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**Signalling Protocols and Switching (SPS);
Q3 interface at the Access Network (AN)
for fault and performance management of V5 interfaces
and associated user ports;
Part 1: Q3 interface specification**

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Signalling Protocols and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS is part 1 of a multi-part standard as described below:

Part 1: "Q3 interface specification at the Access Network (AN) for fault and performance management of V5 interfaces and associated user ports";

NOTE: A possible further part 2 may contain the Managed Object Conformance Statement (MOCS) proforma specification.

The following standards are directly related to this ETS:

ETS 300 376: "Q3 interface at the Access Network (AN) for configuration management of V5 interfaces and associated user ports";

ETS 300 377: "Q3 interface at the Local Exchange (LE) for configuration management of V5 interfaces and associated customer profiles";

ETS 300 379: "Q3 interface at the Local Exchange (LE) for fault and performance management of V5 interfaces and associated customer profiles".

Transposition dates	
Date of adoption of this ETS:	17 November 1995
Date of latest announcement of this ETS (doa):	28 February 1996
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 August 1996
Date of withdrawal of any conflicting National Standard (dow):	31 August 1996

Introduction

V5 interfaces, as described in ETS 300 324-1 and ETS 300 347-1, operate between a Local Exchange (LE) and an Access Network (AN) to support various narrowband Integrated Services Digital Network (ISDN) and Public Switched Telephone Network (PSTN) services. These interfaces and their associated user ports need to be managed by the Operations Systems (OSs) within the Telecommunications Management Network (TMN). This management is performed by means of Q3 interfaces.

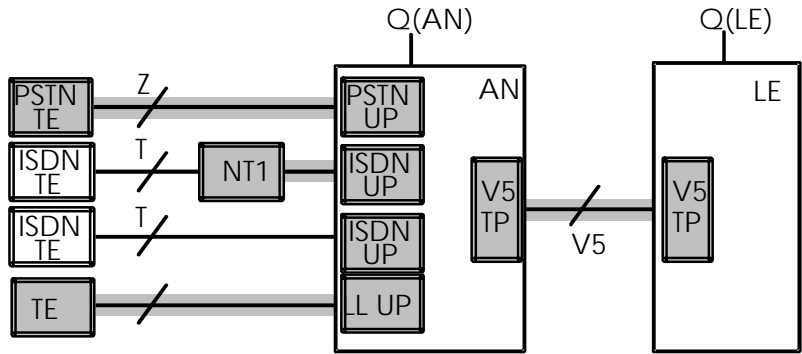
The companion standard on configuration management ETS 300 376-1 defines how the Q3 interface of an AN handles the configuration information for V5 interfaces and their associated user ports. This ETS specifies the extension to include fault and performance management.

Fault management of V5 interfaces and associated user ports 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.

Performance management of V5 interfaces and associated user ports is part of a management activity which is employed in order to maintain the quality of service levels agreed with the customers. The activities undertaken in performance management are monitoring, analysis and problem alerting, diagnosis, optimization and control.

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 activities are covered which are related directly to a V5 interface between a LE and an AN or to that part of the customer access which extends from the AN 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 V5 fault and performance management. User ports represent the different configurations for Line Circuit (LC), Line Termination (LT), Exchange Termination (ET) and Network Termination (NT) as given in figure 2 of the V5 specifications ETS 300 324-1 and ETS 300 347-1. For leased lines (semi-permanent lines), this ETS only covers aspects which are common to PSTN and ISDN.

Figure 1: Scope of V5 fault and performance management

This ETS details only those functions and management information model components for which V5 specific descriptions are required. However, the use of other components which may be applicable from other specifications is not precluded. In this case, combined applications incorporating both V5 specific and more generic aspects would result. For example, if log control is to be provided in conjunction with the V5 specific alarm reporting function (see annex A), then other specifications (e.g. CCITT Recommendation X.735) are available to define this.

The management information model described in this ETS complements that for configuration; both information models will normally share the same physical interface.

1 Scope

This European Telecommunication Standard (ETS) specifies the Q3 interface between an Access Network (AN) and the Telecommunications Management Network (TMN) for the support of fault and performance management functions for V5 interfaces, as described in ETS 300 324-1 [4] and ETS 300 347-1 [5], and their associated user ports. The management of transmission, media and services which are not related to V5 interfaces is outside the scope of this ETS.

This ETS includes the testing of the lines and line circuits at the user ports associated with the V5 interface, and the logging of faults and related functions. Messages on the V5 interface associated with errors or other faults which are handled by local management (e.g. the non-deferred link blocking request) or which involve implementation specific issues (e.g. faults which may result in the connection incomplete information element being used in the Bearer Channel Connection (BCC) protocol) are outside the scope of this ETS.

The location of the Q3 interface to which this ETS refers is specified in ETS 300 376-1 [6].

This ETS does not constrain the logical or physical size of the AN or its geographical dispersion.

Existing protocols are used where possible, and the focus of this ETS is on defining the object models. The definition of Operations System (OS) functionality is outside the scope of this ETS.

2 Normative references

This ETS incorporates by dated and 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.

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- [5] ETS 300 347-1 (1994): "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.2 interface for the support of Access Network (AN); Part 1: V5.2 interface specification".
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- [30] ITU-T Recommendation M.3603: "Application of maintenance principles to ISDN basic rate access".
- [31] ITU-T Recommendation M.3604: "Application of maintenance principles to ISDN primary rate access".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

Access Network (AN): See ETS 300 324-1 [4].

activation-deactivation of the line: See subclause C.3.5.

bearer channel: See ETS 300 324-1 [4].

Bearer Channel Connection (BCC): See ETS 300 347-1 [5].

cable pair identification tone: See subclause C.3.5.

capacitance measurement: See subclause C.3.5.

codec testing: See subclause C.3.5.

Communication Channel (C-Channel): See ETS 300 324-1 [4].

communication path: See ETS 300 324-1 [4].

control protocol: See ETS 300 324-1 [4].

dial pulse test: See subclause C.3.5.

dial tone test: See subclause C.3.5.

digit reception: See subclause C.3.5.

dry loop: See subclause C.3.5.

Digital Tone Multi-Frequency (DTMF) dialling test: See subclause C.3.5.

envelope function address: See ETS 300 324-1 [4].

feeding current: See subclause C.3.5.

feeding voltage: See subclause C.3.5.

foreign voltage: See subclause C.3.5.

insulation resistance measurement: See subclause C.3.5.

layer 3 address: See ETS 300 324-1 [4].

leased lines: See ETS 300 324-1 [4].

line testing: See subclause C.3.5.

line circuit testing: See subclause C.3.5.

Local Exchange (LE): See ETS 300 324-1 [4].

loop detection and ring trip detection: See subclause C.3.5.

loop resistance measurement: See subclause C.3.5.

loopback 1 (line termination loopback): See subclause C.3.5.

loopback 2, 2₁ and 1A (NT1 loopbacks): See subclause C.3.5.

monitoring of the line: See subclause C.3.5.

monitoring of the line with mark tone: See subclause C.3.5.

Operations System (OS): See CCITT Recommendation M.3010 [13].

power feed: See subclause C.3.5.

private meter pulses: See subclause C.3.5.

protection protocol: See ETS 300 347-1 [5].

register recall button test: See subclause C.3.5.

subscriber private metering: See subclause C.3.5.

V5 interface: See ETS 300 324-1 [4].

V5 interface messages: This term refers to all Function Elements (FEs) and other V5 protocol messages as defined in ETS 300 324-1 [4] and ETS 300 347-1 [5] which are communicated via the V5 interface.

V5 time slot: See ETS 300 324-1 [4].

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

AIS	Alarm Indication Signal
AN	Access Network
ASN.1	Abstract Syntax Notation One (see CCITT Recommendation X.208 [18])
BA	Basic Access
BCC	Bearer Channel Connection
C-channel	Communication channel
CMIP	Common Management Information Protocol
CPE	Customer Premise Equipment
DTMF	Digital Tone Multi-Frequency
DS	access Digital Section
ET	Exchange Termination
FE	Function Element
FSM	Finite State Machine
ID	Identity, identifier

ISDN	Integrated Services Digital Network
LC	Line Circuit
LE	Local Exchange
LFA	Loss of Frame Alignment
LOS	Loss Of Signal
LT	Line Termination
MORT	Managed Object Referring to Test
NE	Network Element
NT	Network Termination
OS	Operations System
OS _{AN}	OS of the Access Network
OS _{LE}	OS of the Local Exchange
PL	Permanent Line
PRA	Primary Rate Access
PSTN	Public Switched Telephone Network
Q3 _{AN}	Q3 interface at the Access Network
Q3 _{LE}	Q3 interface at the Local Exchange
RDN	Relative Distinguished Name
REG	Regenerator
SPM	Subscriber Private Meter
TIB	Task Information Base
TMN	Telecommunication Management Network

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

Figures 2 and 3 show the various entities related to traffic measurement and line testing at the AN. They extend the information model described in ETS 300 376-1 [6], which covers the configuration aspects.

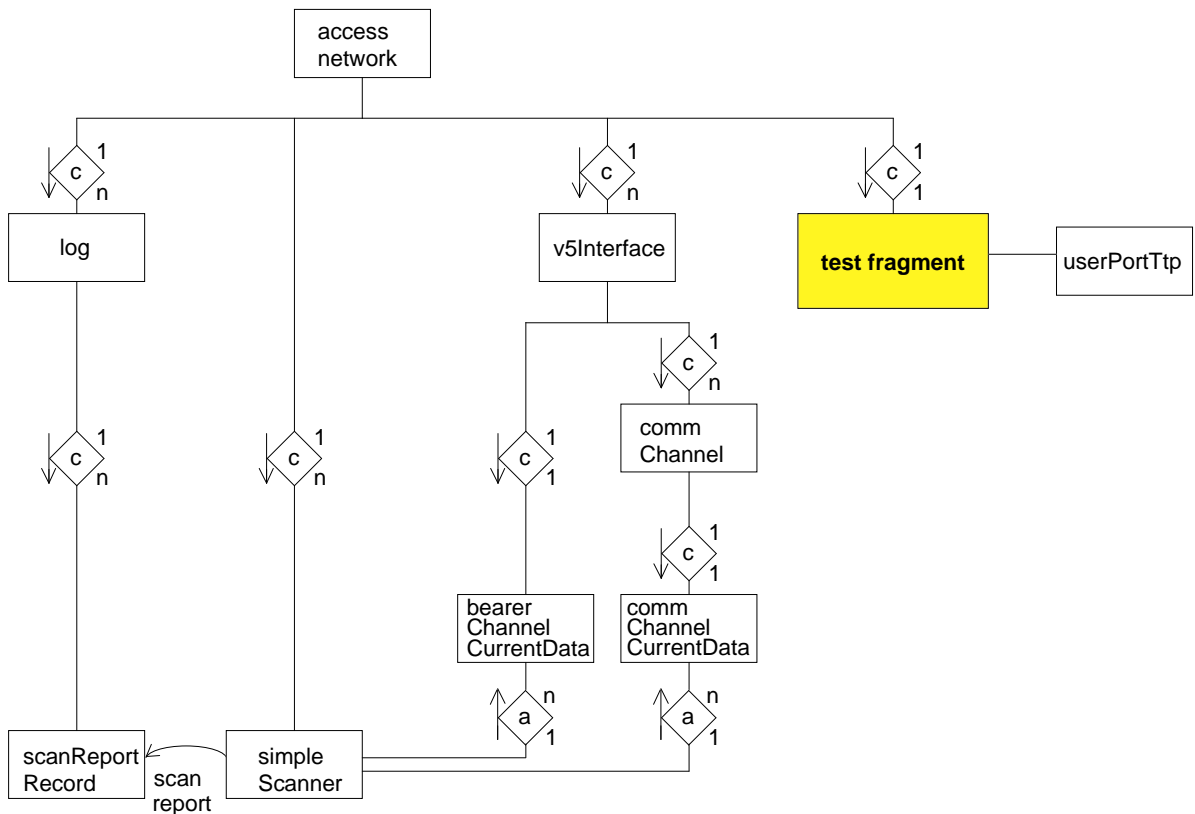
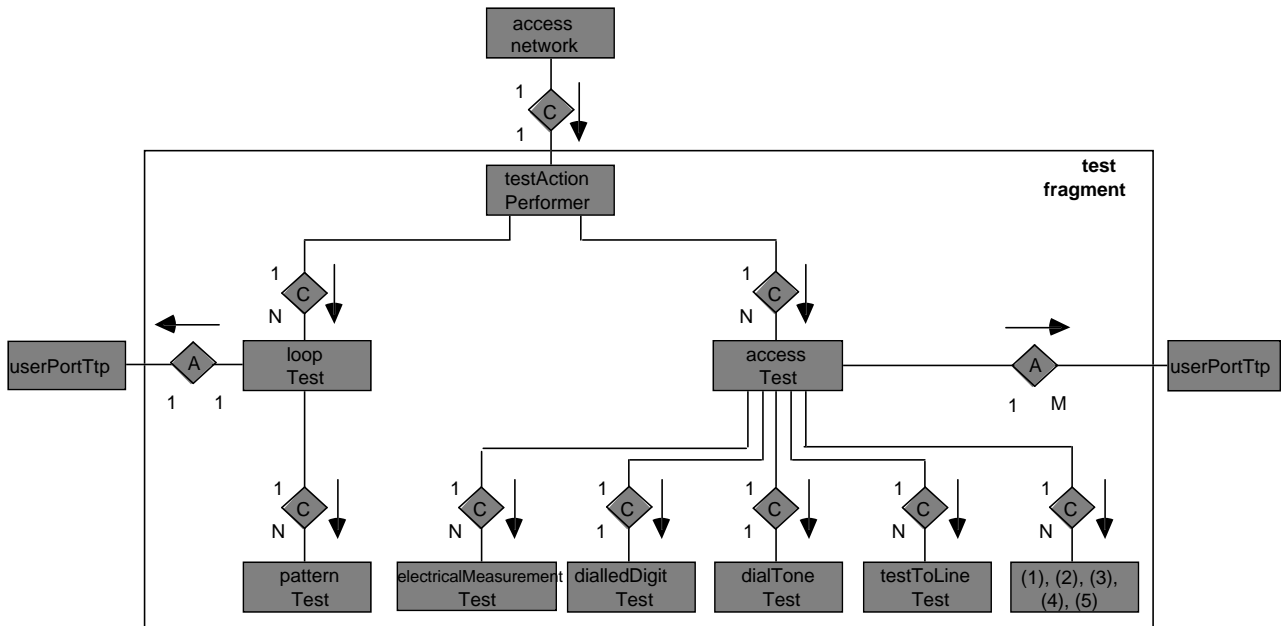


Figure 2: Entity relationship diagram - V5 traffic measurement and test fragment



NOTE: (1) = spmPulses
 (2) = cablePairIdTone
 (3) = ringing
 (4) = dryLoop
 (5) = voiceAccessTest

Figure 3: Entity relationship diagram - test fragment

4.1.1 Traffic measurement

Traffic measurements in the AN are concerned with bearer channel allocation and communication channel traffic characteristics. Subclasses of ITU-T Recommendation Q.822 [17] currentData object classes are used to store traffic measurement data obtained from the object instance they are contained in. The current data is updated every 15 minutes.

The object class bearerChannelCurrentData has attributes for bearer channel oriented performance measurements of a V5.2 interface. These measurements are obtained from the v5Interface object instance representing a V5.2 interface which contains the bearerChannelCurrentData instance. For a V5.1 interface, no bearer channel related traffic measurements are foreseen. The object class commChannelCurrentData is contained in an instance of commChannel. It has attributes for communication channel oriented performance measurements related to a V5 communication channel. Both object classes are described in detail in ETS 300 379-1 [8].

An instance of the ITU-T Recommendation X.738 [26] simpleScanner object class may be used to collect the traffic measurement results stored in commChannelCurrentData and bearerChannelCurrentData object instances in a certain time interval. It generates a scanReport notification being sent to the managing system. In addition results may be logged in a scanReportRecord object instance which will itself be contained in a log object.

4.1.2 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 [28].

Controlled testing is initially delegated to an instance of accessTest or to an instance of loopTest. Each instance of loopTest or accessTest 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 AN 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 non-loopback tests allocated to it. It has an attribute which specifies one or a list of user ports which are to be tested.

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 (see figure 3). Dialed digit tests, dial tone tests and other tests (in particular those involving sending to the line meter pulses, 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.

4.1.3 The testResultNotifications of the tests

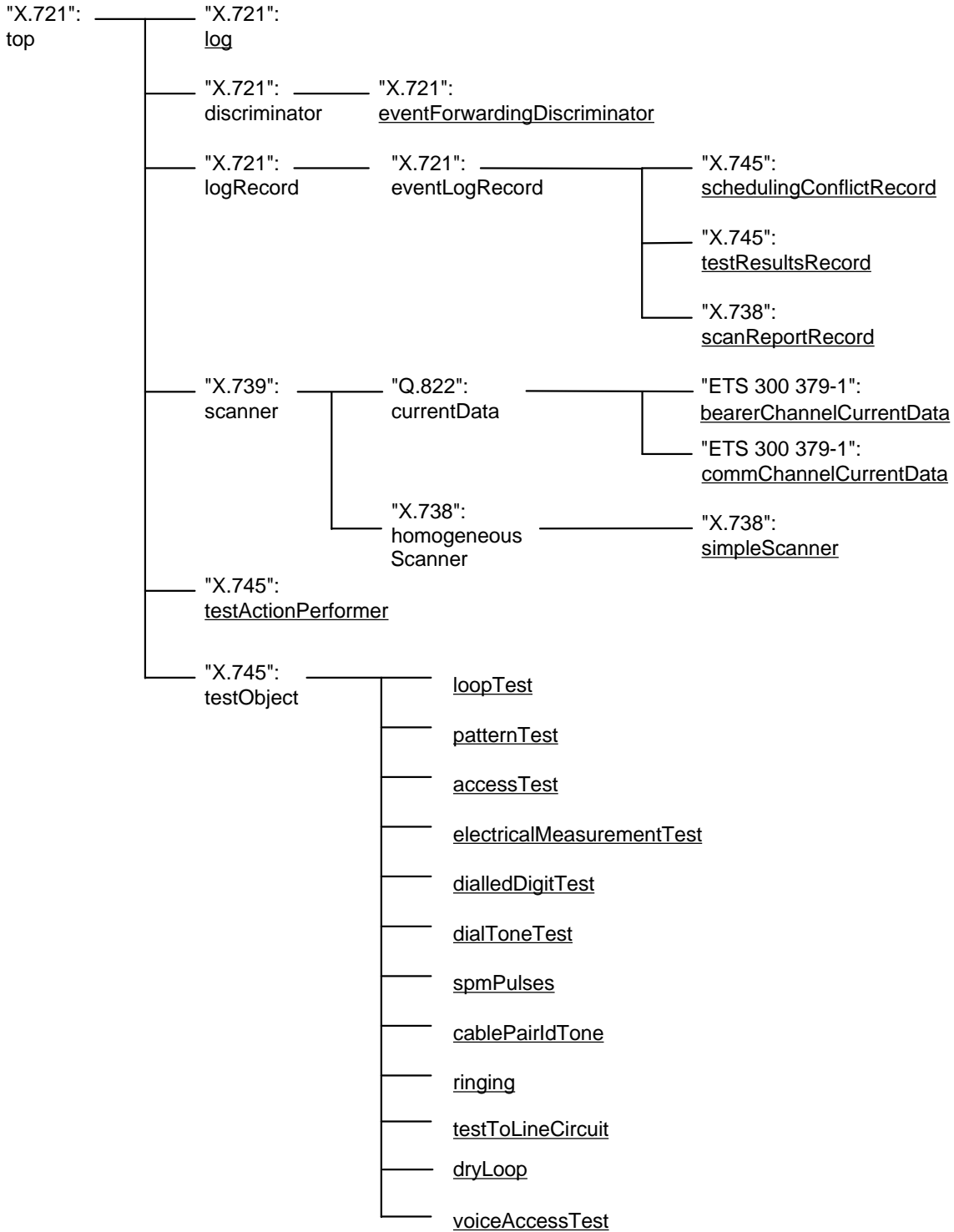
The sending time, the information contents and the number of testResultNotifications sent per test request are not restricted. It is a matter up to the AN implementation. If the testResultNotification contains results whose testing time has importance, they shall be ordered in the ASN.1 sequence oldest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

4.1.4 Performance monitoring of ISDN user ports

Performance monitoring of layer 1 for ISDN user ports can be carried out in accordance with ITU-T Recommendation Q.822 [17].

