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Signalling Protocols and Switching (SPS);
V interfaces at the digital Local Exchange (LE);
V5.2 interface for the support of Access Network (AN);
Part 6: Abstract Test Suite (ATS) and partial Protocol
Implementation eXtra Information for Testing (PIXIT) proforma
specification for the network layer (LE side)

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New presentation - see History box

Contents

Foreword

This draft European Telecommunication Standard (ETS) has been produced by the Signalling Protocol and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Public Enquiry phase of the ETSI standards approval procedure.

This ETS is part 4 of a multi-part standard covering the V5.2 interface as described below:

Part 1: "V5.2 interface specification";

Part 2: "Protocol Implementation Conformance Statement (PICS) proforma";

Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification for the network layer (AN side)";

Part 4: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network layer (AN side)";

Part 5: "TSS&TP specification for the network layer (LE side)";

Part 6: **"ATS and partial PIXIT proforma specification for the network layer (LE side)";**

Part 7: "TSS&TP specification for the data link layer";

Part 8: "ATS and partial PIXIT proforma specification for the data link layer";

Part 9: "Test specifications for the physical layer".

Proposed transposition dates	
Date of adoption of this ETS:	date of ETSI adoption
Date of latest announcement of this ETS (doa):	3 months after ETSI adoption
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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1 Scope

This sixth part of ETS 300 347 contains the Abstract Test Suite (ATS) as well as the Abstract Test Method (ATM) and the partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for the Network layer (NWK) of the V5.2 interface and parts of the system management of the Local Exchange (LE) side of a V5.2 interface.

The objective of this ETS is to provide an ATS containing conformance tests which give a high probability of inter-operability of an Access Network (AN) and a LE from different manufacturers over the V5.2 interface.

ISO/IEC 9646-1 [7] and ISO/IEC 9646-2 [8] are used as the basis for the test methodology. The ATS is defined using the Tree and Tabular Combined Notation (TTCN) according to ISO/IEC 9646-3 [9].

The ATS in annex A describes a set of Test Cases (TCs) which are based on the Test Purposes (TPs) specified in ETS 300 347-5 [6] (which is an extension of ETS 300 324-5 [2]). The TCs provide the implementation of the TPs and can be converted into an executable test suite by using available TTCN translators and the corresponding tools.

Annex B provides the partial PIXIT proforma.

This ETS needs to be used in conjunction with ETS 300 324-6 [3]. To create a complete V5.2 ATS, the V5.1 ATS contained in ETS 300 324-6 [3] and the V5.2 ATS additions contained in annex A of this ETS need to be merged. Annex C gives assistance with this procedure.

Annex D lists the informative references.

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.

[1]   ETS 300 324-1 (1994): "Signalling Protocols and Switching (SPS), V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification".

[2]   ETS 300 324-5: "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network layer (LE side)".

[3]   ETS 300 324-6: "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 6: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network layer (LE side)".

[4]   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".

[5]   ETS 300 347-2 (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 2: Protocol Implementation Conformance Statement (PICS) proforma".

[6]   ETS 300 347-5: "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.2 interface for the support of Access Network (AN); Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network layer (LE side)".

[7]   ISO/IEC 9646-1: "Information Technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".

[8]   ISO/IEC 9646-2: "Information Technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract test suite specification".

[9]   ISO/IEC 9646-3: "Information Technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN)".

[10]   ISO/IEC 9646-5: "Information Technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 5: Requirements on test laboratories and clients for the conformance assessment process".

3   Definitions and abbreviations

3.1   Definitions

For the purposes of this ETS, all definitions given in ETS 300 324-6 [3] apply.

3.2   Abbreviations

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

AN	Access Network
ASP	Abstract Service Primitive
ATC	Abstract Test Case
ATM	Abstract Test Method
ATS	Abstract Test Suite
BCC	Bearer Channel Connection
BI	Invalid Behaviour
BO	Inopportune Behaviour
BV	Valid Behaviour
CA	CApability test
CTRL	Control
DLL	Data Link Layer
DSAP	Data link SAP
FE	Function Element
FSM	Finite State Machine
IE	Information Element
IEI	Information Element Identifier
ISDN	Integrated Services Digital Network
ISDN-BA	ISDN-Basic Access
ISDN-PRA	ISDN-Primary Rate Access
IT	basic Interconnection Test
IUT	Implementation Under Test
L3addr	Layer 3 address
LC	Line Circuit
LT1	Lower Tester 1
MPH	Management Physical layer
NWK	Network Layer

PCO	Point of Control and Observation
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
REQ	Request
SAP	Service Access Point
SUT	System Under Test
TP	Test Purposes
TSS	Test Suite Structure
TTCN	Tree and Tabular Combined Notation
UL	Upper Layer
UT	Upper Tester
V5DLaddr	V5 Data Link address

4 Abstract test method

This clause describes the Abstract Test Method (ATM) and the Point of Control and Observation (PCO) used to test the NWK of the V5.2 protocol for the LE components.

4.1 ATM

Principally, the remote test method is used for V5.2 LE NWK conformance testing. Certain V5.2 LE NWK TPs need also part of the service and national functions. Therefore, the embedded variant of the remote test method is applied.

The national dependent information is defined in the PIXIT.

