

*The drawings contain in this Recommendation have been done in Autocad.*

## SECTION 2

### TEST SPECIFICATION

#### **Recommendation Q.780**

##### SIGNALLING SYSTEM NO. 7 TEST SPECIFICATION GENERAL DESCRIPTION

### **1 General**

**Signalling System No. 7. The test specifications are contained in Recommendations Q.781–Q.783. This Recommendation defines the scope and purpose of the test specification and identifies guidelines that are either specific to the particular protocol under test, or are more general. In addition it identifies functional requirements imposed by the test specification.**

## **2 General principles of test specifications**

The test specification aims at testing protocol conformance in a given implementation. This is independent of a given implementation and does not generally imply any modification of the signalling point under test. However, it is recognized that certain tests require capabilities of the system that are not explicitly defined in the relevant Recommendation, and these capabilities may not be present in all implementations. As a consequence, certain tests may not be possible in all implementations.

## **3 Scope of the test specification**

The test specification is intended to cover all aspects of Signalling System No. 7. However the initial Recommendations cover the message transfer part Q.701–Q.707, and the telephone user part Q.721–Q.724. The test specification is not a definition of the protocol, this is contained in Recommendations Q.701–Q.707 and Q.721–Q.724 as appropriate.

## **4 Field of application**

The test specification applies in the international network, and if appropriate in the national network. In the international network, the actual tests to be performed will be the subject of appropriate bilateral agreements between the two or more Administrations/RPOAs concerned.

## **5 Method of application**

The test specification fulfils the requirements for both validation testing and compatibility testing. See §§ 5.1 and 5.2 for an explanation of these terms.

All tests in the test specification are validation tests (VAT), and in addition those marked with an asterisk are also compatibility tests (CPT).

### **5.1 *Validation testing***

The function of validation testing is to check that a given implementation conforms to the relevant CCITT Recommendations of the Signalling System. These validation tests could apply both in the national and international networks. The validation test is a pre-requisite of compatibility testing (see § 5.2) and is performed under the responsibility of each Administration/RPOA. These tests will generally be performed without the cooperation of another Administration/RPOA, although this is not precluded should this arrangement prove convenient. Validation testing will be performed on a signalling point that is not in service.

The validation test is performed on one signalling point.

It is suggested that the validation test, or subset, is repeated when the implementation is upgraded or modified in any functional way.

Validation testing may require the use of a simulator to check the operation of the signalling point under test. The specification of this simulator is not explicitly covered by these Recommendations although the general requirements are implicit in the test specification.

In validation testing, the signalling point under test is called SP“A”.

## 5.2 *Compatibility testing*

The objective of compatibility testing is to check for the correct interworking of two implementations. To perform compatibility testing the two nodes involved are interconnected. The specification is written for the interconnection of two given implementations for the first time. For subsequent interconnections of the same two implementations a subset of tests may prove sufficient. These tests will not only be performed on a new signalling point, but also on a signalling point already in service.

Each Recommendation identifies a list of tests that may be suitable for compatibility testing, but the actual tests to be performed will be bilaterally agreed between the Administrations/RPOAs concerned.

Certain of the tests identified in the test list as compatibility test may disturb the operation of the exchange, whereas others may not. Any tests which may cause disturbance to the exchange should be carefully selected to meet the operational criteria of the two Administrations/RPOAs.

The satisfactory completion of compatibility testing should be bilaterally agreed.

When a change to the signalling network is made, tests selected from those identified as compatibility tests may be appropriate. In general the tests performed under these circumstances will be the minimum number to ensure that compatibility between points in the network is still maintained.

In compatibility testing, each signalling point may in turn consider itself to be SP“A”, i.e. tests are performed on both signalling points involved.

## 5.3 *Test configuration*

For both validation and compatibility testing the point under test is connected to the test environment and becomes part of the “test configuration”. The test configuration satisfies all of the following three criteria:

- The point under test will be connected by one or more signalling linksets (real or simulated), which may or may not be interconnected.
- The capability of generation and reception of test traffic, where applicable.
- The ability to perform the described test, notably the facility to store and analyze messages to the appropriate degree.

# 6 **Functional requirements imposed by the test specification**

The functional description that follows is intended to identify the functional requirements imposed by the test specification. It does not imply any physical partitioning of equipment in real systems. See also Recommendation Q.701, § 2.2.1.

