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**Integrated Services Digital Network (ISDN);
Attachment requirements for terminal equipment to connect to
an ISDN using ISDN primary rate access**

(Candidate NET 5)

ETSI

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Foreword

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

The text of this ETS may be utilized, wholly or in part, for the establishment of NET 5.

Every ETS prepared by ETSI is a voluntary standard. This ETS has been prepared as a candidate NET which may be transposed, in whole or in part, into a mandatory NET by the Technical Recommendations Application Committee (TRAC). It therefore contains text concerning type approval of the equipment to which it relates. This text should be considered only as a guidance and does not make this ETS mandatory.

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1 Scope

This ETS specifies the attachment requirements for layers 1, 2 and 3, for Terminal Equipment (TE), as defined in subclause 4.1, to connect at the T reference point or coincident S and T reference point to a public Integrated Services Digital Network (ISDN) using primary rate access based on the following:

- layer 1 in accordance with ETS 300 011 [1];
- layer 2 in accordance with ETS 300 125 [11];
- layer 3 in accordance with ETS 300 102-1 [8] and ETS 300 102-2 [10].

In addition this ETS specifies those requirements for Electro Magnetic Compatibility (EMC), safety and protection that arise from connection to the ISDN primary rate access interface and that are not covered by generic standards under the EMC Directive (89/336/EEC) or Low Voltage Directive (73/23/EEC).

The Static Attachment Requirements (SAR) and tests specified in this ETS are for Terminal Equipments (TEs) having the capability of both originating a circuit switched call and receiving an incoming circuit switched call.

No requirements or tests are included in this ETS concerning the procedures for packet communications in the D-channel, user-to-user signalling or supplementary services. In addition, certain TEs of a specialised nature may employ supplementary services as part of their default operation characteristics. The requirements and tests for these specialised terminals are also not covered in this ETS.

NOTE 1: This ETS is written as an exceptions document and contains the "delta requirements" between the basic access (described in ETS 300 153 [6] and ETS 300 104 [7], which comprise Candidate NET 3) and the primary rate access.

NOTE 2: A possible 31 x B-channel application, where signalling is sent over the D-channel in a different primary rate access, is outside the scope of this ETS.

NOTE 3: The application of the interface for permanent leased lines (reference point C) as defined in ETS 300 011 [1], Annex C, is outside the scope of this ETS.

2 Normative references

This 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] ETS 300 011 (1992): "Integrated Services Digital Network (ISDN); Primary rate user-network interface, Layer 1 specification and test principles".
- [2] CCITT Recommendation I.411 (1988): "ISDN user-network interface - reference configurations".
- [3] ETS 300 046-1 (1992): "Integrated Services Digital Network (ISDN); Primary rate access - safety and protection, Part 1: General".
- [4] ETS 300 046-2 (1992): "Integrated Services Digital Network (ISDN); Primary rate access - safety and protection, Part 2: Interface I_a - safety".
- [5] ETS 300 046-3 (1992): "Integrated Services Digital Network (ISDN); Primary rate access - safety and protection, Part 3: Interface I_a - protection".
- [6] ETS 300 153 (1992): "Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access (Candidate NET 3, Part 1)".

- [7] ETS 300 104 (1990): "Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access, Layer 3 aspects (Candidate NET 3 Part 2)".
- [8] ETS 300 102-1 (1990): "Integrated Services Digital Network (ISDN); User-network interface layer 3, Specifications for basic call control".
- [9] ISO IS 9646-1 (1991): "OSI conformance testing methodology and framework - Part 1: General concepts".
- [10] ETS 300 102-2 (1990): "Integrated Services Digital Network (ISDN); User-network interface layer 3, Specifications for basic call control, Specification Description Language (SDL) diagrams".
- [11] ETS 300 125 (1991): "Integrated Services Digital Network (ISDN); User-network interface data link layer specification, Application of CCITT Recommendations Q.920/I.440 and Q.921/I.441".

3 Definitions and abbreviations

Clause 3 of ETS 300 153 [6] applies, together with Clauses 3 and 4 of ETS 300 011 [1].

4 General

4.1 Introduction

This ETS specifies the requirements which Terminal Equipment (TE) shall meet for attachment to the public ISDN primary rate user-network interface at the T, or coincident S and T, reference points. The primary rate user-network interface provides an ISDN primary rate access composed of 30 B-channels of 64 kbit/s each and a D-channel of 64 kbit/s. This ETS does not cover all the requirements which a specific type of TE has to meet.

Unless otherwise stated, the use of the term TE within this specification refers to customers' terminal apparatus which may be a Terminal Equipment Type 1 (TE1), a Terminal Adaptor (TA) or a (Network Termination Type 2 (NT2) as defined in CCITT Recommendation I.411 [2].

This ETS covers the requirements of apparatus providing the Power Source according to ETS 300 011 [1], independent of whether this source is an integral part of the apparatus or designed as a separate device.

However, there is no Static Attachment Requirement (SAR) regarding the provision of power feeding.

Communications between adjacent layers (primitive procedures) is conceptual and allows the description of interactions between functions dedicated to different layers within a TE. These primitive procedures do not constrain implementation, are system internal and therefore cannot be tested in isolation. However, as seen from the outside, the design of TE shall be such that the sequence of events across the user-network interface shall be the same as if the primitives were implemented as described in standards relevant to this ETS.

The layer 2 and 3 requirements and test schedules for this ETS are written as an exceptions document to the equivalent layer 2 and 3 parts of ETS 300 153 [6] (Candidate NET 3, Part 1) and ETS 300 104 [7] (Candidate NET 3, Part 2). The main differences are the outstanding window size at layer 2 and the Restart and Call Re-arrangement procedures at layer 3.

4.2 Configuration at the user-network interface

The only wiring configuration to be supported shall be point-to-point.

A TE attached to the public ISDN primary rate user-network interface shall support point-to-point data link with TEI value 0, and may optionally be capable of supporting additional point-to-point data links at layer 2, using non-automatic and/or automatic TEI assignment categories. In addition, the support of the broadcast data link (TEI value = 127) is:

- optional for terminals supporting only one TEI in the non-automatic assignment category;
- mandatory for terminals supporting one or more additional automatic or non-automatic TEI values, other than TEI = 0.

4.3 Testing and approval methodology

The tests specified in the following Clauses of this ETS shall verify the suitability of the TE for attachment to the public ISDN network.

Those functions and procedures which are optional as indicated in this ETS and for which there are tests in Annex A of this ETS shall be subject to an attachment test, if they are implemented in the TE. The means of determining whether an optional function/procedure has been implemented is by either apparatus supplier's statement or, in the case that no statement is given, as a result of testing the equipment for this function/procedure. Where no statement is made by the apparatus supplier as to the implementation (or not) of an optional function/procedure, and the testing of this feature reveals that the option has at least in part been implemented, the option shall be deemed to have been implemented and the apparatus shall be tested accordingly.

The user-network interface at the T, or S and T coincident reference points provides the only test access for the purpose of performing attachment tests. However, actions at other parts or interfaces of the implementation under test (e.g. at the man-machine interface, execution of higher layer processes, at the interface at the S-reference point in the case of NT2s or at the R-reference point in the case of terminal adaptors) may be used to invoke actions at layers 1, 2 and 3 of the D-channel protocol within the Implementation Under Test (IUT).

The attachment tests for each layer of the D-channel protocol are specified separately and test configuration(s) to be used in testing each layer are specified in the Clause of this ETS relating to the attachment tests for that layer.

Since the verification of a layer protocol normally depends on the proper operation of lower layer services needed for those functions, the verification tests should be performed in a sequential order beginning with the lowest layer. However, this general strategy does not preclude higher layer functions from being essential for the stimulation of lower layer functions under test. Thus at least basic functions of each layer in the IUT are required in order to perform an attachment test for a particular lower layer.

When carrying out a test, it may be necessary for the IUT to be maintained in the active state of a call. In such a case, it may be necessary for the tester to achieve this by procedural means related to functional entities outside the scope of this ETS (e.g. any layers above layer 2/3 for layer 2/3 testing respectively of the control plane, or any layer within the user plane).

Any action necessary to prevent the IUT from premature clearing shall be indicated by the supplier (see subclause 4.5).

This ETS does not require any additional test to cover the case of user equipment that can be connected to the public ISDN by means of multiple primary rate user network interfaces. Where there is more than one primary rate interface on the terminal equipment and these interfaces are implemented in the same manner, the tests shall be applied to only one of these interfaces.