4.2 NWK layer protocol testing

The V5.2 implementations do not offer a direct access to the upper service boundary. The remote test method was chosen because any co-ordination procedures can only be expressed in an informal way.
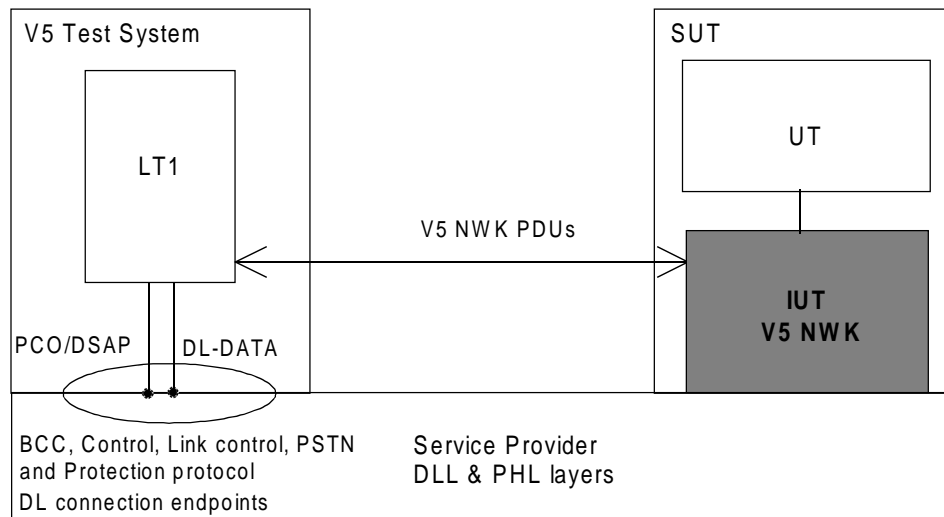
Figure 1: Remote test method applied to the V5.2 NWK layer testing

LT1: A Lower Tester (LT1) is located in a remote V5.2 test system. It controls and observes the behaviours of the IUT.

DSAP: A unique Data link Service Access Point (DSAP) is defined at the V5.2 interface and commonly used for exchanging service data of the different network layer protocol functional entities: PSTN, Control protocols.

PCO: The PCO for NWK testing is located on the DSAP. All test events at the PCO are specified in terms of data link Abstract Service Primitives (ASPs) and network layer PDUs.

UT: No explicit Upper Tester (UT) exists in the test system. However, the SUT needs to carry out some UL functions to achieve some effects of test co-ordination procedures. Designing ATS, the capability of the system management functions, such as controls of the IUT, its interactions with the Q interface may be taken into account. The controls of the IUT will be implied or informally expressed in the ATS, but no assumption shall be made regarding their feasibility or realization. Examples of such controls could be to provoke restarting IUT or blocking/unblocking procedures through Q interface.

4.3 Data link addresses

Within the DSAP, different V5DLaddr are used to identify each corresponding data link connection. Each network layer protocol functional entity can have only one data link connection, e.g. all PSTN signalling information share one data link connection.

Table 1 shows the allocated V5DLaddr used by the protocol function entities.

Table 1: V5DLaddr

Protocol	PSTN	Control	BCC	Protection	Link Control
V5DLaddr	8176	8177	8178	8179	8180

4.4 Execution of TCs

4.4.1 Handling of error indication

During the execution of the NWK ATS many error indications will be sent to the system management due to the invalid and the inopportune TCs. It is up to the IUT supplier to take the necessary precautions to avoid any impact on the test result.

4.4.2 TC execution sequence

The following test sequence shall be applied:

The TC containing the start-up procedure shall always be the first TC executed. Also in any case where the IUT has to be restarted this TC shall be first executed.

Protocol groups: CTRL $\Rightarrow$ LINK$\Rightarrow$ PROTECTION$\Rightarrow$ BCC$\Rightarrow$ PSTN.
Test groups: IT $\Rightarrow$ CA $\Rightarrow$ TI $\Rightarrow$ BV $\Rightarrow$ BO $\Rightarrow$ BI.

Interactions between the different test groups are not considered. It is up to the IUT supplier to take the necessary precautions to avoid any impact on the test result.

5 Untestable test purposes

This clause contains a list of TPs which are not covered by in the ATS due to the chosen ATM or other restrictions.

5.1 Control protocol

Table 2 lists TPs which are not covered by the ATS due to the unknown reaction of the IUT after testing the TPs.

Table 2: Untestable TPs (1)

Test Purpose ID	Reference to ETS 300 324-5 [2]
TP1313S0_04	Refer to subclause 5.2.3.1.3
TP1313SM_07	Refer to subclause 5.2.3.1.3
TP1313SM_10	Refer to subclause 5.2.3.1.3

Table 3 lists TPs which are not covered by the ATS due to existing optional procedures which may or may not be applied by the IUT.

Table 3: Untestable TPs (2)

Test Purpose ID	Reference to ETS 300 324-5 [2]
TP1313SM_06	Refer to subclause 5.2.3.1.3
TP1313SM_08	Refer to subclause 5.2.3.1.3
TP1313SM_09	Refer to subclause 5.2.3.1.3

Table 4 lists TPs which are not covered by the ATS because it is not possible to fix the IUT re-provisioning Finite State Machine (FSM) in state LE1.

Table 4: Untestable TPs (3)

Test Purpose ID	Reference to ETS 300 324-5 [2]
TP1313SM_09	Refer to subclause 5.2.3.1.3

Table 5 lists TPs which are not covered by the ATS because it is not possible to provoke the generation of the necessary MPHs from system management.

Table 5: Untestable TPs (4)

Test Purpose ID	Reference to ETS 300 324-5 [2]
TP1324S1001	Refer to subclause 5.2.3.2.2
TP1324SM_05	Refer to subclause 5.2.3.2.2
TP1324SM_11	Refer to subclause 5.2.3.2.2
TP1325S1001	Refer to subclause 5.2.3.2.3
TP1325SM_11	Refer to subclause 5.2.3.2.3
TP1325S2013	Refer to subclause 5.2.3.2.3
TP1325SM_24	Refer to subclause 5.2.3.2.3
Test Purpose ID	**Reference to ETS 300 347-5 [6]**
TP1326S1001	Refer to subclause 5.2.3.2.4
TP1326SM_06	Refer to subclause 5.2.3.2.4
TP1326SM_11	Refer to subclause 5.2.3.2.4

5.2 PSTN protocol

Table 6 lists TPs which are not covered by the ATS, because it is necessary to perform an incomplete restart to fix the PSTN protocol in state LE0. The reaction of the IUT on an incomplete restart is not defined.

