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SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – Q3 interface

Line and line circuit test management of ISDN and analogue customer accesses

ITU-T Recommendation Q.835

(Previously CCITT Recommendation)

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120–Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.849
General	Q.700
Message transfer part (MTP)	Q.701–Q.709
Signalling connection control part (SCCP)	Q.711–Q.719
Telephone user part (TUP)	Q.720–Q.729
ISDN supplementary services	Q.730–Q.739
Data user part	Q.740–Q.749
Signalling System No. 7 management	Q.750–Q.759
ISDN user part	Q.760–Q.769
Transaction capabilities application part	Q.770–Q.779
Test specification	Q.780–Q.799
Q3 interface	Q.800–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1999
BROADBAND ISDN	Q.2000–Q.2999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION Q.835

LINE AND LINE CIRCUIT TEST MANAGEMENT OF ISDN AND ANALOGUE CUSTOMER ACCESSSES

Summary

The purpose of this Recommendation is to define the Q3 interface between a network element for customer access (i.e. local exchange, access network) and the telecommunications management network (TMN) for the support of line and line circuit test functions and the associated management for ISDN and analogue customer accesses which are connected either directly to a local exchange or remotely at an access network and across V5.1 and/or V5.2 interfaces to a local exchange.

The focus of this Recommendation is on defining an object model based on ITU-T Recommendations Q.824.0, Q.824.5, Q.831, and X.745. Existing protocols are used where possible. The definition of Operations System (OS) functionality is outside the scope of this Recommendation.

Source

ITU-T Recommendation Q.835 was prepared by ITU-T Study Group 4 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 26th of March 1999.

Keywords

Access network, information model, line and line circuit testing, local exchange, Q3 interface, TMN.

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CONTENTS

Page

1	Scope.....	1
2	References.....	1
3	Terms and definitions, abbreviations.....	3
3.1	Definitions	3
3.2	Abbreviations.....	4
4	Line and line circuit testing functions.....	4
4.1	Description of the service	4
4.2	Components of service.....	5
4.3	Management function list	5
4.4	Description of management functions	6
5	Information model diagrams	6
5.1	Entity relationship diagram.....	7
5.1.1	Line testing and line circuit testing.....	7
5.1.2	The testResultNotifications of the tests	8
5.2	Inheritance hierarchy.....	8
5.3	Naming hierarchy.....	9
6	Formal object class definitions	10
6.1	Definitions of object classes	10
6.1.1	Access port fragment	10
6.1.2	Support fragment	10
6.1.3	Test fragment	10
6.2	Name bindings	19
6.2.1	Test fragment	19
6.3	Definition of packages	22
6.3.1	Metallic Test Access Line Package	22
6.3.2	Test environment conditions package	22
6.3.3	Voice access package.....	22
6.4	Definition of attributes.....	23
6.4.1	AC voltage threshold	23
6.4.2	Access network ringback service treatment ID	23
6.4.3	Apply ringing current.....	23
6.4.4	Apply tone	23
6.4.5	Capacitance threshold.....	24
6.4.6	DC voltage threshold	24



Documents

Document Sharing Hub

Recommendation Q.835 (03/99)

iii

	Page
6.4.7 Dial speed threshold	24
6.4.8 Electrical measurement test	24
6.4.9 ISDN quick test.....	24
6.4.10 Iterations	24
6.4.11 Loopback channel.....	25
6.4.12 Loopback duration	25
6.4.13 Loopback position	25
6.4.14 Metallic test access message.....	25
6.4.15 Metallic test access timeout period.....	26
6.4.16 Monitor and speak	26
6.4.17 Number of digits	26
6.4.18 Off hook simulation.....	26
6.4.19 Proposed metallic test access.....	27
6.4.20 Pulse no pulse ratio.....	27
6.4.21 Request result type.....	27
6.4.22 Resistance threshold	27
6.4.23 Ring	27
6.4.24 Ring back number.....	28
6.4.25 Number of subscriber private meter (SPM) pulses.....	28
6.4.26 Type of Line.....	28
6.4.27 Wait time	28
6.4.28 Test threshold class identifier	28
6.5 Definition of actions	29
6.5.1 Loopback select	29
6.6 Definition of notifications.....	29
6.6.1 Off hook.....	29
6.6.2 On hook	29
6.6.3 Time out.....	29
6.7 Definition of parameters	30
6.7.1 Access result	30
6.7.2 Dialed digit test result.....	30
6.7.3 Dialed digit test uncontrolled request.....	30
6.7.4 Dialed digit test uncontrolled result	30
6.7.5 Dial tone test result	30
6.7.6 Dial tone test uncontrolled request	31
6.7.7 Dial tone test uncontrolled result.....	31
6.7.8 Electrical measurement test result	31
6.7.9 Electrical measurement test uncontrolled request	31

	Page
6.7.10 Electrical measurement test uncontrolled result	31
6.7.11 Generic test result	32
6.7.12 Invalid loopback request.....	32
6.7.13 ISDN quick test uncontrolled request.....	32
6.7.14 ISDN quick test uncontrolled result	32
6.7.15 Loopback test result.....	32
6.7.16 Loop back test uncontrolled request	33
6.7.17 Loop back test uncontrolled result.....	33
6.7.18 Number of metallic test accesses.....	33
6.7.19 Pattern test result	33
6.7.20 Ringing test uncontrolled request	33
6.7.21 SPM pulses test uncontrolled request.....	34
6.7.22 Test to line circuit result	34
6.7.23 Test to line circuit uncontrolled request	34
6.7.24 Test to line circuit uncontrolled result	34
6.7.25 Voice access test result	34
6.7.26 ISDN quick test result.....	35
6.8 ASN.1 defined types module	35
7 Protocol requirements	42
Annex A – Requirements and specification of parameters for access port tests.....	42
A.1 General test requirements	42
A.1.1 Scheduled testing.....	43
A.1.2 Test capability.....	43
A.2 Access port test requirements	43
A.2.1 Access port test management functions.....	43
A.2.2 Test scheduling.....	43
A.2.3 Test result management	44
A.2.4 Test threshold management	44
A.2.5 Test requirements description.....	44
Annex B – Test categories	49
B.1 Electrical measurement tests.....	49
B.2 Dialled digit test.....	50
B.3 Dial tone test	51
B.4 Subscriber private meter pulses test.....	51
B.5 Ringing test	52
B.6 Test to line circuit	52