4.4 Connection of IUT to the tester

A TE may be equipped with either a socket (see figure 1, case A) or with a wiring termination (case B).

For testing the following layer 1 requirements, electrical interface characteristics, EMC phenomena, electrical safety and overvoltage protection capabilities, the tester shall be connected directly to the interconnecting points for the interface wiring at the TE/IUT, as described in figure 1, Case A. If a cord is connected at the TE/IUT (i.e. the wiring termination in Case B) it shall be removed since a cord is regarded as an integral part of the interface wiring.

All other tests, e.g. functional and procedural interface characteristics, layer 2 and 3 tests, may be made with interface wiring complying with the requirements given in ETS 300 011 [1].

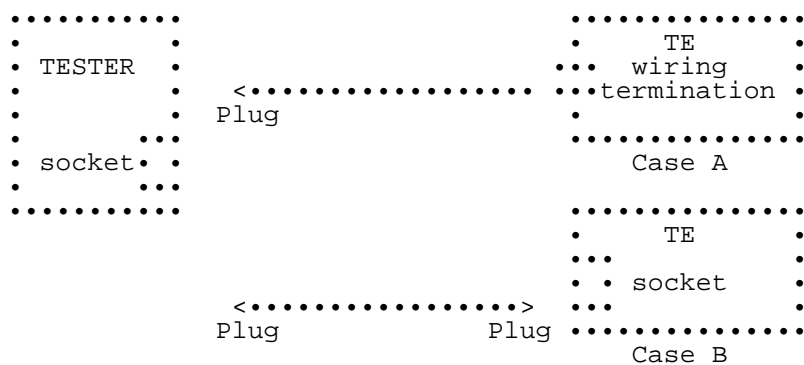


Figure 1: Connection of TE to tester

4.5 Information to be provided by the apparatus supplier

Apparatus suppliers shall provide the information required in this ETS to enable the tests to be carried out. Annex B of ETS 300 153 [6] provides guidance.

NOTE: Proforma for Protocol Implementation Conformance Statement (PICS) and Protocol Implementation eXtra Information for Testing (PIXIT) are being prepared.

4.6 Test support by the apparatus supplier's TEs

The apparatus supplier shall provide at least one of the following facilities:

- 1) a transparent loopback of at least one time slot towards the interface;
- 2) the ability to transmit a Pseudo Random Binary Signal (PRBS) $2^{11}-1$ in a time slot;
- 3) a test equipment using the same chip set and interface components as in the IUT and able to provide a transparent loopback of at least one time slot towards the interface;
- 4) a test equipment using the same chip set and interface components as in the IUT and able to provide a PRBS $2^{11}-1$ in a time slot.

NOTE: 1) and 2) are the preferred options.

4.7 Test environment

All tests shall be performed at:

- an ambient temperature in the range + 15° C to + 35° C,
- a relative humidity in the range 25 % to 75 %,
 - an air pressure in the range 86 kPa to 106 kPa, unless otherwise stated in a relevant standard either giving further general test conditions or specific conditions for a test.

For TE which is directly powered (either wholly or partly) from the mains supply, all tests shall be carried out within ± 5 % of the rated voltage. If the equipment is powered by other means and those means are not supplied as part of the apparatus (e.g. batteries, stabilised ac supplies, dc) all tests shall be carried out within the power supply limit declared by the supplier. If the power supply is ac, the test shall be conducted within ± 4 % of the rated frequency.

5 Layer 1 requirements

5.1 General

This Clause defines the requirements for equipment operation at layer 1 of the ISDN primary rate interface at T, or coincident S and T reference points. These requirements are specified in terms of the tests which

shall be passed. These tests are specified in ETS 300 011 [1], Annex C. All tests referring to interface I_b are not applicable according to the scope of this specification.

NOTE: Although the requirements of this Clause are specified in terms of tests alone, by referring to the tables in ETS 300 011 [1], Annex C, the reader may see how the tests are related to the requirements in ETS 300 011 [1].

5.2 Tests

The Static Attachment Requirements (SARs) define the tests with which, at a minimum, a TE shall comply to ensure the operability at primary rate access to the public network. For layer 1, the SAR is specified in tables 1 to 4.

Within the SAR tables the following notation is used:

M:	Mandatory (i.e. the equipment implementation shall conform to those clauses in that section relating to the operation of the layer 1 protocol of the interface, or where information is given for testing configurations it shall be adhered to);
N/A:	Not Applicable (i.e. the test shall not be applied for attachment testing);
ETS:	Clause or subclause number within ETS 300 011 [1];
SAR:	Static Attachment Requirement;
Comment:	Available for supportive comments/values;
GID:	General Information and Definitions.

ETS 300 011 [1], Annex C, subclause C.1.2, gives additional information concerning the testing of IUT with more than one interface I_a. ETS 300 011 [1], Annex C, subclause C.1.2.2, gives additional definitions which are used in the test specifications.

5.2.1 Electrical characteristics

Table 1: Layer 1, electrical characteristics

Functions	ETS	SAR	Comment
Electrical characteristics tests	C.2.	GID	
Bit rate when unsynchronized	C.2.1.	M	NOTE 1
Received and transmitted line code	C.2.2.	GID	
Received line code	C.2.2.1	M	
Transmitted line code	C.2.2.2	M	
Specifications at the output ports	C.2.3.	GID	
Pulse shape and amplitude of a mark (pulse)	C.2.3.1.	M	
Peak voltage of a space (no pulse)	C.2.3.2.	M	
Ratio of the amplitudes of positive and negative pulses at the centre of the pulse interval	C.2.3.3.	M	
Ratio of the widths of positive and negative pulses at the nominal half amplitude	C.2.3.4.	M	
Specifications at the input ports	C.2.4.	GID	
Return loss at the input port	C.2.4.1	M	
Input port immunity against reflections	C.2.4.2.	M	
Frame structure	C.2.5.	GID	
Number of bits per time-slot	C.2.5.1.	N/A	
Number of time-slots per frame	C.2.5.2.	N/A	
Assignments of bits in time-slot 0	C.2.5.3.	GID	
Generation of frame alignment word	C.2.5.3.1.	M	
Sa bits	C.2.5.3.2.	N/A	
Time-slot assignment	C.2.6.	N/A	
Timing considerations	C.2.7.	GID	
AIS recognition	C.2.7.1.	M	
Synchronization	C.2.7.2.	M	
Jitter	C.2.8.	GID	
Minimum tolerance to jitter and wander at inputs	C.2.8.1.	M	
Output jitter	C.2.8.2.	GID	
Output jitter with no jitter at the input supplying timing	C.2.8.2.1.	M	
Output jitter at network side	C.2.8.2.2.	N/A	
Tolerable longitudinal voltage	C.2.9.	M	
Output signal balance	C.2.10.	N/A	NOTE 2
Impedance towards ground	C.2.11.	GID	
Impedance towards ground of the receiver	C.2.11.1.	M	
Impedance towards ground of the transmitter	C.2.11.2.	M	
NOTE 1: The relevant tolerance shall be ± 50 ppm.			
NOTE 2: This item is N/A because appropriate test specifications are not available. This SAR will be reviewed when further progress has been made with the EMC standards.			

5.2.2 Functional characteristics

Table 2: Layer 1, functional characteristics

Functions	ETS	SAR	Comment
Functional characteristics tests	C.3.	GID	
Test of signals sent by IUT	C.3.1.	GID	
HDB3 coding and normal operational frame	C.3.1.1.	M	
Remote alarm indication	C.3.1.2.	M	
Alarm indication signal	C.3.1.3.	N/A	
CRC error information	C.3.1.4.	M	
Remote alarm indication and continuous CRC error indication	C.3.1.5.	N/A	
States-matrix at the IUT	C.3.2.	GID	
States-matrix at the IUT network side	C.3.2.1.	N/A	
States-matrix at the IUT user side	C.3.2.2.	M	

5.2.3 Interface procedures

Table 3: Layer 1, interface procedure

Functions	ETS	SAR	Comment
Interface procedures tests	C.4.	GID	
Codes for idle channels and idle slots	C.4.1.	M	
Interframe (layer 2) time fill	C.4.2.	M	NOTE
Frame alignment (without the test of CRC procedure)	C.4.3.	M	
CRC multiframe alignment	C.4.4.	M	
CRC processing	C.4.5.	M	
NOTE: This test is possible only when layer 2 is implemented			

5.2.4 Power feeding

Table 4: Layer 1, power feeding

Functions	ETS	SAR	Comment
Provision of power and feeding voltage	C.5.	N/A	

6 EMC requirements

The scope of this ETS is such that it should define only those requirements for equipment immunity to electromagnetic interferences and emission limitation that arise from the connection to the ISDN primary rate interface and that are not covered by generic standards under the EMC Directive (89/336/EEC). Therefore, any requirements shall be limited to conducted emissions. Because appropriate specifications are not available, the need for a requirement for conducted emissions will be reviewed when further progress has been made with the EMC standards.