4.2 Inheritance hierarchy

Figure 4 traces the inheritance from the highest level object "CCITT Recommendation X.721:1992":top to the managed objects defined in this ETS.



NOTE: Only classes which are underlined may be instantiated.

Figure 4: Inheritance hierarchy

4.3 Naming hierarchy

Figure 5 shows the naming (i.e. containment) relationships for the AN's managed objects associated with fault and performance management.

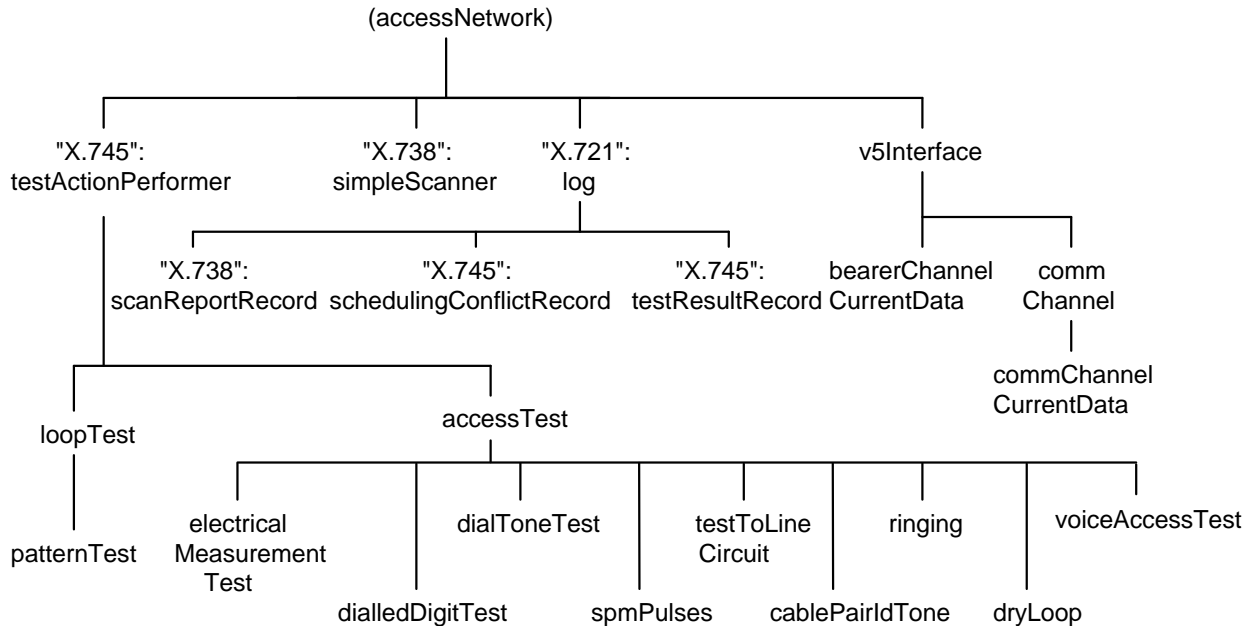


Figure 5: Naming hierarchy

5 Information model description

This clause provides a high-level informal description of the management information model for fault and performance management of the AN.

Subclause 5.1 contains a brief description for each object class or package used in the model as far as it is not described in the reference documents. The description covers:

- the purpose of the object class or package;
- the attributes defined for the object class or package;
- the contents of the event reports defined in this ETS;
- the relationship of the object class to other object classes;
- the applicability of these packages.

Attributes which are common to several object classes are described in subclause 5.2. Subclause 5.3 describes actions which are common to several object classes in the information model. Subclause 5.4 describes the common aspects of the notifications used in the information model.

5.1 Description of object classes

5.1.1 V5 interface fragment

The V5 interface fragment is described in subclause 5.1.1 of ETS 300 379-1 [8].

5.1.2 User port fragment

For performance monitoring of ISDN basic access, the requirements specified in the following documents apply:

- ETR 080 [9];
- ETS 300 297 [3];
- CCITT Recommendation G.821 [11];
- ITU-T Recommendation G.826 [12].

For performance monitoring of ISDN primary rate access, the requirements specified in the following documents apply:

- ETS 300 233 [1];
- CCITT Recommendation G.821 [11];
- ITU-T Recommendation G.826 [12].

Object classes as defined in ITU-T Recommendation Q.822 [17] shall be used for the Q3 interface for ISDN performance monitoring.

In this fragment the following object classes are used. They are defined in ETS 300 376-1 [6]:

- "ETS 300 376-1":pstnUserPort;
- "ETS 300 376-1":isdnBAUserPort;
- "ETS 300 376-1":isdnPRAUserPort;
- "ETS 300 376-1":leasedPort.

5.1.2.1 PSTN user port (pstnUserPort)

A PSTN user port is an object class representing a customer access port which is located in an AN and connected to the LE via a V5 interface.

For V5 fault management, the "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarm-InformationPackage shall be instantiated with instances of this object class.

The following events shall be reported by instances of this object class using the communicationsAlarm notification (for the specification of the alarm reports and for cross reference to the relevant V5 protocol specifications, see annex A):

- a) port control protocol time out errors;
- b) port control protocol errors while "Out of Service";
- c) port control protocol layer 3 address error;
- d) PSTN Protocol time out errors;
- e) PSTN protocol layer 3 address error;
- f) port control protocol syntax errors (optional);
- g) PSTN protocol syntax errors (optional);
- h) power feeding problems.

5.1.2.2 ISDN basic access user port (isdnBAUserPort)

An ISDN Basic Access (BA) user port is an object class representing an ISDN basic customer access port which is located in an AN and connected to the LE via a V5 interface.

For V5 fault management the "ITU-T Recommendation M.3100:1992":tmnCommunicationsAlarm-InformationPackage shall be instantiated with instances of this object class.

The following events shall be reported by instances of this object using the communicationsAlarm notification (for the specification of the alarm reports and for cross reference to the relevant V5 protocol specifications, see annex A):

- a) ISDN layer 1 activation faults (see note 1);
- b) ISDN layer 2 faults (see note 1);
- c) LOS/LFA in access Digital Section (DS) or loss of power at NT1, FE: 7 (see note 1);
- d) LOS/LFA at T reference point, FE: 12 (see note 1);
- e) port control protocol time out errors;
- f) port control protocol errors while "Out of Service";
- g) port control protocol layer 3 address error;
- h) port control protocol syntax errors (optional).

NOTE 1: These events are to be reported only if the port provides Permanent Line (PL) service with permanent layer 1 or layer 2 activation and if the AN is responsible for the activation.

NOTE 2: The defect conditions are more detailed described in subclause "Defect conditions and consequent actions" in ETS 300 297 [3].

For V5 performance management the "ETS 300 377-1":qualityOfServiceAlarmPackage shall be instantiated with instances of this object class whenever a degraded quality of service of the access digital section has to be reported to the OS.

5.1.2.3 ISDN primary rate access user port (isdnPRAUserPort)

An ISDN Primary Rate Access (PRA) user port is an object class representing an ISDN primary rate customer access port which is located in an AN and connected to the LE via a V5 interface.

For V5 fault management the "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarm-InformationPackage shall be instantiated with instances of this object class.

The following events shall be reported by instances of the object class virtual primary rate access using the communicationsAlarm notification (for the specification of the alarm reports and for cross reference to the relevant V5 protocol specifications, see annex A):

- a) unintentional loopback;
- b) LOS/LFA and power failure. FE: D-L;
- c) performance monitoring. FE: U-Y;
- d) ISDN layer 2 faults (see note 1);
- e) port control protocol time out errors;
- f) port control protocol errors while "Out of Service";
- g) port control protocol layer 3 address error;
- h) port control protocol syntax errors (optional).

NOTE 1: These events are to be reported only if the port provides Permanent Line (PL) service with permanent layer 2 activation and if the AN is responsible for the activation.

NOTE 2: The defect conditions are described in detail in tables 2 and 4 of ETS 300 233 [1].

5.1.2.4 Leased port (leasedPort)

A leased port is an object class representing an access port serving a semipermanent leased line which is located in the AN and connected to the LE via a V5 interface. For V5 fault management the "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformationPackage should be instantiated with instances of this object class.

NOTE: In the absence of clear standards for event reporting on leased lines, it is not appropriate to state mandatory requirements.

Events as applicable should be reported by instances of this object class using the communicationsAlarm notification (see also annex A).

5.1.3 Communications path fragment

The communications path fragment is described in subclause 5.1.3 of ETS 300 379-1 [8].

5.1.4 Protection fragment

The protection fragment is described in subclause 5.1.4 of ETS 300 379-1 [8].

5.1.5 Performance fragment

5.1.5.1 Bearer channel current data

The bearer channel current data object class is a class of managed objects representing a set of V5.2 bearer channel oriented traffic measurements. It is a subclass of "ITU-T Recommendation Q.822:1993":currentData.

An instance of this object class is contained in an instance of the "ETS 300 377-1":v5Interface object class representing the V5.2 interface for which the measurements are to be activated. The measurements can then be performed on the basis of 15 minute intervals.

The object class is specified in ETS 300 379-1 [8].

The following measurements are represented by attributes of this object class:

- a) number of bearer channel allocations;
- b) total sum of bearer channel holding times;
- c) total sum of bearer channel in-service times.

In addition to the inherited attributes, it has the attributes given in table 1.

Table 1

Name	M/C/O	Value set
"X.739":scannerId	M	RDN
bearerChannelAllocationsBothway	M	single
bearerChannelHoldingTimesBothway	M	single
bearerChannelInServiceTimes	M	single
numberOfCommChannels	M	single
numberOfV5Links	M	single
bearerChannelAllocationsBothway:		number of bearer channel allocations to originated and terminated calls.
bearerChannelHoldingTimesBothway:		total sum of bearer channel allocation duration for originated and terminated calls.
bearerChannelInServiceTimes:		total sum of in-service times of the V5 time slots.
numberOfCommChannels:		number of V5 C-channels provisioned for the V5 interface.
numberOfV5Links:		number of V5 links which comprise the V5 interface.

5.1.5.2 Communication channel current data

The communication channel current data object class is described in subclause 5.1.5.2 of ETS 300 379-1 [8].

5.1.6 Alarm surveillance fragment

The alarm surveillance fragment is described in subclause 5.1.6 of ETS 300 379-1 [8].

5.1.7 Support fragment

The support fragment is described in subclause 5.1.7 of ETS 300 379-1 [8].

5.1.8 Test fragment

The following classes are used for testing.

5.1.8.1 Access test (accessTest)

Instances of the class accessTest represent configurations and conditions for testing the line and line circuit. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 2.

Table 2

Name	M/O	Value set
"X.745":testObjectId	RDN	single
"X.737":testConditions	M	single
waitTime	M	single
"X.745":mORTs	M	set
"X.737":testConditions:	indicates the action to be taken if the port is busy and if a call is attempted during testing.	
waitTime:	indicates the wait time if the testConditions attribute indicates a wait if busy.	

5.1.8.2 Dialed digit test (dialedDigitTest)

Instances of the class dialedDigitTest represent a dialed digit tests. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 3.

Table 3

Name	M/O	Value set
"X.745":testObjectId	RDN	single
numberOfDigits	M	single
numberOfDigits:	indicates the number of digits for the test.	

5.1.8.3 Dial tone test (dialToneTest)

Instances of the class dialToneTest represent a dial tone tests. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 4.

Table 4

Name	M/O	Value set
"X.745":testObjectId	RDN	single
offHookSimulation	M	single
requestedResultType	M	single
iterations	M	single
offHookSimulation:	indicates how off-hook is to be simulated i.e. loop calling or earth calling.	
requestedResultType:	indicates whether a test result should be a pass or a fail.	
iterations:	indicates the number of iterations for a test.	

5.1.8.4 Electrical measurement test (electricalMeasurementTest)

Instances of the class electricalMeasurementTest represent electrical measurements. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 5.

Table 5

Name	M/O	Value set
"X.745":testObjectId	RDN	single
electricalMeasurementTestToBePerformed	M	single
requestedResultType	M	single
electricalMeasurementTestToBePerformed: indicates the types of electrical measurements. requestedResultType: indicates whether a test result should be a pass or a fail or a measured value.		

5.1.8.5 Subscriber Private Meter (SPM) pulses (spmPulses)

Instances of the class spmPulses represent subscriber private meter pulses which can be applied to a line. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 6.

Table 6

Name	M/O	Value set
"X.745":testObjectId	RDN	single
spmPulsesNo	M	single

5.1.8.6 Cable pair identification Tone (cablePairIdTone)

Instances of the class cablePairIdTone represent identification tone which can be applied to a line. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 7.

Table 7

Name	M/O	Value set
"X.745":testObjectId	RDN	single

5.1.8.7 Ringing (ringing)

Instances of the class ringing represent ringing current which can be applied to a line. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 8.

Table 8

Name	M/O	Value set
"X.745":testObjectId	RDN	single
ring	M	single
ring: indicates for how long ringing is to be applied.		

5.1.8.8 Test to line circuit (testToLineCircuit)

Instances of the class testToLineCircuit represent tests which can be applied to a line circuit. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 9.

Table 9

Name	M/O	Value set
"X.745":testObjectId	RDN	single

5.1.8.9 Dry Loop (dryLoop)

This object class is instantiated when it is required to disconnect the line from the line circuit. This condition is called "dry loop". After a dry loop is established, tests may be performed on the line outside the influence of the Q3_{AN} or Q3_{LE} interfaces, until normal conditions are re-established.

In addition to the inherited attributes, it has the attributes given in table 10.

Table 10

Name	M/O	Value set
"X.745":testObjectId	RDN	single

5.1.8.10 Loop test (loopTest)

Instances of the class loopTest represent loopbacks which are used for testing. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 11.

Table 11

Name	M/O	Value set
"X.745":testObjectId	RDN	single
"X.737":testConditions"	M	single
waitTime	M	single
"X.745":mORTs	M	set
loopbackDuration	M	single
loopbackPosition	M	single
loopbackChannel	M	single
"X.737":testConditions:		indicates the action to be taken if the port is busy and if a call is attempted during testing.
waitTime:		indicates the wait time if the testConditions attribute indicates a wait if busy.
loopbackDuration:		indicates the duration of the loopback.
loopbackPosition:		indicates the location of the loopback.
loopbackChannel:		indicates the type of loopback.

5.1.8.11 Pattern test (patternTest)

Instances of the class patternTest represent the generation and comparison of patterns used for testing. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 12.

Table 12

Name	M/O	Value set
"X.745":testObjectId	RDN	single
"X.737":loopbackResults	M	single
"X.737":testPattern	M	single
"X.737":errorRatioReportType	M	single

5.1.8.12 Voice Access Test (voiceAccessTest)

Instances of the class voiceAccessTest represent these tests which involve the monitoring of the line. The class is a specialization of the testObject class defined in ITU-T Recommendation X.745 [28].

In addition to the inherited attributes, it has the attributes given in table 13.

Table 13

Name	M/O	Value set
"X.745":testObjectId	RDN	single
monitorSpeak	M	single
ringBackNo	M	single
monitorSpeak:	indicates whether the line is to be monitored or if speech can be injected and whether or not a mark tone is used while monitoring.	
ringBackNo:	indicates the number for ring-back.	

5.2 Definition of attributes

This subclause provides the description of all generic attributes used within this information model. The following generic attributes have been identified and their definition can be found within the appropriate standards mentioned in the text:

- Relative Distinguished Name (RDN);
- state attributes;
- relationship attributes.

The attributes specific to this information model are already defined within the object class descriptions.

5.2.1 Relative distinguished name

The semantics of the RDN attribute type are specified in CCITT Recommendation X.720 [20]. This attribute type is used to identify an instance of a managed object uniquely within the scope of its immediate superior in the management information tree. This is modelled as a single-valued attribute type:

Value type: identifier, graphic string or integer;

Inherent properties: the value shall be unique within the scope of superior managed object instance;

Permitted operations: get only;

Implicit relations: the object instance is contained in the superior managed object instance;

Specification properties: this attribute type may be used for naming all object classes defined in this ETS.

5.2.2 State attributes

State related attributes of managed objects in this information model comprise the generic state model as defined by CCITT Recommendation X.731 [23] and every specific state attribute type related only to object classes defined in this ETS.

5.2.2.1 Operational state (operationalState)

The semantics of the operationalState attribute are specified in the operational state attribute in CCITT Recommendation X.731 [23]. The syntax of the operationalState attribute is specified in the operational state attribute in CCITT Recommendation X.721 [21].

5.2.2.2 Administrative state (administrativeState)

The semantics of the administrativeState attribute are specified in the administrative state attribute in CCITT Recommendation X.731 [23]. The syntax of the administrativeState attribute is specified in the administrative state attribute in CCITT Recommendation X.721 [21].

5.2.2.3 Availability status (availabilityStatus)

The semantics of the availabilityStatus attribute are specified in the availability status attribute in CCITT Recommendation X.731 [23]. The syntax of the availabilityStatus attribute is specified in the availability status attribute in CCITT Recommendation X.721 [21].

5.2.3 Relationship attributes

Relationship related attributes of managed objects within the scope of this ETS comprise the generic relationship model as defined by CCITT Recommendation X.732 [24].

The following relationships are used in this ETS:

- group relationship;
- peer relationship.

5.3 Actions description

In addition to the inherited actions, the actions performed on the various object classes are indicated in table 14.

Table 14

Actions	Defined in object class
loopbackSelect	loopTest
loopbackSelect: is used to alter the conditions of a loopback.	