	Page
B.7 ISDN loopback test	53
B.8 ISDN quick test.....	54
Annex C – Test termination	54
C.1 Termination of uncontrolled tests	54
C.2 Termination of controlled tests	55
C.2.1 One-step test	55
C.2.2 Test session.....	55
C.2.3 Aborting tests.....	55
C.2.4 Termination sequence.....	56
Annex D – Test result notification	56
Annex E – Additional requirements on the test action performer	57
E.1 Indication of supported tests	57
E.2 Indication of unsuccessful test requests	57
Annex F – Requirements and specification of parameters for V5 interface tests	57
F.1 V5 interface test requirements	57
F.1.1 V5 interface ID testing.....	57
F.1.2 Link ID testing.....	57
F.1.3 Provisioning variant testing.....	57
Appendix I – Message flows.....	58
Appendix II – Description of test procedures – Application for V5 access networks	60
II.1 Background	60
II.2 Test procedures scenario	60
II.2.1 Scenario for faultsman ringback tests in an AN environment.....	61
II.2.2 Scenario for a subscriber-assisted test in an AN environment	62
Appendix III – State management in relation with line testing – Application for V5 access networks.....	64
III.1 Intrusive tests	64
III.2 Dealing with conflicts between intrusive tests and normal service	64
III.3 State values during intrusive testing	65
III.4 V5 blocking mechanism	65
Appendix IV – Bibliography.....	66

Introduction

Line and circuit testing of analogue customer accesses and ISDN customer accesses 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.

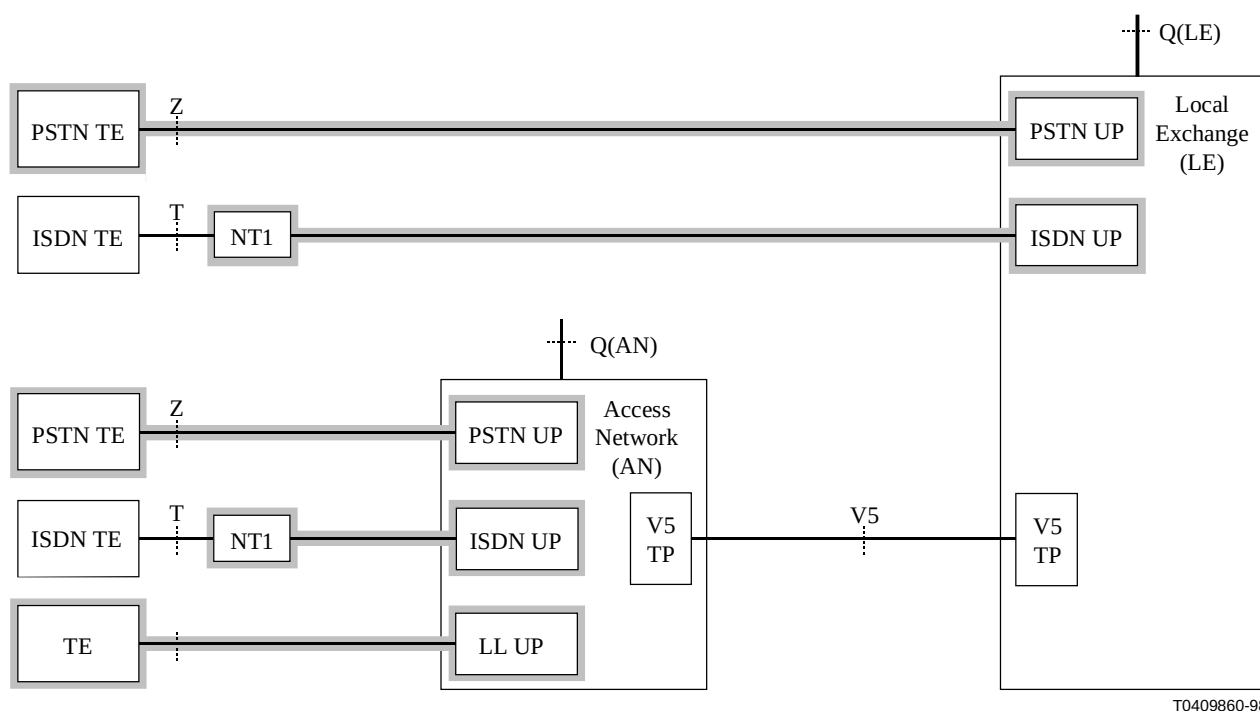
A customer access is considered as being that part of the local network which extends from the network termination equipment up to and including the exchange termination.

Here, only these parts of the activity are covered which are related directly to that part of the customer access which extends from the local exchange 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 premises equipment (CPE) (see Figure 0).

In Figure 0 both customer access scenarios are illustrated:

- Direct access case for PSTN and ISDN customer to a local exchange (LE), which is shown in the top of Figure 0;
- Remote access case for PSTN and ISDN customer as well as for leased lines (semi-permanent lines) via an access network (AN) and across the V5.1 and/or V5.2 interface (as specified in Recommendations I.414, G.964 and G.965), shown in the bottom part of Figure 0.

