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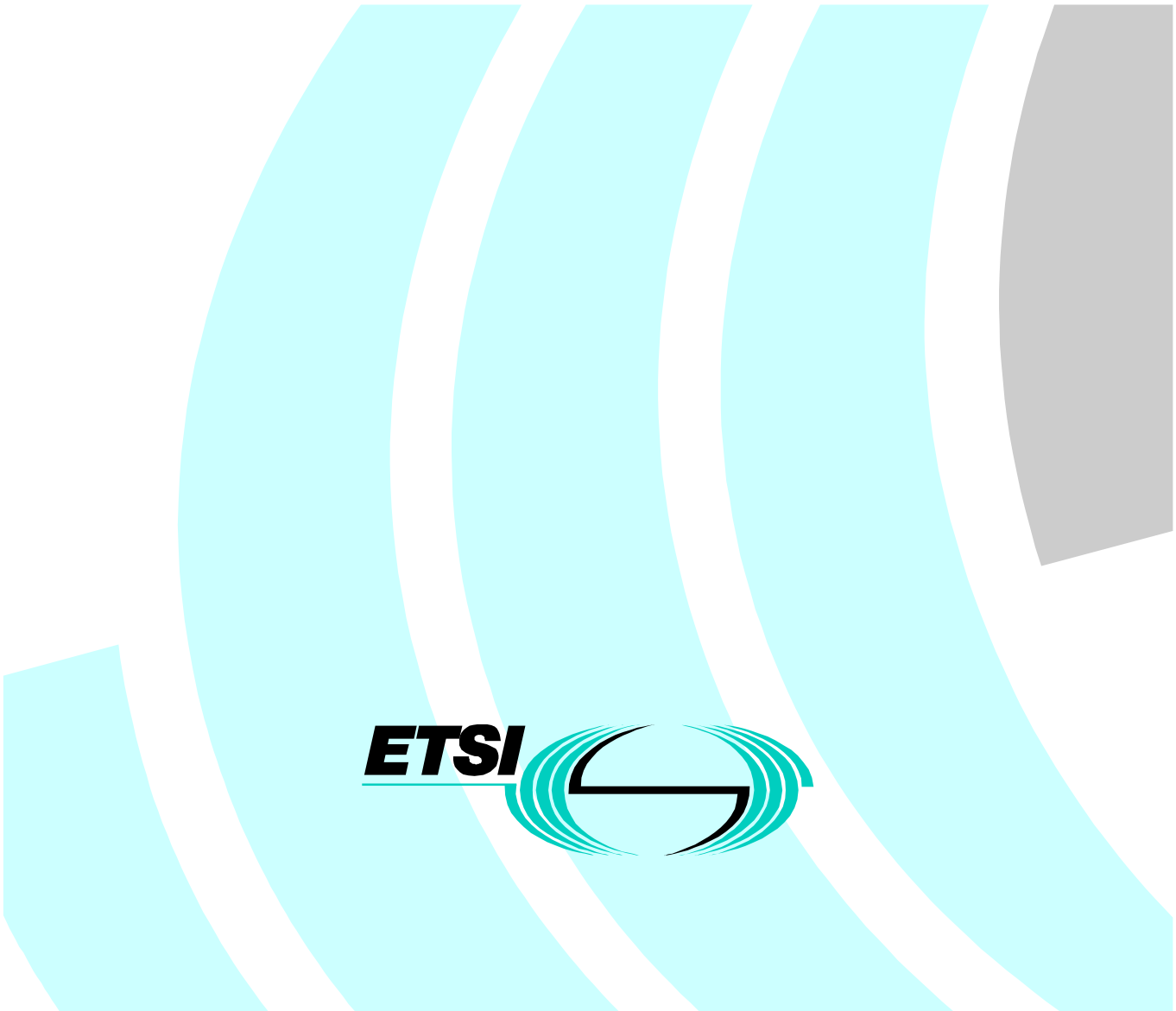
European Standard (Telecommunications series)

Integrated Services Digital Network (ISDN); Signalling System No.7; Signalling Connection Control Part (SCCP); Interoperability test specification



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ETSI

Postal address
F-06921 Sophia Antipolis Cedex - FRANCE

Office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet
secretariat@etsi.fr
http://www.etsi.fr
http://www.etsi.org

Contents

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Signalling Protocols and Switching (SPS).

