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5G NAS Conformance Testing for the N1 interface;
(3GPP™ Release 16);
Part 1: Protocol Implementation
Conformance Statement (PICS)

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Core Network and Interoperability Testing (INT).

The present document is part 1 of a multi-part deliverable covering the test specifications for the 5G NAS Conformance Testing for the N1 interface, as identified below:

Part 1: "Protocol Implementation Conformance Statement (PICS)";

Part 2: "Test Suite Structure (TSS) and Test Purposes (TP)";

Part 3: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) pro forma specification".

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

To evaluate protocol conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a telecommunication specification. Such a statement is called a Protocol Implementation Conformance Statement (PICS).

1 Scope

The present document provides the Protocol Implementation Conformance Statement (PICS) pro forma for the test specification for the 5G NAS protocol on the N1 interface as specified in ETSI TS 124 501 [1] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [2] and ETSI ETS 300 406 [i.2].

The supplier of a protocol implementation which is claimed to conform to ETSI TS 124 501 [1] is required to complete a copy of the PICS pro forma provided in annex A of the present document and is required to provide the information necessary to identify both the supplier and the implementation.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found in the ETSI docbox.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 124 501 (V16.14.0): "5G; Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3 (3GPP TS 24.501 version 16.14.0 Release 16)".

[2] ISO/IEC 9646-7: "Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 7: Implementation Conformance Statements".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

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

[i.2] ETSI ETS 300 406: "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 124 501 [1] and the following apply:

PICS pro forma: document, in the form of a questionnaire, designed by the protocol specifier or conformance test suite specifier, which, when completed for an OSI implementation or system, becomes the PICS

NOTE: See ISO/IEC 9646-1 [i.1].

Protocol Implementation Conformance Statement (PICS): statement made by the supplier of an Open Systems Interconnection (OSI) implementation or system, stating which capabilities have been implemented for a given OSI protocol

NOTE: See ISO/IEC 9646-1 [i.1].

static conformance review: review of the extent to which the static conformance requirements are met by the IUT, accomplished by comparing the PICS with the static conformance requirements expressed in the relevant standard(s)

NOTE: See ISO/IEC 9646-1 [i.1].

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 124 501 [1] apply.

4 Conformance

A PICS pro forma which conforms to this PICS pro forma specification shall be technically equivalent to annex A, and shall preserve the numbering and ordering of the items in annex A.

A PICS which conforms to this PICS pro forma specification shall:

a) describe an implementation which claims to conform to ETSI TS 124 501 [1];

b) be a conforming ICS pro forma which has been completed in accordance with the instructions for completion given in clause A.1;

c) include the information necessary to uniquely identify both the supplier and the implementation.

Annex A (normative): PICS pro forma

A.1 The right to copy

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the PICS pro forma in this annex so that it can be used for its intended purposes and may further publish the completed PICS pro forma.

A.2 Guidance for completing the ICS pro forma

A.2.1 Purposes and structure

The purpose of this PICS pro forma is to provide a mechanism whereby a supplier of an implementation of the requirements defined in relevant specifications may provide information about the implementation in a standardized manner.

The PICS pro forma is subdivided into clauses for the following categories of information:

- instructions for completing the PICS pro forma;
- identification of the implementation;
- identification of the protocol;
- PICS pro forma tables (for example: Major capabilities, etc.).

A.2.2 Abbreviations and conventions

This annex does not reflect dynamic conformance requirements but static ones. In particular, a condition for support of a PDU parameter does not reflect requirements about the syntax of the PDU (i.e. the presence of a parameter) but the capability of the implementation to support the parameter.

In the sending direction, the support of a parameter means that the implementation is able to send this parameter (but it does not mean that the implementation always sends it).

In the receiving direction, it means that the implementation supports the whole semantic of the parameter that is described in the related protocol specification.

As a consequence, PDU parameter tables in this annex are not the same as the tables describing the syntax of a PDU in the reference specification.

