



# SLOVENSKI STANDARD

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Q3 interface at the Local Exchange (LE) for line and circuit testing of analogue and Integrated Services Digital Network (ISDN) subscriber lines; Part 1: Q3 interface specification

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*European Standard (Telecommunications series)*

## **Q3 interface at the Local Exchange (LE) for line and circuit testing of analogue and Integrated Services Digital network (ISDN) subscriber lines; Part 1: Q3 interface specification**

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## Foreword

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

The present document is part 1 of a multi-part document covering the Q3 interface at the Local Exchange (LE) for line and circuit testing of analogue and ISDN subscriber lines, as identified below:

**Part 1: "Q3 interface specification";**

Part 2: "Managed Object Conformance Statement (MOCS) proforma specification".

### iTeh STANDARD PREVIEW Proposed national transposition dates (standards.iteh.ai)

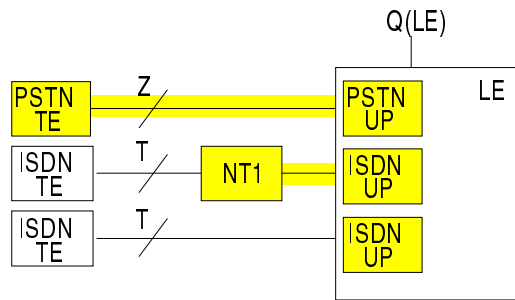
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## Introduction

Line and circuit testing of analogue and ISDN lines is part of a management activity which is performed by the operator in order to detect failure conditions and to bring the customer access back to its normal state of operation whenever a deviation occurs.

A customer access is considered as being that part of the local network which extends from the network termination equipment up to and including the exchange termination.

Here, only these parts of the activity are covered which are related directly to that part of the customer access which extends from the LE to the network termination equipment. An ISDN access extends to but does not include the T reference point. An analogue access extends to and may include the Customer Premise Equipment (CPE) (see figure 1).



NOTE: Shaded areas are subject to line and circuit testing. User ports represent the different configurations for Line Circuit (LC), Line Termination (LT), Exchange Termination (ET) and Network Termination (NT). The option of ISDN access without remote NT1 is valid for ISDN BA only.

**Figure 1: Scope of line and circuit testing**

The present document details only those functions and management information model components which are required for line and circuit testing. However, the use of other components which may be applicable from other specifications is not precluded. In this case, combined applications incorporating line and circuit test specific and more generic aspects would result.

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# 1 Scope

The present document specifies the Q3 interface between an Local Exchange (LE) and the Telecommunications Management Network (TMN) for the support of line and circuit test functions for analogue and ISDN lines which are connected directly to a LE.

The focus of the present document is on defining an object model based on the existing standards ETS 300 378-1 [3] and ITU-T Recommendation X.745 [20]. The add-ons, modifications and restrictions to these standards are specified which are necessary to adapt the object model to a LE. Existing protocols are used where possible. The definition of Operations System (OS) functionality is outside the scope of the present document.

# 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.

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- Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification". 6ab4b2d30eef/sist-en-301-006-1-v1-2-2-2005
- [1] I-ETS 300 291 (1995): "Network Aspects (NA); Functional specification of Customer Administration (CA) on the Operations System/Network Element (OS/NE) interface".
  - [2] ETS 300 324-1: "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification". 6ab4b2d30eef/sist-en-301-006-1-v1-2-2-2005
  - [3] ETS 300 378-1 (1995): "Signalling Protocols and Switching (SPS); Q3 interface at the Access Network (AN) for fault and performance management of V5 interfaces and associated customer profiles; Part 1: Q3 interface specification".
  - [4] CCITT Recommendation M.3010 (1992): "Principles for a telecommunications management network".
  - [5] CCITT Recommendation M.3100 (1992): "Generic network information model".
  - [6] ITU-T Recommendation M.3603: "Application of maintenance principles to ISDN basic rate access".
  - [7] ITU-T Recommendation M.3604: "Application of maintenance principles to ISDN primary rate access".
  - [8] ITU-T Recommendation Q.543 (1993): "Digital exchange performance design objectives".
  - [9] ITU-T Recommendation Q.811 (1993): "Lower layer protocol profiles for the Q3 interface".
  - [10] ITU-T Recommendation Q.812 (1993): "Upper layer protocol profiles for the Q3 interface".
  - [11] CCITT Recommendation X.208 (1988): "Specification of Abstract Syntax Notation One (ASN.1)".
  - [12] CCITT Recommendation X.720 | ISO/IEC 10165-1: "Information technology - Open systems interconnection - Structure of management information: Management information model".
  - [13] CCITT Recommendation X.721 | ISO/IEC 10165-2: "Information technology - Open systems interconnection - Structure of management information: Definition of management information".