7 Safety requirements

7.1 General

This Clause defines only those requirements for equipment electrical safety that arise from connection to the ISDN primary rate interface and that are not covered by generic standards under the Low Voltage Directive (72/23/EEC). The associated conformance tests are specified in ETS 300 046-2 [4] together with ETS 300 046-1 [3].

7.2 Static attachment requirements

Table 5 specifies the minimum electrical safety requirements. In table 5 the following notation is used:

- ETS: Clause or subclause number within ETS 300 046-2 [4];
- M: Conformance with this Clause or subclause is mandatory;
- SAR: Static Attachment Requirement (minimal acceptance);
- GID: General Information and Definitions.

Table 5: Safety requirements

Requirement	ETS	SAR
Safety requirements and tests	5	GID
General	5.1	M
Touch current	5.3	M
Connection of PE conductor for equipment with multiple interfaces	Annex A	N/A

8 Protection requirements

8.1 General

This Clause defines the requirements for equipment overvoltage protection at the ISDN primary rate interface. The associated conformance tests are specified in ETS 300 046-3 [5] together with ETS 300 046-1 [3].

8.2 Static attachment requirements

Table 6 specifies the minimum overvoltage protection requirements. In table 6 the following notation is used:

- ETS: Clause or subclause number within ETS 300 046-3 [5];
- M: Conformance with this Clause or subclause is mandatory;
- SAR: Static Attachment Requirement;
- GID: General Information and Definitions;
- N/A: Not applicable;
- O: Optional.

Table 6: Protection requirements

Requirement	ETS	SAR
Overvoltage surge simulation at interface Ia:	5.5	GID
- common mode test	5.5.1	N/A
- transverse mode test between transmit and receive pairs	5.5.2	N/A
Mains overvoltage simulation:	5.6	GID
- common mode test	5.6.1	N/A
- transverse mode test	5.6.2	N/A
Impulse transfer	5.7	GID
- impulse transfer from mains	5.7.1	M
- impulse transfer from auxiliary interface	5.7.2	O
- conversion of common to transverse mode	5.7.3	M
Electrostatic discharge (ESD)	5.8	N/A
Miswiring resistibility test	5.9	N/A
Voltage and current limitation under single fault conditions	5.10	M
Enhanced requirements for extra-strength equipment	Annex A	N/A

9 Layer 2 requirements

The complete text of ETS 300 153 [6], Clause 9 applies. However, the following items shall be changed:

- Subclause 9.1 The first sentence shall be changed to: "This section defines the requirements for TE operation at layer 2 of the ISDN primary rate interface at T, or S and T coincident reference points (CCITT Recommendation I.411 [2])."
- Subclause 9.2 After the first sentence insert: "This is optional for those TEs which support only TEI value 0 for signalling (SAPI value = 0)."
- Subclause 9.3 Delete the last two sentences and include the following one. "TEI = 0 shall be supported by the user; in addition other TEI values in the range 1-63 (non-automatic assignment) or in the range 64-126 (automatic assignment) may also be supported. If TEI values other than TEI value 0 are supported for signalling, then TEI value 127 (for broadcast data link) shall also be supported where SAPI value = 0."
- Subclause 9.4 Delete the following part in the first Clause: "layer 1 contention in the case of access to the passive bus,".

Subclause 9.6.3.3 Add the following text above table 11: "In the case where the IUT supports only TEI = 0, the TEI management procedures do not need to be supported."

Subclause 9.6.3.10 This whole section shall be deleted (including title).

10 Layer 3 requirements

10.1 General

Subclause 2.1 of ETS 300 104 [7] applies. However, the following text shall be inserted after the first Clause:

"Use of non-associated D-channel signalling according to ETS 300 102-1 [8], Annex F, is beyond the scope of this ETS.

The TE is only required to support a primary rate access where the D-channel signalling is associated with that particular primary rate access."

10.2 Static attachment requirements

Subclause 2.2 of ETS 300 104 [7] applies.

10.2.1 Functional Characteristics

10.2.1.1 General

Subclause 2.2.1.1 of ETS 300 104 [7] applies.

10.2.1.2 Overview of call control

Subclause 2.2.1.2 of ETS 300 104 [7] applies. However, the following lines shall be changed.

Table 7: Amendments to table 2 of ETS 300 104 [7] - Layer 3 call states requirements

Functional characteristics				
Function = Call state	ETS	SAR	Comments	
Suspend request (U15)	subclause 2.1.1.13	N/A	NOTE 3	
Resume request (U17)	subclause 2.1.1.14	N/A	NOTE 3	
States associated with the global call ref.	subclause 2.4	GID		
Call states at the user side of the interface.	subclause 2.4.1	GID		
Null (Rest 0)	subclause 2.4.1.1	M		
Restart request (rest 1)	subclause 2.4.1.2	O	NOTE 2	
Restart (rest 2)	subclause 2.4.1.3	M		
NOTE 2: The user shall implement the Restart Procedures (see subclause 5.5 of ETS 300 102-1 [8]). Whether the user actually sends a RESTART message is however optional. Therefore the RESTART request (Rest 1) state is also optional.				
NOTE 3: The use of the call rearrangement procedure is restricted to basic access (see ETSI Requirement, subclause 5.6, of ETS 300 102-1 [8]).				
NOTE: Normative references given in the notes to table 7 refer to the normative references contained in Clause 2 of this ETS.				

10.2.1.3 Message definition and content

Subclause 2.2.1.3 of ETS 300 104 [7] applies. However, the following lines shall be changed.

Table 8: Amendments to table 3 of ETS 300 104 [7] - Layer 3 message definition and content requirements

```

.....
.                               Functional characteristics                               .
.....
. Function = Message             . ETS             . SAR             . Comments       .
. definition and content        .               .               .               .
.....
. RESUME                         . subclause 3.1.13 . N/A             . NOTE 4         .
. RESUME ACKNOWLEDGE            . subclause 3.1.14 . N/A             . NOTE 4         .
. RESUME REJECT                  . subclause 3.1.15 . N/A             . NOTE 4         .
. SUSPEND                        . subclause 3.1.20 . N/A             . NOTE 4         .
. SUSPEND ACKNOWLEDGE           . subclause 3.1.21 . N/A             . NOTE 4         .
. SUSPEND REJECT                 . subclause 3.1.22 . N/A             . NOTE 4         .
. Message used with the         . subclause 3.4    . GID             .               .
. global call reference.        .                  .                 .               .
. RESTART                        . subclause 3.4.1  . O               . NOTE 3         .
. RESTART ACKNOWLEDGE           . subclause 3.4.2  . O               . NOTE 5         .
. STATUS                         . subclause 3.4.3  . M               .               .
.....
. NOTE 3: The procedures of subclauses 5.5.1 and 5.5.2 of
. ETS 300 102-1 [8] shall be implemented (see subclause
. 5.5a of ETS 300 102-1 [8]). It is however optional
. whether sending a RESTART will ever be invoked. But all
. TES shall be able to receive the message and handle it
. correctly.
.
. NOTE 4: The use of the call re-arrangement procedure is restricted
. to basic access (see ETSI Requirement, subclause 5.6, of
. ETS 300 102-1 [8]),
.
. NOTE 5: The procedures of subclauses 5.5.1 and 5.5.2 of
. ETS 300 102-1 [8] shall be implemented (see subclause
. 5.5c of ETS 300 102-1 [8]). It is however optional
. whether sending a RESTART will ever be invoked and hence
. a RESTART ACKNOWLEDGE will ever be received. But all TES
. shall be able to send the RESTART ACKNOWLEDGE message.
.
.....

```

NOTE: Normative references given in the notes to table 8 refer to the normative references contained in Clause 2 of this ETS.

10.2.1.4 Message format and information element coding

Subclause 2.2.1.4 of ETS 300 104 [7] applies. However, the following lines shall be changed.

Table 9: Amendments to table 4 of ETS 300 104 [7] - Layer 3 message format and coding requirements

```

.....
.                               Functional characteristics                               .
.....
. Function = Message             . ETS             . SAR             . Comments       .
. format and information        .               .               .               .
. element coding                .               .               .               .
.....
. Call identity                  . subclause 4.5.6  . N/A             . NOTE 3         .
. Restart indicator              . subclause 4.5.24 . M               .               .
.....
. NOTE 3: The use of the call re-arrangement procedure is restricted
. to basic access (see ETSI Requirement, subclause 5.6, of
. ETS 300 102-1 [8]).
.
.....