Table 6: Untestable TPs (5)

Test Purpose ID	Reference to ETS 300 324-5 [2]
TP23__S0_01	Refer to subclause 5.3.3.1
TP24__S0_01	Refer to subclause 5.3.4.1
TP24__S0_02	Refer to subclause 5.3.4.1
TP24__S0_03	Refer to subclause 5.3.4.1
TP24__S0_04	Refer to subclause 5.3.4.1
TP24__S0_05	Refer to subclause 5.3.4.1
TP24__S0_06	Refer to subclause 5.3.4.1
TP24__S0_07	Refer to subclause 5.3.4.1
TP24__S0_08	Refer to subclause 5.3.4.1
TP24__S0_09	Refer to subclause 5.3.4.1
TP24__S0_10	Refer to subclause 5.3.4.1
TP24__S0_11	Refer to subclause 5.3.4.1
TP24__S0_12	Refer to subclause 5.3.4.1
TP24__S0_13	Refer to subclause 5.3.4.1
TP26__S0_01	Refer to subclause 5.3.6.1
TP26__S0_02	Refer to subclause 5.3.6.1
TP26__S0_03	Refer to subclause 5.3.6.1

Table 7 lists TPs which are not covered by the ATS because it is not possible to provoke the generation of the necessary MPHs from system management.

Table 7: Untestable TPs (6)

Test Purpose ID	Reference to ETS 300 324-5 [2]
TP23__S0_02	Refer to subclause 5.3.3.1
TP23__S1_06	Refer to subclause 5.3.3.2
TP23__S2_08	Refer to subclause 5.3.3.3
TP23__S4_07	Refer to subclause 5.3.3.4
TP23__S5_10	Refer to subclause 5.3.3.5
TP23__S6_03	Refer to subclause 5.3.3.6

5.3 Link control protocol

Table 8 lists TPs which are not covered by the ATS due to the unknown reaction of the IUT after testing the TPs.

Table 8: Untestable TPs (7)

Test Purpose ID	Reference to ETS 300 347-5 [6]
TP33_1SM_03	Refer to subclause 5.4.3.1
TP33_7SM_11	Refer to subclause 5.4.3.2
TP33_7SM_18	Refer to subclause 5.4.3.2
TP33_7SM_40	Refer to subclause 5.4.3.2

Table 9 lists TPs which are not covered by the ATS due to the unknown generation of the necessary MDUs from system management.

Table 9: Untestable TPs (8)

Test Purpose ID	Reference to ETS 300 347-5 [6]
TP33_7S1112	Refer to subclause 5.4.3.2
TP33_7S1113	Refer to subclause 5.4.3.2
TP33_7S2228	Refer to subclause 5.4.3.2
TP33_7S2229	Refer to subclause 5.4.3.2
TP33_7S2244	Refer to subclause 5.4.3.2

Table 10 lists TPs which are not covered by the ATS due to the unknown generation of a non-persistent V5.2 link failure.

Table 10: Untestable TPs (9)

Test Purpose ID	Reference to ETS 300 347-5 [6]
TP33_7S2001	Refer to subclause 5.4.3.2
TP33_7S2002	Refer to subclause 5.4.3.2
TP33_7S2003	Refer to subclause 5.4.3.2
TP33_7S2004	Refer to subclause 5.4.3.2
TP33_7S2005	Refer to subclause 5.4.3.2

Table 11 lists TPs which are not covered by the ATS due to untestable requirements.

Table 11: Untestable TPs (10)

Test Purpose ID	Reference to ETS 300 347-5 [6]
TP33_7S2134	Refer to subclause 5.4.3.2
TP33_7S2135	Refer to subclause 5.4.3.2

5.4   BCC Protocol

Table 12 lists TPs which are not covered by the ATS due to the unknown invoking of the tested procedures.

Table 12: Untestable TPs (12)

Test Purpose ID	Reference to ETS 300 347-5 [6]
TP42__SM_02	Refer to subclause 5.5.2
TP42__SM_03	Refer to subclause 5.5.2
TP42__SM_04	Refer to subclause 5.5.2
TP42__SM_05	Refer to subclause 5.5.2
TP43__SM_01	Refer to subclause 5.5.3
TP43__SM_02	Refer to subclause 5.5.3
TP43__SM_03	Refer to subclause 5.5.3

Table 13 lists TPs which are not covered by the ATS due to the unknown reaction of the IUT after testing the TPs.

Table 13: Untestable TPs (12)

Test Purpose ID	Reference to ETS 300 347-5 [6]
TP43__S0_11	Refer to subclause 5.5.3
TP43__S0_12	Refer to subclause 5.5.3
TP43__S0_13	Refer to subclause 5.5.3
TP43__S0_14	Refer to subclause 5.5.3
TP43__S0_15	Refer to subclause 5.5.3
TP46__S4_01	Refer to subclause 5.5.6
TP46__S4_02	Refer to subclause 5.5.6
TP46__S4_03	Refer to subclause 5.5.6
TP46__S4_04	Refer to subclause 5.5.6
TP46__S4_05	Refer to subclause 5.5.6
TP46__S4_06	Refer to subclause 5.5.6
TP46__S4_08	Refer to subclause 5.5.6

Table 14 lists TPs which are not covered by the ATS due to the unknown generation of the necessary primitives over the Q-interface.

Table 14: Untestable TPs (13)

Test Purpose ID	Reference to ETS 300 347-5 [6]
TP43__SM_08	Refer to subclause 5.5.3
TP45__S1_11	Refer to subclause 5.5.5

5.5   Protection protocol

Table 14 lists TPs which are not covered by the ATS due to the unknown reaction of the IUT after testing the TPs.

Table 15: Untestable TPs (14)

Test Purpose ID	Reference to ETS 300 347-5 [6]
TP56__S0_02	Refer to subclause 5.6.5
TP56__S1_04	Refer to subclause 5.6.5
TP56__S1_06	Refer to subclause 5.6.5
TP56__S1_07	Refer to subclause 5.6.5

Table 15 lists TPs which are not covered by the ATS due to the unknown invoking of the tested procedures.