The shaded areas are subject to line and circuit testing and the associated management as presented within this Recommendation is based on the specifications within Recommendation Q.831.



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NOTE – Shaded areas are subject to line and circuit testing. User ports (UP) represent the different configurations for line circuit, line termination, exchange termination and network termination (NT). The option of ISDN access without remote NT1 is valid for ISDN BA only.

Figure 0/Q.835 – Direct and remote customer access case scenarios

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Recommendation Q.835

LINE AND LINE CIRCUIT TEST MANAGEMENT OF ISDN AND ANALOGUE CUSTOMER ACCESSES

(Geneva, 1999)

1 Scope

This Recommendation specifies the Q3 interface between a network element for customer access (i.e. local exchange, access network) and the Telecommunications Management Network (TMN) for the support of line and line circuit test functions and the associated management for ISDN and analogue customer accesses which are connected either directly to a local exchange or remotely at an access network and across V5.1 and/or V5.2 interfaces to a local exchange.

It is not mandatory to implement the test and measurements specified in this Recommendation for all types of customer access realisations. However, if any test is implemented and is required to be managed via the Q3 interface on the network element, it shall be modelled as described in this Recommendation.

The focus of this Recommendation is on defining an object model based on Recommendation X.745 [22]. Existing protocols are used where possible. The definition of Operations System (OS) functionality is outside the scope of this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T Recommendation G.964 (1994), *V-Interfaces at the digital local exchange (LE) – V5.1-interface (based on 2048 kbit/s) for the support of access network (AN)*.
- [2] ITU-T Recommendation G.965 (1995), *V-Interfaces at the digital local exchange (LE) – V5.2 Interface (based on 2048 kbit/s) for the support of access network (AN)*.
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- [4] ITU-T Recommendation M.3100 (1995), *Generic network information model*.
- [5] CCITT Recommendation M.3603 (1992), *Application of maintenance principles to ISDN basic rate access*.
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Documents

Document Sharing Hub

Recommendation Q.835 (03/99)

1

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- [18] CCITT Recommendation X.732 (1992) | ISO/IEC 10164-3:1993, *Information technology – Open Systems Interconnection – Systems Management: Attributes for representing relationships.*
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- [20] CCITT Recommendation X.735 (1992) | ISO/IEC 10164-6:1993, *Information technology – Open Systems Interconnection – Systems Management: Log control function.*
- [21] ITU-T Recommendation X.737 (1995) | ISO/IEC 10164-14:1996, *Information technology – Open Systems Interconnection – Systems management: Confidence and diagnostic test categories.*
- [22] ITU-T Recommendation X.745 (1993) | ISO/IEC 10164-12:1994, *Information technology – Open Systems Interconnection – Systems Management: Test management function.*
- [23] ITU-T Recommendation X.746 (1995) | ISO/IEC 10164-15:1995, *Information technology – Open Systems interconnection – Systems management: Scheduling function.*
- [24] ITU-T Recommendation X.680 (1997) | ISO/IEC 8824-1:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- [25] ITU-T Recommendation X.681 (1997) | ISO/IEC 8824-2:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification.*
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3 Terms and definitions, abbreviations

3.1 Definitions

This Recommendation defines the following terms:

- Access Network (AN): See Recommendation G.964 [1].
- bearer channel: See Recommendation G.964 [1].
- Bearer Channel Connection (BCC): See Recommendation G.965 [2].
- cable pair identification tone: See A.2.5.1.10.
- capacitance measurement: See A.2.5.1.2.
- codec testing: See A.2.5.2.1.6.
- Communication Channel (C-Channel): See Recommendation G.964 [1].
- communication path: See Recommendation G.964 [1].
- control protocol: See Recommendation G.964 [1].
- dial pulse test: See A.2.5.1.5.
- dial tone test: See A.2.5.2.2.1.
- digit reception: See A.2.5.2.1.7.
- dry loop: See A.2.5.1.11.
- DTMF dialling test: See A.2.5.1.6.
- envelope function address: See Recommendation G.964 [1].
- feeding current: See A.2.5.2.1.2.
- feeding voltage: See A.2.5.2.1.1.
- foreign voltage or current: See A.2.5.1.1.
- insulation resistance measurement: See A.2.5.1.3.
- layer 3 address: See Recommendation G.964 [1].
- leased lines: See Recommendation G.964 [1].
- PSTN line testing: See A.2.5.1.
- line circuit testing: See A.2.5.2.1.
- Local Exchange (LE): See Recommendation G.964 [1].
- loop and ring trip detection: See A.2.5.2.1.3.
- loop resistance measurement: See A.2.5.1.4.
- loopback 1 (line termination loopback): See A.2.5.3.2.1.
- loopback 2, 2₁ and 1A (NT1 loopbacks): See A.2.5.3.2.1.
- monitoring of the line: See A.2.5.1.9.
- Operation System (OS): See Recommendation M.3010 [3].
- power feed: See A.2.5.3.3.1.
- private meter pulses: See A.2.5.2.1.5.
- protection protocol: See Recommendation G.965 [2].

- register recall button test: See A.2.5.1.12.
- subscriber private meter testing: See A.2.5.1.7.
- V5 interface: See Recommendation G.964 [1].
- V5 interface messages: This term refers to all Function Elements (FEs) and other V5 protocol messages as defined in Recommendations G.964 [1] and G.965 [2] which are communicated via the V5 interface.
- V5 time slot: See Recommendation G.964 [1].