National transposition dates	
Date of adoption of this EN:	3 April 1998
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1 Scope

The present document specifies interoperability testing between nodes meeting the requirements of ITU-T Recommendations Q.711 to Q.714 [2] as modified by ETS 300 009-1 [1]. The present document may optionally also be applied within national networks and implementations of earlier versions of ETS 300 009 and the ITU-T Recommendations.

The present document is not meant to restrict national networks. The tests in the present document form a basic set of interoperability tests, and are used in gaining confidence that implementations of the Signalling Connection Control Part (SCCP) can interwork.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

2.1 Normative references

[1] ETS 300 009-1 (1996): "Integrated Services Digital Network (ISDN); Signalling System No.7; Signalling Connection Control Part (SCCP) (connectionless and connection-oriented class 2) to support international interconnection; Part 1: Protocol specification [ITU-T Recommendations Q.711 to Q.714 and Q.716 (1993), modified]".

[2] ITU-T Recommendations Q.711 to Q.714 (1993): "Signalling Connection Control Part (SCCP)".

2.2 Informative references

[3] ITU-T Recommendation Q.786 (1993): "SCCP Test Specification".

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

DPC	Destination Point Code
DT1	Data Form 1 message
GT	Global Title
GTAI	Global Title Address Information
MTP	Message Transfer Part
NI	Network Indicator
OPC	Origination Point Code
PC	Point Code
SCCP	Signalling Connection Control Part
SIO	Service Information Octet
SP	Signalling Point
SSA	SubSystem Allowed message
SSN	SubSystem Number
SST	Subsystem Status Test message
UDT	UnitData message
UDTS	UnitData Service message
UPU	User Part Unavailable
XUDT	Extended Unitdata message
XUDTS	Extended UnitData Service message

4 SCCP test specification

Conformance and performance tests are not included in the present document.

4.1 Introduction

The function of interoperability testing is to confirm that different implementations, each of which conforms to ETS 300 009-1 [1], can interwork. These interoperability tests apply in the international network but may also be applied in national networks. Successful conformance or validation testing of SCCP itself, SCCP applications and Message Transfer Part (MTP) is a pre-requisite of interoperability testing. It is recommended that interoperability testing is performed on signalling nodes that are not in service.

Interoperability testing may require the use of a monitor to check the operation of the signalling node(s) under test. The specification of this monitor is not covered by the present document although the general requirements are that the equipment is capable of capturing all data on the signalling link, and preferably be able to decode the information captured into SCCP messages.

The tests in the present document are only a basic set in gaining confidence in the interoperability of SCCP implementations. Specific interconnections may require more interoperability testing than specified here. The specific range of tests performed between nodes is subject to bilateral or multilateral agreement and also dependent on the functionality of the implementations under test. The tests are shown in one direction of testing, thus they should be repeated in the reverse direction for completeness.

4.2 Network and implementation dependency considerations

SCCP applications may be external to the nodes under test (e.g. external testers).

Where the receiving node is a stand alone SCCP relay Sub System Number (SSN) routing to it cannot be used. In this case tests using SSN routing are not applicable.

In some implementations SCCP and MTP availability are inseparable (e.g. in the case where MTP and SCCP are handled together). In such cases tests that require the availability status of SCCP and MTP to be different cannot be run.

If the nodes under test are in service it is inadvisable to run tests that require the MTP or SCCP to be unavailable.

4.3 Test network configuration

The following network configuration is intended to show a typical international SCCP network scenario and is the basis of all the tests in the present document. In practice, in some cases, node B (i.e. a "stand alone" SCCP relay node) may not exist. In these cases the relay functionality part of the tests may still be applied but would relate to international gateway nodes A and C.