```

NOTE: Normative references given in the notes to table 9 refer to the normative references contained in Clause 2 of this ETS.

10.2.1.5 Layer 3 system parameters

Subclause 2.2.1.5 of ETS 300 104 [7] applies. However, the following lines shall be changed.

Table 10: Amendments to table 5 of ETS 300 104 [7] - Layer 3 system parameters requirements

Functional characteristics			
Function = Layer 3 system parameters	ETS	SAR	Comments
T316	subclause 9.2	NOTE 2	
T317	subclause 9.2	M	
T318	subclause 9.2	N/A	NOTE 3
T319	subclause 9.2	N/A	NOTE 3

NOTE 2: If the TE is capable of sending a RESTART message, timer T316 is mandatory, otherwise it is not applicable.

NOTE 3: The use of the call re-arrangement procedure is restricted to basic access (see ETSI Requirement, subclause 5.6 of ETS 300 102-1 [8], ETSI Requirement).

NOTE: Normative references given in the notes to table 10 refer to the normative references contained in Clause 2 of this ETS.

10.2.2 Interface procedures

10.2.2.1 Call establishment

Subclause 2.2.2.1 of ETS 300 104 [7] applies. However, the following lines shall be changed.

Table 11: Amendments to table 6 of ETS 300 104 [7] - Layer 3 call establishment requirements

Interface procedures			
Procedure = Call establishment	ETS	SAR	Comments
Compatibility checking	subclause 5.2.2	M	NOTE 4
SETUP message delivered by broadcast data link	subclause 5.2.3.2	N/A	
Non-selected user Clearing	subclause 5.2.9	N/A	
Compatibility checking	Annex B	M	

NOTE 4: For an NT2 Annex B, subclause 3.3 of ETS 300 102-1 [8] is Optional but Mandatory in the case of interworking.

NOTE: Normative references given in the notes to table 11 refer to the normative references contained in Clause 2 of this ETS.

10.2.2.2 Call clearing

Subclause 2.2.2.2 of ETS 300 104 [7] applies.

10.2.2.3 Tones and announcements

Subclause 2.2.2.3 of ETS 300 104 [7] applies.

10.2.2.4 Restart

Subclause 2.2.2.4 of ETS 300 104 [7] applies. However, the following lines shall be changed.

Table 12: Amendments to table 9 of ETS 300 104 [7] - Layer 3 restart requirements

```

.....
.                               Interface procedures                               .
.....
. Function = Restart      .      ETS      . SAR      . Comments      .
.....
. Restart procedure      . subclause 5.5      . M      .NOTE      .
. Receiving RESTART      . subclause 5.5.2      . M      .      .
.....
. NOTE: The procedures of subclauses 5.5.1 and 5.5.2 of      .
. ETS 300 102-1 [8] shall be implemented (see subclause 5.5c      .
. of ETS 300 102-1 [8]). It is however optional whether      .
. sending a RESTART will ever be invoked.      .
.....
NOTE: Normative references given in the notes to table 12 refer to the normative references
      contained in Clause 2 of this ETS.

```

10.2.2.5 Call re-arrangement

Subclause 2.2.2.5 of ETS 300 104 [7] applies. However, the following lines shall be changed.

Table 13: Amendments to table 10 of ETS 300 104 [7] - Layer 3 call re-arrangement requirements

```

.....
.                               Interface procedures                               .
.....
. Function = Call re-    .      ETS      . SAR      . Comments      .
. arrangement           .      .      .      .      .
.....
. Call re-arrangements  . subclause 5.6      . GID      .      .
. Call suspension       . subclause 5.6.1    . N/A      .NOTE 1    .
. Call suspended        . subclause 5.6.2    . N/A      .NOTE 1    .
. Call suspend error    . subclause 5.6.3    . N/A      .NOTE 1    .
. Call re-establishment . subclause 5.6.4    . N/A      .NOTE 1    .
. Call resume error     . subclause 5.6.5    . N/A      .NOTE 1    .
. Double suspension     . subclause 5.6.6    . N/A      .NOTE 1    .
. Call re-arrangement   . subclause 5.6.7    . O        .      .
. controlled by an NT2  .      .      .      .      .
. User notification     . subclause 5.9      .      .      .
. Procedure             .      .      .      .      .
. - Receipt of          .      .      . M        .      .
. - Generation of       .      .      . O        .      .
.....
. NOTE 1: The use of the call re-arrangement procedure is restricted      .
. to basic access, see ETSI Requirements, subclause 5.6 of      .
. ETS 300 102-1 [8].      .
.....
NOTE: Normative references given in the notes to table 13 refer to the normative references
      contained in Clause 2 of this ETS.

```

10.2.2.6 User-to-user signalling

Subclause 2.2.2.6 of ETS 300 104 [7] applies.

10.2.2.7 Handling of error conditions

Subclause 2.2.2.7 of ETS 300 104 [7] applies.

10.2.2.8 Packet communications

Subclause 2.2.2.8 of ETS 300 104 [7] applies.

10.2.2.9 Supplementary services

Subclause 2.2.2.9 of ETS 300 104 [7] applies.

10.2.2.10 Symbolic Description Language (SDLs)

Subclause 2.2.2.10 of ETS 300 104 [7] applies.

10.2.3 Automatic call repeat attempts

No requirement exists within the scope of this ETS.

Annex A (normative): Test schedules

A.1 Test schedule for layer 1 conformance

Conformance to the requirements specified in this ETS shall be tested using the appropriate tests specified in the following:

- ETS 300 011 [1], Annex C, for electrical, functional and procedural requirements;
- ETS 300 046-2 [4], for safety requirements;
- ETS 300 046-3 [5], for protection requirements.

A.2 Test schedule for layer 2 conformance

A.2.1 Introduction

The text of object and scope of ETS 300 153 [6], subclause A.1.1, plus test schedule, General subclause A.2.1 applies. However, paragraph 4, subclause A.2.1 has to be changed and paragraph 5 shall be included.

Para 4: If a TE acknowledges within T200 an I-frame by an I-frame instead of an RR-frame, the TE shall not be considered to have failed the test and the test shall be continued. This is applicable to tests in subclauses 2.2, 2.3, 2.4, 4.2, 4.3, and 8.4.3.

Para 5: For all the tests, specified in the Test Schedule, the default values for the layer 2 parameters for a 64 kbit/s D-channel (as specified in table 3 of ETS 300 125 [11]) are applicable.

Each time S/T appears it shall be changed to "T, or S and T coincident".

A.2.2 Test schedule

A.2.2.1 Initialisation

Subclause A.2.2.1 of ETS 300 153 [6] applies. However, the precondition of test A.2.2.1.1 shall be changed to:

"The data link shall be in the TEI assigned state (TEI used in the range 0-63 or 64-126 if obtained using management procedures).

The sequence may be started by call origination from the terminal or by offering the terminal a compatible call."

A.2.2.2 Frame transfer tests

The tests of subclause A.2.2.2 of ETS 300 153 [6] excluding subclause A.2.2.2.1 shall apply.

In addition one extra test shall be included as described in the following pages.

Additional test A.2.2.2.5 of ETS 300 153 [6]

A.2.2.2.5 Multiple outstanding I-frames

Purpose: Ensures that the maximum number of unacknowledged I-frames equals K (=7).

This test consists of 3 parts:

- 1) Stimulating layer 3 to invoke K+1 service requests (DL_DATA_REQ).
- 2) Execution of the first K service requests by layer 2.
- 3) Checking whether the (K+1)th service request is not executed before the first K I-frames are acknowledged.

Expected sequence:

Part 1

	Tester	Terminal
	• (SAPI, TEI) RNR c N(R) p=0	•
	1>	•
	• (SAPI, TEI) I c N(S) N(R) p=0	•
Update V(S)	2>	•
	• (SAPI, TEI) RR r N(R) f=0	•
Update V(A)	•<.....	•3

Execute the above sequence K+1 times. The I-frames from the tester shall contain RELEASE messages with different call reference values in each repeated sequence.

NOTE 1: The repetition of RNR should prevent a T200 timeout, at the user side, because RNR will restart T200.

Before executing part 2, the tester shall continue sending RNR-frames (Interval between RNR-frames < T200) until layer 3 has requested all DL_DATA_REQ primitives. The processing time for all the RELEASE messages shall be supplied by the apparatus supplier.