Table 16: Untestable TPs (15)

Test Purpose ID	Reference to ETS 300 347-5 [6]
TP53__SM_04	Refer to subclause 5.6.3
TP53__SM_05	Refer to subclause 5.6.3
TP53__S1_13	Refer to subclause 5.6.3
TP53__S1_15	Refer to subclause 5.6.3

6 Abstract test suite conventions

The ATS conventions are intended to give a better understanding of the ATS but they describe also the conventions made for the development of the ATS, thus for any later maintenance purposes or further development of the ATS the conventions described in this clause shall be considered.

The ATS conventions contain two clauses, the naming conventions and the implementation conventions. The naming conventions describe the structure of the naming of all ATS elements. The implementation conventions describe the functional structure of the ATS.

> NOTE: To define the ATS, the guidelines given in ETS 300 406 and ETR 141 were considered.

6.1 Naming conventions

6.1.1 Declaration part

The ID names of the following definitions are written in lowercase:

- structured type definitions;
- ASP type definitions;
- PDU type definitions.

The ID names of the following definitions are written in uppercase:

- Test Suite Parameter Declarations;
- Test Case Selection Expression Definitions;
- Test Suite Constant Declarations;
- Test Case Variable Declarations.

ID names of PDUs and structured types commence with a protocol identifier to define which protocol they are belonging to. The following identifiers are used:

- control protocol: ctrl e.g. crtl_common_control_ack;
- PSTN signalling: pstn e.g. pstn_signal_ack.

ID names of PDUs and structured types which are used for invalid tests commence with "bi".

EXAMPLE: bi_com_ctrl_two_mety.

Complete names as defined in the specifications are used for ID names of declarations.

EXAMPLE: ctrl_control_function_element.

Test suite parameter ID names commence with TSP:

- PICS are identified by adding the letter "C": TSPC_. (e.g.: TSPC_PSTN);
- PIXIT are identified by adding the letter "X": TSPX_. (e.g.: TSPX_PORT_ADDRESS).

If a test suite parameter is representing a system parameter or value, only the parameter name is used.

EXAMPLE: MR (receive sequence number in signal message).

Test suite operations commence with TSO.

EXAMPLE: TSO_INTEGER_TO_OCTETSTRING.

Test suite constant ID names commence with TSC.

EXAMPLE: TSC_CFE_FE201_2_UNBL.

If the constant is representing a system parameter or value, only the parameter name is used.

EXAMPLE: N01.

ID names of Timers commence with T. The same names as in the specification are used.

EXAMPLE: T01.

6.1.2   Constraint part

Constraint names commence with uppercase. The remaining part of the ID name is written in lowercase.

ID names of elements concerning the same subject have equivalent names in the declaration and the constraint part:

Declaration part: ctrl_control_function_element;
Constraint part: Ctrl_control_function_element.

The name of the modified constraint describes the particularity of the modified constraint.

EXAMPLE: Ctrl_cc_mand_only (common control message which contains only the mandatory IEs).

If formal parameter lists are used, the variable names are written in lowercase. The variable name is the same as the name of the element it is representing.

6.1.3   Dynamic part

6.1.3.1   Test cases

The identifier of the TCs is constructed in the same way as for the TPs described in ETS 300 347-5 [6], subclause 5.1.1, with the exception that "TP" is replaced by "TC".

TP identifier: TP1324S1106;
TC identifier: TC1324S1106.

6.1.3.2   Test steps

In TCs, test steps as well as local trees are used. To allow an easy distinction, the following naming is applied:

local tree: LTS_[local_tree_name];
test step: STEP_[test-step_name].

6.1.3.3   General aspects

All verdict assignments are labelled. To allow an exact identification in which table the verdict was assigned, the following name convention is applied:

B   test Body
CS   status verification test steps (Check Status)
D   Default
E   Error handling test steps
PO   POstamble
PR   PReamble
S   test Step

Combinations of labels are also possible.

EXAMPLE: DPR --> label which is used in a default for preambles.

6.1.4 ATS abbreviations

These abbreviations are used to shorten identifier names:

addr	address
act	activate
acc	access
ack	acknowledgement
alloc	allocation
cau	cause
cc	common control
cfe	control function element
cfi	control function identifier
chan	channel
com	common
cpl	complete
ctrl	control
dl	data link
enq	enquiry
est	establish
func	function
ind	indication
interf	interface
mand	mandatory
mety	message type
mod	modified
par	parameter
pc	port control
pd	protocol discriminator
perform	performance
prog	progress
pr	protection protocol
prot	protocol
prov	provisioned
repro	re-provisioning
req	request
rest	restart
rsp	response
up	user port
var	variant
verify	verifying
vid	variant & interface ID

6.2 Implementation conventions

6.2.1 Declaration part

The comment line of single element TTCN tables (e.g. test suite constants) is used to give a reference where the format and content of the element is described in the relevant protocol specifications. Any particularity of the element format or content is described in the comment line.

The comment line in the header of multi-element TTCN tables (e.g. ASPs) is used to reference to the protocol specification.

The detailed comments are used to describe any particularity of the table.

In the ASP and PDU declarations, the comments column is used to identify if an element is mandatory or optional.

m: mandatory;
o: optional.

In the ASP and PDU declarations the comments column is further used to give information about the element value, in particular if the element contains a fixed spare value.

In tables where structure types are used the information element and the relevant structured type have always the same name, that allows to have the same structure as in the protocol standards is used to document the relation between information elements in a table and their specific description in an other clause of the protocol standard.

6.2.2   Constraint part

The ASPs and PDUs are defined in a way that all relevant element are parametrized. That improves the transparency of the constraints in the dynamic part, as all values which are relevant for the test are always present.

Generally the base constraint contains all possible parameters and the relevant formal parameter list which goes with the base constraint. In case where a specific message IE is not used at all in the ATS, the base constraint will not contain such an IE. The base constraints of the PSTN protocol contain all mandatory IEs. The optional IEs are defined in one element of type OCTETSTRING. The actual value and format of the optional IE has to be defined in the PIXITs according to the PSTN specifications which is implemented in the IUT.

Modified constraints have the same parameter list as the base constraint. Not used elements of the parameter list are set to a default value "ANY" in the dynamic part. The number of base constraints is reduced to a minimum.

