiating the tests transmits a signalling link test message on the signalling link to be tested. This message includes a test pattern which is chosen at the discretion of the end initiating the test. After receiving a signalling link test message, a signalling point responds with a signalling link test acknowledgement message on the same signalling link within $T = 100$ ms (provisional value). The test pattern included in the signalling link test acknowledgement message is identical to the test pattern received. In the case that a test pattern in a received signalling link test acknowledgement is the same as that sent in a signalling link test message, no further action is taken.

In the case when:

- a) a signalling link test acknowledgement message is not received on the link being tested within $T_1 = 1$ s (provisional value), after the signalling link test message has been sent, or
- b) a signalling link test acknowledgement message is received with a test pattern that is different from the last pattern sent in a signalling link test message,

the test is considered to have failed, and is repeated once. In the case when the repeated test also fails, a management system must be informed, and subsequent actions such as link taken out of service and procedures during signalling network congestion conditions are for further study. *

The formats and codes of signalling link test and signalling link test acknowledgement messages used for signalling link testing are specified in Section 5.4.

2.3 Signalling Route Test

In addition to the procedures specified in Recommendation Q.704, Section 12, the need for, and form of, other line procedures are for further study.

3. FAULT LOCATION

Fault location operations, employing particular manual or automatic internal test equipment, are left to the discretion of the individual signalling points. Tests requiring provision of messages are for further study. See Section 7.1. *

4. SIGNALLING NETWORK MONITORING

In order to obtain information on the status of the signalling network, monitoring of the signalling activity must be provided (for example, measures of the signalling load on the signalling data link). The specification of such means and procedures is contained in Recommendation Q.791 and Q.795. The requirement for additional messages and procedures are for further study. *

5. FORMATS AND CODES OF SIGNALLING NETWORK TESTING AND MAINTENANCE MESSAGES

5.1 General

The signalling network testing and maintenance messages are carried on the signalling channel in message signal units, the format of which is described in Recommendation Q.703, Section 2. As indicated in Recommendation Q.704 Section 13.2 these messages are distinguished by the configuration 0001 or 0010 of the Service Indicator (SI). The Sub Service Field (SSF) of signalling network testing and maintenance messages is used in accordance with Recommendation Q.704, Section 13.2. The Signalling Information field (SIF) consists of an integral number of octets, and contains the label, the heading code and one or more signals and indications. *

TEST AND MAINTENANCE

5.2 Label

For signalling network testing and maintenance messages, the label has the same structure as the label of signalling network management messages (see Recommendation Q.704, Section 14.2).

5.3 Heading Code H0

The heading code H0 is the 4-bit field following the label and identifies the message group. The different heading codes are allocated as follows:

- 0 0 0 0 Spare
- 0 0 0 1 Test messages

The remaining codes are spare.

5.4 Signalling Link Test Messages²

The format of the signalling link test messages is shown in Figure 1/Q.707.

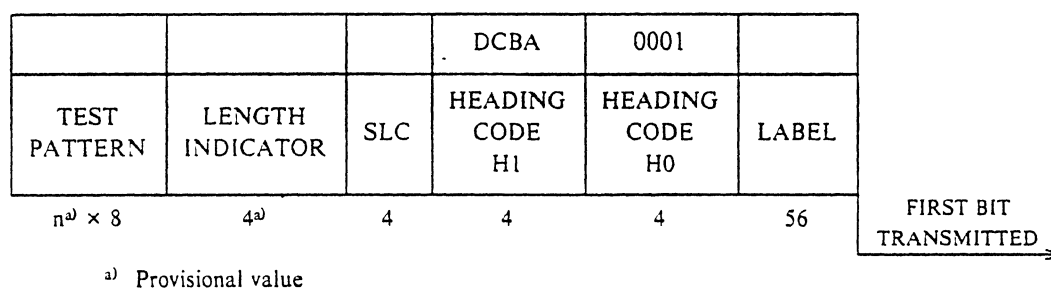


Figure 1/Q.707 - Signalling Link Test Messages

The signalling link test messages are made up of the following fields:

- Label: 56 bits (see Section 5.2)
- Heading code H0: 4 bits
- Heading code H1: 4 bits
- SLC: 4 bits
- Length indicator: 4-bits (Provisional value)
- Test pattern: $n \times 8$ bits with $n < 16$ (Provisional value)

For the signalling link test described in Section 2.2, the SI configuration=0010.

The heading code H1 contains signal codes as follows:

- | | | |
|------|---------|--|
| bits | D C B A | |
| | 0 0 0 1 | signalling link test message |
| | 0 0 1 0 | signalling link test acknowledgement message |

The requirement for additional H1 codes is for further study.

The signalling link code (SLC) indicates the signalling link on which the test applies.

2. Text from the CCITT Red Book Vol. VI.7 related to the signalling link selection code (SLS) identifying the signalling link on which the test message is sent has been deleted from this section.

TEST AND MAINTENANCE

The length indicator gives the number of octets which the test pattern comprises.