5.4 Notifications description

The following generic notifications are utilized:

- object creation according to CCITT Recommendations X.721 [21] and X.730 [22];
- object deletion according to CCITT Recommendations X.721 [21] and X.730 [22];
- attribute value change according to CCITT Recommendations X.721 [21] and X.730 [22];
- state change according to CCITT Recommendations X.721 [21] and X.731 [23];
- relationship change according to CCITT Recommendations X.721 [21] and X.732 [24];
- test result according to ITU-T Recommendation X.745 [28].

The additionalInformation field of the test result notification is used to carry the detailed measurement results for the test where it is applied.

No specific notifications are utilized.

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 V5 interface fragment

The following classes which are defined in ETS 300 377-1 [7] may be instantiated:

- "ETS 300 377-1":v5Interface;
- "ETS 300 377-1":v5Ttp;
- "ETS 300 377-1":v5TimeSlot.

6.1.2 Access port fragment

The following classes which are defined in ETS 300 376-1 [6] may be instantiated:

- "ETS 300 376-1":pstnUserPort;
- "ETS 300 376-1":isdnBAUserPort;
- "ETS 300 376-1":isdnPRAUserPort;
- "ETS 300 376-1":leasedPort;
- "ETS 300 376-1":userPortBearerChannelCtp.

6.1.3 Performance fragment

The following classes which are defined in ITU-T Recommendation X.738 [26] may be instantiated:

- "ITU-T Recommendation X.738:1993":simpleScanner;
- "ITU-T Recommendation X.738:1993":scanReportRecord.

The following classes which are defined in ETS 300 379-1 [8] may be instantiated:

- "ETS 300 379-1":bearerChannelCurrentData;
- "ETS 300 379-1":commChannelCurrentData.

6.1.4 Alarm surveillance fragment

The following classes which are defined in ITU-T Recommendation Q.821 [16] may be instantiated:

- "ITU-T Recommendation Q.821:1993":currentAlarmSummaryControl;
- "ITU-T Recommendation Q.821:1993":managementOperationsSchedule.

6.1.5 Support fragment

The following class which is defined in CCITT Recommendation M.3100 [14] may be instantiated:

- "CCITT Recommendation M.3100:1992":alarmSeverityAssignmentProfile.

The following classes which are defined in CCITT Recommendation X.721 [21] may be instantiated:

- "CCITT Recommendation X.721:1992":alarmRecord;
- "CCITT Recommendation X.721:1992":attributeValueChangeRecord;
- "CCITT Recommendation X.721:1992":eventForwardingDiscriminator;
- "CCITT Recommendation X.721:1992":log.

The following classes which are defined in ITU-T Recommendation X.745 [28] may be instantiated.

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

6.1.6 Test fragment

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

6.1.6.1 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 attribute 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 AN.

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 contains 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 life span 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 {managedObjectClass 1};

6.1.6.2 Dialled 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 [28], 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 AN 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 ASN1FPANTypeModule.defaultNumberOfDigits
                    GET-REPLACE;
            NOTIFICATIONS
                "ITU-T Recommendation X.745":testResultNotification dialledDigitTestResult;
        ;;
REGISTERED AS {managedObjectClass 2};
```

6.1.6.3 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 [28], for the MORT(s) to which the test is to be applied.
                An off-hook is simulated by the AN 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 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. It's 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 ASN1FPANTypeModule.defaultRequestedResultType
                    GET-REPLACE,
                iterations
                    DEFAULT VALUE ASN1FPANTypeModule.defaultIterations
                    GET;
            NOTIFICATIONS
                "ITU-T Recommendation X.745":testResultNotification dialToneTestResult;
        ;;
REGISTERED AS {managedObjectClass 3};
```

6.1.6.4 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 [28], for the MORT(s) to which the test is to be applied.
                The electricalMeasurementTestToBePerformed attribute defines which electrical
                measurement are to be performed, what results are required and (optionally)
                thresholds that override predefined AN 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 AN because it is not supported,
                the AN 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 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. It's 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
                    ASN1FPANTypeModule.defaultElectricalMeasurementTestToBePerformed
                    GET-REPLACE,
                requestedResultType
                    DEFAULT VALUE ASN1FPANTypeModule.defaultRequestedResultType
                    GET-REPLACE;
            NOTIFICATIONS
                "ITU-T Recommendation X.745":testResultNotification electricalMeasurementTestResult;
        ;;
REGISTERED AS {managedObjectClass 4};

```

6.1.6.5 SPM pulses

```

spmPulses MANAGED OBJECT CLASS
DERIVED FROM "ITU-T Recommendation X.745":testObject;
CHARACTERIZED BY
    spmPulsesPkg PACKAGE
        BEHAVIOUR
            spmPulsesPkgBehaviour 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 [28], for the MORT(s) to which the test is to be applied.
                This test shall be performed in the following way: apply the requested number of
                Subscriber Private Metering pulses (0-99) at the required frequency level to the line.
                After the pulses have been sent or after a timeout the test result notification shall be
                emitted, with the testOutcome parameter set to 'inconclusive' or 'timed-out'.
                The spmPulseNo indicates the number of pulse which shall be applied.";;
            ATTRIBUTES
                spmPulsesNo
                    DEFAULT VALUE ASN1FPANTypeModule.defaultSpmPulses GET-REPLACE;
            NOTIFICATIONS
                "ITU-T Recommendation X.745":testResultNotification genericTestResult;
        ;;
REGISTERED AS {managedObjectClass 5};

```

6.1.6.6 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 [28], 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 {managedObjectClass 6};

```

6.1.6.7 Ringing

```

ringing MANAGED OBJECT CLASS
DERIVED FROM "ITU-T Recommendation X.745":testObject;
CHARACTERIZED BY
  ringingPkg PACKAGE
    BEHAVIOUR
      ringingPkgBehaviour 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 [28], for the MORT(s) to which the test is to be applied.
An instance of this object class represent the application of a ringing current to the line.
The current shall be removed either on request or after a timeout. The testOutcome
parameter of the testResult shall indicate 'pass' if the ringing was tripped. When a
timeout occurs it shall be indicated in the appropriate testOutcome parameter.
The ring attribute indicates for how long ringing is to be applied.";;
        ATTRIBUTES
          ring DEFAULT VALUE ASN1FPANTypeModule.defaultRing GET-REPLACE;
        NOTIFICATIONS
          "ITU-T Recommendation X.745":testResultNotification genericTestResult;
        ;;
REGISTERED AS {managedObjectClass 7};

```

6.1.6.8 Test to line circuit

```

testToLineCircuit MANAGED OBJECT CLASS
DERIVED FROM "ITU-T Recommendation X.745":testObject;
CHARACTERIZED BY
  testToLineCircuitPkg PACKAGE
    BEHAVIOUR
      testToLineCircuitPkgBehaviour 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 [28], for the MORT(s) to which the test is to be applied.
This managed object class is instantiated whenever an OS requests an inward test on
a specified user port or on a set of them. This consists of executing a set of specific
circuit tests.
The test result is based on a passed/not passed method covering all circuit tests on a
global way. If the NE supports the transfer of result values, these may be additionally
provided in the 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 tests on a
MORT passed, the testOutcome field of the test result notification contains the value
'pass'. In case at least one test on a MORT fails, the testOutcome field of the test

```


result notification shall contain the value 'fail'. If the testOutcome for a MORT is 'fail' and the AN is able to, it provides a list of the line circuit tests which have failed.";;

NOTIFICATIONS

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

::

REGISTERED AS {managedObjectClass 8};

6.1.6.9 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 [28], 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 MORTs 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 timeout, by deleting the dryLoop object or by terminating the function with a testTerminate action.";;

NOTIFICATIONS

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

::

REGISTERED AS {managedObjectClass 9};

6.1.6.10 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 user port which is represented by an object, then the inherited mORTs attribute consists of a single object identifier which indicates the port to which loopback is to be applied. Patterns are transmitted towards the user, then looped back towards the port.

Further details about the generation and comparison of patterns may be modelled 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.

The loopbackSelect action may be used to select new durations, positions and types for further loopback testing, without deleting the instance of this object class.

If an invalid loopback is requested, then the request shall be rejected with an invalidLoopbackRequest parameter. If the test is terminated before completion of the specified duration, then the loopback shall be removed before the result is returned

and the instance deleted. If the loopback is, then the loopbackResult parameter shall be returned in the testResult notification.

The testEnvironmentalConditionsPackage package is used to control any possible interference between tests ordered by the manager and all other activities taking place in the AN.";;

ATTRIBUTES

loopbackDuration

DEFAULT VALUE ASN1FPANTypeModule.defaultLoopbackDuration GET,

loopbackPosition

DEFAULT VALUE ASN1FPANTypeModule.defaultLoopbackPosition GET,

loopbackChannel

DEFAULT VALUE ASN1FPANTypeModule.defaultLoopbackChannel GET;

ACTIONS

loopbackSelect;

NOTIFICATIONS

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

;;

REGISTERED AS {managedObjectClass 10};

6.1.6.11 Pattern test

patternTest MANAGED OBJECT CLASS

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

CHARACTERIZED BY

"ITU-T Recommendation X.737":loopbackResultsPkg,

patternTestPkg PACKAGE

BEHAVIOUR

patternTestPkgBehaviour BEHAVIOUR

DEFINED AS "A Pattern Test is an object class which represents the generation and matching of bit patterns which may be used in association with loopback testing. The mORTs attribute consists of a set of two objects identifiers. The first of these defines how pattern generation is applied, and the second defines how pattern matching is applied. Patterns are injected at the object identified by the first identifier unless it is null, in which case pattern generation shall be disabled. Patterns received from the object identified by the second identifier are used for comparison unless this identifier is null, in which case pattern matching shall be disabled.

Possible ambiguities about the signal paths by which injected signals leave or arrive at the objects identified in the mORTs attribute is normally resolved in the object which contains the instance of this object. If ambiguities remain, they may be clarified in an object contained in this object.";;

ATTRIBUTES

"ITU-T Recommendation X.737":testPattern

GET-REPLACE,

"ITU-T Recommendation X.737":errorRatioReportType

GET;

;;

REGISTERED AS {managedObjectClass 11};

6.1.6.12 Voice access test

voiceAccessTest MANAGED OBJECT CLASS

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

CHARACTERIZED BY

voiceAccessPackage,

voiceAccessTestPackage PACKAGE

BEHAVIOUR

voiceAccessTestBehaviour BEHAVIOUR

DEFINED AS "This object class allows for the provision of a Voice Access Test.";;

NOTIFICATIONS

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

;;

REGISTERED AS {managedObjectClass 12};

6.2 Name bindings

6.2.1 Test fragment

6.2.1.1 Access test

accessTest-testActionPerformer NAME BINDING
SUBORDINATE OBJECT CLASS accessTest AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "ITU-T Recommendation X.745":testActionPerformer
AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {nameBinding 1};

6.2.1.2 Dialed digit test

dialledDigitTest-accessTest NAME BINDING
SUBORDINATE OBJECT CLASS dialledDigitTest AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS accessTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 2};

6.2.1.3 Dial tone test

dialToneTest-accessTest NAME BINDING
SUBORDINATE OBJECT CLASS dialToneTest AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS accessTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 3};

6.2.1.4 Electrical measurement test

electricalMeasurementTest-accessTest NAME BINDING
SUBORDINATE OBJECT CLASS electricalMeasurementTest AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS accessTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 4};

6.2.1.5 SPM pulses

spmPulses-accessTest NAME BINDING
SUBORDINATE OBJECT CLASS spmPulses AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS accessTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 5};

6.2.1.6 Cable pair identification tone

cablePairIdTone-accessTest NAME BINDING
SUBORDINATE OBJECT CLASS cablePairIdTone AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS accessTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 6};

6.2.1.7 Ringing

ringing-accessTest NAME BINDING
SUBORDINATE OBJECT CLASS ringing AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS accessTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 7};

6.2.1.8 Test to line circuit

testToLineCircuit-accessTest NAME BINDING
SUBORDINATE OBJECT CLASS testToLineCircuit AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS accessTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 8};

6.2.1.9 Dry loop

dryLoop-accessTest NAME BINDING
SUBORDINATE OBJECT CLASS dryLoop AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS accessTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 9};

6.2.1.10 Loop test

loopTest-testActionPerformer NAME BINDING
SUBORDINATE OBJECT CLASS loopTest AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "ITU-T Recommendation X.745":testActionPerformer
AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {nameBinding 10};

6.2.1.11 Pattern test

patternTest-loopTest NAME BINDING
SUBORDINATE OBJECT CLASS patternTest AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS loopTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 11};

6.2.1.12 Voice access test

voiceAccessTest-accessTest NAME BINDING
SUBORDINATE OBJECT CLASS voiceAccessTest AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS accessTest AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Recommendation X.745":testObjectId;
DELETE;
REGISTERED AS {nameBinding 12};

6.3 Definition of packages

6.3.1 Test environment conditions

testEnvironmentConditionsPackage PACKAGE

BEHAVIOUR

testEnvironmentConditions BEHAVIOUR

DEFINED AS "This package allows the manager to specify the relative priorities between a test request and normal traffic. This package does not work in case a voiceAccessTest is instantiated contained in the same accessTest object and its monitorSpeak attribute is set to existingConnection.

The priority between normal traffic and a test request is determined by the test conditions attribute.

If this attribute is set to 'testIfBusy', then testing shall proceed.

In the case of an active connection and the attribute is set to 'waitIfBusy', then the test shall wait at most for the period of time specified in the attribute waitTime. If the active connection has not been released within this time then the test shall enter the terminating phase, skipping the testing phase. The manager shall be notified about the termination using the test result notification with the value 'busyAccessAborted'. Otherwise testing shall proceed.

In the case of an active connection and the attribute is set to 'rejectIfBusy', then the test shall enter the terminating phase skipping the testing phase immediately. The manager may be notified about the termination using the test result notification with the value 'busyAccessAborted'.

During the initialization of the testing phase, an outgoing call attempt may be detected, depending on the particular test and implementation. If the value of the testConditions attribute is 'noCustomerOverrideTest', the test shall continue, otherwise the terminating phase shall be entered and the call shall proceed. The termination shall be notified to the manager using the test result notification with the value 'customerOverrideAborted'.";;

ATTRIBUTES

"ITU-Recommendation X.737":testConditions

DEFAULT VALUE ASN1FPANTypeModule.defaultTestConditions GET,

waitTime

DEFAULT VALUE ASN1FPANTypeModule.defaultBusyLCWaitTime GET-REPLACE;

REGISTERED AS {package 1};

6.3.2 Voice access

voiceAccessPackage PACKAGE

BEHAVIOUR

voiceAccessPackageBehaviour BEHAVIOUR

DEFINED AS "This package provides the central operator with a voice access to the line to be tested. This test shall only be applied to a single user port. An agent provides the voice path by one or both of the following methods.

For the 'existing connection' method an object instance with the attribute monitor speak set to existingConnection shall enter its initializing phase during an ongoing, previously established normal connection between the User Port and the Operator Port. Then the existing connection shall be transformed into a test condition; i.e. the voice connection shall be maintained (ignoring the testConditions parameter), but the line signalling shall now be controlled by the Q3 interface of the agent by means of other possible test objects for subscriber assisted tests, so that, i.e. an on hook shall not clear the connection at this time, but be indicated to the manager. This allows the use of an existing connection for a subscriber assisted test.

For the 'parallel voice path' method the monitorSpeak attribute shall be set to monitorWithoutMark, monitorWithMark or speakAndMonitor. In this method a parallel voice path across the test function instead of the user port line circuit is used. The ringBackNo attribute may be used to inform the test function of the operator's directory number to which the parallel voice path shall be established. If the establishment of the parallel voice path fails, an error shall be reported (ringBackFailed) and the test shall be aborted. After successful establishment of the parallel voice path, the agent shall connect the parallel voice path to the user port line as requested in the monitorSpeak attribute. An initial intrusion tone shall be applied if the values 'monitorWithMark' or 'speakAndMonitor' are requested.

When a connection is successful, a test result notification with the value 'connectionEstablished' shall be emitted.";;

ATTRIBUTES

monitorSpeak DEFAULT VALUE

ASN1FPANTypeModule.defaultMonitorSpeak

GET-REPLACE,

ringBackNo

GET-REPLACE;

REGISTERED AS {package 2};

6.4 Definition of Attributes**6.4.1 Electrical measurement test**

electricalMeasurementTestToBePerformed ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.ElectricalMeasurementTestToBePerformed;

MATCHES FOR EQUALITY;

BEHAVIOUR

electricalMeasurementTestToBePerformedBehaviour BEHAVIOUR

DEFINED AS "This attribute specifies which electrical parameters are to be tested. Multiple parameters may be identified in the same request. The default is that all parameters, which the tester can support shall be tested, excluding Subscriber Assisted tests.";;

REGISTERED AS {attribute 1};

6.4.2 Iterations

iterations ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.Iterations;

MATCHES FOR EQUALITY;

BEHAVIOUR

iterationsBehaviour BEHAVIOUR

DEFINED AS "This attributes specifies the number times off-hook is simulated.";;

REGISTERED AS {attribute 2};

6.4.3 Loopback duration

loopbackDuration ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.LoopbackDuration;

MATCHES FOR EQUALITY;

BEHAVIOUR

loopbackDurationBehaviour BEHAVIOUR

DEFINED AS "The loopbackDuration attribute specifies for how long the loopback is applied. The duration is measured from the time of the application of the loopback, and not from the time when the loopback request is received";;

REGISTERED AS {attribute 3};

6.4.4 Loopback position

loopbackPosition ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.LoopbackPosition;

MATCHES FOR EQUALITY;

BEHAVIOUR

loopbackPositionBehaviour BEHAVIOUR

DEFINED AS "The loopbackPosition attribute specifies the location and direction of the loopback which is to be applied";;

REGISTERED AS {attribute 4};

6.4.5 Loopback channel

loopbackChannel ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.LoopbackChannel;

MATCHES FOR EQUALITY;

BEHAVIOUR

loopbackChannelBehaviour BEHAVIOUR

DEFINED AS "The loopbackChannel attribute specifies the channels or connections which are to be looped back.";;

REGISTERED AS {attribute 5};

6.4.6 Monitor and speak

monitorSpeak ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.MonitorSpeak;
MATCHES FOR EQUALITY;
BEHAVIOUR
 monitorSpeakBehaviour BEHAVIOUR
 DEFINED AS "This attribute specifies whether the line is to be monitored, whether speech can be injected, and whether a tone is used to indicate to the user that the line is being monitored.";;
REGISTERED AS {attribute 6};

6.4.7 Number of digits

numberOfDigits ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.NumberOfDigits;
MATCHES FOR EQUALITY;
BEHAVIOUR
 numberOfDigitsBehaviour BEHAVIOUR
 DEFINED AS "This attribute specifies the number of digits which are to be tested during a dialled digit test. The default value is 1.";;
REGISTERED AS {attribute 7};

6.4.8 Off hook simulation

offHookSimulation ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.OffHookSimulation;
MATCHES FOR EQUALITY;
BEHAVIOUR
 offHookSimulationBehaviour BEHAVIOUR
 DEFINED AS "This attribute specifies, how off hook for the dial tone test is realized depending on national, vendor or operator specific conditions. The default value is 0, which means loop calling.";;
REGISTERED AS {attribute 8};