The comment line of a constraint contains always the reference to the used specifications. The detailed comments sector is used to describe any particularity of the table.

6.2.3   Dynamic part

Some TCs need a particular initialization of the IUT environment conditions to run the actual test, e.g. for testing re-provisioning procedures. Such message sequence can be quite complicated and long. In cases where a Local Test Step (LTS) facilitates the TC structure, the preamble and the condition setting are described in a LTS called **LTS_pre_step**. All LTS_pre_steps are described in the detailed comment part of the TTCN table.

Some TCs need after the actual test a particular re-initialization of the IUT, e.g. after re-provisioning. Such message sequence can be quite complicated and long. In cases where a Local Test Step (LTS) facilitates the TC structure, the postamble and the re-initialization are described in a LTS called **LTS_post_step**. All LTS_post_steps are described in the detailed comment part of the TTCN table.

All events which are defined as a conformance requirements by the TP, cause a preliminary verdict PASS if the requirement is met.

All invalid events are handled in the default tree. FAIL verdicts are only assigned in the default tree. The default tree contains the error handling procedure for the particular TC.

The preamble, the test body and the postamble have different defaults, what allows a specific verdict handling, e.g. only INCONC verdicts are assigned in the preamble.

Test steps do not contain a default. That allows to apply them with no restrictions regarding the error handling.

All verdict assignments are labelled. According to ISO/IEC 9646-3 [9], clause E.2, labels should be written to the conformance log. This allows to identify were the test failed. To allow an exact identification in which table the verdict was assigned, the naming convention as described in subclause 6.1.3.3 is applied.

The labels of the same type are numbered sequentially if they are in the same TC, test step or default.

TPs which only reference to an other TP, e.g. BV TPs which were already defined as CA TPs, are only implemented ones, thus the numbering of the TCs is not always continues.

TPs which are listed in the untestable TP list in clause 5, or which reference to an other TP, e.g. BV TPs which were already defined as CA TPs, are not considered in the ATS, thus these TC identifiers are missing in the ATS and the numbering of the TCs is not always continues.

NWK implementation:

1)   the PDUs used in implicit send have the same name as the system management message which has to be sent to the IUT to provoke the requested event;

2)   the ATS rebuilds the PSTN functions. Therefore, the signal message sequence numbers M(S) and M(R) are implemented and used according to their function described in ETS 300 347-1 [4];

3)   TCs of the */PORT/TRANS test group which have to be applied either to the PSTN user port or the ISDN-BA user port depending on the provisioned application in the IUT, use a common TC definition where the L3addr is parametrized (TCV_l3_addr). The L3_addr to be used during the execution is assigned in the test step STEP_Ctrl_pc_trans_init depending on the setting of the PICS which describe the provisioned data set. All of the TCs in the test groups */PORT/TRANS begin with the test step STEP_Ctrl_pc_trans_init.

6.2.4   Documentation

The comment line of the TC or test step header contains a reference to the relevant protocol specification.

The comment column of the dynamic behaviour part is used to number the test events which are relevant for the particular test or test operation.

Based on the numbering in the comment column all for the TC relevant events are described in the detailed comments part of each TTCN table.

Test procedures which cover a conformance requirement and lead to a preliminary or final verdict assignment are described as follows in the detailed comments part:

Expected event: a specific receive event is expected.

Expected behaviour: no event or a timer expiry is expected.

Expected status: the IUT is expected to be in a particular status.

Annex A (normative): Abstract test suite for NWK testing

This ATS has been produced using the Tree and Tabular Combined Notation (TTCN) according to ISO/IEC 9646-3 [9].

The ATS was developed on a separate TTCN software tool and therefore the TTCN tables are not completely referenced in the contents table. The ATS itself contains a Test Suite Overview Part which provides additional information and references.

A.1 The TTCN Graphical form (TTCN.GR)

The TTCN.GR representation of this ATS is contained in a Postscript file (DEP03476.PS) which can be found on the diskette which is attached to the last page of this ETS.

A.2 The TTCN Machine Processable form (TTCN.MP)

The TTCN.MP representation corresponding to this ATS is contained in an ASCII file (DEP03476.MP) which can be found on the diskette which is attached to the last page of this ETS.

NOTE: According to ISO/IEC 9646-3 [9], in case of a conflict in interpretation of the operational semantics of TTCN.GR and TTCN.MP, the operational semantics of the TTCN.GR representation takes precedence.

Annex B (normative):   Partial PIXIT proforma

B.1   Introduction

The PIXIT proforma are based on ISO/IEC 9646-5 [10], any additional information needed can be found in this ETS.

B.2   PIXIT proforma

B.2.1   Identification summary

PIXIT Number:
Test Laboratory Name:
Date of Issue:
Issued to:

B.2.2   Abstract test suite summary

Protocol Specification: ETS 300 347-1
Protocol to be tested: V5.2, LE network layer
ATS Specification: ETS 300 347-6
Abstract Test Method: Remote test method, embedded variant

B.2.3   Test laboratory

Test Laboratory Identification:
Test Laboratory Manager:
Means of Testing:
SAP Address:

B.2.4   Client

Client Identification:
Client Test manager:
Test Facilities required:

B.2.5   SUT

Name:
Version:
SCS Number:
Machine configuration:
Operating System Identification:
IUT Identification:
PICS Reference for IUT:
Limitations of the SUT:
Environmental Conditions:

B.2.6   Protocol layer information

B.2.6.1   Protocol identification

Name: V5.2, network layer protocol for Control and PSTN
Version:
PICS References: ETS 300 347-2