Part 2

	• (SAPI, TEI) RNR c N(R) p=0	•
N(R)=0	4>	•
	• (SAPI, TEI) RR c N(R) p=0	•
N(R)=0	5>	•
	• (SAPI, TEI) I c N(S) N(R) p=0	•
N(S) shall be V(R)	•<.....	•6
V(R)=V(R)+1	•	•
Repeat part 2 K times.		

NOTE 2: The alternation of RNR and RR should prevent a timeout of T200 at the user side (due to possible delays at layers 3 and 2) because RNR will restart T200. None of the I-frames transmitted by the TE is acknowledged by the tester.

Part 3a: Expected sequence when I-frame retransmission is implemented.

	• (SAPI, TEI) I c N(S) N(R) p=1	•
Timeout T200	•<.....	•7
N(S) shall be K-1	•	•
	• (SAPI, TEI) REJ r N(R) f=1	•
N(R)=K	8>	•
	• (SAPI, TEI) I c N(S) N(R) p=0	•
N(S) shall be K	•<.....	•9

Part 3b: Expected sequence when I-frame retransmission is not implemented.

Timeout T200	•	(SAPI, TEI) RR c N(R) p=1	•
	•<	•10
	•		•
	•	(SAPI, TEI) RR r N(R) f=1	•
N(R)=K	11	•.....>	•
	•	(SAPI, TEI) I c N(S) N(R) p=0	•
N(S) shall be K	•<	•12

Precondition: Data link shall be in the MF established state. V(S) and V(R) shall be reset to 0 by running test A.2.2.1.5 of ETS 300 153 [6].

Frame content to terminal:

1,4	A 4 octet RNR-frame	(SAPI=0, TEI=current TEI) c=1, p=0.
2	A "n" octet I-frame	(SAPI=0, TEI=current TEI) c=1, p=0. Layer 3 content - RELEASE.
5	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) c=1, p=0.
8	A 4 octet REJ-frame	(SAPI=0, TEI=current TEI) r=0, f=1.
11	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) r=0, f=1.

Frame content from terminal:

3	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) r=1, f=0.
6,9,12	An "n" octet I-frame	(SAPI=0, TEI=current TEI) c=0, p=0. Layer 3 content - RELEASE COMPLETE.
7	An "n" octet I-frame	(SAPI=0, TEI=current TEI) c=0, p=1. Layer 3 content - RELEASE COMPLETE.
10	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) c=0, p=1.

Refer to: ETS 300 125 [11], Part 2, Q.921, subclause 5.6.1.

A.2.2.3 Layer 2 disconnection

Subclause A.2.2.3 of ETS 300 153 [6] applies.

A.2.2.4 Link failure

Clause 4 of IS 9646-4 [9] applies. However, the following test shall be included.

Additional test 4.5 of ISO IS 9646-1 [9]

4.5 Multiple acknowledge after RR response frame loss

Purpose: Ensures that simultaneous acknowledgement of more than one frame is allowed.

This test consists of 2 parts:

- 1) Stimulating layer 3 to invoke 2 service requests (DL-DATA-REQ).
- 2) Execution of the 2 service requests by layer 2 and checking whether an acknowledgement of only the last one (RR-frame loss) is sufficient.

Expected sequence:

Part 1

	Tester		Terminal
	1	• (SAPI, TEI) RNR c N(R) p=0	•
		•>	•
Update V(S)	2	• (SAPI, TEI) I c N(S) N(R) p=0	•
		•>	•
Update V(A)		• (SAPI, TEI) RR r N(R) f=0	•
		•<.....	•3

Repeat the above sequence 2 times. The I-frames from the tester shall contain RELEASE messages with a different call reference value in the repeated sequence.

NOTE: The retransmission of RNR should prevent a timeout of T200 at the user side because RNR will restart T200.

Before executing part 2, the tester shall continue sending RNR-frames (Interval between RNR-frames < T200) until layer 3 has requested all DL_DATA_REQ primitives. The processing time for all the release messages shall be supplied by the apparatus supplier.

Part 2

N(R)=0	4	• (SAPI, TEI) RR c N(R) p=0	•
		•>	•
N(S) shall be V(R)		• (SAPI, TEI) I c N(S) N(R) p=0	•
V(R)=V(R)+1		•<.....	•5
		•	•
Tester simulates		•	•
RR-frame loss		•	•
(ET to TE)		•	•
N(S) shall be V(R)		• (SAPI, TEI) I c N(S) N(R) p=0	•
V(R)=V(R)+1		•<.....	•6
		•	•
N(R)=2	7	• (SAPI, TEI) RR r N(R) f=0	•
		•>	•
		Wait at least T200	

Precondition: Data link shall be in the MF established state. V(S) and V(R) shall be reset to 0 by running test A.2.2.1.5 of ETS 300 153 [6].

Frame content to terminal:

1	A 4 octet RNR-frame	(SAPI=0, TEI=current TEI) c=1, p=0.
2	An "n" octet I-frame	(SAPI=0, TEI=current TEI) c=1, p=0. Layer 3 content - RELEASE.
4	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) c=1, p=0.
7	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) r=0, f=0.

Frame content from terminal:

3	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) r=1, f=0.
5,6	An "n" octet I-frame	(SAPI=0, TEI=current TEI) c=0, p=0. Layer 3 content - RELEASE COMPLETE.

Refer to: ETS 300 125 [11], Part 2, Q.921, subclause 5.6.3.2.

A.2.2.5 Flow control

Subclause A.2.2.5 of ETS 300 153 [6] applies.

A.2.2.6 Layer 2 command collision

Subclause A.2.2.6 of ETS 300 153 [6] applies.

A.2.2.7 Management procedures

Subclause A.2.2.7 of ETS 300 153 [6] applies. However, the following paragraph shall be added as the first paragraph to this section:

"The tests in this section shall not be performed in the case where the terminal supports only fixed TEIs."

A.2.2.8 Provocative testing

Subclause A.2.2.8 of ETS 300 153 [6] applies. However, the following test shall be altered.

Altered text for subclause A.2.2.8.4.2 of ETS 300 153 [6]

A.2.2.8.4.2 Forced I-frame retransmission.

Purpose: Ensures that on receipt of a REJ-frame the terminal transmits the appropriate I-frames.

This test consists of 2 parts:

- 1) Stimulating layer 3 to invoke 2 service requests (DL-DATA-REQ).
- 2) Execution of the 2 service requests by layer 2 and checking whether the receipt of an REJ-frame (rejecting both I-frames) invokes retransmission of both I-frames.

Expected sequence:

Part 1

	Tester	Terminal
	• (SAPI, TEI) RNR c N(R) p=0	•
1	•>	•
Update V(S)	• (SAPI, TEI) I c N(S) N(R) p=0	•
2	•>	•
Update V(A)	• (SAPI, TEI) RR r N(R) f=0	•
	<•	•3

Execute the above sequence 2 times. The I-frames from the tester shall contain RELEASE messages with a different call reference value in the repeated sequence.

NOTE: The retransmission of RNR should prevent a timeout of T200 at the user side because RNR will restart T200.

Before executing part 2, the tester shall continue sending RNR-frames (Interval between RNR-frames < T200) until layer 3 has requested all DL_DATA_REQ primitives. The processing time for all the RELEASE messages shall be supplied by the apparatus supplier.

Part 2

N(R)=0	4	• (SAPI, TEI) RR c N(R) p=0	•
		•>	•
N(S) shall be V(R)		• (SAPI, TEI) I c N(S) N(R) p=0	•
V(R)=V(R)+1		<•	•5
Tester simulates		•	•
I-frame loss		•	•
		• (SAPI, TEI) I c N(S) N(R) p=0	•
N(S) shall be V(R)		<•	•6
V(R)=V(R)+1		•	•
N(R)=0 V(R)=0	7	• (SAPI, TEI) REJ r N(R) f=0	•
		•>	•
N(S) shall be V(R)		• (SAPI, TEI) I c N(S) N(R) p=0	•
V(R)=V(R)+1		<•	•8
		•	•
N(R)=1	9	• (SAPI, TEI) RR r N(R) f=0	•
		•>	•
N(S) shall be V(R)		• (SAPI, TEI) I c N(S) N(R) p=0	•
V(R)=V(R)+1		<•	•10
		•	•
N(R)=2	11	• (SAPI, TEI) RR r N(R) f=0	•
		•>	•

Precondition: Data link shall be in the MF established state. V(S) and V(R) shall be reset to 0 by running test A.2.2.1.5 of ETS 300 153 [6].