6.4.9 Request result type

requestedResultType ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.RequestedResultType;
MATCHES FOR EQUALITY;
BEHAVIOUR
 requestedResultTypeBehaviour BEHAVIOUR
 DEFINED AS "This attribute is used to control the test result reports by a combination of the three Boolean parameters passed, notPassed and value. If passed is true, a result report is sent only if a port passed a test. If notPassed is true, a result report is sent only if a port did not passed a test. If value is true, the measured value is reported.";;
REGISTERED AS {attribute 9};

6.4.10 Ring

ring ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.Ring;
MATCHES FOR EQUALITY;
BEHAVIOUR
 ringBehaviour BEHAVIOUR
 DEFINED AS "This attribute specifies the time for which ringing is applied. The ring attribute is used to generate continuous or timed ringing. If it has an integer value then it specifies the time in seconds for which ringing is applied. If it has a Null value then continuous ringing shall be applied. If the value is not specified then the default value shall be used.";;
REGISTERED AS {attribute 10};

6.4.11 Ring back number

ringBackNo ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.RingBackNo;
MATCHES FOR EQUALITY;
BEHAVIOUR
 ringBackNoBehaviour BEHAVIOUR
 DEFINED AS "The ringBackNo attribute allows the test function to be informed of the telephone number of the operator and to dial back to set up a monitor or a speak and monitor path.";;
REGISTERED AS {attribute 11};

6.4.12 Number of SPM pulses

spmPulsesNo ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.SpmPulses;
MATCHES FOR EQUALITY;
BEHAVIOUR
 spmPulsesNoBehaviour BEHAVIOUR
 DEFINED AS "The spmPulsesNo attribute indicates the number of SPM pulses which shall be applied. This number ranges between 0 and 99.";;
REGISTERED AS {attribute 12};

6.4.13 Wait time

waitTime ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1FPANTypeModule.WaitTime;
MATCHES FOR EQUALITY;
BEHAVIOUR
 waitTimeBehaviour BEHAVIOUR
 DEFINED AS "In case of 'waitIfBusy' as value for testConditions attribute, this attribute defines the maximum amount of time to wait for the end of the busy condition before performing a test.";;
REGISTERED AS {attribute 13};

6.5 Definition of actions

6.5.1 Loopback select

loopbackSelect ACTION
BEHAVIOUR
 loopbackSelectActionBehaviour BEHAVIOUR
 DEFINED AS "The loopbackSelect action is used either to change duration, position and type of already existing loopbacks, or to remove one. If the loopbackSelect action specifies a new loopback duration, position and type, it causes any existing loopbacks specified by the managed object to be removed, regardless of their specified duration or time to completion. It then causes a new loopback to be applied according to the new specified parameters of duration, position and type.
 If the action specifies as loopback position the value 'noloopback', the existing loopback specified by the managed object is removed.
 If the new parameters specified are invalid, then the request is rejected and the original loopback is not removed or otherwise affected.
 The result returns the parameters which are given in the request and confirms the correct reception of the requested.";;
MODE CONFIRMED;
WITH INFORMATION SYNTAX ASN1FPANTypeModule.LoopbackSelectRequestInfo;
WITH REPLY SYNTAX ASN1FPANTypeModule.LoopbackSelectRequestResult;
REGISTERED AS {action 1};

6.6 Definition of notifications

No new notifications are contained in this ETS.

6.7 Definition of parameters

invalidLoopbackRequest PARAMETER
CONTEXT SPECIFIC-ERROR;
WITH SYNTAX ASN1FPANTypeModule.InvalidLoopbackRequest;
BEHAVIOUR
 invalidLoopbackRequestBehaviour BEHAVIOUR
 DEFINED AS "The invalidLoopbackRequest parameter type is used to report that the requested loopback cannot be applied. This may be due to invalid parameters or to a loopback already in existence.";;
REGISTERED AS {parameter 1};

loopbackResult PARAMETER
CONTEXT EVENT-INFO;
WITH SYNTAX ASN1FPANTypeModule.LoopbackResult;
BEHAVIOUR
 loopbackResultBehaviour BEHAVIOUR
 DEFINED AS "The loopbackResult parameter type is used to indicate the result consequent to a loopback request, such as 'loopback overridden' as a loopback has been overridden for any reason.";;
REGISTERED AS {parameter 2};

NOTE: Only one value has been identified for this parameter, which is "overridden". Further values are under study.

accessResult PARAMETER
CONTEXT Test-ASN1Module.TestResultInfo.additionalInformation;
WITH SYNTAX ASN1FPANTypeModule.AccessResult;
BEHAVIOUR
 accessResultBehaviour BEHAVIOUR
 DEFINED AS "The accessResult is carried in the test result notification testResultInfo additionalInformation field.";;
REGISTERED AS {parameter 3};

dialledDigitTestResult PARAMETER
CONTEXT Test-ASN1Module.TestResultInfo.additionalInformation;
WITH SYNTAX ASN1FPANTypeModule.DialledDigitTestResult;
BEHAVIOUR
 dialledDigitTestResultBehaviour BEHAVIOUR
 DEFINED AS "The dialledDigitTestResult is carried in the test result notification testResultInfo additional information field when the dialled digit test is invoked.";;
REGISTERED AS {parameter 4};

dialToneTestResult PARAMETER
CONTEXT Test-ASN1Module.TestResultInfo.additionalInformation;
WITH SYNTAX ASN1FPANTypeModule.DialToneTestResult;
BEHAVIOUR
 dialToneTestResultBehaviour BEHAVIOUR
 DEFINED AS "The dialToneTestResult is carried in the test result notification testResultInfo additional information field when the dial tone test is invoked.";;
REGISTERED AS {parameter 5};

dryLoopResult PARAMETER
CONTEXT Test-ASN1Module.TestResultInfo.additionalInformation;
WITH SYNTAX ASN1FPANTypeModule.GenericTestResult;
BEHAVIOUR
 dryLoopResultBehaviour BEHAVIOUR
 DEFINED AS "The dryLoopResult is carried in the test result notification testResultInfo additional information field.";;
REGISTERED AS {parameter 6};

electricalMeasurementTestResult PARAMETER

CONTEXT Test-ASN1Module.TestResultInfo.additionalInformation;

WITH SYNTAX ASN1FPANTypeModule.ElectricalMeasurementTestResult;

BEHAVIOUR

electricalMeasurementTestResultBehaviour BEHAVIOUR

DEFINED AS "The electricalMeasurementTestResult is carried in the test result notification testResultInfo additionalInformation field.";;

REGISTERED AS {parameter 7};

genericTestResult PARAMETER

CONTEXT Test-ASN1Module.TestResultInfo.additionalInformation;

WITH SYNTAX ASN1FPANTypeModule.GenericTestResult;

BEHAVIOUR

testToLineResultBehaviour BEHAVIOUR

DEFINED AS "The genericTestResult is carried in the test result notification testResultData field.";;

REGISTERED AS {parameter 8};

testToLineCircuitResult PARAMETER

CONTEXT Test-ASN1Module.TestResultInfo.additionalInformation;

WITH SYNTAX ASN1FPANTypeModule.TestToLineCircuitResult;

BEHAVIOUR

testToLineCircuitResultBehaviour BEHAVIOUR

DEFINED AS "The testToLineCircuitResult is carried in the test result notification testResultData field.";;

REGISTERED AS {parameter 9};

voiceAccessTestResult PARAMETER

CONTEXT Test-ASN1Module.TestResultInfo.additionalInformation;

WITH SYNTAX ASN1FPANTypeModule.VoiceAccessTestResult;

BEHAVIOUR

voiceAccessTestResultBehaviour BEHAVIOUR

DEFINED AS "The voiceAccessTestResult is carried in the test result notification testResultInfo additional information field.";

REGISTERED AS {parameter 10};

electricalMeasurementTestUncontrolledRequest PARAMETER

CONTEXT Test-ASN1Module.TestRequestUncontrolledInfo.testCategoryInformation;

WITH SYNTAX ASN1FPANTypeModule.ElectricalMeasurementTestUncontrolledRequestType;

BEHAVIOUR electricalMeasurementTestUncontrolledRequest BEHAVIOUR

DEFINED AS "The electricalMeasurementTestUncontrolledRequest parameter is used to request one or more electrical measurement tests with the testCategoryInformation field of an uncontrolled test request. For additional details see the behaviour definition in subclause 6.1.6.4.";;

REGISTERED AS {parameter 11};

spmPulsesTestUncontrolledRequest PARAMETER

CONTEXT Test-ASN1Module.TestRequestUncontrolledInfo.testCategoryInformation;

WITH SYNTAX ASN1FPANTypeModule.GenericUncontrolledRequestType;

BEHAVIOUR spmPulsesUncontrolledRequestBehaviour BEHAVIOUR

DEFINED AS "The spmPulsesUncontrolledRequest parameter is used to request one or more SPM pulses to be sent to the subscriber private meter with the testCategoryInformation field of an uncontrolled test request. For additional details see the behaviour definition in subclause 6.1.6.5.";;

REGISTERED AS {parameter 12};

ringingTestUncontrolledRequest PARAMETER
CONTEXT Test-ASN1Module.TestRequestUncontrolledInfo.testCategoryInformation;
WITH SYNTAX ASN1FPANTypeModule.GenericUncontrolledRequestType;
BEHAVIOUR ringingTestUncontrolledRequestBehaviour BEHAVIOUR
DEFINED AS "The ringingTestUncontrolledRequest parameter is used to apply ringing to the subscriber line with the testCategoryInformation field of an uncontrolled test request. For additional details see the behaviour definition in subclause 6.1.6.6.";;
REGISTERED AS {parameter 13};

dialToneTestUncontrolledRequest PARAMETER
CONTEXT Test-ASN1Module.TestRequestUncontrolledInfo.testCategoryInformation;
WITH SYNTAX ASN1FPANTypeModule.DialToneTestUncontrolledRequestType;
BEHAVIOUR dialToneTestUncontrolledRequestBehaviour BEHAVIOUR
DEFINED AS "The dialToneTestUncontrolledRequest parameter is used to request the simulation of an off-hook condition in the AN. It is checked whether the dial tone appears at the line circuit termination or not. For additional details see the behaviour definition in subclause 6.1.6.3.";;
REGISTERED AS {parameter 14};

dialledDigitTestUncontrolledRequest PARAMETER
CONTEXT Test-ASN1Module.TestRequestUncontrolledInfo.testCategoryInformation;
WITH SYNTAX ASN1FPANTypeModule.DialledDigitTestUncontrolledRequestType;
BEHAVIOUR dialledDigitTestUncontrolledRequestBehaviour BEHAVIOUR
DEFINED AS "The dialledDigitTestUncontrolledRequest parameter is used to check the proper operation of the subscriber's terminal equipment with the testCategoryInformation field of an uncontrolled test request. For additional details see the behaviour definition in subclause 6.1.6.2.";;
REGISTERED AS {parameter 15};

testTolineCircuitUncontrolledRequest PARAMETER
CONTEXT Test-ASN1Module.TestRequestUncontrolledInfo.testCategoryInformation;
WITH SYNTAX ASN1FPANTypeModule.GenericUncontrolledRequestType;
BEHAVIOUR testTolineCircuitUncontrolledRequestBehaviour BEHAVIOUR
DEFINED AS "The TestToLineCircuitUncontrolledRequest parameter is used to request the check of the ability of the line circuit to provide and to detect certain signals and feeding voltage with the testCategoryInformation field of an uncontrolled test request. For additional details see the behaviour definition in subclause 6.1.6.8.";;
REGISTERED AS {parameter 16};

loopbackTestUncontrolledRequest PARAMETER
CONTEXT Test-ASN1Module.TestRequestUncontrolledInfo.testCategoryInformation;
WITH SYNTAX ASN1FPANTypeModule.LoopbackTestUncontrolledRequestType;
BEHAVIOUR loopbackTestUncontrolledRequestBehaviour BEHAVIOUR
DEFINED AS "The loopbackTestUncontrolledRequest parameter is used to request a loopback at a certain loopback point, to apply a test pattern and to determine differences between the sent and received test pattern. Contained in the request are duration and position of the loopback and the channel(s) to which the loopback shall be applied. For additional details see the behaviour definition in subclause 6.1.6.10.";;
REGISTERED AS {parameter 17};

electricalMeasurementTestUncontrolledResult PARAMETER
CONTEXT Test-ASN1Module.TestRequestUncontrolledResponse.additionalInformation;
WITH SYNTAX ASN1FPANTypeModule.ElectricalMeasurementTestResult;
BEHAVIOUR electricalMeasurementTestUncontrolledResultBehaviour BEHAVIOUR
DEFINED AS "The electricalMeasurementTestUncontrolledResult parameter contains the result(s) of previously requested electrical measurement tests and is carried in the additional information field of the uncontrolled test response.";;
REGISTERED AS {parameter 18};

```

dialToneTestUncontrolledResult PARAMETER
  CONTEXT Test-ASN1Module.TestRequestUncontrolledResponse.additionalInformation;
  WITH SYNTAX ASN1FPANTypeModule.DialToneTestResult;
  BEHAVIOUR dialToneTestResultBehaviour BEHAVIOUR
    DEFINED AS "The dialToneTestUncontrolledResult parameter contains the result(s) of
    previously requested dial tone tests and is carried in the additional information field of the
    uncontrolled test response.";;
REGISTERED AS {parameter 19};

```

```

dialledDigitTestUncontrolledResult PARAMETER
  CONTEXT Test-ASN1Module.TestRequestUncontrolledResponse.additionalInformation;
  WITH SYNTAX ASN1FPANTypeModule.DialledDigitTestResult;
  BEHAVIOUR dialledDigitUncontrolledTestResultBehaviour BEHAVIOUR
    DEFINED AS "The dialledDigitTestUncontrolledResult parameter contains the result(s) of
    previously requested dialled digit tests and is carried in the additional information field of the
    uncontrolled test response.";;
REGISTERED AS {parameter 20};

```

```

TestToLineCircuitUncontrolledResult PARAMETER
  CONTEXT Test-ASN1Module.TestRequestUncontrolledResponse.additionalInformation;
  WITH SYNTAX ASN1FPANTypeModule.TestToLineCircuitResult;
  BEHAVIOUR TestToLineCircuitUncontrolledResult BEHAVIOUR
    DEFINED AS "The TestToLineCircuitUncontrolledResult parameter contains the result(s) of
    previously requested inward tests and is carried in the additional information field of the
    uncontrolled test response.";;
REGISTERED AS {parameter 21};

```

```

loopbackTestUncontrolledResult PARAMETER
  CONTEXT Test-ASN1Module.TestRequestUncontrolledResponse.additionalInformation;
  WITH SYNTAX ASN1FPANTypeModule.LoopbackTestUncontrolledResult;
  BEHAVIOUR iSDNLoopTestUncontrolledResult BEHAVIOUR
    DEFINED AS "The iSDNLoopTestUncontrolledResult parameter contains the result(s) of
    previously requested loopback tests including the comparison of the sent and received test
    patterns and is carried in the additional information field of the uncontrolled test response.";;
REGISTERED AS {parameter 22};

```

6.8 ASN.1 defined types module

```

ASN1FPANTypeModule {ccitt(0) identified-organization(4) etsi(0) v5AnFPManagement(378)
  informationModel(0) asn1Module(2) asn1TypeModule(0)}

DEFINITIONS IMPLICIT TAGS ::=
BEGIN -- EXPORTS everything

IMPORTS
-- I-ETS 300 291 [2]
  DialledDigits,
  E164DirectoryNumber
  FROM CustomerAdminModule {ccitt(0) identified-organization(4) etsi(0)
  customerAdministration(291) informationModel(0) asn1Module(2)
  asn1DefinedTypesModule(0)}
-- CCITT Recommendation X.711 [19]
  ObjectInstance
  FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)}
-- ITU-T Recommendation X.745 [28]
  ActualStartTime,
  ActualStopTime,
  EndTime,
  TestOutcome,
  TestRequestUncontrolledInfo,
  TestRequestUncontrolledResponse,
  TestResultInfo,
  Timespec
  FROM Test-ASN1Module {joint-iso-ccitt ms(9) function(2) part12(12) asn1Module(2) 0}
-- ITU-T Recommendation X.737 [25]
  ErrorRatioReportType,
  LoopbackTestResults,
  TestPattern,
  TestConditions
  FROM TestCategories-ASN1Module {joint-iso-ccitt ms(9) function(2) part14(14) asn1Module(2) 1}
;

```

```

informationModel          OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0)
                           v5AnFPManagement(378) informationModel(0)}
standardSpecificExtension OBJECT IDENTIFIER ::= {informationModel standardSpecificExtension(0)}
managedObjectClass       OBJECT IDENTIFIER ::= {informationModel managedObjectClass(3)}
package                   OBJECT IDENTIFIER ::= {informationModel package(4)}
nameBinding               OBJECT IDENTIFIER ::= {informationModel nameBinding(6)}
attribute                 OBJECT IDENTIFIER ::= {informationModel attribute(7)}
action                    OBJECT IDENTIFIER ::= {informationModel action(9)}
notification              OBJECT IDENTIFIER ::= {informationModel notification(10)}

AccessResult              ::= SET OF SEQUENCE{
                           mORT                      [0] MORT,
                           realStartTime              [1] ActualStartTime OPTIONAL,
                           realStopTime              [2] ActualStopTime OPTIONAL,
                           accessTestResult          [3] AccessTestResult}

AccessTestResult          ::= INTEGER {
                           connectionEstablished      (0),
                           accessFailed              (1),
                           busyAccessAborted          (2),
                           dangerousVoltage           (3),
                           testMechanismBusy          (4),
                           customerOverrideAborted    (5)}

Between                   ::= SEQUENCE{
                           between                    BetweenType,
                           threshold                  Threshold OPTIONAL}

BetweenType               ::= ENUMERATED {
                           aToB                      (0),
                           aToEarth                  (1),
                           bToEarth                  (2),
                           aToBattery                (3),
                           bToBattery                (4),
                           aToBReverse               (5),
                           aToEarthReverse            (6),
                           bToEarthReverse            (7),
                           aToBatteryReverse          (8),
                           bToBatteryReverse          (9)}

DialledDigitTestResult    ::= SEQUENCE OF ReceivedDigit

DialledDigitTestUncontrolledRequestType ::= SEQUENCE {
                           numberOfDigits             [1] NumberOfDigits,
                           testConditions             [2] TestConditions OPTIONAL,
                           waitTime                  [3] INTEGER OPTIONAL}
                           -- waitTime has importance only if TestConditions are set
                           -- to waitIfBusy.

DialToneTestResult        ::= SET OF SEQUENCE {
                           mORT                      [0] MORT,
                           realStartTime              [1] ActualStartTime OPTIONAL,
                           realStopTime              [2] ActualStopTime OPTIONAL,
                           result                    [3] Result}

DialToneTestUncontrolledRequestType ::= SEQUENCE {
                           offHookSimulation         [0] OffHookSimulation,
                           requestedResultType        [1] RequestedResultType,
                           iterations                [2] Iterations,
                           testConditions             [3] TestConditions OPTIONAL,
                           waitTime                  [4] INTEGER OPTIONAL}
                           -- waitTime has importance only if TestConditions are set
                           -- to waitIfBusy.

ElectricalMeasurementTestResult ::= SET OF SEQUENCE {
                           mORT                      [0] MORT,
                           realStartTime              [1] ActualStartTime OPTIONAL,
                           realStopTime              [2] ActualStopTime OPTIONAL,
                           foreignAcVoltage           [3] Reading OPTIONAL,
                           foreignDcVoltage           [4] Reading OPTIONAL,
                           foreignACCurrent          [5] Reading OPTIONAL,
                           foreignDCCurrent          [6] Reading OPTIONAL,
                           resistance                 [7] Reading OPTIONAL,
                           capacitance               [8] Reading OPTIONAL,
                           termination                [9] Termination OPTIONAL,
                           feedingVoltage            [10] Reading OPTIONAL,
                           feedingCurrent            [11] Reading OPTIONAL,
                           testOutcome                [12] TestOutcome OPTIONAL}