3.2 Abbreviations

This Recommendation uses the following abbreviations:

AN	Access Network
CMIP	Common Management Information Protocol
CPE	Customer Premises Equipment
LC	Line Circuit
LE	Local Exchange
LL	Leased Line
MORT	Managed Object Referring to Test
MTA	Metallic Test Access
NE	Network Element
OS	Operations System
REG	Regenerator
RDN	Relative Distinguished Name
SPM	Subscriber Private Meter
TMN	Telecommunication Management Network
TE	Terminal Equipment
TO	Test Object
TP	Termination Point
UP	User Port

4 Line and line circuit testing functions

4.1 Description of the service

Line and circuit testing 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.

In this clause, only the parts of the activities are covered which are directly related to that part of the customer access which extends from the exchange termination 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 CPE.

4.2 Components of service

- a) *Failure detection*
Observe or supervise the subscriber access and collect relevant data in order to detect failures or degradation. Perform continuous or periodic checks of the system functions.
- b) *Failure information*
Send alarms and event reports from the NE to TMN with failure information related to subscriber access.
- c) *Failure localization*
Receive failure information from NEs which may be generated by performing tests and measurements on subscriber access. Initiate additional fault localization procedures and receive information from these procedures.
- d) *Fault correction*
Replace faulty access port equipment with working replacements.
- e) *Verification*
Apply the appropriate tests and measurements to the replaced component before bringing it back to service.
- f) *Restoration*
Restore the component to service.

4.3 Management function list

- a) *Request status*
TMN requests NE to send the current status information related to the access port.
- b) *Set service state*
TMN directs NE to place a access port in a specified service state, e.g. in service (available for use), standby (not for normal use), out of service (unavailable for use).
- c) *Alarm report*
NE notifies TMN of alarm information concerning access ports.
- d) *Set alarm conditions*
TMN directs NE to assign specific alarm parameters, modes and thresholds to alarms concerning access ports.
- e) *Start line or circuit test*
TMN directs NE to start an on-demand or a periodic test of the subscriber line or access port.
- f) *Stop line or circuit test*
TMN directs NE to stop an on-demand or a periodic test of the subscriber line or access port.
- g) *Set test conditions*
TMN directs NE to assign parameters, modes and thresholds to tests and measurements of the subscriber line or access port.

- h) *Apply test signals*
TMN directs NE to send test signals to the terminating equipment or to the line circuit, e.g. ringing signals, dial pulses, meter pulses.
- i) *Remove test signals*
TMN directs NE to remove the test signal sent by the apply function.
- j) *Connect external test equipment*
TMN directs NE to connect the customer line or access port to an external test equipment.
- k) *Disconnect external test equipment*
TMN directs NE to disconnect the subscriber line or access port from a previously connected external test equipment.
- l) *Request test results*
TMN requests NE to report intermediate or final results from a test applied to a subscriber line or an access port.
- m) *Test result report*
NE sends the results of a test applied to a subscriber line or an access port to TMN.

4.4 Description of management functions

Management functions related to testing are defined in Recommendation X.745 [22]. No specific functions are defined in the context of line and circuit testing at the network element for customer access (i.e. local exchange, access network).

5 Information model diagrams

The entity relationship diagram is given in 5.1 and the inheritance hierarchy ("is-a" relationships) and naming hierarchy (containment relationships) are given in 5.2 and 5.3, respectively.

The conventions given in Figure 1 are used in the entity relationship diagrams.

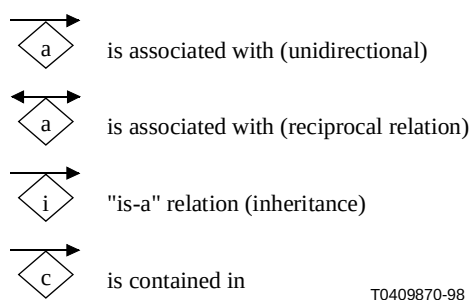
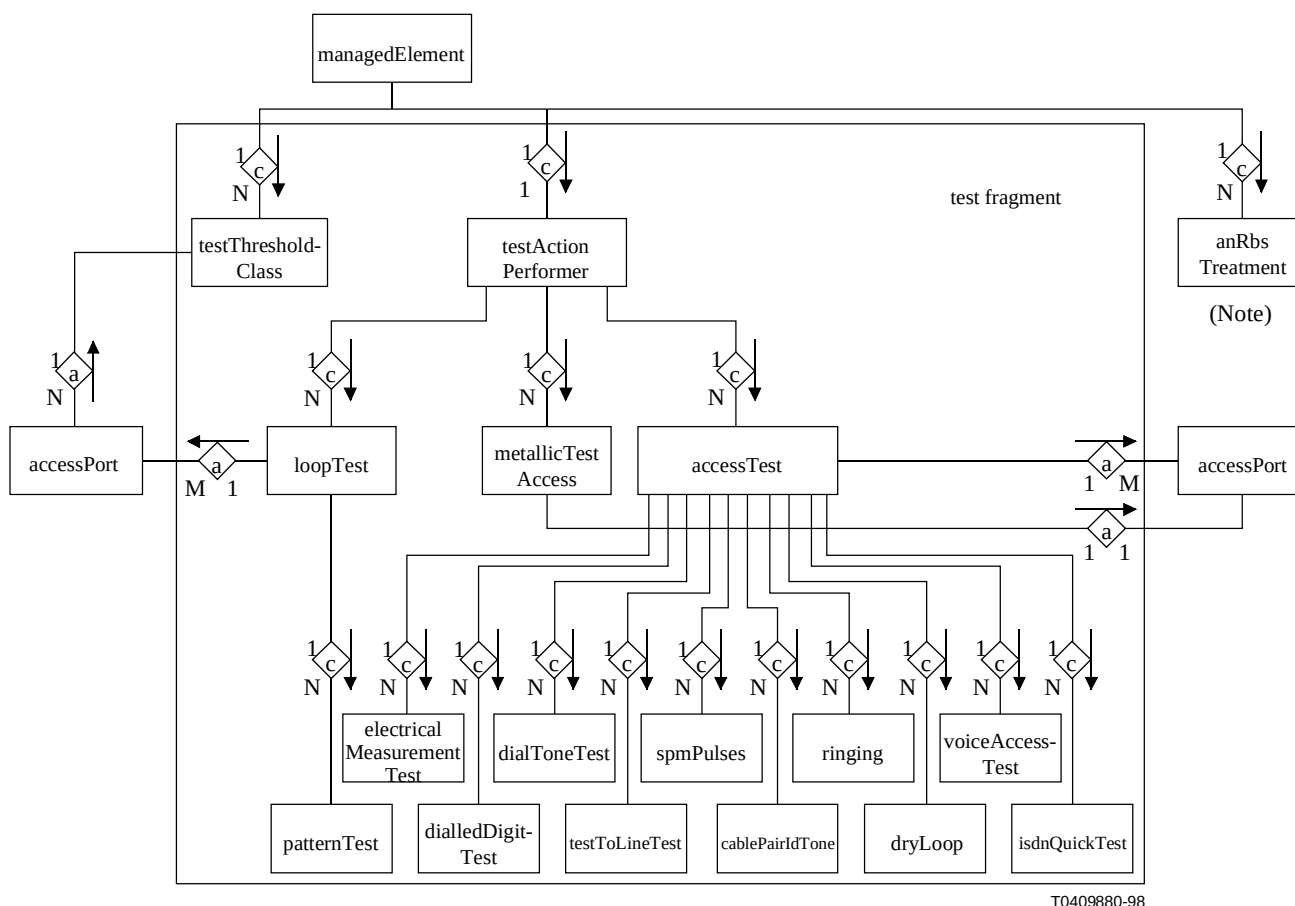