## 6.1 *Level 1*

The test specification assumes the availability of a suitable signalling data link with the parameters identified in the relevant Q Recommendations, e.g. Q.702 (referring to Recommendation G.821).

In validation testing the signalling data link may be a pseudo-signalling data link, in which case it should preferably have similar/identical characteristics to the signalling data links likely to be encountered in service. Simulation of deterioration of the transmission link may not be necessary if the emulator includes the capability to simulate abnormal conditions on the signalling data link.

In compatibility testing the signalling data link is the actual signalling data link that will be used in service.

## 6.2 *Level 2*

The level 2 test environment consists of four items (see Figure 1/Q.780):

- the level 3 simulator;
- the test simulator;
- the signalling link monitor (see § 7);
- the signalling data link.

### 6.2.1 *Level 3 simulator*

During the level 2 tests it is necessary to inject signalling messages and indications to and from the level 2 under test. It is desirable that the level 3 function used is the actual level 3 of the MTP with some additional functions for test purposes.

### 6.2.2 *Test simulator*

During level 2 testing it is necessary to inject some abnormal signal units (as well as normal signal units) to fully test the level 2 under test, the test simulator should have this function. In addition the simulator should have the capability to receive and check signal units from the level 2 under test. The generation of certain abnormal sequences of signal units should also be a capability of the test simulator.

## 6.3 *Level 3*

The level 3 test specification assumes that the level 2 has already been tested satisfactorily. However, certain tests will in addition explicitly test the level 2/3 interface.

The level 3 test environment consists of 3 items (see Figure 2/Q.780):

- the simulator of upper levels;
- simulated network including test simulator and signalling data links;
- the signalling link monitor(s) (see § 7).

### 6.3.1 *Simulator of upper levels*

During level 3 testing it is necessary to inject signalling messages into level 3 for testing, e.g. message loss during changeover. It is desirable that the simulator used should be as close as possible to the actual upper level to be used. In addition an MML interface is assumed. The level 3 under test must use an already tested level 2.

### 6.3.2 *Simulated network including test simulator*

During level 3 testing it is necessary to inject some abnormal messages (as well as normal messages) to check the level 3 under test, the simulated network including test simulator should have this function. In addition the test simulator should have the capabilities to receive and check messages from the level 3 under test. The generation of certain abnormal sequences of messages should also be a capability of the test simulator. The test simulator must include an already tested level 2.

## 6.4 *TUP*

The TUP test specification assumes a tested MTP for compatibility tests but no assumption is made about message transfer between the TUP under test and the TUP tester for validation tests.

The TUP test environment consists of three items (see Figure 3/Q.780):

- the TUP tester;
- a stable signalling relation and telephone circuits;
- a monitor of TUP messages and telephone circuits.

### 6.4.1 *TUP tester*

The TUP tester is required to simulate TUP protocol operations and some exchange call control operations.

### 6.4.2 *Monitor*

The monitor is required to monitor and record TUP message sequences and to monitor the result of call control operations on the controlled telephone circuits. This includes checking that tones are correctly received and that speech/information transfer is possible.

## 7 **Signalling link monitor(s)**

The test specification assumes the availability of a signalling link monitor and a suitable access point for connection of the monitor as specified in Recommendation Q.702, § 4.

The test specification does not attempt to specify what a signalling link monitor should be, but instead the functional requirements are identified in general terms. A signalling link monitor will be used for decoding of signal unit sequences during testing and to give the operator confidence that the signalling protocol has been correctly observed.

The requirements imposed on a signalling link monitor will be different for the two types of testing. For validation testing detailed decoding down to a field level will be required, but for compatibility testing decoding down to a message level may be adequate.

In addition it should be noted that compatibility testing will be a function performed numerous times on a signalling point, whereas validation testing will be performed once only, except under certain circumstances of upgrading of the signalling point.

*Note* – It should be observed that implementations may include a signalling link monitor as an intrinsic part of the signalling point, however, for validation testing this cannot necessarily be relied upon. In addition, the test specification does not attempt to perform the function of testing the accuracy of any signalling link monitor implemented in the signalling point, however, certain conclusions will inevitably be made from the performance of validation testing.

Fig.1/Q.780 /T1109810-88 = 9.5 cm

Fig.2/Q.780 /T1109820-88 = 9.5 cm

Fig.3/Q.780 /T1109830-88 = 7 cm