```

```

ElectricalMeasurementTests ::= SEQUENCE {
    foreignAcVoltage      [0] Between      OPTIONAL,
    foreignDcVoltage      [1] Between      OPTIONAL,
    foreignACCurrent      [2] Between      OPTIONAL,
    foreignDCCurrent      [3] Between      OPTIONAL,
    capacitance           [4] Between      OPTIONAL,
    resistance            [5] Resistance   OPTIONAL,
    termination           [6] NULL        OPTIONAL,
    feedingVoltage        [7] Between      OPTIONAL,
    feedingCurrent        [8] Between      OPTIONAL}

ElectricalMeasurementTestToBePerformed ::= CHOICE {
    full                    NULL,
    electricalMeasurementTests ElectricalMeasurementTests}

ElectricalMeasurementTestUncontrolledRequestType ::= SEQUENCE {
    electrMeasToBePerformed [0] ElectricalMeasurementTestToBePerformed,
    requestedResultType     [1] RequestedResultType,
    testConditions          [2] TestConditions OPTIONAL,
    waitTime                [3] INTEGER      OPTIONAL}
-- waitTime has importance only if TestConditions are set
-- to waitIfBusy.

GenericTestResult ::= SET OF SEQUENCE {
    mORT                    [0] MORT,
    realStartTime           [1] ActualStartTime OPTIONAL,
    realStopTime           [2] ActualStopTime  OPTIONAL,
    testOutcome             [3] TestOutcome}

GenericUncontrolledRequestType ::= SEQUENCE {
    testConditions          [1] TestConditions OPTIONAL,
    waitTime               [2] INTEGER      OPTIONAL}
-- waitTime has importance only if TestConditions are set
-- to waitIfBusy.

InvalidLoopbackRequest ::= ENUMERATED {
    loopExists              (0),
    loopNotSupported        (1),
    loopTimeTooLarge        (2)}

Iterations ::= INTEGER

LoopbackChannel ::= INTEGER {
    b1                      (0),
    b2                      (1),
    b1b2d                   (2),
    pra                     (3)}

LoopbackDuration ::= Timespec

LoopbackPosition ::= INTEGER {
    noLoopback              (0),
    ltNetwork               (1),
    ntlNetwork              (2),
    repNetwork              (3)}

LoopbackResult ::= INTEGER {
    override                (0)}
-- Further values for this syntax are for further study.

LoopbackSelectRequestInfo ::= SEQUENCE{
    loopbackPosition        LoopbackPosition,
    loopbackTime            LoopbackDuration,
    loopbackChannel         LoopbackChannel OPTIONAL}

LoopbackSelectRequestResult ::= ENUMERATED{
    loopbackSet              (1),
    loopNotSupported        (2),
    loopbackTimeTooLarge    (3)}

LoopbackTestUncontrolledRequestType ::= SEQUENCE {
    loopbackDuration        [1] LoopbackDuration,
    loopbackPosition        [2] LoopbackPosition,
    loopbackChannel         [3] LoopbackChannel,
    testPattern              [4] TestPattern      OPTIONAL,
    errorRatioReport        [5] ErrorRatioReportType OPTIONAL,
    testConditions          [6] TestConditions   OPTIONAL,
    waitTime                [7] INTEGER        OPTIONAL}
-- waitTime has importance only if TestConditions are set
-- to waitIfBusy.

LoopbackTestUncontrolledResult ::= LoopbackTestResults

```

```

MonitorSpeak ::= ENUMERATED {
    monitorWithMark      (0),
    speakAndMonitor     (1),
    monitorWithOutMark   (2),
    existingConnection   (3)}

MORT ::= ObjectInstance

NotDigit ::= ENUMERATED {
    recallButton      (0),
    onhook            (1),
    wrongSignal       (2),
    offhook           (3)}

Null ::= NULL

NumberOfDigits ::= INTEGER

OffHookSimulation ::= ENUMERATED {
    loopCalling      (0),
    earthCalling     (1)}

Reading ::= SEQUENCE {
    aToB              [0] Result OPTIONAL,
    aToEarth          [1] Result OPTIONAL,
    bToEarth          [2] Result OPTIONAL,
    aToBattery        [3] Result OPTIONAL,
    bToBattery        [4] Result OPTIONAL,
    bToEarthReverse   [5] Result OPTIONAL,
    aToEarthReverse   [6] Result OPTIONAL,
    bToa              [7] Result OPTIONAL,
    aToBatteryReverse [8] Result OPTIONAL,
    bToBatteryReverse [9] Result OPTIONAL}

ReceivedDigit ::= SEQUENCE {
    digit              [0] CHOICE {
        normalDigits [0] DialedDigits,
        notDigit     [1] NotDigit},
    lowLevel         [1] REAL OPTIONAL,
    highLevel        [2] REAL OPTIONAL,
    lowFrequency     [3] REAL OPTIONAL,
    highFrequency    [4] REAL OPTIONAL,
    pulseLength      [5] REAL OPTIONAL,
    makeDuration     [6] REAL OPTIONAL,
    breakDuration    [7] REAL OPTIONAL}

RequestedResultType ::= SEQUENCE {
    passed            BOOLEAN,
    notPassed        BOOLEAN,
    value            BOOLEAN}

Resistance ::= CHOICE {
    insulation        [0] Between,
    loop             [1] Between}

Result ::= SEQUENCE {
    testOutcome      TestOutcome OPTIONAL,
    value            REAL OPTIONAL}

ResultOfTestToLineCircuit ::= SEQUENCE {
    feedingVoltage   [0] Result OPTIONAL,
    feedingCurrent   [1] Result OPTIONAL,
    loopRingTripDetection [2] Result OPTIONAL,
    ringingCurrent   [3] Result OPTIONAL,
    privateMeterPulses [4] Result OPTIONAL,
    codecTesting     [5] Result OPTIONAL,
    digitReception   [6] Result OPTIONAL}

Ring ::= CHOICE {
    timedRing        [0] INTEGER, -- number of seconds
    continuousRing   [1] NULL}

RingBackNo ::= E164DirectoryNumber

SpmPulses ::= INTEGER (0..99)

Termination ::= INTEGER {
    nTEAndCPE        (0),
    nTE              (1),
    leakageCurrent    (2),
    noTermination     (3),
    offHook          (4),
    nonStandardTermination (5)}

TestsPassed ::= INTEGER {timesTaken (0)}

```

```
TestToLineCircuitResult ::= SET OF SEQUENCE{
    mORT [0] MORT,
    realStartTime [1] ActualStartTime OPTIONAL,
    realStopTime [2] ActualStopTime OPTIONAL,
    testOutcome [3] TestOutcome,
    resultOfTestToLineCircuit [4] ResultOfTestToLineCircuit
    OPTIONAL}

Threshold ::= SEQUENCE {
    min [0] REAL OPTIONAL,
    max [1] REAL OPTIONAL}

VoiceAccessTestResult ::= INTEGER {
    connectionEstablished (0),
    ringbackFailed (3),
    noExistingConnection (6)}

WaitTime ::= EndTime

defaultBusyLCWaitTime EndTime ::= relative : minutes : 5
defaultElectricalMeasurementTestToBePerformed ElectricalMeasurementTestToBePerformed ::= full
defaultIterations Iterations ::= 1
defaultLoopbackChannel LoopbackChannel ::= b1b2d
defaultLoopbackDuration LoopbackDuration ::= seconds : 500
defaultLoopbackPosition LoopbackPosition ::= noLoopback
defaultMonitorSpeak MonitorSpeak ::= monitorWithMark
defaultNumberOfDigits NumberOfDigits ::= 1
defaultRequestedResultType RequestedResultType ::= {passed: FALSE, notPassed: TRUE, value: FALSE}
defaultRing Ring ::= timedRing : 3
defaultSpmPulses SpmPulses ::= 1
defaultTestConditions TestConditions ::= {rejectIfBusy, noCustomerOverride}

END -- of ASN1FPANTypeModule
```

7 Protocol requirements

The protocol stack for use on this Q3 interface is the same as that specified in the companion standard on configuration management, ETS 300 376-1 [6], clause 8.

Annex A (normative): Specification of parameters for V5 specific alarm reports

Alarm reports shall be generated using the communicationsAlarm notification, as defined in CCITT Recommendation X.721 [21], whenever one of the following events occur. The reports shall use the alarm report parameters as specified below.

The parameters are defined in ITU-T Recommendation Q.821 [16], CCITT Recommendation X.721 [21] and ETS 300 379-1 [8], respectively.

The values for the parameter perceived severity as given below are defaults. They may be modified by means of the alarm event criteria function as specified in ITU-T Recommendation Q.821 [16].

NOTE: All parameters and parameter values given in the following list are mandatory in the context of V5 alarm reporting if not marked as optional.

A.1 Alarm reports related to the V5 interface object class

A.1.1 Control protocol errors

Event: Persistent control protocol timer expiration error
Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 14.4.4.6
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsSubsystemFailure (CCITT Recommendation X.721 [21])
Specific problems: commonControlProtocolTimeOutError
Perceived severity: critical

Event: Persistent control protocol syntax errors
Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 14.4.4.2
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: commonControlProtocolSyntaxError
Perceived severity: major

NOTE 1: Reporting of this event is optional.

Event: Persistent port control protocol syntax errors
Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 14.4.4.2.2
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: portControlProtocolLayer3AddressError
Perceived severity: warning
Additional Information: layer3PortAddress or envelopeFunctionAddress

NOTE 2: This event report shall be used to indicate that an unknown layer 3 address has been received.

A.1.2 Link control protocol errors

Event: Persistent link control protocol layer 3 address error
Reference: V5.2: ETS 300 347-1 [5], subclause 16.3.5.2
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: linkControlProtocolLayer3AddressError
Perceived severity: major
Monitored attribute: assocV5Interface, linkId
Additional Information: layer3PortAddress

NOTE: This event report shall be used to indicate that an unknown layer 3 address has been received.

A.1.3 BCC protocol errors

Event: Persistent BCC protocol timer expiration error
Reference: V5.2: ETS 300 347-1 [5], subclauses 17.5.2 to 17.5.4, 17.5.6 and 17.5.7
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsSubsystemFailure (CCITT Recommendation X.721 [21])
Specific problems: bccProtocolTimeOutError
Perceived severity: critical
Additional Information: causeValue

NOTE 1: If a protocol error message has been received in the LE the cause value contained in this message shall be included in the additional information parameter.

Event: Persistent BCC protocol syntax errors
Reference: V5.2: ETS 300 347-1 [5], subclause 17.5.8
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: bccProtocolSyntaxErrors
Perceived severity: major

NOTE 2: Reporting of this event is optional.

A.1.4 Protection protocol errors

Event: Persistent protection protocol timer expiration error
Reference: V5.2: ETS 300 347-1 [5], subclauses 18.6.2.3.2, 18.6.3.3 and 18.6.5.4
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: protectionProtocolTimeOutError
Perceived severity: critical

NOTE 1: If a protocol error message has been received in the LE the cause value contained in this message shall be included in the additional information parameter.

Event: Persistent protection protocol syntax error
Reference: V5.2: ETS 300 347-1 [5], subclause 18.6.6
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: protectionProtocolSyntaxError
Perceived severity: major

NOTE 2: Reporting of this event is optional.

A.1.5 PSTN protocol errors

Event: Restart timer error
Reference: V5.1: ETS 300 324-1 [4], subclause 13.5.4.3 and annex C, item 14;
V5.2: ETS 300 347-1 [5], annex C, item 14
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: pstnProtocolTimeOutError
Perceived severity: major

Event: Persistent PSTN protocol layer 3 address errors
Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 13.5.2.3
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: pstnProtocolLayer3AddressError
Perceived severity: warning
Additional Information: layer3PortAddress

NOTE: This event report shall be used to indicate that an unknown layer 3 address has been received.

A.1.6 Interface control failures

Event: Interface identification failure
Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 14.5.4 and annex C, item 13
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: configurationOrCustomizationError (CCITT Recommendation X.721 [21])
Specific problems: v5InterfaceIdFailure
Perceived severity: critical

Event: V5 Interface provisioning mismatch failure
Reference: For V5.1 and V5.2: ETS 300 324-1 [4], subclause 14.5.4 and annex C, item 13
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: configurationOrCustomizationError (CCITT Recommendation X.721 [21])
Specific problems: v5InterfaceProvisioningMismatchFailure
Perceived severity: major

NOTE: This alarm report shall be used to indicate a mismatch of the provisioning variants used in AN and LE during a startup or restart procedure.

A.1.7 V5 data link failures

Event: Persistent link control protocol data link failures
Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclauses 10.4.1, 10.4.5.1.3 and annex C, item 17
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsSubsystemFailure (CCITT Recommendation X.721 [21])
Specific problems: linkControlProtocolDataLinkError
Perceived severity: critical

Event: Persistent BCC protocol data link failures
Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclauses 10.4.1, 10.4.5.1.3 and annex C, item 17
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsSubsystemFailure (CCITT Recommendation X.721 [21])
Specific problems: bccProtocolDataLinkError
Perceived severity: critical

Event: Persistent protection protocol data link failures
Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclauses 10.4.1, 10.4.5.1.3 and annex C, item 17
Managed object class: v5Interface
Event type: communicationsAlarm
Probable cause: communicationsSubsystemFailure (CCITT Recommendation X.721 [21])
Specific problems: protectionProtocolDataLinkError
Perceived severity: critical

Event: Persistent PSTN protocol data link failures
 Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclauses 10.4.1, 10.4.5.1.3 and annex C, item 17
 Managed object class: v5Interface
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: pstnProtocolDataLinkError
 Perceived severity: major

A.2 Alarm reports related to the V5 trail termination point object class

A.2.1 Link control failures

Event: Link identification failure
 Reference: V5.2: ETS 300 347-1 [5], subclause 16.2.4.3.5
 Managed object class: v5Ttp
 Event type: communicationsAlarm
 Probable cause: configurationOrCustomizationError (CCITT Recommendation X.721 [21])
 Specific problems: linkIdFailure
 Perceived severity: critical
 Monitored attribute: assocV5Interface, linkId

Event: Persistent link control protocol timer expiration error
 Reference: V5.2: ETS 300 347-1 [5], subclause 16.3.4.4
 Managed object class: v5Ttp
 Event type: communicationsAlarm
 Probable cause: communicationsSubsystemFailure (CCITT Recommendation X.721 [21])
 Specific problems: linkControlProtocolTimeOutError
 Perceived severity: critical

Event: Persistent link control protocol syntax errors
 Reference: V5.2: ETS 300 347-1 [5], subclause 16.3.5 (excluding subclause 16.3.5.2)
 Managed object class: v5Ttp
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: linkControlProtocolSyntaxError
 Perceived severity: major

NOTE: Reporting of this event is optional.

Event: Persistent link control protocol error while "Out of Service"
 Reference: V5.2: ETS 300 347-1 [5], subclause 16.3.4.2
 Managed object class: v5Ttp
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: linkControlProtocolOutOfService
 Perceived severity: major
 Monitored attribute: assocV5Interface, linkId

Event: Persistent link control protocol layer 3 address error
 Reference: V5.2: ETS 300 347-1 [5], subclause 16.3.5.2
 Managed object class: v5Ttp
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: linkControlProtocolLayer3AddressError
 Perceived severity: major
 Monitored attribute: assocV5Interface, linkId
 Additional Information: layer3PortAddress

A.2.2 Link layer 1 failures

Event: Reception of Alarm Indication Signal (AIS)
Reference: V5.1: ETS 300 324-1 [4], subclause 14.3;
V5.2: ETS 300 347-1 [5], subclause 16.1
Managed object class: v5Ttp
Event type: communicationsAlarm
Probable causes: AIS (ITU-T Recommendation Q.821 [16])
Perceived severity: minor

Event: LFA
Reference: V5.1: ETS 300 324-1 [4], subclause 14.3;
V5.2: ETS 300 347-1 [5], subclause 16.1
Managed object class: v5Ttp
Event type: communicationsAlarm
Probable causes: lossOfFrame (ITU-T Recommendation Q.821 [16], CCITT Recommendation X.721 [21])
Perceived severity: minor

Event: Reception of remote alarm indication
Reference: V5.1: ETS 300 324-1 [4], subclause 14.3;
V5.2: ETS 300 347-1 [5], subclause 16.1
Managed object class: v5Ttp
Event type: communicationsAlarm
Probable causes: remoteAlarmInterface (ITU-T Recommendation M.3100 [14])
Perceived severity: minor

Event: Persistent CRC error
Reference: V5.1: ETS 300 324-1 [4], subclause 14.3;
V5.2: ETS 300 347-1 [5], subclause 16.1.4
Managed object class: v5Ttp
Event type: communicationsAlarm
Probable causes: transmissionError (ITU-T Recommendation M.3100 [14])
Specific problems: crcError
Perceived severity: minor

NOTE: The exact specification of the meaning of persistent is outside the scope of this ETS.

Event: Internal failure
Reference: V5.1: ETS 300 324-1 [4], subclause 14.3;
V5.2: ETS 300 347-1 [5], subclause 16.1
Managed object class: v5Ttp
Event type: communicationsAlarm
Probable causes: localNodeTransmissionError (CCITT Recommendation X.721 [21])
Specific problems: internalFailure
Perceived severity: minor

A.3 Alarm reports related to the V5 time slot object class

A.3.1 V5 communication channel failures

Event: Cessation of flags on a C-channel
Reference: V5.2: ETS 300 347-1 [5], subclause 18.1.5.2
Managed object class: v5TimeSlot
Event type: communicationsAlarm
Probable cause: localNodeTransmissionError (CCITT Recommendation X.721 [21])
Specific problems: cessationOfFlagsError
Perceived severity: minor

A.4 Alarm reports related to the user port object class and subclasses

A.4.1 Control protocol errors

Event: Persistent port control protocol timer expiration errors
 Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 14.4.4.5
 Managed object class: userPortTtp and subclasses
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: portControlProtocolTimeOutError
 Perceived severity: minor

Event: Persistent port control protocol errors while "Out of Service"
 Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 14.4.4.3
 Managed object class: userPortTtp and subclasses
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: portControlProtocolError
 Perceived severity: warning

Event: Persistent port control protocol syntax errors
 Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 14.4.4.2 (excluding subclause 14.4.4.2.2)
 Managed object class: userPortTtp and subclasses
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: portControlProtocolSyntaxError
 Perceived severity: warning

NOTE: Reporting of this event is optional.