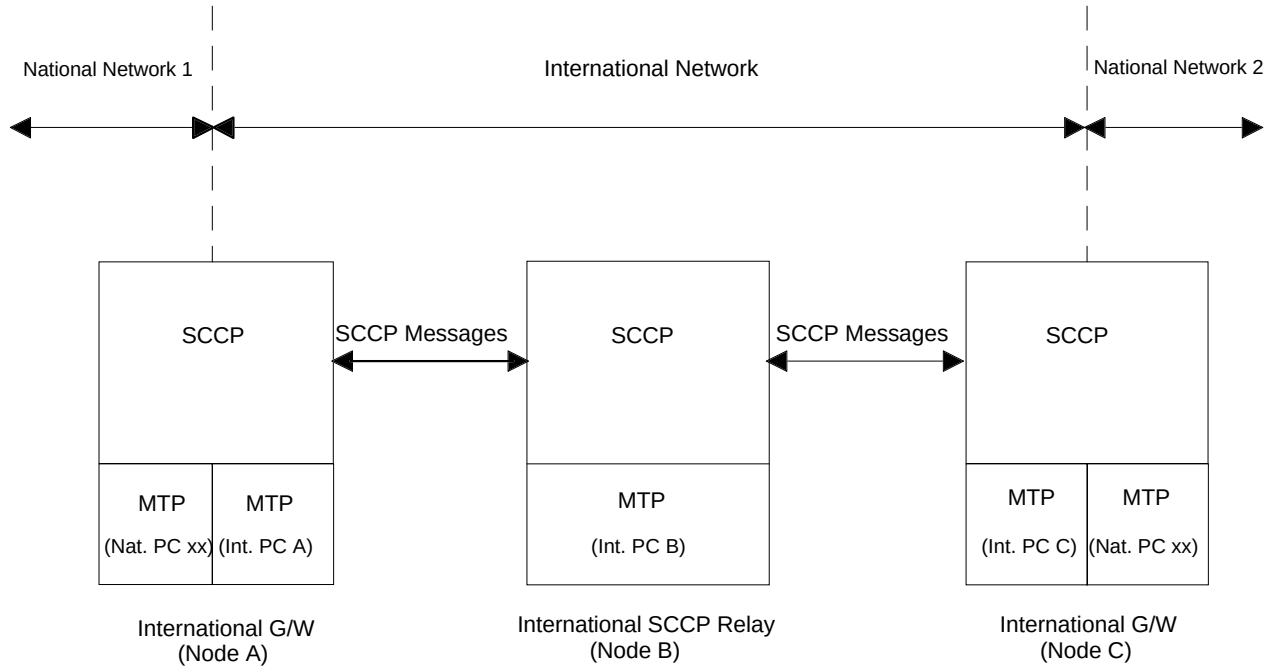


Figure 1

4.4 Reference specification

The SCCP is described in the ETS 300 009-1 [1].

4.5 Test list

NOTE: A number of the tests given in the present document make reference to UnitData (Service) message (UDT(S)) messages. Where supported by all the nodes in the test, Extended UnitData (Service) message (XUDT(S)) messages may be employed as an alternative.

4.5.1 GT routing tests

Test Number 1

To verify correct Global Title (GT) translation and a correctly functioning signalling route exists between nodes under test. The primary purpose of this test is to give confidence that a signalling relationship exists between the nodes under test. Specific signalling functionality is tested by the other tests.

Test Number 2

To verify correct GT translation, message return and SCCP management functionality following temporary SCCP unavailability.

Test Number 3

To verify that UDTS is not returned when GT translates to an inaccessible Destination Point Code (DPC) and/or unavailable SSN/SCCP and the return on error option is not set.

Test Number 4

To verify that UDTS is returned when the GT translates to an inaccessible DPC and/or unavailable SSN/SCCP and the return on error option is set.

Test Number 5

To verify that UDTS is returned when the GT is of a type that cannot be translated and the return on error option is set.

Test Number 6

To verify that UDTS is returned when unknown GT Address digits are received and the return on error option is set.

4.5.2 Connectionless protocol class tests

Test Number 7

To verify that segmented messages are correctly transferred.

4.6 Test tables

Test Number	1
Reference	ITU-T Recommendation Q.714 [2], clause 2, as modified by ETS 300 009-1 [1]
Title	GT translation
Subtitle	Correct operation of signalling route
Purpose	To verify correct Global Title translation and a correctly functioning signalling route exists between nodes under test

Pre-test Conditions:

1. Arrange the generation of a UDT message from Node A to Node B with:

   - SCCP address information:

     - GT;

     - route on GT.