Frame content to terminal:

- 1 A 4 octet RNR-frame (SAPI=0, TEI=current TEI) c=1, p=0.
- 2 An "n" octet I-frame (SAPI=0, TEI=current TEI) c=1, p=0.
Layer 3 content - RELEASE.
- 4 A 4 octet RR-frame (SAPI=0, TEI=current TEI) c=1, p=0.
- 7 A 4 octet REJ-frame (SAPI=0, TEI=current TEI) r=0, f=0.

- 9,11 A 4 octet RR-frame (SAPI=0, TEI=current TEI) r=0, f=0.

Frame content from terminal:

- 3 A 4 octet RR-frame (SAPI=0, TEI=current TEI) r=1, f=0.
- 5,6,8,10 An "n" octet I-frame (SAPI=0, TEI=current TEI) c=0, p=0.
Layer 3 content - RELEASE COMPLETE.

Refer to: ETS 300 125 [11], Part 2, Q.921, subclause 5.6.4.

A.2.2.9 Layer 2 timer and transmission counter tests

The tests of subclause A.2.2.9 of ETS 300 153 [6] shall apply. However, the following test shall be included.

Additional test A.2.2.9.3 of ETS 300 153 [6]

A.2.2.9.3 Restart of Timer T200

Purpose: Ensures that the terminal restarts timer T200 upon receipt of an acknowledgement while there are still outstanding I-frames unacknowledged.

This test consists of 2 parts:

- 1) Stimulating layer 3 to invoke 2 service requests (DL-DATA-REQ).
- 2) Execution of the 2 service requests by layer 2. The first I-frame shall be acknowledged after the second one is received.

Expected sequence:

Part 1

	Tester	Terminal
	•	•
	• (SAPI, TEI) RNR c N(R) p=0	•
1	•>	•
	• (SAPI, TEI) I c N(S) N(R) p=0	•
Update V(S)	2 •>	•
	• (SAPI, TEI) RR r N(R) f=0	•
Update V(A)	•<	•3

Execute the above sequence twice. The I-frames from the tester shall contain RELEASE messages with a different call reference value in the repeated sequence.

NOTE: The retransmission of RNR should prevent a timeout of T200 at the user side because RNR will restart T200.

Before executing part 2, the tester shall continue sending RNR-frames (Interval between RNR-frames < T200) until layer 3 has requested all DL_DATA_REQ primitives. The processing time for all the RELEASE messages shall be supplied by the apparatus supplier.

Part 2

```

N(R)=0          4  • (SAPI, TEI) RR c N(R) p=0          •
                  <.....> •
N(S) shall be V(R) • (SAPI, TEI) I c N(S) N(R) p=0 •
V(R)=V(R)+1      • .....> •5
Start Timer1     • .....> •
                  • .....> •
N(S) shall be V(R) • (SAPI, TEI) I c N(S) N(R) p=0 •
V(R)=V(R)+1      • .....> •6
Wait until      • .....> •
Timer1 > 5%*T200 • .....> •
                  • .....> •
N(R)=1          7  • (SAPI, TEI) RR r N(R) f=0          •
Start Timer 2    • .....> •

```

Expected sequence when I-frame retransmission is not implemented.

```

Ensure Timer 2   • (SAPI, TEI) RR c N(R) p=1          •
within interval • .....> •8
T200 +/- 5%     • .....> •
N(R)=2          9  • (SAPI, TEI) RR r N(R) f=1          •
                  • .....> •

```

Expected sequence when I-frame retransmission is implemented.

```

Ensure Timer 2   • (SAPI, TEI) I c N(S) N(R) p=1          •
within interval • .....> •10
T200 +/- 5%     • .....> •
N(R)=2          11 • (SAPI, TEI) REJ r N(R) f=1          •
                  • .....> •

```

Precondition: Data link shall be in the MF established state. V(S) and V(R) shall be reset to 0 by running test A.2.2.1.5 of ETS 300 153 [6].

Frame content to terminal:

1	A 4 octet RNR-frame	(SAPI=0, TEI=current TEI) c=1, p=0.
2	An "n" octet I-frame	(SAPI=0, TEI=current TEI) c=1, p=0. Layer 3 content - RELEASE.
4	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) c=1, p=0.
7	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) r=0, f=0.
9	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) r=0, f=1.
11	A 4 octet REJ-frame	(SAPI=0, TEI=current TEI) r=0, f=1.

Frame content from terminal:

3	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) r=1, f=0.
5,6	An "n" octet I-frame	(SAPI=0, TEI=current TEI) c=0, p=0. Layer 3 content - RELEASE COMPLETE.
8	A 4 octet RR-frame	(SAPI=0, TEI=current TEI) c=0, p=1.
10	An "n" octet I-frame	(SAPI=0, TEI=current TEI) c=0, p=1. Layer 3 content - RELEASE COMPLETE.

Refer to: ETS 300 125 [11], Part 2, Q.921, subclause 5.6.3.2.

A.3 Test schedule for layer 3 conformance

Section 0: Introduction

A.3.0 Introduction

The text of Section 0 (Introduction) of ETS 300 104 [7] Annex A, applies. However, the following items printed in bold shall be changed.

Altered items of ETS 300 104 [7] Annex A

1 Object and scope

The object of part 3 of the annex to this ETS is to provide procedures which shall be applied to test the conformance of Terminal Equipment to the necessary requirements of ETS 300 102-1 [8] and ETS 300 102-2 [10], as described in Clause 5 of this ETS.

The testing is performed using the . . . (etc) . . .

2 Preliminary notes

- 1.1.1) a message which is **5** octets long with the message type coded to a value not yet identified . . .(etc) . . .
- 1.1.2) a message which contains a Call reference information element with an invalid Call reference format (i.e. with bits 5 to 8 not equal to "0000") **or indicating a length (bits 1 through 4) greater than the maximum length supported by the receiving equipment (maximum length is 2 octets).**
- 1.2) for the tests which are only performed in Section 1 (General tests):
 - a message which is too short (a message length less than **5** octets).
- 4) For those tests in which a SETUP message is sent to the TE simulating an incoming call, the SETUP message shall be sent via **a point-to-point data link** and ...

Section 1: General tests

A.3.1 Incoming call handling tests

Clause 1 of ETS 300 104 [7] Annex A, applies. However, the following tests shall be altered.

Altered tests 1.1.2.1, 1.1.2.2 and 1.3.1 of ETS 300 104 [7] Annex A

1.1.2.1 Incompatibly coded bearer capability value.

Purpose: Ensures that on receipt of a valid SETUP message containing an incompatibly coded bearer capability value in the Bearer capability information element the TE responds by sending a RELEASE COMPLETE message and remains in the Null state. Where the IUT is an NT2, this requirement shall apply only if the NT2 is capable of determining whether the bearer capability coding is incompatible.

Precondition: Layer 3 shall be in the null state.

Test case sequence:

```

Tester                                     Terminal
.
. SETUP (incompatible BC value)          .
1 .....> .
. RELEASE COMPLETE (cause = 88 )        .
.<.....2
. Checking message                       .
.....> .
. RELEASE/RELEASE COMPLETE (cause=81) .
.<.....

```

Test description:

- 1) Transmit a valid SETUP message, (refer to preliminary notes) with an incompatible Bearer capability value.
- 2) Expect a RELEASE COMPLETE message, cause = 88 (incompatible destination).

Result checking:

Transmit a checking message.

Expect a RELEASE or a RELEASE COMPLETE message, cause = 81 (invalid call reference value) indicating the terminal has remained in the Null state (see preliminary note 10).

Postamble: If a RELEASE message has been received, transmit a RELEASE COMPLETE message.

Refer to: ETS 300 102-1 [8], subclause 5.2.2 and Annex B.

1.1.2.2 Incompatibly coded HLC value

Purpose: This test is only applicable to TEs with an HLC capability. It ensures that on receipt of a valid SETUP message containing a compatible BC but an incompatible High layer compatibility information element the TE (which performs high layer compatibility checks) responds by sending a RELEASE COMPLETE message and remains in the Null state.

Precondition: Layer 3 shall be in the Null state.

Test case sequence:

```

Tester                                     Terminal
.
. SETUP (incompatible HLC value)          .
1 .....> .
. RELEASE COMPLETE ( cause = 88 )        .
.<.....2
. Checking message                       .
.....> .
. RELEASE/RELEASE COMPLETE (cause=81) .
.<.....