Figure 1/Q.835 – Conventions used in diagrams for entity relationship diagrams

5.1 Entity relationship diagram

Figure 2 shows the various entities related to line and circuit testing at the network element for customer access (i.e. local exchange, access network). They extend the information model described in Recommendations Q.824.0 [10] and Q.824.5 [11], which specifies management information describing the various user port aspects.



NOTE – Only for customers connected remotely via an access network (AN) and V5 interface to the local exchange (LE).

Figure 2/Q.835 – Entity relationship diagram – test fragment

5.1.1 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 Recommendation X.745 [22].

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 NE 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 NE. The implementation of the metallic test access is outside the scope of this Recommendation.

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 `dialedDigitTest`, `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 tests 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.

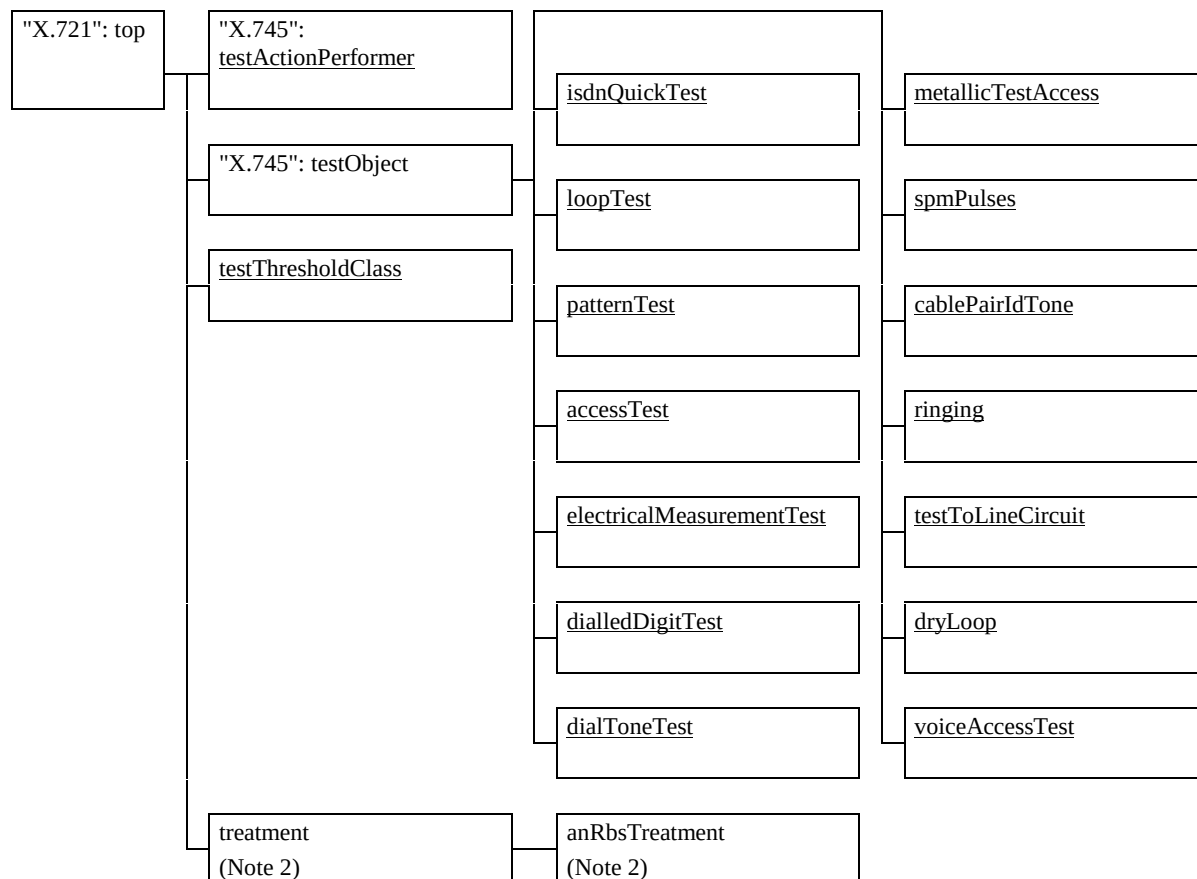
The object class `testThresholdClass` can be used to modify predefined test thresholds via the Q3 interface.