2. Arrange the SCCP routing control data at Node B as follows:

     - GT translated to DPC of Node C.

3. At node B, DPC and SCCP of Node C and, if applicable (i.e. RI Node B→C = SSN routing), Subsystem all available.

Expected Message Sequence

NODE A	NODE B	NODE C
UDT →	UDT →	

(continued)

(Test 1 continued)

Test Description:

1. Arrange Node A to send a UDT message to Node B with a GT to be translated at Node B to PC of Node C.
2. Record the message sequence and parameters using a signal monitor.
3. CHECK A: Was the UDT message correctly forwarded to Node C?
4. CHECK B: Was the message sequence as above?
5. CHECK C: Were the parameter fields set correctly as indicated in the check table below?

Check Table:

UDT (NODE A → NODE B)

1) Protocol Class : x0000000 (Class 0); or

x0000001 (Class 1).

Called Party Address:

2) Global Title Indicator : 0100.

3) Routing Indicator: 0 (Route on GT).

4) Global Title : Address information, as appropriate.

UDT (NODE B → NODE C)

5) Protocol Class : Identical to UDT (NODE A → NODE B).

Called Party Address: As appropriate to addressing scheme used between Node B and Node C.

NOTE: The presence or coding of any address parameters not specifically mentioned are not critical to this test.

Test Number	2
Reference	ITU-T Recommendation Q.714 [2], subclause 5.2, as modified by ETS 300 009 [1]
Title	GT translation
Subtitle	Updating of translation table status based on information of SCCP temporary unavailability and subsequent availability
Purpose	To verify correct GT translation, message return and SCCP management functionality following temporary SCCP unavailability NOTE: Refer to subclause 4.2 regarding SCCP availability status.

Pre-test Conditions:

1. Arrange the generation of a UDT message from Node A to Node B with:

   - SCCP address information:

     - GT;

     - route on GT;

     - return on error option set.