The PICS pro forma contained in this annex is comprised of information in tabular form in accordance with the guidelines presented in ISO/IEC 9646-7.

Item column

The item column contains a number which identifies the item in the table.

Item description column

The item description column describes in free text each respective item (e.g. parameters, timers, etc.). It implicitly means "is <item description> supported by the implementation?".

Reference column

The reference column gives reference to the relevant sections in core specifications.

Status column

The various status used in this annex are in accordance with the rules in table A.1.

Table A.1: Key to status codes

Status code	Status name	Meaning
m	mandatory	The capability shall be supported. It is a static view of the fact that the conformance requirements related to the capability in the reference specification are mandatory requirements. This does not mean that a given behaviour shall always be observed (this would be a dynamic view), but that it shall be observed when the implementation is placed in conditions where the conformance requirements from the reference specification compel it to do so. For instance, if the support for a parameter in a sent PDU is mandatory, it does not mean that it shall always be present, but that it shall be present according to the description of the behaviour in the reference specification (dynamic conformance requirement).
o	optional	The capability may or may not be supported. It is an implementation choice.
n/a	not applicable	It is impossible to use the capability. No answer in the support column is required.
c.<integer>	conditional	The requirement on the capability ("m", "o", "n/a") depends on the support of other optional or conditional items. <integer> is the identifier of the conditional expression.
o.<integer>	qualified optional	For mutually exclusive or selectable options from a set. <integer> is the identifier of the group of options, and the logic of selection of the options.

Mnemonic column

The Mnemonic column contains mnemonic identifiers for each item.

Support column

The support column shall be filled in by the supplier of the implementation. The following common notations, defined in ISO/IEC 9646-7, are used for the support column:

Y or y — supported by the implementation.

N or n — not supported by the implementation.

N/A, n/a or - — no answer required (allowed only if the status is N/A, directly or after evaluation of a conditional status).

References to items

For each possible item answer (answer in the support column) within the PICS pro forma there exists a unique reference, used, for example, in the conditional expressions. It is defined as the table identifier, followed by a solidus character "/", followed by the item number in the table.

EXAMPLE: A.4/1 is the reference to the answer of item 1 in table A.4.

A.2.3 Instructions for completing the PICS pro forma

The supplier of the implementation may complete the PICS pro forma in each of the spaces provided. More detailed instructions are given at the beginning of the different clauses of the PICS pro forma.

A.3 Identification of the Network Equipment

A.3.1 Introduction

Identification of the Network Equipment should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the PICS should be named as the contact person.

A.3.2 Date of the statement

.....

A.3.3 Network Equipment Under Test identification

Name:

.....

.....

Hardware configuration:

.....

.....

.....

Software configuration:

.....

.....

.....

A.3.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

A.3.5 Client

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

A.3.6 PICS contact person

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

A.4 Identification of the protocol

This PICS pro forma applies to the following specification:

- ETSI TS 124 501.

A.5 Global statement of conformance

The implementation described in this PICS meets all the mandatory requirements of the referenced standard?

[ ] Yes

[ ] No

NOTE: Answering "No" to this question indicates non-conformance to the protocol specification. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming. Explanations may be entered in the comments field at the bottom of each table or on attached pages.

In the tabulations which follow, all references are to ETSI TS 124 501 unless another numbered reference is explicitly indicated.