5.1.2 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 NE implementation. If the `testResultNotification` contains results whose testing time has importance, they shall be ordered in the ASN.1 sequence oldest first.

5.2 Inheritance hierarchy

Figure 3 traces the inheritance from the highest level object "ITU-T Recommendation X.721":top to the managed objects defined in this Recommendation.



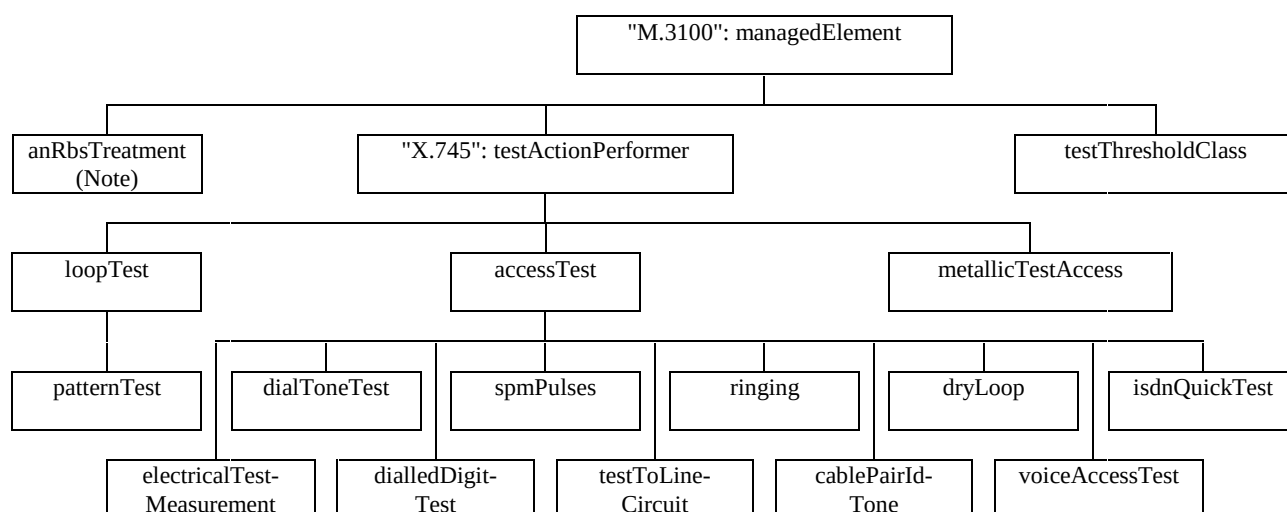
NOTE 1 – Only classes which are underlined may be instantiated.

NOTE 2 – Only for customers connected remotely via an access network (AN) and V5 interface to the local exchange (LE).

Figure 3/Q.835 – Inheritance hierarchy

5.3 Naming hierarchy

Figure 4 shows the naming (i.e. containment) relationships for the NE's managed objects associated with line and circuit testing.



NOTE – Only for customers connected remotely via an access network (AN) and V5 interface to the local exchange (LE).

Figure 4/Q.835 – Naming hierarchy

6 Formal object class definitions

This clause gives the formal definitions of the managed object classes, name bindings, general packages, behaviours, attributes, actions and notifications.

6.1 Definitions of object classes

This subclause specifies the object classes for all of the managed objects used in the management information model. These object classes are either defined here or by reference to other specifications. Classes of managed objects which are defined elsewhere and which are only used for containment are not included, but are identified by the name bindings for the classes specified here.

6.1.1 Access port fragment

6.1.1.1 Access port fragment at the local exchange

In this fragment, the following object classes are used. They are used in the test operations to identify the MORTs. They are defined in Recommendation Q.824.0 [10]:

- analogueAccess;
- "ITU-T Recommendation Q.824.1":accessPortISDNBasicRate;
- "ITU-T Recommendation Q.824.1":accessPortISDNPrimaryRate.

6.1.1.2 Access port fragment at the access network

In this fragment, the following object classes are used. They are used in the test operations to identify the MORTs. They are defined in Recommendation Q.824.5 [11]:

- "ITU-T Recommendation Q.824.5":pstnUserPort;
- "ITU-T Recommendation Q.824.5":isdnBAUserPort;
- "ITU-T Recommendation Q.824.5":isdnPRAUserPort;
- "ITU-T Recommendation Q.824.5":leasedPort;
- "ITU-T Recommendation Q.824.5":userPortBearerChannelCtp.

6.1.2 Support fragment

The following classes which are defined in Recommendation X.721 [15] may be instantiated:

- "ITU-T Recommendation X.721:1992":attributeValueChangeRecord;
- "ITU-T Recommendation X.721:1992":eventForwardingDiscriminator;
- "ITU-T Recommendation X.721:1992":log.

The following classes which are defined in Recommendation X.745 [22] may be instantiated.

- "ITU-T Recommendation X.745:1993":schedulingConflictRecord;
- "ITU-T Recommendation X.745:1993":testActionPerformer;
- "ITU-T Recommendation X.745:1993":testResultsRecord.

6.1.3 Test fragment

The following classes which are required for the testing of lines and line circuits are defined in the following subclauses. They may all be instantiated.

6.1.3.1 Access test

accessTest **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.745": testObject;

CHARACTERIZED BY

testEnvironmentConditionsPackage,

"ITU-T Recommendation X.745": mORTsPackage,

accessTestPkg **PACKAGE**

BEHAVIOUR

accessTestPkgBehaviour **BEHAVIOUR**

DEFINED AS "The MORTs which are subject to test are listed in the mORTs attribute.