Event: Persistent port control protocol syntax errors
 Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 14.4.4.2.2
 Managed object class: userPortTtp and subclasses
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: portControlProtocolLayer3AddressError
 Perceived severity: warning
 Additional Information: layer3PortAddress or envelopeFunctionAddress

A.4.2 PSTN protocol errors

Event: PSTN protocol syntax errors
 Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 13.5.2 (excluding subclause 13.5.2.3)
 Managed object class: pstnUserPort
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: pstnProtocolSyntaxError
 Perceived severity: warning

NOTE: Reporting of this event is optional.

Event: Persistent PSTN protocol layer 3 address errors
 Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclause 13.5.2.3
 Managed object class: pstnUserPort
 Event type: communicationsAlarm
 Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
 Specific problems: pstnProtocolLayer3AddressError
 Perceived severity: warning

Event: Persistent PSTN protocol timer expiration errors
Reference: V5.1 and V5.2: ETS 300 324-1 [4], subclauses 13.5.5.2.11 and 13.5.7
Managed object class: pstnUserPort
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: pstnProtocolTimeOutError
Perceived severity: minor

A.4.3 ISDN layer 1 faults (Q(AN) only)

A.4.3.1 ISDN BA layer 1 faults (Q(AN) only)

Event: LOS/LFA in DS or loss of power at NT1
Reference: -
Managed object class: isdnBAUserPort,
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: LOS/LFA in DS or loss of power at NT1
Perceived severity: warning

Event: LOS/LFA at T reference point
Reference: -
Managed object class: isdnBAUserPort,
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: LOS/LFA at T reference point
Perceived severity: minor

Event: ISDN layer 1 activation fault.
Reference: -
Managed object class: isdnBAUserPort
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: ISDN layer 1 activation fault.
Perceived severity: warning

NOTE: These events indicate layer 1 faults. They are relevant only when the AN is responsible for the activation.

A.4.3.2 ISDN PRA layer 1 faults (Q(AN) only)

Event: unintentional loopback, FE: C
Reference: -
Managed object class: isdnPRAUserPort
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: this parameter may be used for specific detailed indications related to the unintentional loopback,
Perceived severity: warning

Event: LOS/LFA and power failure, FE: D-L
Reference: -
Managed object class: isdnPRAUserPort
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: this parameter may be used for specific detailed indications related to the LOS/LFA and power failure
Perceived severity: warning

Event: Performance monitoring, FE: U-Y
Reference: -
Managed object class: isdnPRAUserPort
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: this parameter may be used for specific detailed indications related to the performance monitoring
Perceived severity: minor

NOTE: These events indicate layer 1 faults. They are relevant only when the AN is responsible for the activation.

A.4.4 ISDN layer 2 faults (Q(AN) only)

Event: ISDN Layer 2 fault
Reference: CEPT Recommendation T/S 54-08 E [10], subclause 3.2
Managed object class: isdnBAUserPort, isdnPRAUserPort
Event type: communicationsAlarm
Probable cause: communicationsProtocolError (CCITT Recommendation X.721 [21])
Specific problems: isdnLayer2Fault
Perceived severity: warning

NOTE: This event indicates a layer 2 fault of an ISDN access with PL service and permanent layer 2. It is relevant only when the AN is responsible for the activation.

A.4.5 Line faults (Q(AN) only)

Event: Power feeding problem
Reference: CEPT Recommendation T/S 54-08 E [10], subclause 3.2
Managed object class: userPortTtp
Event type: communicationsAlarm
Probable cause: powerProblem (CCITT Recommendation X.721 [21])
Specific problems: this parameter may be used for specific detailed indications related to the power feeding problem
Perceived severity: warning

Annex B (normative): V5 specific traffic measurement

V5 specific traffic measurement is described in annex B of ETS 300 379-1 [8].

Annex C (normative): Requirements and specification of parameters for user port tests

It is not mandatory to implement test requirements and functionalities described in this ETS, but if any test is required to be managed via the Q3 interface on the AN, it shall be modelled as described in the relevant subclause(s) of this ETS.

C.1 General test requirements

These are the general requirements for the test management of V5 interfaces and related user ports via the Q3 interface of an AN.

C.1.1 Scheduled testing

The Q3 interface provides the functionality to control scheduling of tests in the AN, if the scheduling functionality is implemented in the AN.

C.1.2 Test capability

Information about which tests the AN is able to perform is required at the Q3 interface. The manager should be able to retrieve information about the test capabilities of an AN. If the OS is requesting the execution of a non-existing test, then the AN shall reply with an error message.

C.2 V5 interface test requirements

These are the requirements for the test management of V5 interfaces via the Q3 interface of an AN. They are covered by the information model defined in ETS 300 379-1 [8].

C.2.1 V5 interface ID testing

The testing of consistency between the V5 interface IDs at either side of a V5 interface is required.

C.2.2 Link ID testing

The testing of consistency between the link IDs at either side of a V5 2 048 kbit/s link is required.

C.2.3 Provisioning variant testing

The testing of consistency between the provisioning variant labels at either side of a V5 interface is required.

C.3 User port test requirements

These are the requirements for the fault and performance management of user ports managed via the Q3 interface of an AN.

Further complex test procedures may be operator dependant. Examples are given in an informative way in annex G. These procedures may involve the execution of simple tests or other procedures such as subscriber assisted tests described in this subclause.

C.3.1 User port test management functions

Whenever a test request is sent by the manager to the AN, the following information may be associated to it, as given in table C.1.

Table C.1: Possible test request parameters and values

Parameter	Value
type of tests and/or procedures	see list of test requirement description
scheduling of test	start time, stop time
repetition of test	number of repetitions and/or period of repetition
ID of user ports under test	list of 1 or N user port object instances involved in the test
type of result	any conceivable combination among three possible results: passed, not passed, values
thresholds (on a per test basis)	values of thresholds

If one of the parameters is not permitted in the relevant test request, it shall be ignored by the AN.

If the AN is not able to manage one of the parameters listed above, a notification shall be emitted to the manager indicating the error cause.

C.3.2 Test scheduling

The following tests are suitable for scheduled tests:

- foreign voltage and current measurement;
- capacitance measurement;
- insulation resistance measurement;
- all line circuit tests;
- dial tone test;
- loopback test;
- activation and deactivation of the line.

The following requirements are valid for scheduling:

- routine tests shall have lower priority than on-demand test and normal traffic;
- the test result shall indicate those ports which have not been tested due to any reason;
- it shall be possible to specify the start time and the stop time of the whole test sequence;
- it shall be possible to specify the number of times a test attempt is to be repeated in case the first attempt failed due to any reason;
- it shall be possible to add new MORTs to a routine test and to delete MORTs from a routine test;
- it shall be possible to specify the test interval between the start of consecutive test sequences (e.g. daily, weekly, seconds between repeated tests) or the number of times a test is to be repeated.

The information model for scheduling and test repetition shall be based on already existing models specified in ITU-T Recommendation X.746 [29].

NOTE: The requirements for scheduling and test repetition are not satisfied by the current standard. Therefore further amendments are for further study.

C.3.3 Test result management

The result for a test request shall be reported on a per test and per port basis. These reports are controlled by a combination of the following three Boolean conditions:

- a) pass: if TRUE send a result report if the port passed the test (the testOutcome field of the test result notification in ITU-T Recommendation X.745 [28] contains the value "pass");

- b) not passed: if TRUE send a result report only if the port did not pass the test (in this case the testOutcome field of the test result notification in ITU-T Recommendation X.745 [28] contains one of the following values: "fail", "inconclusive", "timed out" or "premature termination");
- c) measured values: if TRUE send the measured values (for that tests producing values as result).

These Boolean values shall be combined by means of the logical operator AND in order to determine when the result is to be sent.

EXAMPLE: When the following combination is used:

pass = FALSE;
not passed = TRUE;
values = TRUE,

the expected result contains the list of measured values for such ports that have not passed the test.

C.3.4 Test threshold management

When a passed/not passed result is requested, a predefined AN threshold value is used, unless the test request contains threshold values which override predefined thresholds. After the termination of that test the predefined thresholds shall be restored.

C.3.5 Test requirements description

This subclause deals with requirements for line testing purposes. It is subdivided into PSTN line tests and PSTN inward tests; ISDN BA testing and ISDN PRA testing.

Accuracy and range of measurements are out of the scope of this ETS.

C.3.5.1 PSTN line testing

In general, line testing requires that a certain line condition is established (e.g. off-hook or a line termination), then a test is performed and after the test the line is restored to its normal condition. In some cases, not all of these steps are under the control of the Q3 interface (e.g. where the test action is carried out by craft personnel), and so a test function may include all, or only some of these steps. The dry loop test, for example, is concerned only with disconnecting a line from the line circuit. In this case, the actual test conduction and the observation of the test outcome are assumed to be controlled separately.

In the following, subscriber assisted and voice connection mean that an operator gives instructions to the subscriber on how to perform a test. The subscriber returns the result back to the operator, when applicable.

C.3.5.1.1 Foreign voltage or current

It is required to check for the presence of foreign voltage or foreign current on the line.

This test is performed by disconnecting the line from the line circuit and measuring foreign voltage or foreign current between a/b, a/E or b/E. Both AC and DC voltage measurement are required. The manager may select one or more of these measurements. Results shall be passed, not passed and/or the values. Units are V (Volt) or A (Ampere).

C.3.5.1.2 Capacitance measurement

It is required to measure the capacitance on the line.

This test is performed by disconnecting the line from the line circuit and measuring the capacitance between a/b, a/E or b/E. The manager may select one or more of these measurements. Results shall be passed, not passed and/or the values. Units are F (Farad).

C.3.5.1.3 Insulation resistance measurement

It is required to measure the insulation resistance.

This test is performed by disconnecting the line from the line circuit and measuring the insulation resistance between a/b, a/Earth, b/Earth, aToBattery or bToBattery (both polarities are possible). The manager may select one or more of these measurements. Results shall be passed, not passed and/or the values. Units are Ω (Ohm).

C.3.5.1.4 Loop resistance measurement

It is required to measure the loop resistance during off-hook.

The loop resistance between a/b (both polarities are possible) is measured during off-hook. The manager may select one or both measurements. Results shall be passed, not passed and/or the values. Subscriber assistance may be required. Units are Ω (Ohm).

C.3.5.1.5 Dial pulse test

It is required to check the proper operation of the subscriber terminal.

The subscriber is requested to dial one or more digits: it is required to verify that the correct sequence of dialled digits is received by the AN. Results shall be passed, not passed and/or the values. The reported values are number of pulses, average make and break duration.

C.3.5.1.6 DTMF dialling test

It is required to check the proper operation of the subscriber terminal.

The subscriber is requested to dial one or more digits. It is required to verify that the correct sequence of digits is received by the AN in normal operation. DTMF handling is out of the scope of the V5 interface, because the tones are carried transparently through the AN and call processing is performed at the LE. However, an AN implementation may have this test functionality, thus providing a common maintenance support for both types of dialling. Results shall be: passed, not passed and/or values for dialled digits, tone levels, tone frequencies, pulse length. Units are: dBm (decibel relative to 1milliwatt), Hz (Hertz), s (seconds).

C.3.5.1.7 Subscriber private meter testing

It is required to check the subscriber's private meter.

The AN sends a specified number of metering pulses to the subscriber. The private meter at the customer premises should then step the same number of pulses. As a result, a comparison is made at the manager between subscriber answer and the notification from the AN about the number of pulses sent. The result parameter is number of pulses.

C.3.5.1.8 Ring subscriber

It is required to check the proper operation of the subscriber terminal.

The test is carried out by applying the ring signal and checking the answer of the subscriber. When off-hook is detected (both during the ringing tone itself or during the silent interval), no ringing current shall be sent anymore, according to the limits described in ITU-T Recommendation Q.543 [15]. The digital exchange performance design objectives are:

- a) < 100 ms (mean value);
- b) < 150 ms (95% value).

C.3.5.1.9 Monitoring of the line

It is required, at either AN or LE side, that the operator may either listen into the line with or without sending a mark tone, or listen and speak.

C.3.5.1.10 Cable pair identification tone

It is required to assist the identification of cable pairs in the field, by generating a trace tone at the AN side. The tone shall continue until it is stopped by a manager command or after a timeout.

C.3.5.1.11 Dry loop

It is required to disconnect the line from the line circuit. This condition is called "dry loop". After a dry loop is established, tests may be performed on the line outside the influence of the $Q3_{AN}$ or $Q3_{LE}$ interfaces, until normal conditions are re-established.

a and b wires are disconnected from the line circuit leaving them in an open circuit state. The subscriber line shall remain in dry loop condition until re-connected by a manager command or after a timeout.

C.3.5.1.12 Register recall button test

It is required to check the proper operation of the register recall button of the subscriber terminal.

The subscriber is requested to press the button. The pulse break time is then checked for acceptability. Results shall be passed/not passed.

C.3.5.1.13 Ring back procedure

The installer at the subscriber site may initiate a test procedure by dialling a special ring back code to the LE. The LE shall then initiate the ring back procedure. If during this procedure line or line circuit tests are required those already defined in this ETS shall be applied. The co-ordination between the manager of the AN and the manager of the LE is out of the scope of this ETS. More detailed information on executing this procedure is contained in annex F.

C.3.5.2 PSTN inward tests

C.3.5.2.1 Line circuit testing

PSTN line circuit test results shall be reported as passed/not passed covering all circuit tests in a global way, in order to identify the replaceable units.

If the AN is able to provide the relevant information, the manager may be notified about which test failed and the related measured values. Even if the AN supports this information, the management application still requires a pass/fail (passed/not passed) result.

In the following detailed requirements are described. This list is not exhaustive, and new items may be added in the future.

Thresholds for result comparison are specific to the line card implementation and the manager is not required to manage (both reading and setting) them.

C.3.5.2.1.1 Feeding voltage

Feeding voltage between a and b wires shall be measured.

C.3.5.2.1.2 Feeding current

Feeding current between a and b wires shall be measured.

C.3.5.2.1.3 Loop and ring trip detection

It is checked whether the line circuit is able to detect a loop (i.e. an off-hook) with both normal and reversed polarity, while the line circuit busy or idle (busy means ongoing call on the line). The ring trip detection is carried out by applying the ring signal and simulating the answer of the subscriber. When off-hook simulation is detected (during the ringing tone itself or during the silent interval), the ringing current shall be stopped immediately, according to the limits described in ITU-T Recommendation Q.543 [15]:

- a) < 100 ms (mean value);
- b) < 150 ms (95% value).

C.3.5.2.1.4 Ringing current sending

The ringing current shall be measured at the line side of the line circuit.

C.3.5.2.1.5 Private meter pulses

The duration and the level of private meter pulses shall be tested.

C.3.5.2.1.6 Codec testing

The analogue to digital and the digital to analogue conversion shall be tested including hybrid functionality.

C.3.5.2.1.7 Digit reception

The line circuit is tested to check whether it receives a decadic digit. The test shall be performed with both normal and reversal polarities.

C.3.5.2.2 Other inward tests

C.3.5.2.2.1 Dial tone test

An off-hook condition is simulated in the AN. It shall be checked whether the dial tone appears at the LC termination or not.

C.3.5.3 ISDN BA testing

C.3.5.3.1 ISDN BA line testing

If copper wires are used, the following line tests as defined for PSTN lines shall be carried out:

- foreign voltage;
- current measurement;
- capacitance measurement;
- insulation resistance measurement (only normal polarity is possible);
- dry loop.

C.3.5.3.2 ISDN BA line termination testing

C.3.5.3.2.1 Loopbacks

Generally, a loopback is set up to test the integrity of the devices and the line between two points, by applying a known signal (pattern) on one side and checking whether the signal received is the same as the sent one. The input signal may be applied either by a device embedded in the network element which contains the port (or related line) under test, or by an external equipment. In the latter case, it is required that a loopback is set up without signal generation.

According to ITU-T Recommendation M.3603 [30], the terminology for ISDN BA loopbacks is:

- loopback 1: complete Line Termination (LT) loopback;
- loopback 1A: Regenerator (REG) loopback;
- loopback 2: complete NT1 loopback;
- loopback 2₁: B1, B2, NT1 loopback.

The NT1 may be located either within or outside the AN (see figure 1).

All the loopbacks mentioned above may be applied in connection with either an AN internal equipment or an external equipment to inject and detect a test pattern. The line under test is activated and a loopback is established.

The manager shall be notified whether the loopback is set up or not.

If the pattern injection and detection equipment are under the control of the manager via the Q3 interface, pattern injection and detection shall be initiated after the set up of the loopback. The pattern may be injected at a particular point and detected either at the same point or at another one. The received pattern shall be compared with the sent one and the result shall be reported as passed, not passed and/or bit error rate.

C.3.5.3.2.2 Activation and deactivation of lines

It is required to check the capability for activating and deactivating the line under test.

C.3.5.3.3 ISDN BA line circuit testing

C.3.5.3.3.1 Power feed

It is required to measure the feeding voltage between a and b wires provided by the line circuit. The voltage between a and b shall be measured in order to verify the proper operation of the power feeding of the NT1. The reported result shall be passed/not passed.

C.3.5.4 ISDN PRA testing

C.3.5.4.1 ISDN PRA line testing

Not applicable

C.3.5.4.2 ISDN PRA line termination testing

Set up of loopbacks at the LT (loopback 1), at the regenerator (if more than one regenerator is installed, it shall be the one which is closest to the line termination; loopback 1A) and at the NT1 (loopback 2) shall be possible.

According to ITU-T Recommendation M.3604 [31], the terminology for ISDN PRA loopbacks is:

- loopback 1: complete LT loopback;
- loopback 1A: REG loopback;
- loopback 2: complete NT1 loopback.

Annex D (normative): Test categories

This annex specifies the test categories for all tests in an access network which are invoked by the uncontrolled test request as defined in ITU-T Recommendation X.745 [28].

D.1 Electrical measurement tests

Test category name

Electrical Measurement Tests

Test category purpose

The purpose of tests of this category is measurement of electrical parameters.

Possible tests according to the ASN.1 definition of electricalMeasurementTest, e.g.:

- foreign voltage;
- foreign current;
- capacitance;
- resistance.

MORT requirements

The test invocation involves one object class (userPortTtp as defined in ETS 300 376-1 [6]), which represents the user port under test. One or more object instances can be involved in the test.

Associated object requirements

There are no associated object classes.

Test environment

Tests of this category are outward tests or inward tests.

Tests of this category do not require customer assistance.

Test request service type

"ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Specific errors

"ITU-T Recommendation X.745:1993":noSuchMORT;

"ITU-T Recommendation X.745:1993":mORTNotAvailable;

"ITU-T Recommendation X.745:1993":mistypedTestCategoryInformation.