```

Test description:

- 1) Transmit a valid SETUP message, (refer to preliminary notes) with a compatibly coded BC but an incompatibly coded High layer compatibility value.
- 2) Expect a RELEASE COMPLETE message, cause = 88 (incompatible destination).

Result checking:

Transmit a checking message.

Expect a RELEASE or a RELEASE COMPLETE message, cause = 81 (invalid call reference value) indicating the terminal has remained in the Null state (see preliminary note 10).

Postamble: If a RELEASE message has been received, transmit a RELEASE COMPLETE message.

Refer to: ETS 300 102-1 [8], subclause 5.2.2 and Annex B.

1.3.1 With a length which is too short

Purpose: Ensures that on receipt of a message which is too short (<5 octets), the terminal ignores the message and remains in the same state.

Precondition: Layer 3 shall be in the Null state.

Test case sequence:

Tester	Terminal
•	•
• Message (too short)	•
1>	•
•	•
Ensure no response	•
•	•
• Checking message	•
•>	•
• RELEASE/RELEASE COMPLETE (cause=81)	•
•<.....	•

Test description:

Transmit a message with a length < 5 octets but which has a valid Protocol Discriminator and valid call reference information element, and ensure no response.

Result checking:

Transmit a checking message.

Expect a RELEASE or a RELEASE COMPLETE message, cause = 81 (invalid call reference value) indicating the Terminal has remained in the Null state (see preliminary note 10).

Postamble: If a RELEASE message has been received, transmit a RELEASE COMPLETE message.

Refer to: ETS 300 102-1 [8], subclause 5.8.2.

Section 2: Called user terminal tests

A.3.2 NULL STATE tests, state 0

The tests of Clause 2 of ETS 300 104 [7] Annex A shall apply. However, the following tests shall be altered:

Altered test 2.5 of ETS 300 104 [7] Annex A

2.5 RESUME message from the terminal

The implementation of the SUSPEND/RESUME procedures are not applicable for primary rate interfaces.

A.3.3 CALL PRESENT state tests, state 6

Clause 3 of ETS 300 104 [7] Annex A applies.

A.3.4 OVERLAP RECEIVING state tests, state 25

The tests of Clause 4 of ETS 300 104 [7] Annex A shall apply.

A.3.5 INCOMING CALL PROCEEDING state tests, state 9

The tests of Clause 5 of ETS 300 104 [7] Annex A shall apply.

A.3.6 CALL RECEIVED state tests, state 7

The tests of Clause 6 of ETS 300 104 [7] Annex A shall apply.

A.3.7 CONNECT REQUEST state tests, state 8

The tests of Clause 7 of ETS 300 104 [7] Annex A shall apply.

A.3.8 ACTIVE state tests, state 10

The tests of Clause 8 of ETS 300 104 [7] Annex A shall apply. However, the following tests shall be altered.

Altered tests 8.9 and 8.11 of ETS 300 104 [7] Annex A

8.9 SUSPEND message from the terminal

The implementation of the SUSPEND/RESUME procedures are not applicable for primary rate interfaces.

8.11 Call to a terminal already involved in a call

This test is not applicable to primary rate interfaces.

Section 3: Calling user terminal tests

A.3.9 NULL state tests, state 0

The tests of Clause 9 of ETS 300 104 [7] Annex A shall apply.

A.3.10 CALL INITIATED state tests, state 1

The tests of Clause 10 of ETS 300 104 [7] Annex A shall apply.

A.3.11 OVERLAP SENDING state tests, state 2

The tests of Clause 11 of ETS 300 104 [7] Annex A shall apply.

A.3.12 OUTGOING CALL PROCEEDING state tests, state 3

The tests of Clause 12 of ETS 300 104 [7] Annex A shall apply.

A.3.13 CALL DELIVERED state tests, state 4

The tests of Clause 13 of ETS 300 104 [7] Annex A shall apply.

Section 4: CLEARDOWN state tests

A.3.14 DISCONNECT REQUEST state tests, state 11

The tests of Clause 14 of ETS 300 104 [7] Annex A shall apply.

A.3.15 DISCONNECT INDICATION state tests, state 12

Clause 15 of ETS 300 104 [7] Annex A applies.

A.3.16 RELEASE REQUEST state tests, state 19

The tests of Clause 16 of ETS 300 104 [7] Annex A shall apply.

Section 5: SUSPEND/RESUME states tests

A.3.17 SUSPEND REQUEST state tests, state 15

All tests specified in Clause 17 of ETS 300 104 [7] Annex A are not applicable to primary rate interfaces. Instead the following text shall be inserted:

"The implementation of the SUSPEND/RESUME procedures are not applicable to primary rate interfaces."

A.3.18 RESUME REQUEST state tests, state 17

All tests specified in Clause 18 of ETS 300 104 [7] Annex A are not applicable to primary rate interfaces. Instead the following text shall be inserted:

"The implementation of the SUSPEND/RESUME procedures are not applicable to primary rate interfaces."

Section 6: Layer 3 timers

A.3.19 Timer tests

The tests of Clause 19 of ETS 300 104 [7] Annex A shall apply. However, the following tests shall be altered and an extra test shall be added.

Altered tests 19.6 and 19.7 of ETS 300 104 [7] Annex A

19.6 Timer T318

The implementation of the SUSPEND/RESUME procedures are not applicable to primary rate interfaces.

19.7 Timer T319

The implementation of the SUSPEND/RESUME procedures are not applicable to primary rate interfaces.

Additional test 19.9 of ETS 300 104 [7] Annex A

19.9 Timer T316

This test shall only be performed on TEs which perform consecutive restart attempts.

Purpose: Ensures timer T316 > 114 seconds.

Precondition: Current state associated with the global call reference shall be Rest 0.

Test case sequence:

	Tester	Terminal
	•	•
	• RESTART	•1 Invoke
	•• <.....	•1 RESTART
Ensure T316	• RESTART	•
> 114s	•• <.....	•2

Test description:

- 1) Invoke a RESTART message and start timer in tester on receipt of this message.
- 2) Await a second RESTART message, on receipt of this message stop timer in tester, ensure elapsed time is greater than 114 seconds.

Postamble: Transmit a RESTART ACKNOWLEDGE message.

Refer to: ETS 300 102-1 [8], subclause 5.5.1.

Section 7: Global call reference tests

A.3.20 RESTART NULL state tests, rest 0

A.3.20.1 Receipt of an "erroneous" message

A.3.20.1.1 Receipt of an inopportune message

No tests are specified because the error handling procedures described in subclause 5.8.4 of ETS 300 102-1 [8] are not applicable to states associated with the global call reference. The corresponding procedures for "global" states are given in subclause 5.8.3.2.f of ETS 300 102-1 [8]. The messages referred to in this part may, from the global state's point of view, be seen as syntactically invalid messages. For this reason the reaction to these messages are tested in subclause A.3.20.1.2 (Receipt of an unrecognized message type).

A.3.20.1.2 Receipt of an unrecognized message type

Purpose: Ensures that on receipt of an unrecognized message type using the global call reference, a STATUS message using the global call reference with a call state indicating the current state associated with the global call reference and cause #81 "invalid call reference" is returned.

Precondition: Current state associated with the global call reference shall be Rest 0.

Test case sequence:

```
Tester                                     Terminal
  .                                         .
  . Invalid message (MT)                   .
1 .....> .
  . STATUS (callst=Rest 0, cause=81)      .
  <..... 2
```

Test description:

- 1) Transmit a message having an invalid message type and using the global call reference.
- 2) Expect a STATUS message, cause = 81 (invalid call reference value); ensure the call state (given in octet 3 of the call state information element) is state 0 (Rest 0), and that the global call reference value is used for the STATUS message.

Postamble:

Refer to: ETS 300 102-1 [8], subclause 5.8.3.2.f.

A.3.20.2 Receipt of a status message

Purpose: Ensures that on receipt of a STATUS message with the global call reference, the terminal takes no action.

Precondition: Current state associated with the global call reference shall be Rest 0.

Test case sequence:

	Tester		Terminal
	•		•
	•	STATUS (callst=Rest 2, cause=81)	•
1	•>	•
Ensure no response	•		•
	•	Checking message	•
	•>	•
	•	STATUS (callst=Rest 0, cause=81)	•
	•	<.....	•

Test description:

Transmit a STATUS message, call state = Rest 2, cause = 81 (invalid call reference value).

Result checking:

Transmit a checking message containing the global call reference value.

Expect a STATUS message, cause = 81 (invalid call reference value), ensure the call state (given in octet 3 of the call state information element) is state 0 (Rest 0), and that the global call reference value is used for the STATUS message.