The creation of an instance of this object class represents a test session and permits test access to lines or line circuits during which a number of different tests can be performed. These tests are executed by instances of specific test object classes contained in the accessTest object, which acts for them as a common framework in terms of state handling (dependent on the performed tests) and test mechanism reservation (implementation specific).

If this object class is instantiated with a contained voiceAccessTest object instance, the mORTs attribute shall contain only one user port.

If an instance of this object class contains instances of specific test object classes, the line access conditions are those implicitly specified by the individual test objects. The procedure for the sequential or parallel performance of the tests specified by the contained objects on the user port(s) listed in their mORTs, attributes is up to the implementation.

The testEnvironmentConditionsPackage is used to control any possible interference between tests ordered by the manager and all other activities taking place in the NE.

In case of multiple MORTs testing, the additionalInformation field of the test result notification shall contain the results for each MORT under test. In the case that at least one test of a MORT fails to seize sufficient test resources, the testOutcome field of test result notification shall contain the value 'fail'. The test result notification shall only be sent for the MORTs for which there was a failure to set up an adequate test environment.

The NE may perform, at any time during the lifespan of the accessTest object, a check for the presence of a dangerous voltage. If this condition is detected, then this is reported in the test result of the accessTest and the affected test is terminated (in the case of multiple MORTs testing, the effective MORT is skipped).";

NOTIFICATIONS

"ITU-T Recommendation X.745": testResultNotification accessResult;;;

REGISTERED AS {q835ManagedObjectClass 1};

6.1.3.2 Cable pair identification tone

cablePairIdTone **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.745": testObject;

CHARACTERIZED BY

cablePairIdTonePkg **PACKAGE**

BEHAVIOUR

cablePairIdTonePkgBehaviour **BEHAVIOUR**

DEFINED AS "This test is only performed given that the containing accessTest object instance exists and that it is in the testing state, as defined in ITU-T Recommendation X.745, for the MORT(s) to which the test is to be applied.

This test shall be performed in the following way: a tone shall be sent out on a 2-wire pair to assist in identifying cable pairs in the field.";;

NOTIFICATIONS

"ITU-T Recommendation X.745": testResultNotification genericTestResult;;;

REGISTERED AS {q835ManagedObjectClass 2};

6.1.3.3 Dialed digit test

dialledDigitTest **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.745": testObject;

CHARACTERIZED BY

dialledDigitTestPkg **PACKAGE**

BEHAVIOUR

dialledDigitTestPkgBehaviour **BEHAVIOUR**

DEFINED AS "This test is only performed given that the containing accessTest object instance exists and that it is in the testing state, as defined in ITU-T Recommendation X.745, for the MORT to which the test is to be applied.

DTMF tone (if possible) or pulses received are decoded and results reported after the specified number of digits have been received. This value is stored in the numberOfDigits attribute (default 1 digit).

The wrongSignal value of the NotDigit data type result may be generated by the NE if a signal has been detected of similar nature as the expected one, but out of the range for any of its aspects, e.g., invalid duration (loop break or DTMF tones), invalid level and/or frequency (DTMF) or one-tone-missing (DTMF). If an implementation generates this result, it shall be well specified under which conditions it is done.";;

ATTRIBUTES

numberOfDigits **DEFAULT VALUE**

ASN1LLCTTypeModule.defaultNumberOfDigits GET-REPLACE,

requestedResultType **DEFAULT VALUE**

ASN1LLCTTypeModule.defaultRequestedResultType GET-REPLACE;

NOTIFICATIONS

"ITU-T Recommendation X.745": testResultNotification dialledDigitTestResult;;

REGISTERED AS {q835ManagedObjectClass 3};

6.1.3.4 Dial tone test

dialToneTest **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.745": testObject;

CHARACTERIZED BY

dialToneTestPkg **PACKAGE**

BEHAVIOUR

dialToneTestPkgBehaviour **BEHAVIOUR**

DEFINED AS "This test is only performed given that the containing accessTest object instance exists and that it is in the testing state, as defined in ITU-T Recommendation X.745, for the MORT(s) to which the test is to be applied.

An off-hook is simulated by the NE according to the offHookSimulation attribute and the time is measured until the dial tone appears on the line circuit termination. This time is compared with a predefined threshold. If a number of iterations are specified, then the results are returned in a single test result notification.

In case of multiple MORTs testing, the additionalInformation field of the test result notification shall contain the results for each MORT under test. When all MORTs passed the tests, the testOutcome field of the test result notification shall contain the value 'pass'. In case at least one MORT test fails, the testOutcome field of the test result notification shall contain the value 'fail'.

The requestedResultType is used to control the test result notification. Its three Boolean parameters define whether the MORTs which passed and/or those which failed and/or the measured values are to be reported.";;

ATTRIBUTES

offHookSimulation **GET,**

requestedResultType **DEFAULT VALUE**

ASN1LLCTTypeModule.defaultRequestedResultType GET-REPLACE,

iterations **DEFAULT VALUE** ASN1LLCTTypeModule.defaultIterations;

NOTIFICATIONS

"ITU-T Recommendation X.745": testResultNotification dialToneTestResult;;

REGISTERED AS {q835ManagedObjectClass 4};

6.1.3.5 Dry loop

dryLoop **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.745": testObject;

CHARACTERIZED BY

dryLoopPkg **PACKAGE**

BEHAVIOUR

dryLoopPkgBehaviour **BEHAVIOUR**

DEFINED AS "This test is only performed given that the containing accessTest object instance exists and that it is in the testing state, as defined in ITU-T Recommendation X.745, for the MORT(s) to which the test is to be applied.