- [14] CCITT Recommendation X.730 | ISO/IEC 10164-1: "Information technology - Open systems interconnection - Systems management: Object management function".
- [15] CCITT Recommendation X.731 | ISO/IEC 10164-2: "Information technology - Open systems interconnection - Systems management: State management function".
- [16] CCITT Recommendation X.732 | ISO/IEC 10164-3: "Information technology - Open systems interconnection - Systems management: Attributes for representing relationships".
- [17] CCITT Recommendation X.734 | ISO/IEC 10164-5: "Information technology - Open systems interconnection - Systems management: Event report management function".
- [18] CCITT Recommendation X.735 | ISO/IEC 10164-6: "Information technology - Open systems interconnection - Systems management: Log control functions".
- [19] ITU-T Recommendation X.737 | ISO/IEC 10164-14: "Information technology - Open systems interconnection - Systems management: Confidence and diagnostic test function".
- [20] ITU-T Recommendation X.745 | ISO/IEC 10164-12: "Information technology - Open systems interconnection - Systems management: Test management function".
- [21] ITU-T Recommendation X.746 | ISO/IEC 10164-15: "Information technology - Open systems interconnection - Systems management: Scheduling function".

## 3 Definitions and abbreviations

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### 3.1 Definitions

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

**Access Network (AN):** See ETS 300 324-1 [2].  
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**activation-deactivation of the line:** See subclause A.2.5.