B.2.6.2 IUT information

Table B.1: Addresses

Address name	Parameter type	Reference	Value
TSPX_CTRL_ISDNBA_ PORT_ADDR	OCTETSTRING[11]	Port address of the ISDN-BA user port provisioned (ETS 300 324-1 [1], subclause 14.4.2.3)	
TSPX_CTRL_ ISDNPRA_PORT_ADD R	OCTETSTRING[11]	Port address of the ISDN-BA user port provisioned (ETS 300 324-1 [1], subclause 14.4.2.3)	
TSPX_CTRL_PSTN_ PORT_ADDR	OCTETSTRING[11]	Port address of the PSTN user port provisioned (ETS 300 324-1 [1], subclause 14.4.2.3)	
TSPX_CTRL_PSTN_ PORT_ADDR_NOT_ PROV	OCTETSTRING[11]	Port address of the PSTN user port which is not provisioned (ETS 300 324-1 [1], subclause 14.4.2.3)	
TSPX_V5DL_ADDR_ BCC	OCTETSTRING[2]	V5DLaddr for the BCC protocol (see note) (ETS 300 324-1 [1], table 1)	default value: '1111 11?? 1110 010?'B
TSPX_V5DL_ADDR_ CTRL	OCTETSTRING[2]	V5DLaddr for the Control protocol (see note) (ETS 300 347-1 [4], table 1)	default value: '1111 11?? 1110 001?'B
TSPX_V5DL_ADDR_LC	OCTETSTRING[2]	V5DLaddr for the Link control protocol (see note) (ETS 300 347-1 [4], table 1)	default value: '1111 11?? 1110 100?'B
TSPX_V5DL_ADDR_PR	OCTETSTRING[2]	V5DLaddr for the Protection protocol (see note) (ETS 300 347-1 [4], table 1)	default value: '1111 11?? 1110 011?'B
TSPX_V5DL_ADDR_ PSTN	OCTETSTRING[2]	V5DLaddr for the PSTN protocol (see note) (ETS 300 347-1 [4], table 1)	default value: '1111 11?? 1110 000?'B
NOTE:	The TSPX_V5DL_ADDR is used to address either the Control or PSTN NWK entity. The TSPX V5DL_ADDR is part of the ASP send or received. Depending on the V5DLaddr format requested by the target implementation (LT1), the TSPX_V5DL_ADDR shall be coded according to ETS 300 324-1 [1], table 1.		

Table B.2: Parameter values

Parameter name	Parameter type	Reference	Parameter value
TSPX_BCC_MULTI_SLOT_ALOC	OCTETSTRING[8]	Multi Slot Map information element (ETS 300 347-1 [4], subclause 17.4.2.4)	
TSPX_BCC_REF_NUM	OCTETSTRING[2]	BCC Reference Number used to initialize a single BCC process (ETS 300 347-1 [4], subclause 17.4.1)	
TSPX_BCC_UP_ID_ISDN_BA	OCTETSTRING[2]	ISDN-BA User Port Identification Value (last two octets of UP IE) (ETS 300 347-1 [4], subclause 17.4.2.1)	
TSPX_BCC_UP_ID_ISDN_PRA	OCTETSTRING[2]	ISDN-PR User Port Identification Value (last two octets of UP IE) (ETS 300 347-1 [4], subclause 17.4.2.1)	
TSPX_BCC_UP_ID_NOT_PROV	OCTETSTRING[2]	PSTN User Port Identification Value (last two octets of UP IE) which is not provisioned in the IUT (ETS 300 347-1 [4], subclause 17.4.2.1)	
TSPX_BCC_UP_ID_NOT_USED	OCTETSTRING[2]	PSTN User Port Identification Value (last two octets of UP IE) which is provisioned but not in use in the IUT (ETS 300 347-1 [4], subclause 17.4.2.1)	
TSPX_BCC_UP_ID_PSTN	OCTETSTRING[2]	PSTN User Port Identification Value (last two octets of UP IE) (ETS 300 347-1 [4], subclause 17.4.2.1)	
TSPX_BCC_UP_ID_2	OCTETSTRING[2]	PSTN User Port Identification Value (last two octets of UP IE) of another PSTN port than assigned to TSPX_BCC_UP_ID_ISDN_BA, TSPX_BCC_UP_ID_ISDN_PRA or TSPX_BCC_UP_ID_PSTN (ETS 300 347-1 [4], subclause 17.4.2.1)	
TSPX_BCC_V5_LINK_ID_PRIMARY	OCTETSTRING[1]	V5 2 048 kbit/s link identifier of the primary link (ETS 300 347-1 [4], subclause 17.4.2.3)	
TSPX_BCC_V5_LINK_ID_2ND	OCTETSTRING[1]	V5 2 048 kbit/s link identifier of the secondary link (ETS 300 347-1 [4], subclause 17.4.2.3)	
TSPX_BCC_V5_LINK_ID_NOT_PROV	OCTETSTRING[1]	V5 2 048 kbit/s link identifier of a V5.2 link which is not provisioned (ETS 300 347-1 [4], subclause 17.4.2.3)	
TSPX_BCC_V5_LINK_TS	BITSTRING[5]	V5 Time Slot Number (ETS 300 347-1 [4], subclause 17.4.2.3)	
TSPX_BCC_V5_LINK_TS_2	BITSTRING[5]	V5 Time Slot Number of a second V5 Time Slot which is different to TSPX_BCC_V5_LINK_TS (ETS 300 347-1 [4], subclause 17.4.2.3)	
		(continued)	