When an object is instantiated, the lines related to the user ports listed in the MORT's attribute are disconnected from the corresponding line circuit.

The result of the attempt to switch the requested dry loop(s) may be reported immediately or after the appropriate wait time as given in the test request.

A dry loop is terminated by time-out, by deleting the dryLoop object or by terminating the function with a testTerminate action.";;

NOTIFICATIONS

"ITU-T Recommendation X.745": testResultNotification genericTestResult;;

REGISTERED AS {q835ManagedObjectClass 5};

6.1.3.6 Electrical measurement test

electricalMeasurementTest **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.745": testObject;

CHARACTERIZED BY

electricalMeasurementTestPkg **PACKAGE**

BEHAVIOUR

electricalMeasurementTestPkgBehaviour **BEHAVIOUR**

DEFINED AS "This test is only performed given that the containing accessTest object instance exists and that it is in the testing state, as defined in ITU-T Recommendation X.745, for the MORT(s) to which the test is to be applied.

The electricalMeasurementTestToBePerformed attribute defines which electrical measurements are to be performed, what results are required and (optionally) thresholds that override predefined NE thresholds to be used only during this test.

The appropriate testOutcome shall be set to 'pass' only if all performed tests were successful. If requested, measured values will be returned in the electricalMeasurementTestResult parameter carried in the test result notification. If a requested measurement could not be executed by the NE because it is not supported, the NE shall omit the related optional elements within the electricalMeasurementTestResult.

In case of multiple MORTs testing, the additionalInformation field of the test result notification shall contain the results for each MORT under test. When all MORTs passed the tests, the testOutcome field of the test result notification shall contain the value 'pass'. In case at least one MORT test fails, the testOutcome field of the test result notification shall contain the value 'fail'.

The requestedResultType is used to control the test result notification. Its three Boolean parameters define whether the MORTs which passed and/or those which failed and/or the measured values are to be reported.";;

ATTRIBUTES

electricalMeasurementTestToBePerformed **DEFAULT VALUE**

ASN1LLCTTypeModule.defaultElectricalMeasurementTestToBePerformed GET-REPLACE,

requestedResultType **DEFAULT VALUE**

ASN1LLCTTypeModule.defaultRequestedResultType GET-REPLACE;

NOTIFICATIONS

"ITU-T Recommendation X.745": testResultNotification electricalMeasurementTestResult;;

REGISTERED AS {q835ManagedObjectClass 6};

6.1.3.7 ISDN quick test

isdnQuickTest **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.745": testObject;

CHARACTERIZED BY

"ITU-T Recommendation X.745":mORTsPackage,

isdnQuickTestPkg **PACKAGE**

BEHAVIOUR

isdnQuickTestPkgBehaviour **BEHAVIOUR**

DEFINED AS "The ISDN quick test is only performed given that the containing accessTest object instance exists and that it is in the testing state, as defined in ITU-T Recommendation X.745 for the MORT(s) to which the test is to be applied.

The isdnQuickTestToBePerformed attribute defines which quick tests are to be performed.

The appropriate testOutcome shall be set to 'pass' only if all test steps performed by the quick test were successful. If requested, detailed error reasons will be returned in the isdnQuickTestResult parameter carried in the test result notification. If a requested isdnQuickTest could not be executed by the NE because it is not supported, the NE shall generate the appropriate specific error indicating the not supported test.

In case of multiple MORTs testing the additionalInformation field of the test result notification shall contain the results for each MORT under test. When all MORTs passed the tests, the testOutcome field of the test result notification contains the value 'pass'. In case at least one MORT test fails, the testOutcome field of the test result notification shall contain the value 'fail'.

The requestedResultType is used to control the test result notification. Its three Boolean parameters define whether the MORTs which passed and/or those which failed and/or the measured values are to be reported.";;

ATTRIBUTES

isdnQuickTestToBePerformed **DEFAULT VALUE**

ASN1LLCTTypeModule.defaultIsdnQuickTestToBePerformed GET-REPLACE,

requestedResultType **DEFAULT VALUE**

ASN1LLCTTypeModule.defaultRequestedResultType GET-REPLACE;

NOTIFICATIONS

"ITU-T Recommendation X.745":testResultNotification isdnQuickTestResult;;

REGISTERED AS {q835ManagedObjectClass 7};

6.1.3.8 Loop test

loopTest **MANAGED OBJECT CLASS**

DERIVED FROM "ITU-T Recommendation X.745": testObject;

CHARACTERIZED BY

testEnvironmentConditionsPackage,

"ITU-T Recommendation X.745": mORTsPackage,

loopTestPkg **PACKAGE**

BEHAVIOUR

loopTestPkgBehaviour **BEHAVIOUR**

DEFINED AS "Instances of this object class represent loopbacks which are used for testing.

When an instance of this object class is applied to a set of user ports which are represented by objects, then the inherited mORTs attribute consists of a set of object identifiers which indicates the ports to which loopback are to be applied. Patterns are transmitted towards the user, then looped back towards the port for each indicated port.

Further details about the generation and comparison of patterns may be modeled using one or more objects which are contained in this loopTest object instance. If there are no such contained objects, then pattern generation and detection may be performed remotely or implicitly performed locally.

The loopbackDuration attribute indicates for how long a loopback is to be applied. It shall have a finite value to ensure that the loopback will be eventually removed, and any request which would result in a loopback being applied infinitely shall be rejected. The loopback shall be removed before the instance of this class is deleted.

The loopbackPosition attribute indicates the position where loopback is to be applied. Loopbacks in different positions may be used in the testing of a single object. The loopbackPosition attribute indicates both the position and the direction of the loopback.

The loopbackChannel attribute indicates the nature of the loopback, in particular the channels or connections which are looped back at the loopback position.