2. Arrange the SCCP routing control data at Node B as follows:

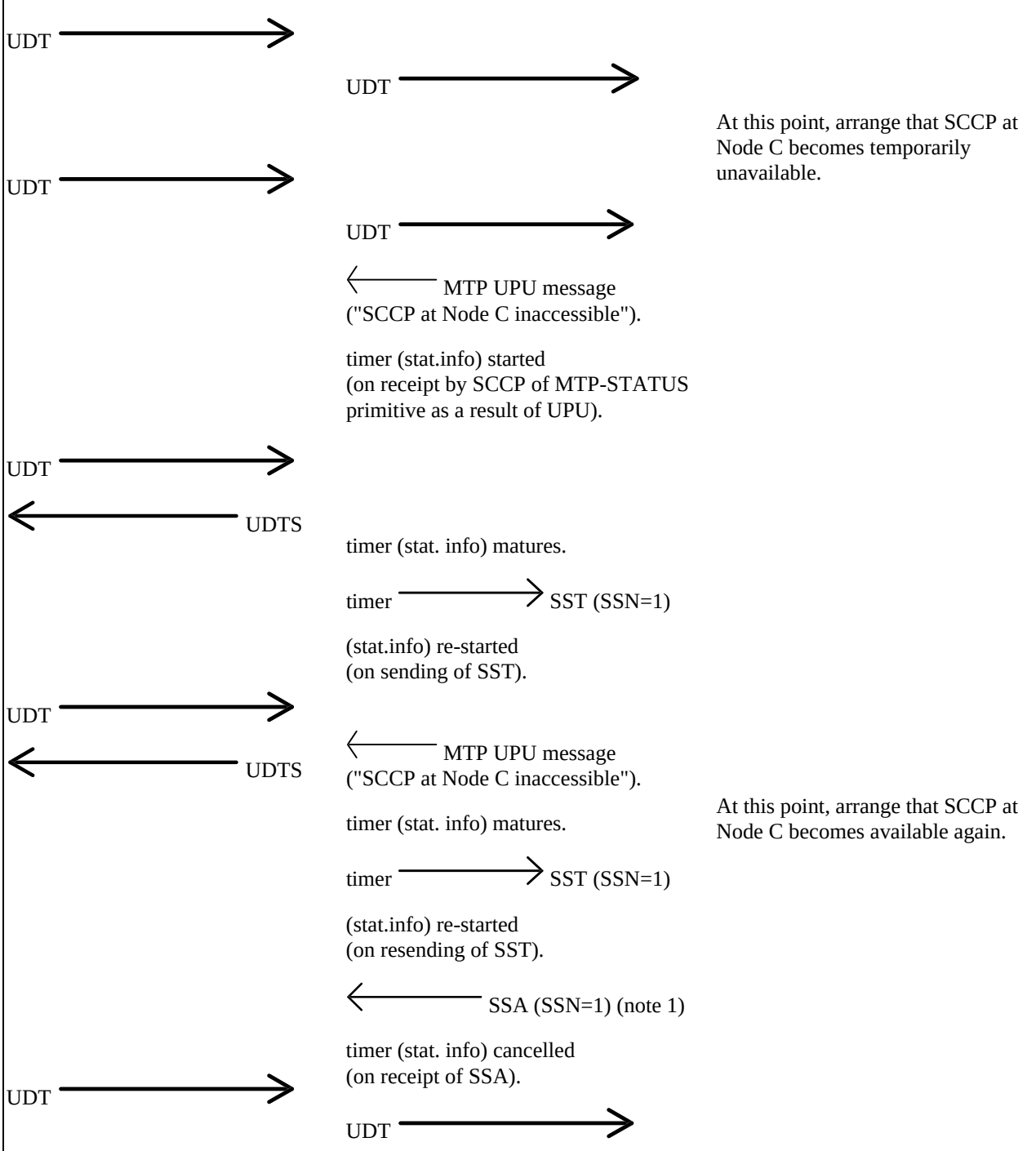
   - GT translated to - DPC of Node C.

3. DPC and SCCP of Node C and, if applicable (i.e. RI Node B→C = SSN routing), Subsystem all available.

(continued)

(Test 2 continued)

Expected Message Sequence



NOTE 1: In the case of Node C being to CCITT Blue Book, SSA is not sent, in this case when timer (stat. info) matures Node B can assume the SCCP at Node C is available.

NOTE 2: It is not the intention of the present document to test the MTP. The MTP message flow is given for information purposes only.

(continued)

(Test 2 concluded)

Test Description:

1. Arrange Node A to send a UDT message to Node B with a GT to be translated at Node B to PC of Node C.
2. Having received the UDT message at Node C, arrange that the SCCP at Node C becomes unavailable.
3. Arrange Node A to send further UDT messages to Node B with a GT to be translated at Node B to PC of Node C.
4. Having processed the UDT messages at Node B, arrange that the SCCP at Node C becomes available again.
5. Arrange Node A to send another UDT message to Node B with a GT to be translated at Node B to PC of Node C.
6. Record the message sequence and parameters using a signal monitor.
7. CHECK A: Was the first UDT message correctly sent to and processed at Node C?
8. CHECK B: Did the second UDT message sent to Node C result in an MTP UPU message?
9. CHECK C: Were the UDTS messages correctly generated by Node B?
10. CHECK D: Was the final UDT message correctly sent to and processed at Node C?
11. CHECK E: Was the message sequence as above?
12. CHECK F: Were the parameter fields set correctly as indicated in the check table below?

Check Table:

UDT (NODE A → NODE B)

1) Protocol Class : 10000000 (Class 0, Return on error option set); or

10000001 (Class 1, Return on error option set).

Called Party Address:

2) Global Title Indicator : 0100;

3) Routing Indicator: 0 (Route on GT);

4) Global Title : Address information, as appropriate.

Calling Party Address : As appropriate to addressing scheme used between Node A and Node B.

UDT (NODE B → NODE C)

5) Protocol Class : Identical to UDT (NODE A → NODE B).

Called Party Address: As appropriate to addressing scheme used between Node B and Node C.

UDTS (NODE B → NODE A)

6) Return Cause : 00001011 "SCCP failure".