Test category information parameter

The electricalMeasurementTestUncontrolledRequest parameter as content of the test category information field in the information syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Uncontrolled test response additional information parameter

The electricalMeasurementTestUncontrolledResult parameter as content of the additionalInformation field in the reply syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

D.2 Dialed digit test

Test category name

Dialed Digit Test

Test category purpose

The purpose of tests of this category is to check the proper operation of the subscriber equipment's (pulse or DTMF) dialling. Possible tests according to the ASN.1 definition of `dialedDigitTest`, e.g.:

- dial pulse test;
- DTMF dialling test;
- register recall button test.

MORT requirements

The test invocation involves one object class (`userPortTtp` as defined in ETS 300 376-1 [6]), which represents the line being measured. Only one object instances can be involved in the test;

Associated object requirements

There are no associated object classes.

Test environment

Tests of this test category are outward tests.

Tests of this category require customer assistance.

Test request service type

"ITU-T Recommendation X.745:1993":`testRequestUncontrolledAction`.

Specific errors

"ITU-T Recommendation X.745:1993":`noSuchMORT`;

"ITU-T Recommendation X.745:1993":`mORTNotAvailable`;

"ITU-T Recommendation X.745:1993":`mistypedTestCategoryInformation`.

Test category information parameter

The `dialedDigitTestUncontrolledRequest` parameter as content of the test category information field in the information syntax of "ITU-T Recommendation X.745:1993":`testRequestUncontrolledAction`.

Uncontrolled test response additional information parameter

The `dialedDigitTestUncontrolledResult` parameter as content of the `additionalInformation` field in the reply syntax of "ITU-T Recommendation X.745:1993":`testRequestUncontrolledAction`.

D.3 Dial tone test

Test category name

Dial Tone Test

Test category purpose

The purpose of tests of this category is to check the ability of the line circuit to detect an off-hook and to check the provision of the dial tone from the LE.

Possible tests according to the ASN.1 definition of dialToneTest:

- dial tone test.

MORT requirements

The test invocation involves one object class (userPortTtp as defined in ETS 300 376-1 [6]), which represents the line being measured. One or more object instances can be involved in the test;

Associated object requirements:

There are no associated object classes.

Test environment

Tests of this test category are inward tests. They are performed with disconnected line.

Tests of this category do not require customer assistance.

Test request service type

"ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Specific errors

"ITU-T Recommendation X.745:1993":noSuchMORT;

"ITU-T Recommendation X.745:1993":mORTNotAvailable;

"ITU-T Recommendation X.745:1993":mistypedTestCategoryInformation.

Test category information parameter

The dialToneTestUncontrolledRequest parameter as content of the test category information field in the information syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Uncontrolled test response additional information parameter

The dialToneTestUncontrolledResult parameter as content of the additionalInformation field in the reply syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

D.4 Subscriber private meter pulses test

Test category name

SPM Pulses Test

Test category purpose

The purpose of tests of this category is to check the cable and equipment in the customer's premises by sending SPM pulses to the private meter of the subscriber.

Possible tests according to the ASN.1 definition of spmPulses test:

- subscriber private meter testing.

MORT requirements

The test invocation involves one object class (userPortTtp as defined in ETS 300 376-1 [6]), which represents the line being measured. One or more object instances can be involved in the test.

Associated object requirements

There are no associated object classes.

Test environment

Tests of this test category are outward tests. They are performed with the line connected to the line circuit or with disconnected line.

Tests of this category either require customer assistance or assist an operator's craftsman in detecting an error in the field.

Test request service type

"ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Specific errors

"ITU-T Recommendation X.745:1993":noSuchMORT;

"ITU-T Recommendation X.745:1993":mORTNotAvailable;

"ITU-T Recommendation X.745:1993":mistypedTestCategoryInformation.

Test category information parameter

The spmPulsesTestUncontrolledRequest parameter as content of the test category information field in the information syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Uncontrolled test response additional information parameter

None.

D.5 Ringing test

Test category name

Ringing Test

Test category purpose

The purpose of tests of this category is to check the cable and equipment in the customer's premises by applying ringing to the subscriber.

Possible tests according to the ASN.1 definition of ringing test:

ringing test.

MORT requirements

The test invocation involves one object class (userPortTtp as defined in ETS 300 376-1 [6]), which represents the line being measured. One or more object instances can be involved in the test;

Associated object requirements

There are no associated object classes.

Test environment

Tests of this test category are outward tests. They are performed with the line connected to the line circuit or with disconnected line.

Tests of this category either require customer assistance or assist an operator's craftsman in detecting an error in the field.

Test request service type

"ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Specific errors

"ITU-T Recommendation X.745:1993":noSuchMORT;

"ITU-T Recommendation X.745:1993":mORTNotAvailable;

"ITU-T Recommendation X.745:1993":mistypedTestCategoryInformation.

Test category information parameter

The ringingTestUncontrolledRequest parameter as content of the test category information field in the information syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Uncontrolled test response additional information parameter

None.

D.6 Test to line circuit test

Test category name

Test To Line Circuit

Test category purpose

The purpose of tests of this category is to check the ability of the inward test to provide or detect certain signals or feeding voltage. The test comprises of a set of possible tests, which are predefined in the NE and performed all together:

- feeding voltage;
- feeding current;
- loop detection and ring trip detection;
- ringing current sending;
- private meter pulse generator test;
- codec testing;
- digit reception.

MORT requirements

The test invocation involves one object class (userPort) as under test, which represents the line being measured. One or more object instances can be involved in the test.

Associated object requirements

There are no associated object classes.

Test environment

Tests of this test category are inward tests. They are performed with disconnected line.

Tests of this category do not require customer assistance.

Test request service type:

"ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Specific errors

"ITU-T Recommendation X.745:1993":noSuchMORT;

"ITU-T Recommendation X.745:1993":mORTNotAvailable;

"ITU-T Recommendation X.745:1993":mistypedTestCategoryInformation.

Test category information parameter

The testToLineCircuitUncontrolledRequest parameter as content of the test category information field in the information syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Uncontrolled test response additional information parameter

The testToLineCircuitUncontrolledResult parameter as content of the additionalInformation field in the reply syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

D.7 ISDN loopback test

Test category name

ISDN Loopback Test

Test category purpose:

The purpose of tests of this category is to perform an internal loop test for ISDN basic or primary rate accesses. Possible tests according to the ASN.1 definition of iSDNLoopTest:

- loopback test.

MORT requirements

The test invocation involves one object class (userPortTtp as defined in ETS 300 376-1 [6]), which represents the line being measured. One or more object instances can be involved in the test.

Associated object requirements

There are no associated object classes.

Test environment

Tests of this test category are outward tests.

Tests of this category do not require customer assistance.

Test request service type:

"ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Specific errors

"ITU-T Recommendation X.745:1993":noSuchMORT;

"ITU-T Recommendation X.745:1993":mORTNotAvailable;

"ITU-T Recommendation X.745:1993":mistypedTestCategoryInformation.

Test category information parameter

The loopbackTestUncontrolledRequest parameter as content of the test category information field in the information syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Uncontrolled test response additional information parameter

The loopbackTestUncontrolledResult parameter as content of the additionalInformation field in the reply syntax of "ITU-T Recommendation X.745:1993":testRequestUncontrolledAction.

Annex E (informative): Task Information Base (TIB)

TIB is described in annex C of ETS 300 379-1 [8].

Annex F (informative): Description of management functions

Management functions are described in annex D of ETS 300 379-1 [8].

Annex G (informative): Description of test procedures

G.1 Background

This annex describes complex test procedures, as ring back service and all subscriber assisted tests at the AN side, to show the impact that they have on both Q3 interfaces.

G.2 Test procedures scenario

The general scenario, which is referred to, includes four functional blocks and all reference points between them as described in CCITT Recommendation M.3010 [13].

The functional blocks are: NE functionalities which represent LE and AN, and OS functionalities managing AN and LE.

The reference points are: q (between AN or LE and respective OS) and q (or x if they belong to different TMNs) between OSs¹⁾.

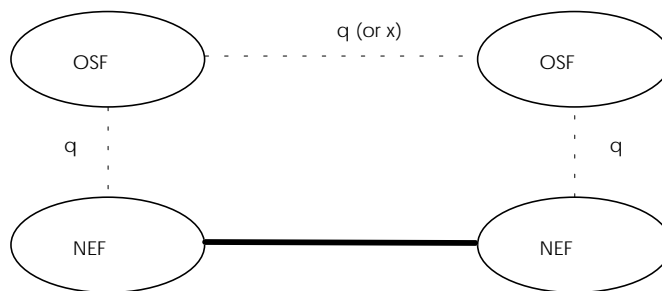


Figure G.1: Functional architecture for test procedures

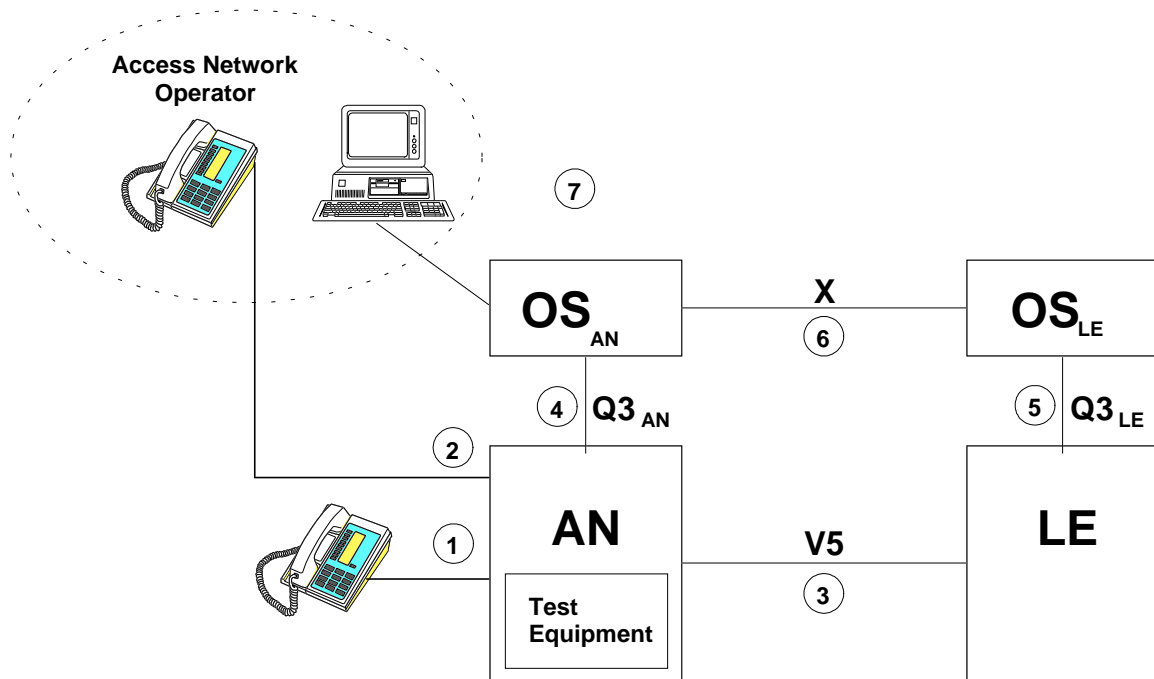
The following subclauses describe examples of test procedures and the interactions between functional blocks via reference points.

G.2.1 Scenario for faultsman ringback tests in an AN environment

Figure G.2 gives a synopsis of all elements involved in maintenance of an AN subscriber line and set: in this example, all the previous reference points have been translated to interfaces and the OSs belong to different TMNs. The telephone set located at the AN operator premises will not be used for this scenario as the operator at the subscriber location will only get responses from the system:

- 1) the operator at the subscriber location (installer) dials a special service code. This special code is detected at the LE over the V5 interface (③ in figure F.2):
 - a) the LE notifies the OS_{LE} via the Q3_{LE} interface (⑤ in figure F.2);
 - b) the OS_{LE} "informs" OS_{AN} via the X interface (⑥ in figure F.2);
 - c) OS_{AN} checks via Q3_{AN} if Test Equipment is available at AN level and reserves this equipment (④ in figure F.2);
 - d) reporting back from OS_{AN} to OS_{LE} via X interface (⑥ in figure F.2);
 - e) OS_{LE} initiates tone LE via Q3_{LE} (⑤ in figure F.2);
- 2) if test equipment is available the LE answers with a ringing tone (③ in figure G.2), otherwise with a busy tone (③ in figure G.2);
- 3) the installer puts the set on-hook (③ in figure G.2):
 - a) the LE notifies the OS_{LE} via the Q3_{LE} interface of the on-hook (⑤ in figure G.2);
 - b) the OS_{LE} "informs" OS_{AN} via the X interface (⑥ in figure G.2);
 - c) OS_{AN} requests testing at AN level via Q3_{AN} (④ in figure G.2);
 - d) the AN blocks the related user port object instance via the V5 protocol (③ in figure G.2);

¹⁾ This reference point and the interface relating to it are out of the scope of this ETS.



NOTE: The operator's telephone set may also be connected to another AN, or to this or another LE.

Figure G.2: Physical architecture for the faultsman ringback service and for subscriber assisted tests in an AN environment

- 4) automatic testing is performed by the AN (foreign voltage, insulation, capacitance, etc.):
 - a) the AN notifies the test results via $Q3_{AN}$ to OS_{AN} (④ in figure G.2);
 - b) the test equipment is disconnected at the AN;
 - c) reporting back the passed/not passed result from OS_{AN} to OS_{LE} via X interface (⑥ in figure G.2);
 - d) OS_{LE} initiates ringing to LE via $Q3_{LE}$ (⑤ in figure G.2) and indicates which tone to apply;
- 5) the LE rings the installer back;
- 6) the installer takes the set off-hook (implying the ringer is OK);
- 7) the test results (of item 4 above) are communicated with a tone (passed: dial tone, not passed: busy tone) to the installer (③ in figure G.2);
- 8) faultsman receives dial tone and sends digits (DTMF or DECADIC) in a given order, removal of dial tone after first digit (③ in figure G.2). This is just a check of the capability to dial (i.e. no measurements are performed on the dial performance);
- 9) passed/not passed tone to report a successful test (③ in figure G.2);
- 10) end of test, set on-hook:
 - a) the LE notifies the OS_{LE} via the $Q3_{LE}$ interface of the on-hook and successful test (⑤ in figure G.2);
 - b) the OS_{LE} "informs" OS_{AN} via the X interface (⑥ in figure G.2);
 - c) report is printed on the AN operator printer (⑦ in figure G.2).

G.2.2 Scenario for a subscriber assisted test in an AN environment

The subscriber assisted tests, i.e. those in which the subscriber at its premises handles the telephone set and observes the SPM, are normally carried out with a speech connection between him and the operator who is also working at the OS_{AN} . This speech connection can be in two modes, as specified in the voice access package.

G.2.2.1 Existing connection mode

- 1) A normal connection is setup between the subscriber and the operator. This connection can be e.g. due to a claiming call from the subscriber (1-3-2 in figure G.2) (no charging should be applied) or may be originated by the operator (2-3-1 in figure G.2).
The operator indicates to the subscriber that some tests are going to be performed, and requests assistance for this purpose according to the following instructions.
- 2) The operator, by means of a test request on the Q3_{AN} interface (7-4 in figure G.2), converts the existing voice connection into a test connection (by creating an access test object and a voice access test object contained in it with the monitorSpeak parameter set to existingConnection). The test connection condition means that the voice connection is kept (1-3-2) but the line signalling is put under the control of the OS_{AN} interface instead of the LE, which will not receive any V5 signal message.
- 3) If, e.g. the ringing function of the telephone set has to be tested, the operator asks the subscriber to hang up and to pick up again when the set rings (or after a given time otherwise). The on-hook is noticed by the operator by hearing to the line (or by previously creating within the access test object a dialled digit test object which reports the on-hook signal event through the Q3_{AN} interface). Then the operator creates within the access test object a ringing test object. This causes the AN to generate ringing to the subscriber's line. The test object will generate a result either upon the off-hook detection or when a built-in timer expires (e.g. a little before the subscriber should pick up if the ringing does not work). In both cases the ringing test object is automatically deleted.
- 4) If, e.g. the dialling function of the telephone set has to be tested, the operator creates within the access test object a dialled digit test object and then asks the subscriber to dial a given sequence of digits. Information on detected digits at the AN and their performance (e.g. make/break duration) are reported by the test object to the OS_{AN} where the operator checks it. The dialled digit test object is automatically deleted.
- 5) If, e.g. the SPM pulse reception function has to be tested, the operator asks to the subscriber to watch how many pulses are going to be received, then creates within the access test an SPM pulse test object with the desired number of pulses to be sent as a parameter. This causes the generation of those pulses. The subscriber counts the number of pulses accumulated in the SPM and it is checked against the generated number.
- 6) When no more subscriber assisted testing is needed, the operator terminates the voice access test object and the access test object through the Q3_{AN} interface. An implementation may restore the original normal connection condition (voice connection kept and line signalling again under LE control) or release the connection completely.

G.2.2.2 Parallel voice path mode

- 1) The operator creates through the Q3_{AN} interface (7-4 in figure G.2) an access test object and contained in it a voice access test object with the monitorSpeak parameter set to speakAndMonitor. This causes the AN to block the port (3 in figure G.2) and to generate a call from the AN-internal test function (simulating to be a telephone) to the telephone number of the operator, provided in the ringBackNo parameter of the test request (3-2 in figure G.2, though the V5 interface and the LE for the test function may not be the same as for the port to be tested).
- 2) Once the voice path between the operator and the test function is established, the test function is connected to the subscriber's line so that the operator and the subscriber can speak to each other.
- 3), 4) and 5) as in the existing connection mode above.
- 6) When no more subscriber assisted testing is needed, the operator terminates the voice access test object and the access test object through the Q3_{AN} interface. The user port is unblocked (3 in figure G.2) and gets ready for normal traffic.

Annex H (informative): Summary of requirements

Table H.1 summarizes all the test requirements and maps them against test characteristics.