Table B.2 (concluded): Parameter values

Parameter name	Parameter type	Reference	Parameter value
TSPX_BCC_V5_LINK_ TS_16	BITSTRING[5]	V5 Time Slot Number of the V5 Time Slot number 16 (ETS 300 347-1 [4], subclause 17.4.2.3)	
TSPX_CTRL_INTERF_ ID	OCTETSTRING[2]	Interface ID (ETS 300 324-1 [1], subclause 14.4.2.5.7, figure 4)	
TSPX_CTRL_VAR	OCTETSTRING[10]	Presently active variant of the IUT (ETS 300 324-1 [1], figure 39, table 55)	
TSPX_CTRL_VAR_ NEW	OCTETSTRING[10]	Variant announced to become next active variant of the IUT (ETS 300 324-1 [1], figure 39, table 55)	
TSPX_CTRL_VAR_ NOT_PROV	OCTETSTRING[10]	Not available Variant in the IUT (not provisioned) (ETS 300 324-1 [1], figure 39, table 55)	
TSPX_LC_L3_ADDR_ MAIN	OCTETSTRING[2]	Layer 3 address IE of the 2 Mbit/s link used for the link control protocol tests (ETS 300 324-1 [1], subclause 14.4.2.3)	
TSPX_LC_L3_ADDR_ 2ND_LINK	OCTETSTRING[2]	Layer 3 address IE of the second 2 Mbit/s link used for the link control protocol tests (ETS 300 324-1 [1], subclause 14.4.2.3)	
TSPX_LC_L3_ADDR_ UNPROV	OCTETSTRING[2]	Layer 3 address IE of a not provisioned V5.2 2 Mbit/s link (ETS 300 324-1 [1], subclause 14.4.2.3)	
TSPX_LC_NUMBER_ OF_2Mb_LINKS	INTEGER	Number of 2 Mbit/s links provisioned in the IUT	
TSPX_PR_LOGICAL_ C_CHANN_ID_ CHANN1	OCTETSTRING[2]	Logical C-channel 1 ID information element (ETS 300 347-1 [4], subclause 18.5.1)	
TSPX_PR_LOGICAL_ C_CHANN_ID_ CHANN2	OCTETSTRING[2]	Logical C-channel 2 ID information element (ETS 300 347-1 [4], subclause 18.5.1)	
TSPX_PR_LOGICAL_ C_CHANN_ID_ CHANN3	OCTETSTRING[2]	Logical C-channel 3 ID information element (ETS 300 347-1 [4], subclause 18.5.1)	
TSPX_PR_PHL_C_ CHANN_ID_LINK_ID_ 1ST	OCTETSTRING[1]	Primary physical C-channel ID, V5 2 Mbit/s link ID in use (ETS 300 347-1 [4], subclause 18.5.3, figure 29)	
TSPX_PR_PHL_C_ CHANN_ID_LINK_ID_ 2ND	OCTETSTRING[1]	Secondary physical C-channel ID, V5 2 Mbit/s link ID in use (ETS 300 347-1 [4], subclause 18.5.3, figure 29)	
TSPX_PR_PHL_C_ CHANN_ID_TS_15	BITSTRING[5]	Physical C-channel ID, V5 time slot number 15 (ETS 300 347-1 [4], subclause 18.5.3, figure 29)	
TSPX_PR_PHL_C_ CHANN_ID_TS_16	BITSTRING[5]	Physical C-channel ID, V5 time slot number 16 (ETS 300 347-1 [4], subclause 18.5.3, figure 29)	
TSPX_PR_PHL_C_ CHANN_ID_TS_31	BITSTRING[5]	Physical C-channel ID, V5 time slot number 31 (ETS 300 347-1 [4], subclause 18.5.3, figure 29)	

Table B.3: Procedural information

Procedural name	Reference to ETS 300 324-1 [1]	Valid?
TSPX_PSTN_ TERMINATING_CALL_ PRIORITY	Terminating calls have priority (val: TRUE) (subclause 13.5.3.3). If the parameter is not set (val: FALSE), originating calls have priority.	
NOTE: All parameters are of type BOOLEAN.		

Table B.4 requests the national specific optional PSTN data, which shall be coded according to the PSTN standard to which the PSTN application of the IUT shall conform.

Table B.4: Optional information

PIXIT name	Related message	Reference to ETS 300 324-1 [1]	Specific requirements	Value
TSPX_PSTN_OPT_ INFO_EST	ESTABLISH	13.3.1, table 5		
TSPX_PSTN_OPT_ INFO_EST_4_ REPEATED_OPT_IE	ESTABLISH	13.3.1, table 5 13.5.2.5 (error conditions) see also note	The optional part shall contain 4 repeated optional IE which are valid for the IUT to be tested.	
TSPX_PSTN_OPT_ INFO_EST_ONE_ VALID_ONE_ INCORRECT_OPT_ IE	ESTABLISH	13.4.5, table 17 13.5.2.9 (error conditions) see also note	The optional part shall contain one valid and one incorrect optional IE.	
TSPX_PSTN_OPT_ INFO_EST_ONE_ VALID_ONE_ UNSPECIFIED_ OPT_IE	ESTABLISH	13.4.5, table 17 13.5.2.7 (error conditions) see also note	The optional part shall contain one valid and one unspecified optional IE.	
TSPX_PSTN_OPT_ INFO_EST_TWO_ DIFFERENT_OPT_ IE	ESTABLISH	13.3.1, table 5 13.5.2.11 (error conditions) see also note	The optional part shall contain two different optional IEs.	
TSPX_PSTN_OPT_ INFO_EST_ACK	ESTABLISH_ACK	13.3.2, table 6		
TSPX_OPT_INFO_ SIGNAL_DIGIT1	SIGNAL	13.3.3, table 7	Optional information of a SIGNAL message which is sent from the AN to the LE and which represents the line signal of digit 1	
TSPX_OPT_INFO_ SIGNAL_LE	SIGNAL	13.3.3, table 7	Optional information of a SIGNAL message which is send from the LE to the AN	
NOTE: The PSTN messages which contain invalid optional information shall be coded according to the national PSTN specifications but the optional information shall be modified according to ETS 300 324-1 [1], subclause 13.5.2.				