Postamble:

Refer to: ETS 300 102-1 [8], subclause 5.8.11.

A.3.20.3 Receipt of a RESTART message

Purpose: Ensures that on receipt of a RESTART message the specified channel is returned to the idle condition, the call reference is returned to the Null state, and a RESTART ACKNOWLEDGE is sent.

Precondition:

- a) One call using call reference X and B-channel Y shall be in the active state.
- b) Current state associated with the global call reference shall be Rest 0.

Test case sequence:

```

Tester                                     Terminal
.
. RESTART                                 .
1 .....>                                 .
. RESTART ACKNOWLEDGE                    .
.<.....2                                 .
. Checking message                        .
.....>                                 .
. RELEASE/RELEASE COMPLETE (cause = 81) .
.<.....

```

Test description:

- 1) Transmit a RESTART message indicating B-Channel Y.
- 2) Expect a valid RESTART ACKNOWLEDGE message.

Result checking:

Transmit a checking message containing call reference X.

Expect a RELEASE or a RELEASE COMPLETE message, cause = 81 (invalid call reference value) indicating the terminal has entered the Null state.

Postamble: If a RELEASE message has been received transmit a RELEASE COMPLETE message.

Refer to: ETS 300 102-1 [8], subclause 5.5.2.

A.3.21 RESTART REQUEST state tests, rest 1

The user shall implement the RESTART procedures (subclause 5.5 of ETS 300 102-1 [8]).

The use of the RESTART message is, however, optional and hence state Rest 1 is optional in a terminal implementation. The tests in this section shall only be performed on terminals for which the apparatus supplier has declared that transmission of the RESTART message can be invoked, and how.

A.3.21.1 Receipt of an "erroneous" message

A.3.21.1.1 Receipt of an inopportune message

No tests are specified because the error handling procedures described in subclause 5.8.4 of ETS 300 102-1 [8] are not applicable to states associated with the global call reference. The corresponding procedures for "global" states are given in subclause 5.8.3.2.f of ETS 300 102-1 [8]. The messages referred to in this part may, from the global state's point of view, be seen as syntactically invalid messages. For this reason the reaction to these messages are tested in subclause A.3.21.1.2.1 (Receipt of an unrecognized message type).

A.3.21.1.2 Receipt of a syntactically invalid message

A.3.21.1.2.1 Receipt of an unrecognized message type

Purpose: Ensures that on receipt of an unrecognized message type using the global call reference, a STATUS message using the global call reference with a call state indicating the current state associated with the global call reference and cause #81 "invalid call reference" is returned.

Precondition: Current state associated with the global call reference shall be Rest 0.

Test case sequence:

Tester	Terminal
•	•
• RESTART	• Invoke
•<.....	•1 RESTART
• invalid message (MT)	•
2 •>.....	•
• STATUS (callst=Rest 1, cause=81)	•
•<.....	•3

Test description:

- 1) Invoke RESTART from the terminal.
- 2) Transmit a message having an invalid message type and using the global call reference.
- 3) Expect a STATUS message, cause = 81 (invalid call reference value), ensure the call state (given in octet 3 of the call state information element) is state 1 (Rest 1), and that the global call reference value is used for the STATUS message.

Postamble: Layer 3 and the state associated with the global call reference should be cleared down to the Null state by transmitting a RESTART ACKNOWLEDGE message.

Refer to: ETS 300 102-1 [8], subclause 5.8.3.2.

A.3.21.1.2.2 Receipt of an invalid call reference format

Purpose: Ensures the terminal ignores a message received with an invalid call reference format and that no change of state occurs.

Precondition:

Current state associated with the global call reference shall be Rest 0.

Test case sequence:

	Tester		Terminal
	•		•
	• RESTART		• Invoke
	•<.....		•1 RESTART
	• Invalid message (CRF)		•
	2 •>.....		•
Ensure no response	•		•
	•		•
	• Checking message		•
	•>.....		•
	• STATUS (callst=Rest 1, cause=81)		•
	•<.....		•

Test description:

- 1) Invoke RESTART from the terminal.
- 2) Transmit a message with an invalid call reference format (i.e. a value in octet 1 larger than H"02"), but with a call reference value of 0, and ensure no response to this message.

Result checking:

Transmit a checking message containing the global call reference value.

Expect a STATUS message, cause = 81 (invalid call reference value), ensure the call state (given in octet 3 of the call state information element) is state 1 (REST 1), and that the global call reference value is used for the STATUS message.

Postamble: Layer 3 and the state associated with the global call reference should be cleared down to the Null state by transmitting a RESTART ACKNOWLEDGE message.

Refer to: ETS 300 102-1 [8], subclause 5.8.3.1.

A.3.21.2 Receipt of a STATUS message

Purpose: Ensures that on receipt of a STATUS message specifying the global call reference and reporting an incompatible state, the terminal takes no action.

Precondition: Current state associated with the global call reference shall be Rest 0.

Test case sequence:

Tester	Terminal
•	•
• RESTART	• Invoke
• <.....	• 1 RESTART
• STATUS (callst=Rest 0, cause=81)	•
2 •>	•
Ensure no response	•
•	•
• Checking message	•
•>	•
• STATUS (callst=Rest 1, cause=81)	•
• <.....	•

Test description:

- 1) Invoke RESTART from the terminal.
- 2) Transmit a STATUS message, call state = Rest 0, cause = 81, which uses the global call reference value.

Result checking:

Transmit a checking message containing the global call reference value.

Expect a STATUS message, cause = 81 (invalid call reference value), ensure the call state (given in octet 3 of the call state information element) is state 1 (Rest 1), and that the global call reference value is used for the STATUS message.

Postamble: Layer 3 and the state associated with the global call reference should be cleared down to the Null state by transmitting a RESTART ACKNOWLEDGE message.

Refer to: ETS 300 102-1 [8], subclause 5.8.11.

A.3.21.3 Receipt of a RESTART ACKNOWLEDGE message

Purpose: Ensures that on receipt of a RESTART ACKNOWLEDGE message the terminal frees the channels and call reference values for re-use, and enters the Null state.

Precondition:

- a) Layer 3 shall be in a state in which the RESTART (Call Reference Value X, B-Channel Y) can be invoked.
- b) Current state associated with the global call reference shall be Rest 0.

Test case sequence:

Tester	Terminal
• RESTART	• Invoke
•<.....	•1 RESTART
• RESTART ACKNOWLEDGE	•
2 •.....>	•
• SETUP	•
3 •.....>	•
• CALL PROCEEDING (optional)	•
•<.....	•4
• ALERTING (optional)	•
•<.....	•5
• CONNECT	• Invoke
•<.....	•6 CONNECT
•	•
• Checking message	•
•.....>	•
• STATUS (callst=REST 0, cause=81)	•
•<.....	•

Test description:

- 1) Invoke a RESTART message indicating B-Channel Y.
- 2) Transmit a valid RESTART ACKNOWLEDGE message.
- 3) Transmit a valid SETUP message using call reference X, with the sending complete information element included and indicating B-channel Y (no alternative acceptable).
- 4) Await optional CALL PROCEEDING and/or a ALERTING messages using call reference X; the first such message shall indicate B-channel Y accepted.
- 5) INVOKE a CONNECT message from the terminal; this message shall use call reference X; if neither a CALL PROCEEDING nor an ALERTING message were received from the terminal, the CONNECT message shall indicate B-channel Y accepted.

Result checking:

Transmit a checking message containing the global call reference value.

Expect a STATUS message, cause = 81 (invalid call reference value), ensure the call state (given in octet 3 of the call state information element) is state 0 (Rest 0), and that the global call reference value is used for the STATUS message.

Postamble: Layer 3 should be cleared down to the Null state with a RELEASE/RELEASE COMPLETE sequence.

Refer to: ETS 300 102-1 [8], subclauses 5.5.1 and 5.2.3.1.

A.3.22 RESTART state tests, rest 2

No tests are specified for the RESTART state since this state is a transitory state lasting only for the time taken by the terminal to process the received RESTART message (releasing the B-channel(s) and Call Reference value(s)) and transmit the appropriate response. Hence, the length of time spent in this state is likely to be very short and the state may not even be implemented in the terminal.

Annex B (informative): Test Report Format

Annex C of ETS 300 153 [6] applies. However, an extra paragraph, equivalent to subclause 3.2 ("Layer 2 Test Report Summary") but referring to layer 3 tests, shall be inserted between subclauses C.3.2 and C.3.3 of ETS 300 153 [6].

History

Document history	
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