Table H.1

	Test is affecting			Test access of the TU			Test result		subscriber assistance	voice connection	source	sink	routine/ on demand	remark
	Q _{AN}	Q _{LE}	LE	line	line circuit	bridged	values	passed/ not passed						
voltage	yes	no	no	yes	no	no	yes	yes	no	no	line	TU	r/d	AC+DC, a/b, a/E, b/E and reverse
resistance	yes	no	no	yes	no	no	yes	yes	no	no	line	TU	r/d	a/b, a/E, b/E and reverse
capacitance	yes	no	no	yes	no	no	yes	yes	no	no	line	TU	r/d	a/b, a/E, b/E
dial pulse test	yes	no	no	no/yes	no	no/yes	yes	no	yes	yes	CPE	TU/LC	d	voice connection preferably in interaction with tests
register recall button	yes	no	no	no/yes	no	no/yes	yes	no	yes	yes	CPE	TU/LC	d	
DTMF dialing	no/yes	no/yes	no/yes	no/yes	no	no/yes	yes	no	yes	yes	CPE	TU/LC	d	
meter pulses	yes	no	no	no/yes	no	no/yes	no	no	yes	yes	TU/LC	CPE	d	
ring subscriber	yes	no	no	no/yes	no	no/yes	no	no	yes	yes	TU/LC	CPE	d	
loop resistance	yes	no	no	yes	no	no	yes	yes	yes	yes	line	TU	d	
monitoring w mark	no/yes	no/yes	no/yes	no	no	no/yes	no	no	no	no/yes	speech connection between OS and CPE		d	no: implemented in the LE
monitoring w/o mark	no/yes	no/yes	no/yes	no	no	no/yes	no	no	no	no/yes	speech connection between OS and CPE		d	yes: implemented in the AN
identification tone	yes	no	no	no/yes	no	no	no	no	no	no	TU	line	d	
dry loop	yes	no	no	no	no	no	no	no	no	no			d	disconnection between line and line circuit
ring back service	no/yes	no/yes	no/yes	no	no	no	no	yes	yes	no	CPE	LE	d	
dial tone test	yes	no	no	no	yes	no	no/yes	yes	no	no/yes	TU / LC		r/d	
feeding voltage	yes	no	no	no	yes	no	no/yes	yes	no	no	LC	TU	r/d	
feeding current	yes	no	no	no	yes	no	no/yes	yes	no	no	LC	TU	r/d	
loop detection	yes	no	no	no	yes	no	no	yes	no	no	LC	TU	r/d	
ring signal sending	yes	no	no	no	yes	no	no/yes	yes	no	no	LC	TU	r/d	
meter pulse test	yes	no	no	no	yes	no	no/yes	yes	no	no	LC	TU	r/d	
digit reception	yes	no	no	no	yes	no	no	yes	no	no	LC	TU	r/d	
codec testing	yes	no	no	no	yes	no	no	yes	no	no	LC	TU	r/d	
simple loopback	yes	no	no	no	no	no	no	yes	no	no	AN/LT, REG, NT		d	normal condition of the line: line circuit connected to the line; no connection to the test unit
activation/deactivation	yes	no	no	no	no	no	no	yes	no	no	AN / NT		r/d	
LT loopback	yes	no	no	no	no	no	no	yes	no	no	AN / LT		r/d	
REG loopback	yes	no	no	no	no	no	no	yes	no	no	AN / REG		r/d	
NT1 loopback	yes	no	no	no	no	no	no	yes	no	no	AN / NT		r/d	
power feed	yes	no	no	yes	no	no	no	yes	no	no	AN	CPE	d	

Annex J (informative): State management in relation with line testing - Application for V5 access networks

J.1 Intrusive tests

Tests can be intrusive or non-intrusive. A test on a resource is intrusive when its testing phase is incompatible with the normal working of that resource.

Most of the test functionality modelled in this ETS is intrusive, with the only exceptions of the monitoring function and of the monitor-and-speak function while a previous connection between the user port being tested and a third party is still on (if this connection is cleared then the monitor-and-speak function becomes intrusive).

Additionally, any tests performed during a speech connection between the operator and the user in the "existingConnection" mode (as described in the voiceAccess test object) are not considered as intrusive.

J.2 Dealing with conflicts between intrusive tests and normal service

When a resource is disabled for any reason, it cannot provide its normal service and thus there is no conflict with intrusive tests. For V5-related user ports, the disabled state of the object implies the blocked state of the corresponding V5 FSM. Disabling reasons are AN-internal, e.g. faults or a (V5-specific) blocking procedure initiated at the LE, as specified in ETS 300 376-1 [6].

When a resource is not disabled, a way of avoiding conflicts between intrusive testing on that resource and its normal working is by preventing the latter by setting its administrative state to "locked" (via shutting down, if desired). This state also allows to hold a test session without risk of interruption due to call attempts between consecutive tests. With V5-related user ports, the locked state implies that the V5 FSM is blocked (see ETS 300 376-1 [6]).

However, the locking or shutting down and the subsequent unlocking operations on the Q3 interface may be cumbersome e.g. in the case of series of single tests on many user ports, and for this reason the model allows to avoid them. In this case, the AN shall solve interferences between an intrusive test and normal traffic according to the priority criterion defined in the testConditions parameter of the request for the containing access test. As specified in the object model, tests to be initiated when the port is not idle may have to be rejected ("reject if busy"), or wait until the port becomes idle ("wait if busy", with a time limit set by the waitTime parameter), or force the clearance of the call ("test if busy").

NOTE 1: A test session without call interruptions between tests can be supported, without using the locked administrative state, by means of the access test object along with the testSessionId parameter.

NOTE 2: The above approach of using the administrative state does not cover the "reject if busy" case or the timing facility for the "wait if busy" case.

In order for the AN to appropriately use the testConditions and the waitTime parameters, two functions are necessary:

- 1) capability to know whether there is an ongoing call;
- 2) procedures for the possible cases of interference.

Regarding function 1, the general principles for ANs and in particular the V5 specifications state that the AN has limited or no knowledge of the state of the call. On that basis, there are two ways out:

- a) for V5-related user ports, an approach is the use of the V5 blocking mechanisms. They only indirectly provide some call information, but at the same time cover function 2 (they are active procedures), as explained in clause J.4;
- b) it is possible for an AN to have additional capabilities allowing it to get call state information, if an implementation goes beyond the definition of AN in the V5 specification.

This approach has the disadvantage of making the AN more complex and dependent on possibly network-specific and time-evolving signalling issues, against the spirit of the V5 specification. However, it cannot be ruled out, and for that reason the V5 blocking approach described below is not in the normative part of this ETS. Moreover, keeping independence on the V5 specificities allows the model to be used in non-V5 environments.

Regarding function 2, in the case of a user port related to a V5 interface, the normal way is by means of the V5 blocking mechanisms, even if a different approach is used for function 1.

A second aspect of possible interference between service and testing is when a call attempt occurs during the execution of a test. The testConditions parameter may also be used by the manager to choose which function prevails, as described in the model. The "customer overrides" option, which is not possible if the locked administrative state is used, requires the AN to be able to detect the call attempt, as well as procedures to abort the test, and for this aspect the same considerations above are valid.

J.3 State values during intrusive testing

Whenever the user port is in the testing phase of an intrusive test it cannot give normal service. Thus the testing phase of an intrusive test is an AN-internal disabling reason, i.e. one of the possible reasons for its disabled operational state.

For short tests, this general rule may be simplified so that the Q3 interface state attributes of the user port are not affected, thus avoiding the corresponding notifications and manager processing. This means that during the test execution the disabled condition of the port is only known by the AN.

For V5-related user ports, the disabled condition (even if not reflected on the Q3 interface) means the blocked state of the V5 FSM, as defined in ETS 300 376-1 [6]. Exceptions are or may be:

- the dial tone test requires the unblocked state due to its special nature;
- for other tests, if their execution have a very short duration, an implementation might not follow this rule.

J.4 V5 blocking mechanism

This clause describes the use of the V5 blocking mechanism for V5-related user ports to cover functions 1 and 2 (as described in clause J.2) as a complement of the generic behaviour description of the test environment conditions package.

- If the testConditions parameter is set to "test if busy" the V5 urgent blocking procedure is started, so that the test proceeds (as far as this mechanism is concerned, the AN does not know if there was a call).
- If the parameter is set to "wait if busy" the V5 deferred blocking is started, and it is up to the LE to block the port (when this happens, the AN "knows" that the call has finished). If the timer expires, the AN cancels the block request.
- The least elegant case for this approach is when the testConditions parameter is set to "reject if busy", as there is no direct V5 mechanism. Then the AN starts the deferred blocking procedure; if after "a few seconds" the LE has not yet confirmed the blocking, the AN assumes that there is a call and rejects the test, while the block request to the LE is cancelled.

For the dial tone test, these procedures need to be complemented, once the port is blocked, by the unblocking procedure (if the concept of test session were to be supported to avoid a call to interrupt a sequence of dial tone tests, the user port would be immediately blocked after each test).

It is possible for an implementation to follow the above V5 blocking approach with the variation that, for PSTN ports and/or ISDN-BA ports without permanent line activation, the AN determines by itself whether the line is busy, only in order to simplify the "reject if busy" case (direct rejection if the port is found busy); and, on PSTN ports, also to simplify the dial tone test (direct testing when the port is found idle).

Annex K (informative): Message flows

In the following figures the principles of the message flows are introduced as examples.

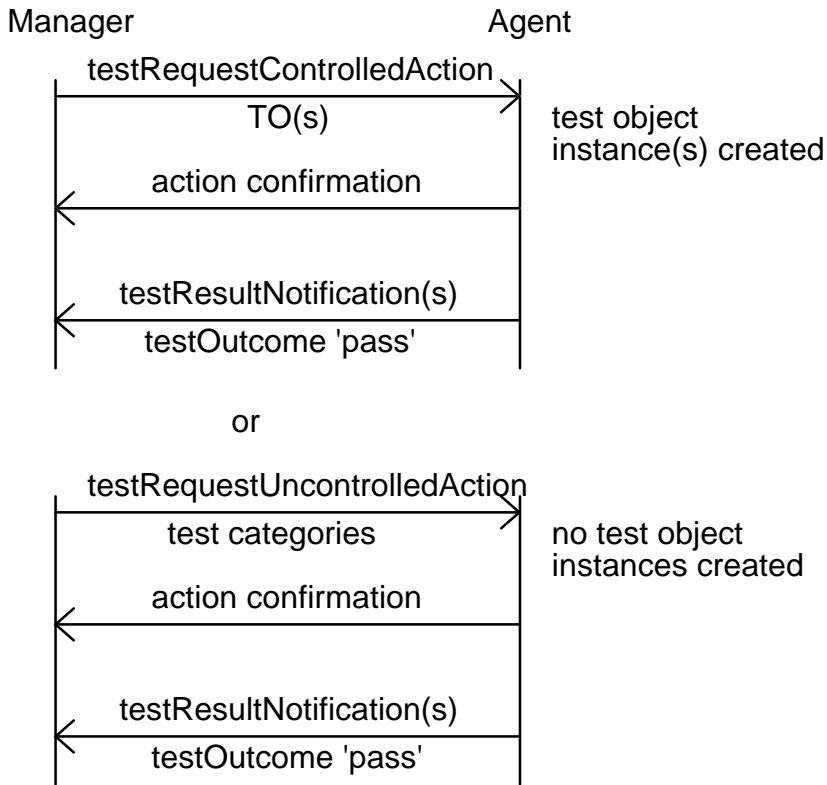


Figure K.1: The simple cases: a successful on-demand test

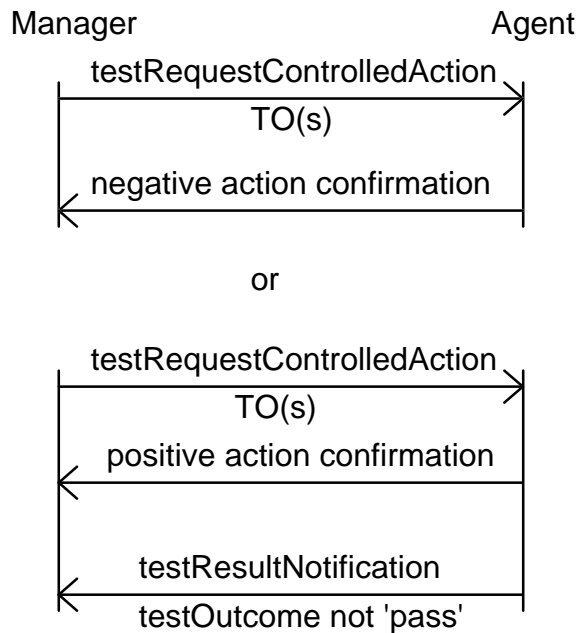


Figure K.2: Any failed test

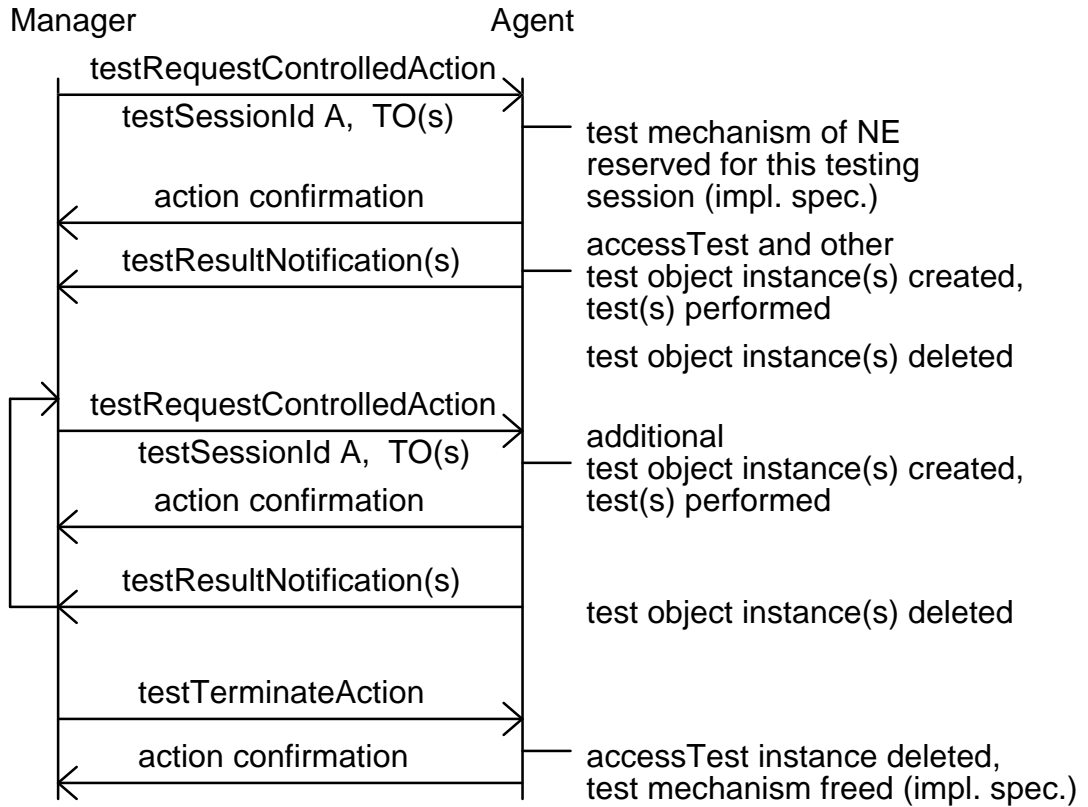


Figure K.3: A test session

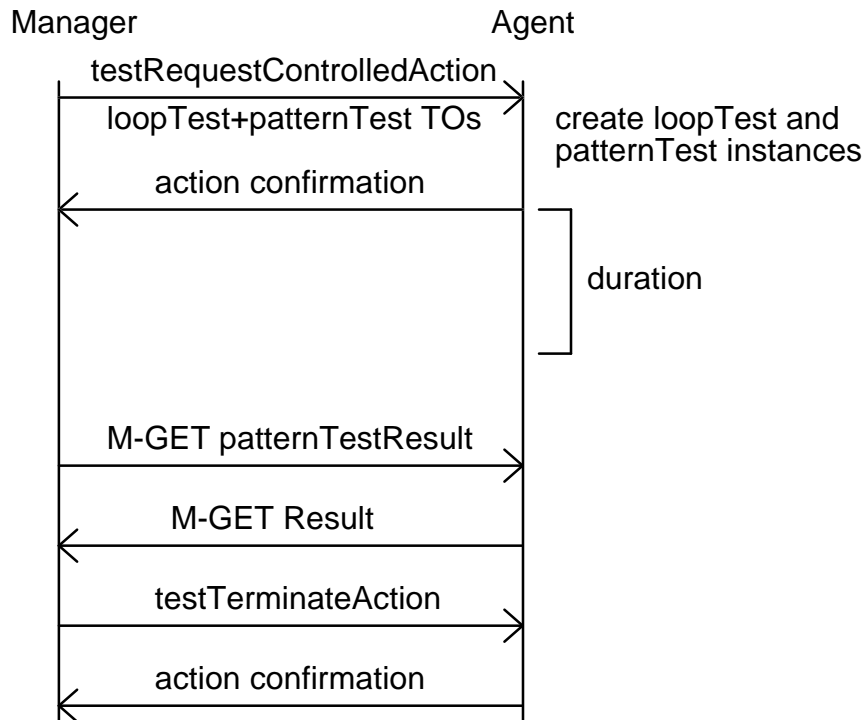


Figure K.4: Internal Pattern Injection

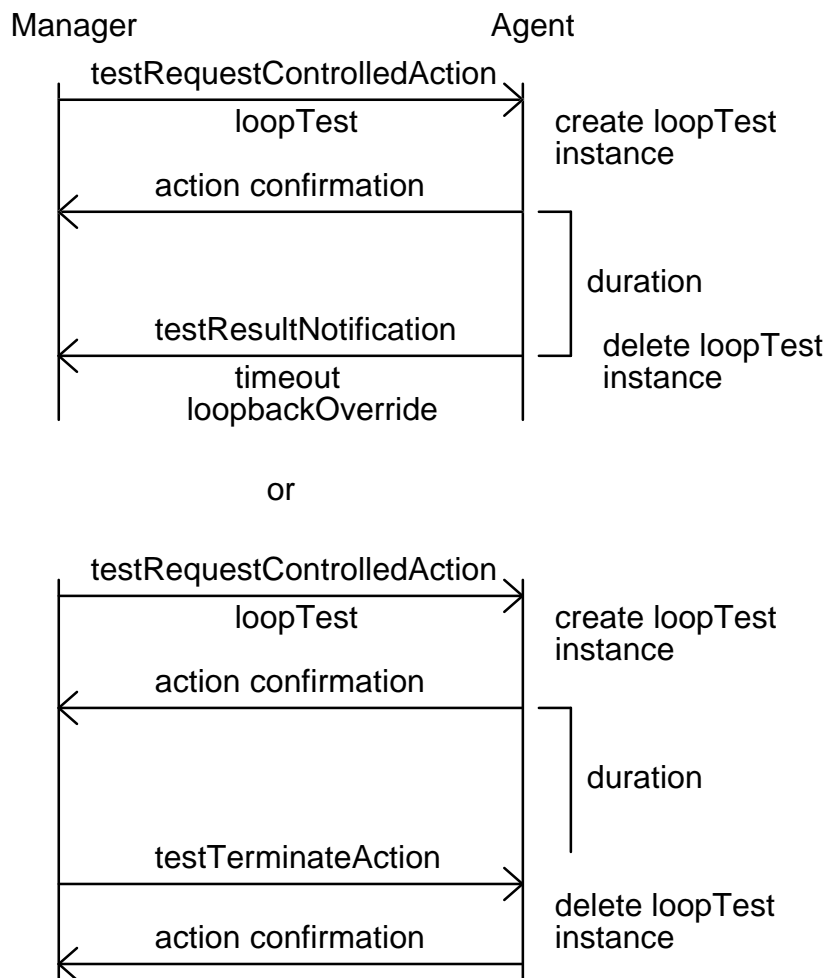


Figure K.5: External Pattern Injection

Annex L (informative): Bibliography

- ETR 008 (1990): "Network Aspects (NA); The method for the characterisation of the machine-machine interfaces utilised by a Telecommunications Management Network (TMN)".
- ETR 037 (1992): "Network Aspects (NA); Telecommunications Management Network (TMN); Objectives, principle, concepts and reference configurations".
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