Table B.5: Implicit send events for an IUT

Implicit event	Description	Procedural information
<IUT ! ctrl_com_ctrl> Ctrl_cc_no_interf_id(TSC_CFI_ SWITCH_OVER_TO_NEW_VAR, TSPX_CTRL_VAR_NEW, ANY_1, ANY_3	How can the sending of an COMMON CONTROL message (cfi: switch over to new variant) by the IUT be invoked?	
<IUT ! ctrl_com_ctrl> Ctrl_cc_no_interf_id(TSC_CFI_ REST_REQ, SPX_CTRL_VAR, ANY_1, ANY_3)	How can the sending of an COMMON CONTROL message (cfi: restart request) by the IUT be invoked?	
<IUT ! ctrl_com_ctrl> Ctrl_cc_mand_only(TSC_CFI_REQ_ VID, ANY_1, ANY_1, ANY_3)	How can the sending of an COMMON CONTROL message (cfi: request variant & interface ID) by the IUT be invoked?	
<IUT ! ctrl_port_ctrl> Ctrl_pc_isdnba(TSC_CFE_FE102_ ACT_INIT)	How can the sending of an PORT CONTROL message (cfi: FE2, access activation initiated by user) by the IUT (ISDN-BA entity) be invoked?	
<IUT ! ctrl_port_ctrl> Ctrl_pc_isdnba(TCV_l3_addr, TSC_CFE_FE203_4_BL)	How can the sending of an PORT CONTROL message (cfe: block command) by the IUT (ISDN-BA entity) be invoked?	
<IUT ! ctrl_port_ctrl> Ctrl_pc_isdnba(TSC_CFE_FE205_ BL_REQ)	How can the sending of an PORT CONTROL message (cfe: block request) by the IUT (ISDN-BA entity) be invoked?	
<IUT ! ctrl_port_ctrl> Ctrl_pc_isdnba(TSC_CFE_FE201_ 2_UNBL)	How can the sending of an PORT CONTROL message (cfi: unblock request/ack) by the IUT (ISDN-BA entity) be invoked?	
<IUT ! ctrl_port_ctrl> Ctrl_pc_pstn(TCV_l3_addr, TSC_CFE_FE203_4_BL)	How can the sending of an PORT CONTROL message (cfe: block command) by the IUT (PSTN entity) be invoked?	
<IUT ! ctrl_port_ctrl> Ctrl_pc_pstn(TSC_CFE_FE205_BL_ REQ)	How can the sending of an PORT CONTROL message (cfe: block request) by the IUT (PSTN entity) be invoked?	
<IUT ! ctrl_port_ctrl> Ctrl_pc_pstn(TSC_CFE_FE201_2_U NBL)	How can the sending of an PORT CONTROL message (cfi: unblock request/ack) by the IUT (PSTN entity) be invoked?	
<IUT ! lc_link_ctrl> Lc_lc(TSPX_LC_L3_ADDR_MAIN, TSC_LCF_FE301_2_UNBL)	How can the sending of an LINK CONTROL message (lcf: FE301/2, link_unblock ack/req) by the IUT be invoked?	
<IUT ! lc_link_ctrl> Lc_lc(TSPX_LC_L3_ADDR_2ND_ LINK, TSC_LCF_FE303_4_BL)	How can the sending of an LINK CONTROL message (lcf: FE303/4, link_block_cmd) by the IUT be invoked?	
<IUT ! lc_link_ctrl> Lc_lc(TSPX_LC_L3_ADDR_2ND_ LINK, TSC_LCF_FE305_DFBL)	How can the sending of an LINK CONTROL message (lcf: FE305, deferred_link_block req) by the IUT be invoked?	

(continued)

Table B.5 (concluded): Implicit send events for an IUT

Implicit event	Description	Procedural information
<IUT ! lc_link_ctrl> Lc_lc(TSPX_LC_L3_ADDR_2ND_ LINK, TSC_LCF_FE306_NDFBL)	How can the sending of an LINK CONTROL message (lcf: FE306, non_deferred_link_block_req) by the IUT be invoked?	
<IUT ! lc_link_ctrl> Lc_lc(TSPX_LC_L3_ADDR_2ND_ LINK, TSC_LCF_ID_REQ)	How can the sending of an LINK CONTROL message (lcf: FE-IDReq) by the IUT be invoked?	
<IUT ! pstn_est> Pstn_est	How can the sending of an PSTN ESTABLISH message by the IUT be invoked? (sending of a FE-subscriber_seizure message to the NWK entity)	
<IUT ! pstn_signal> Pstn_signal(S_R,TSPX_PSTN_ OPT_INFO_SIGNAL_DIGIT1)	How can the sending of an PSTN SIGNAL message (digit 1) by the IUT be invoked? (sending of a FE-line_signal message (digit 1) message to the NWK entity)	
<IUT ! mdu_ctrl_data_set_available>	How can the IUT internal status "data set available" be invoked?	
<IUT ! mdu_system_start_up>	How can a system start-up procedure in the IUT be invoked as described in ETS 300 324-1 [1], annex C, item 17?	
<IUT ! mph_ar_isdn>	How can the IUT internal event "MPH_AR, activate access from AN" be invoked? (New state AN3.1)	
<IUT ! te_off_hook_pstn>	How can the IUT internal event "sending of a FE-subscriber_seizure message" be invoked?	
<IUT ! te_on_hook_pstn>	How can the IUT internal event "sending of a FE-subscriber_release message message" be invoked?	
<IUT ! v52_2nd_link_interruption>	How can the IUT internal event "persistent link failure condition" be invoked? (interruption (disconnect/ connect) the second V5.2 link)	
<IUT ! v52_2nd_link_disconnect>	How can the IUT internal event "persistent link failure condition" be invoked? (disconnecting the second V5.2 link)	
<IUT ! v52_2nd_link_connect>	How can the IUT internal event "disappearance of the persistent link failure condition" be invoked? (connecting the second V5.2 link)	

Annex C (informative): Merging procedure of V5.1 ATS and V5.2 ATS additions

This annex describes how the V5.1 ATS specified in ETS 300 324-6 [3] and the V5.2 ATS additions specified in this ETS can be merged into a complete V5.2 ATS. The principle of this merging procedure will be similar for every TTCN software, however, the real procedure may vary.

Merging procedure:

-       compare the V5.2 ATS additions with the V5.1 ATS and select in the V5.1 ATS those parts which have identical names to the V5.2 ATS additions;

-       delete the identical named parts in the V5.1 ATS;

-       merge the modified V5.1 ATS and the V5.2 ATS additions;

-       parse the merged V5.2 ATS to verify the merging procedure.

Annex D (informative): Bibliography

- ETS 300 406 (1995): "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

- ETR 141 (1994): "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; The Tree and Tabular Combined Notation (TTCN) style guide".

History

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