7) Called Party Address: Derived from the calling party address in the UDT message.

8) Calling party address: Derived from called party address in the UDT message.

9) Data : Same data as in the UDT message.

NOTE 2: The presence or coding of any address parameters not specifically mentioned are not critical to this test.

Test Number	3 (see ITU-T Recommendation Q.786 [3], test 1.1.2.1.6)
Reference	ITU-T Recommendation Q.714 [2], subclause 2.3.1 item 3) b) i)
Title	GT translation
Subtitle	GT translated to remote but inaccessible DPC and/or unavailable SSN/SCCP (return on error option not set)
Purpose	To verify that UDTS is not returned when the GT translates to an inaccessible DPC and/or unavailable SSN/SCCP and the return on error option is not set

Pre-test Conditions:

1. Arrange the generation of a UDT message from Node A to Node B with:

   - SCCP address information:

     - GT;

     - route on GT;

     - return on error option not set.

2. Arrange the SCCP routing control data at Node B as follows:

   - GT translated to - DPC of Node C;

     - new or same SSN.

3. DPC inaccessible and/or SSN and/or SCCP of Node C unavailable.

Expected Message Sequence

NODE A NODE B NODE C

UDT 

Test Description:

1. Arrange Node A to send a UDT message to Node B with a GT to be translated at Node B.
2. Record the message sequence and parameters using a signal monitor.
3. CHECK A: Confirm that no messages were sent by Node B to Node A or Node C (except possibly management messages).
4. CHECK B: Was the message sequence as above?

(continued)

(Test 3 concluded)

Check Table:

UDT (NODE A → NODE B)

1) Protocol Class : 00000000 (Class 0, Return on error option is not set); or

00000001 (Class 1, Return on error option is not set).

Called Party Address:

2) Global Title Indicator : 0100.

3) Routing Indicator: 0 (Route on GT).

4) Global Title : Address information, as appropriate.

Calling Party Address : As appropriate to addressing scheme used between Node A and Node B.

NOTE: The presence or coding of any address parameters not specifically mentioned are not critical to this test.

Test Number	4 (see ITU-T Recommendation Q.786 [3], test 1.1.2.1.5)
Reference	ITU-T Recommendation Q.714 [2], subclause 2.4 item 3
Title	GT translation
Subtitle	GT translated to remote but inaccessible DPC and/or unavailable SSN/SCCP (Return on error option set)
Purpose	To verify that UDTS is returned when the GT translates to an inaccessible DPC and/or unavailable SSN/SCCP and the return on error option is set

Pre-test Conditions:

1. Arrange the generation of a UDT message from Node A to Node B with:

   - SCCP address information:

     - GT;

     - route on GT;

     - return on error option set.

2. Arrange the SCCP routing control data at Node B as follows:

   -GT translated to DPC of Node C;

   - new or same SSN.

3. DPC inaccessible and/or SSN and/or SCCP of Node C unavailable.

Expected Message Sequence

NODE A NODE B NODE C

UDT →

← UDTS

Test Description:

1. Arrange Node A to send a UDT message to Node B with a GT to be translated at Node B. 1.
2. Record the message sequence and parameters using a signal monitor.
3. CHECK A: Was the UDTS message correctly generated by Node B?
4. CHECK B: Were the parameter fields set correctly as indicated in the check table below?
5. CHECK C: Was the message sequence as above? (Except possibly management messages)

(continued)

(Test 4 concluded)

Check Table:

UDT (NODE A → NODE B)

1) Protocol Class : 10000000 (Class 0, Return on error option set); or

10000001 (Class 1, Return on error option set).

Called Party Address:

2) Global Title Indicator : 0100.

3) Routing Indicator: 0 (Route on GT).

4) Global Title : Address information, as appropriate.

UDTS (NODE B → NODE A)

5) Return Cause : 00000101 "network failure" if Node C not accessible; or

00000011 "subsystem failure" if SSN not available; or

00001011 "SCCP failure" if SCCP not available.

6) Called Party Address: Derived from the calling party address in the UDT message.

7) Calling party address: Derived from the called party address in the UDT message.