A.6 PICS pro forma tables for the N1 interface

A.6.1 Roles

Table A.2: Roles for the 5G NAS interface

Item	Roles	Reference	Status	Support
1	AMF		m	

A.6.2 PICS Items for AMF

A.6.2.1 Sublayer states in the AMF

Table A.3: Sublayer states in the AMF

Item	Does the IUT support state ...	Reference	Status	Support
5GMM sublayer states in the network side				
1	5GMM-DEREGISTERED?	5.1.3.2.3.2	m	
2	5GMM-COMMON-PROCEDURE-INITIATED?	5.1.3.2.3.3	m	
3	5GMM-REGISTERED?	5.1.3.2.3.4	m	
4	5GMM-DEREGISTERED-INITIATED?	5.1.3.2.3.5	m	
5GSM sublayer states in the network side				
5	PDU SESSION INACTIVE?	6.1.3.3.2	m	
6	PDU SESSION ACTIVE?	6.1.3.3.3	m	
7	PDU SESSION INACTIVE PENDING?	6.1.3.3.4	m	
8	PDU SESSION MODIFICATION PENDING?	6.1.3.3.5	m	
9	PROCEDURE TRANSACTION INACTIVE?	6.1.3.3.6	m	
10	PROCEDURE TRANSACTION PENDING?	6.1.3.3.7	m	

A.6.2.2 5G mobility management procedures

Table A.4: 5G mobility management procedures

Item	Does the IUT support ...	Reference	Status	Support
5GMM common procedures				
1	Primary authentication and key agreement procedures?	5.4.1	m	
1.1	Initiation and control of the EAP based primary authentication and key agreement procedures?	5.4.1.2, 5.4.1.2.1	m	
1.2	Initiation and control of the 5G AKA based primary authentication and key agreement procedures?	5.4.1.3, 5.4.1.3.1	m	
1.2.1.1	Provision of new authentication parameters to the UE on receipt of an AUTHENTICATION FAILURE message containing 5GMM cause #21 "synch failure"?	5.4.1.3.4	o	
1.2.1.2	Termination of the 5G AKA based primary authentication and key agreement procedure with AUTHENTICATION REJECT on receipt of two consecutive AUTHENTICATION FAILURE message containing 5GMM cause #21 "synch failure"?	5.4.1.3.7 f)	o	
1.2.2.1	Initiation of the identification procedure on receipt of an AUTHENTICATION FAILURE message containing 5GMM cause #20 "MAC failure"?	5.4.1.3.7 c), 5.4.3	o	
1.2.2.2	Termination of the 5G AKA based primary authentication and key agreement procedure on receipt of an AUTHENTICATION FAILURE message containing 5GMM cause #20 "MAC failure"?	5.4.1.3.7 c), 5.4.1.3.5	o	
1.2.3.1	Initiation of the identification procedure on receipt of an AUTHENTICATION FAILURE message containing 5GMM cause #26 "non-5G authentication unacceptable"?	5.4.1.3.7 d), 5.4.3	o	
1.2.3.2	Termination of the 5G AKA based primary authentication and key agreement procedure on receipt of an AUTHENTICATION FAILURE message containing 5GMM cause #26 "non-5G authentication unacceptable"?	5.4.1.3.7 d), 5.4.1.3.5	o	
1.2.4	Re-initiation of the 5G AKA based primary authentication and key agreement procedure on receipt of an AUTHENTICATION FAILURE message containing 5GMM cause #71 "ngKSI already in use"?	5.4.1.3.7 e), 5.4.1.3.2	o	
2	Security mode control procedures?	5.4.2	m	
2.1	Initiation of the security mode control procedure to take a 5G NAS security context into use, and initialize and start NAS signalling security?	5.4.2.1	m	