**cable pair identification tone:** See subclause A.2.5.

**capacitance measurement:** See subclause A.2.5.

**Codec testing:** See subclause A.2.5.

**dial pulse test:** See subclause A.2.5.

**dial tone test:** See subclause A.2.5.

**digit reception:** See subclause A.2.5.

**dry loop:** See subclause A.2.5.

**Dual Tone Multi-Frequency (DTMF) dialling test:** See subclause A.2.5.

**feeding current:** See subclause A.2.5.

**feeding voltage:** See subclause A.2.5.

**foreign voltage:** See subclause A.2.5.

**insulation resistance measurement:** See subclause A.2.5.

**line circuit testing:** See subclause A.2.5.

**line testing:** See subclause A.2.5.

**Local Exchange (LE):** See ETS 300 324-1 [2].

**loop and ring trip detection:** See subclause A.2.5.

**loop resistance measurement:** See subclause A.2.5.

**loopback 1 (line termination loopback):** See subclause A.2.5.

**loopback 2, 2<sub>1</sub> and 1A (NT1 loopbacks):** See subclause A.2.5.

**monitoring of the line with mark tone:** See subclause A.2.5.

**monitoring of the line:** See subclause A.2.5.

**Operations System (OS):** See CCITT Recommendation M.3010 [4].

**power feed:** See subclause A.2.5.

**private meter pulses:** See subclause A.2.5.

**register recall button test:** See subclause A.2.5.

**subscriber private metering:** See subclause A.2.5.

## 3.2 Abbreviations

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

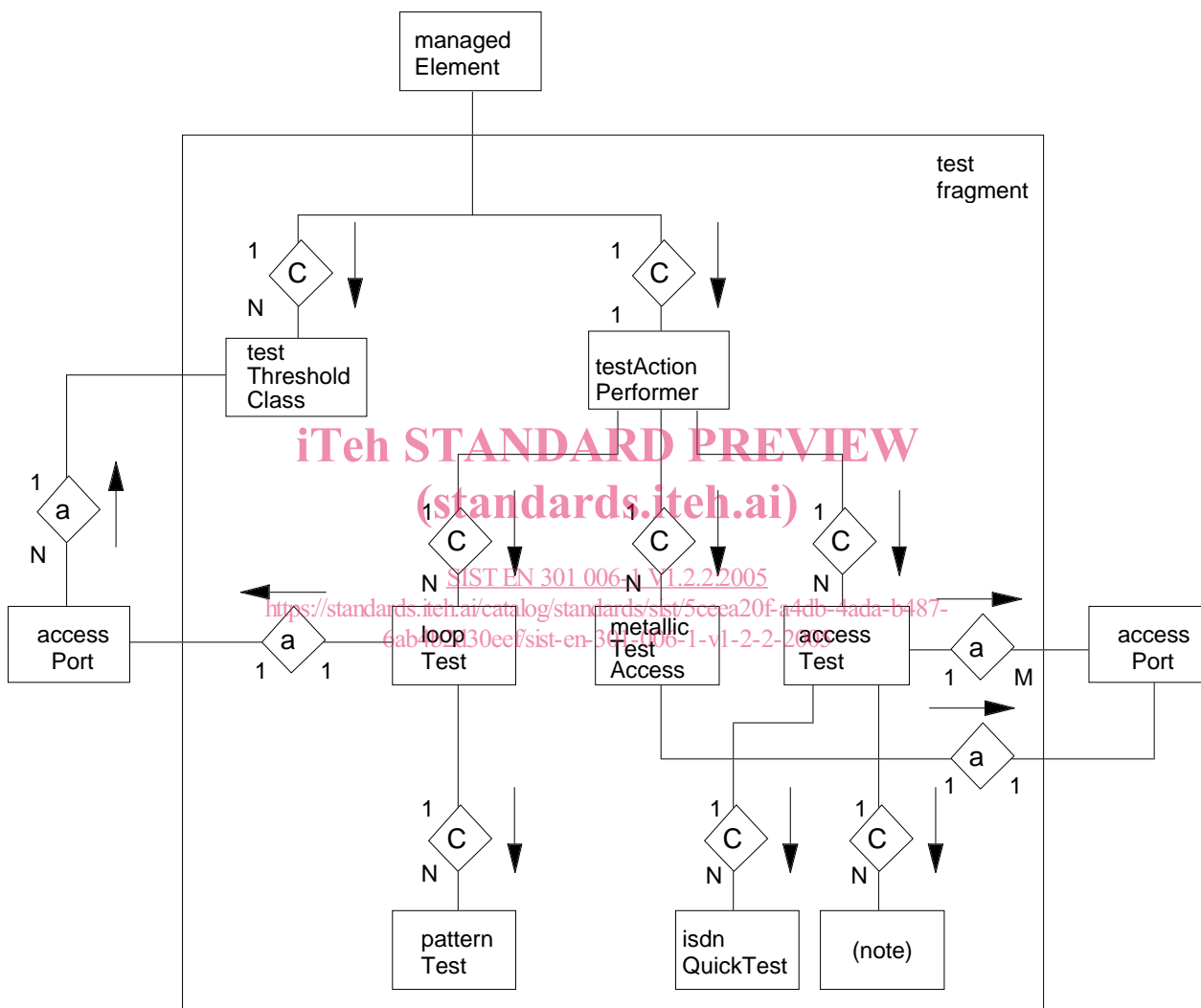
AC	Alternating Current
AN	Access Network
ASN.1	Abstract Syntax Notation One (see CCITT Recommendation X.208 [11])
BA	Basic Access
CMIP	Common Management Information Protocol
CPE	Customer Premise Equipment
DC	Direct Current
DTMF	Dual Tone Multi-Frequency
ET	Exchange Termination
ID	Identity, identifier
ISDN	Integrated Services Digital Network
LC	Line Circuit
LE	Local Exchange
LT	Line Termination
M/C	Mandatory/Conditional
MORT	Managed Object Referring to Test
NE	Network Element
NT	Network Termination
OS	Operations System
PRA	Primary Rate Access
PSTN	Public Switched Telephone Network
RDN	Relative Distinguished Name
REG	Regenerator
SPM	Subscriber Private Meter
TARR	Test Action Request Receiver
TIB	Task Information Base
TMN	Telecommunication Management Network
TO	Test Object