8) Data : Same data as in the UDT message.

NOTE: The presence or coding of any address parameters not specifically mentioned are not critical to this test.

Test Number	5 (see ITU-T Recommendation Q.786 [3], test 1.1.2.1.5)
Reference	ITU-T Recommendation Q.714 [2], subclause 2.4 item 1
Title	GT translation
Subtitle	Message contains GT for which no translation table can be selected in Node B (Return on error option set)
Purpose	To verify that UDTS is returned when the GT is of a type that cannot be translated and the return on error option is set

Pre-test Conditions:

1. Arrange the generation of a UDT message from Node A to Node B with:

   - SCCP address information:

     - GT;

     - route on GT;

     - return on error option set.

2. No translator table is selectable for the received GT from Node A.

Expected Message Sequence

NODE A NODE B NODE C

UDT →

← UDTS

Test Description:

1. Arrange Node A to send a UDT message to Node B with a GT to be translated at Node B.
2. Record the message sequence and parameters using a signal monitor.
3. CHECK A: Was the UDTS message correctly generated by Node B?
4. CHECK B: Were the parameter fields set correctly as indicated in the check table below?
5. CHECK C: Was the message sequence as above?

(continued)

(Test 5 concluded)

Check Table:

UDT (NODE A → NODE B)

1) Protocol Class : 10000000 (Class 0, Return on error option set); or

10000001 (Class 1, Return on error option set).

Called Party Address:

2) Global Title Indicator : 0100.

3) Routing Indicator: 0 (Route on GT).

4) Global Title : Valid but non-selectable translator table inputs (i.e. Translation Type, Numbering Plan, Nature of Address Indicator) which are sufficient to result in Return Cause 0 being sent.

UDTS (NODE B → NODE A)

5) Return Cause : 00000000 "no translation for an address of such nature".

6) Called Party Address: Derived from the calling party address in the UDT message.

7) Calling party address: Derived from the called party address in the UDT message.

8) Data : Same data as in the UDT message.

NOTE: The presence or coding of any address parameters not specifically mentioned are not critical to this test.

Test Number	6 (see ITU-T Recommendation Q.786 [3], test 1.1.2.1.5)
Reference	ITU-T Recommendation Q.714 [2], subclause 2.4 item 2
Title	GT Translation
Subtitle	Message contains GTAI which does not exist in the selected translation table of Node B (Return on error option set)
Purpose	To verify that UDTS is returned when unknown GT Address digits are received and the return on error option is set

Pre-test Conditions:

1. Arrange the generation of a UDT message from Node A to Node B with:

   - SCCP address information:

     - GTAI (of a valid type but not contained in the routing tables of Node B);

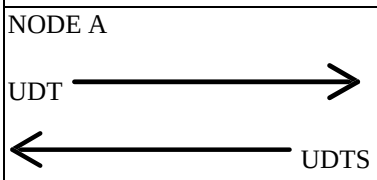
     - route on GT;

     - return on error option set.

2. Arrange the SCCP routing control data at Node B as follows:

   - No Global Title translation for specific address.

Expected Message Sequence



Test Description:

1. Arrange Node A to send a UDT message to Node B with a GT to be translated at Node B.
2. Record the message sequence and parameters using a signal monitor.
3. CHECK A: Was the UDTS message correctly generated by Node B?
4. CHECK B: Were the parameter fields set correctly as indicated in the check table below?
5. CHECK C: Was the message sequence as above?

(continued)

(Test 6 concluded)

Check Table:

UDT (NODE A → NODE B)

1) Protocol Class : 10000000 (Class 0, Return on error option set); or

10000001 (Class 1, Return on error option set).

Called Party Address:

3) Global Title Indicator : 0100.

4) Routing Indicator: 0 (Route on GT).

5) Global Title : Translation Type, as appropriate;

Encoding Scheme, as appropriate;

Numbering Plan, as appropriate;

Nature of Address Indicator, as appropriate;

Address information, unknown to Node B; but sufficient to result in Return Cause 1 being sent.

UDTS (NODE B → NODE A)

6) Return Cause : 00000001 "no translation for this specific address".

7) Called Party Address: Derived from the calling party address in the UDT message.