The test pattern is an integral number of octets and is chosen at the discretion of the originating point.

6. STATE TRANSITION DIAGRAM

The state transition diagram is intended to show precisely the behavior of the signalling system under normal and abnormal conditions as viewed from a remote location. It must be emphasized that the functional partitioning shown in the following diagram is used only to facilitate understanding of the system behavior, and is not intended to specify the functional partitioning to be adopted in a practical implementation of the signalling system. *

7. REFERENCE AND SOURCE MATERIAL *

7.1 Recommended International Standards *

CCITT Recommendation, "Lining up an international... (Not applicable to U. S. Networks). *

CCITT Recommendation Q.791 - Monitoring and Measurements for the MTP. *|

CCITT Recommendation Q.795 - Operation and Maintenance Application Part. *|

CCITT Recommendation, "Organization of the maintenance of international telephone-type circuits used for data transmission", Vol. VIII, Fascicle VIII.1, Rec. V.51.

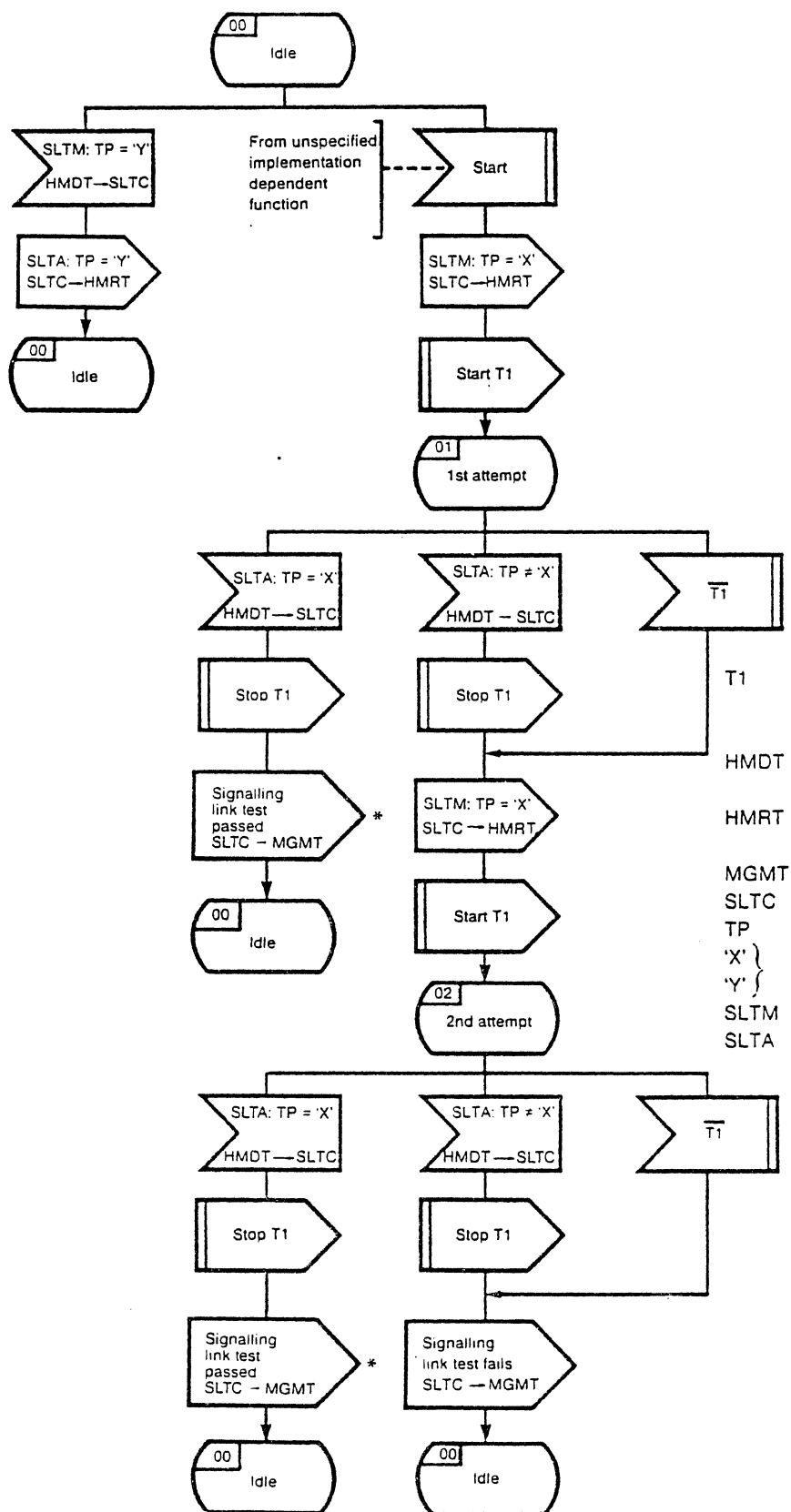


Figure 2/Q.707 - Signalling link test control