Item	Does the IUT support ...	Reference	Status	Support
2.2	Initiation of the security mode control procedure to change the 5G NAS security algorithms for a current 5G NAS security context already in use?	5.4.2.1 a), 5.4.2.2	o	
2.3	Initiation of the security mode control procedure to change the value of uplink NAS COUNT used in the latest SECURITY MODE COMPLETE message?	5.4.2.1 b)	o	
2.4	Initiation of the security mode control procedure to provide the Selected EPS NAS security algorithms to the UE?	5.4.2.1 c)	o	
3	Identification procedures?	5.4.3	m	
4	Generic UE configuration update procedures?	5.4.4	m	
4.1	Sending of CONFIGURATION UPDATE COMMAND messages to the UE?	5.4.4.2	o	
5	NAS transport procedures?	5.4.5	m	
5.1	UE-initiated NAS transport procedures (receipt of UL NAS TRANSPORT messages)?	5.4.5.2	m	
5.1.1	Sending back to the UE 5GSM messages which were not forwarded due to abnormal case on the network side?	5.4.5.2.5 a) 3), 7), 8), 10), 20), 5.4.5.3.1 e), f)	o	
5.2	Network-initiated NAS transport procedures (sending of DL NAS TRANSPORT messages)?	5.4.5.3	m	
6	5GMM status procedures?	5.4.6	m	
7	Network slice-specific authentication and authorization procedures?	5.4.7	m	
5GMM specific procedures				
8	Registration procedures?	5.5.1	m	
8.1	Initial registration procedures?	5.5.1.2	m	
8.1.1.1	Initiation of 5GMM common procedures during the initial registration procedure	5.5.1.2.3	o	
8.1.1.2	Skipping of the authentication procedure during an (initial) emergency registration procedure, if the AMF is configured to support emergency registration for unauthenticated SUCIs?	5.5.1.2.3	o	
8.1.2.1	Inclusion of service area restrictions in the Service area list IE in the REGISTRATION ACCEPT message?	5.5.1.2.4	o	
8.1.2.2	Inclusion of a list of equivalent PLMNs in the REGISTRATION ACCEPT message?	5.5.1.2.4	o	
8.1.2.3	Inclusion of rejected NSSAI (S-NSSAIs which are included in the requested NSSAI in the REGISTRATION REQUEST message but rejected by the network) in the REGISTRATION ACCEPT message?	5.5.1.2.4	o	
8.1.2.4	Inclusion of operator-defined access category definitions in the REGISTRATION ACCEPT message?	5.5.1.2.4	o	
8.1.3	SMS over NAS in initial registration?	5.5.1.2.4	o	
8.1.4	MICO mode in initial registration i.e., inclusion of the MICO indication IE in the REGISTRATION ACCEPT message?	5.5.1.2.4	o	
8.2	Registration procedures for mobility and periodic registration update?	5.5.1.3	m	
8.2.1.1	Initiation of 5GMM common procedures during the mobility and periodic registration update procedure?	5.5.1.3.3	o	
8.2.1.2	Skipping of the authentication procedure during the registration procedure for mobility and periodic registration update for a UE that has only an emergency PDU session?	5.5.1.3.3	o	
8.2.2.1	Inclusion of a new TAI list for the UE in the REGISTRATION ACCEPT message?	5.5.1.3.4	o	
8.2.2.2	Inclusion of a list of equivalent PLMNs in the REGISTRATION ACCEPT message?	5.5.1.3.4	o	
8.2.2.3	Inclusion of new service area restrictions in the Service area list IE in the REGISTRATION ACCEPT message?	5.5.1.3.4	o	
8.2.2.4	Inclusion of rejected NSSAI (S-NSSAIs which are included in the requested NSSAI in the REGISTRATION REQUEST message but rejected by the network) in the REGISTRATION ACCEPT message?	5.5.1.3.4	o	

Item	Does the IUT support ...	Reference	Status	Support
8.2.2.5	Inclusion of the LADN information IE in the REGISTRATION ACCEPT message?	5.5.1.3.4	o	
8.2.2.6	Inclusion of operator-defined access category definitions in the REGISTRATION ACCEPT message?	5.5.1.3.4	o	
8.2.3	SMS over NAS in mobility and periodic registration updates?	5.5.1.3.4	o	
8.2.4	MICO mode in mobility and periodic registration updates i.e., inclusion of the MICO indication IE in the REGISTRATION ACCEPT message?	5.5.1.3.4	o	
9	Deregistration procedures?	5.5.2	m	
9.1	UE-initiated deregistration procedures?	5.5.2.2	m	
9.2	Network-initiated deregistration procedures?	5.5.2.3	m	
9.2.1	Inclusion of the 5GMM cause IE to specify the reason for the deregistration in the DEREGISTRATION REQUEST message?	5.5.2.3.1	o	
5GMM connection management procedures				
10	Service request procedures?	5.6.1	m	
10.1	Initiation of common procedures during the service request procedure (receipt of SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message)?	5.6.1.3	o	
11	Paging procedures?	5.6.2	m	
11.1	Re-initiation of network paging on expiry of timer T3513?	5.6.2.2.1	o	
12	Notification procedures?	5.6.3	m	