8) Calling party address: Derived from the called party address in the UDT message.

9) Data : Same data as in the UDT message.

NOTE: The presence or coding of any address parameters not specifically mentioned are not critical to this test.

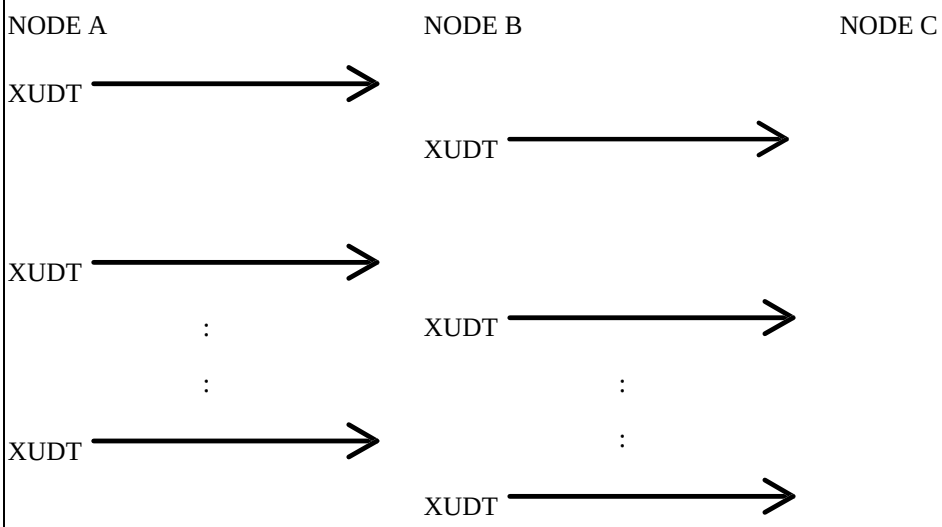
Test Number	7
Reference	ITU-T Recommendation Q.714 [2], subclause 4.1.1, as modified by ETS 300 009-1 [1]
Title	Connectionless procedures
Subtitle	Transfer of segmented user data
Purpose	To verify that segmented messages are correctly transferred NOTE: This test requires that all nodes in the test support the XUDT message type.

Pre-test Conditions:

1. Arrange the generation of user data which requires segmenting into XUDTs by the SCCP at Node A.
2. Arrange for the user data to be sent to a valid destination Node C via Node B.

NOTE: The presence of Node B is not essential for this test.

Expected Message Sequence



Test Description:

1. Arrange Node A to segment the user data into a number of segments and send the XUDT messages to Node C (possibly via Node B).
2. Record the message sequence and parameters using a signal monitor.
3. CHECK A: Were the XUDT messages correctly generated by Node A?
4. CHECK B: Were the messages received correctly at node C?

NOTE 1: The verification of reassembly is outside the scope of the present document.

5. CHECK C: Were the parameter fields set correctly as indicated in the check table below?
6. CHECK D: Was the message sequence as above?

(continued)

(Test 7 concluded)

Check Table:

XUDT (NODE A → NODE B)

1) Protocol Class : 00000001 (Class 1, Return on error option is not set);
or

10000001 (Class 1, Return on error option is set).

2) Called Party Address: all parameters coded appropriately.

3) Calling Party Address : all parameters coded appropriately (for example only the SSN may be included when Node B does not exist).

4) Segmentation : 4 octets long, with

Octet 1 : Bit 8 = 1 if first segment, otherwise 0;

: Bit 7 = 1/0 (in sequence delivery or out of sequence delivery);

: Bits 6 & 5 = 00 (spare);

: Bits 4 to 1 = number of remaining segments, as appropriate;

Octets 2 to 4 : Segmentation local reference, as appropriate.

XUDT (NODE B → NODE C)

5) Protocol Class : 00000001 (Class 1, Return on error option is not set); or

10000001 (Class 1, Return on error option is set).

6) Called Party Address: all parameters coded appropriately.

7) Segmentation : All octets to be identical to XUDT (NODE A → NODE B).

NOTE 2: The presence or coding of any address parameters not specifically mentioned are not critical to this test.

History

Document history				
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