## 4 Information model diagrams

The entity relationship diagram is given in subclause 4.1 and the inheritance hierarchy (is-a relationships) and naming hierarchy (containment relationships) are given in subclauses 4.2 and 4.3, respectively.

### 4.1 Entity relationship diagram

Figure 2 shows the various entities related to line and circuit testing at the LE. They extend the information model described in I-ETS 300 291 [1], which specifies management information describing the various user port aspects.



NOTE: Other specific test object classes are defined in ETS 300 378-1 [3].

Figure 2: Entity relationship diagram - test fragment

### 4.1.1 Line testing and line circuit testing

Test requests from the OS are sent as Common Management Information Protocol (CMIP) testRequestControlled or testRequestUncontrolled action to an instance of testActionPerformer. In this model, all controlled tests are delegated by instances of testActionPerformer to instances of subclasses of testObject, i.e. when receiving a test request the testActionPerformer automatically creates the required instances of these classes. Further instances of subclasses of testObject are created if further delegation of the performance of the test is required. This creation is achieved by sending additional testRequestControlled actions, the testSessionId parameter is used to identify in which access test instance the new tests should be contained. All instances of these subclasses of testObject exist only for the duration of their delegated operations. Details of the mechanism how to transmit test requests to testActionPerformer and how test results are generated are described in ITU-T Recommendation X.745 [20].

Management information related to uncontrolled tests can be found in annex B.

Controlled testing is initially delegated to an instance of accessTest or to an instance of loopTest or to an instance of metallicTestAccess. Each instance of loopTest or accessTest or metallicTestAccess is contained in an instance of testActionPerformer.

The object class loopTest is used to set up loopbacks for the user port to which it is associated by an attribute. If patterns are to be injected and compared within the LE as part of the loopback test, then this is delegated to an instance of patternTest which is contained in the delegating instance of loopTest.

The object class accessTest has all specific non-loopback tests allocated to it. It has an attribute which specifies one or a list of user ports which are to be tested.

If external test systems are used for line testing, the metallicTestAccess allows to connect it to each subscriber line (outbound or bridged) and to each line circuit (inbound) of the LE. The implementation of the metallic test access is outside the scope of this standard.

The creation of an instance of accessTest represents a test session and permits test access to lines or line circuits during which a number of different tests can be performed. These delegated tests are handled by specific contained test objects. Each contained test object triggers the specific test on one or more user ports which are specified in accessTest.

Electrical measurements, such as voltage, capacitance and resistance, are delegated to instances of electricalMeasurementTest. Dialed digit tests, dial tone tests and other tests (in particular those involving sending meter pulses to the line, cable pair identification tone and ringing) are triggered by the creation of instances of dialledDigitTest, dialToneTest, spmPulses, cablePairIdTone and ringing, respectively. The dry loop condition is set up by instances of dryLoopTest. The inward line circuit tests are delegated to instances of testToLineCircuit. The voiceAccessTest allows for the provision of those test which involve the establishment of a voice connection with the line under test. A quick check of an ISDN access is represented by an isdnQuickTest object.

The object class testThresholdClass can be used to modify predefined test thresholds via the Q3 interface.

### 4.1.2 The testResultNotifications of the tests

The sending time, the information contents and the number of testResultNotifications sent per test request are not restricted. It is a matter up to the LE implementation. If the testResultNotification contains results whose testing time has importance, they shall be ordered in the ASN.1 sequence oldest first.