A.6.2.3 5G session management procedures

Table A.5: 5G session management procedures

Item	Does the IUT support ...	Reference	Status	Support
Network-requested 5GSM procedures				
1	PDU session authentication and authorization procedures?	6.3.1	m	
2	Network-requested PDU session modification procedures?	6.3.2	m	
3	Network-requested PDU session release procedures?	6.3.3	m	
UE requested 5GSM procedures				
6	UE-requested PDU session establishment procedures?	6.4.1	m	
6.1	Inclusion of the Back-off timer value IE in the PDU SESSION ESTABLISHMENT REJECT message, if a PDU session establishment procedure is not accepted by the network?	6.4.1.4.1	o	
7	UE-requested PDU session modification procedures?	6.4.2	m	
7.1	Inclusion of the Back-off timer value IE in the PDU SESSION MODIFICATION REJECT message, if a PDU session modification procedure is not accepted by the network?	6.4.2.4.1	o	
8	UE-requested PDU session release procedures?	6.4.3	m	
5GMM status procedure				
9	5GMM status procedures?	6.5	m	
Miscellaneous procedures				
10	Exchange of extended protocol configuration options?	6.6.1	o	

A.6.2.4 Procedures for handling of unknown, unforeseen, and erroneous protocol data

Table A.6: Error handling procedures

Item	Does the IUT support ...	Reference	Status	Support
1	Procedures for handling of unknown, unforeseen, and erroneous protocol data?	7.1	m	
Message too short or too long				
1.1	Handling (i.e., ignoring) of messages that are too short to contain a complete message type information element?	7.2.1	m	

Item	Does the IUT support ...	Reference	Status	Support
Unknown or unforeseen procedure transaction identity or PDU Session identity				
1.2.1	Handling of an unknown, erroneous, or unforeseen PTI received in a 5GSM message?	7.3.1	m	
1.2.2	Handling of an unknown, erroneous, or unforeseen PDU session identity received in the header of a 5GSM message?	7.3.2	m	
Unknown or unforeseen message type				
1.3	Sending of a 5GMM STATUS or 5GSM STATUS message (depending on the EPD) with cause #97 "message type non-existent or not implemented" on receipt of a message with message type not defined for the EPD or not implemented by the receiver?	7.4	o	
Non-semantical mandatory information element errors				
1.4.1	Treating messages (see note) received with non-semantical mandatory information element errors?	7.5.1	o.1	
1.4.2	Ignoring messages (see note) received with non-semantical mandatory information element errors?	7.5.1	o.1	
1.4.3	Rejection of PDU SESSION ESTABLISHMENT REQUEST, PDU SESSION MODIFICATION REQUEST, and PDU SESSION RELEASE REQUEST messages with cause #96 "invalid mandatory information" when an error is encountered with a mandatory information element in the 5GSM message?	7.5.3	m	
Unknown and unforeseen IEs in the non-imperative message part				
1.5	Handling of messages containing unknown or unforeseen (out of sequence, repeated) IEs in the non-imperative message part?	7.6	m	
Non-imperative message part errors				
1.6.1	Treating messages received missing a conditional IE or containing an unexpected or a syntactically incorrect conditional IE?	7.7.2	o.2	
1.6.2	Ignoring messages received missing a conditional IE or containing an unexpected or a syntactically incorrect conditional IE?	7.7.2	o.2	
1.6.2.1	Returning a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #100 "conditional IE error" when ignoring a message received missing a conditional IE or containing an unexpected or a syntactically incorrect conditional IE?	7.7.2	o.3	
Messages with semantically incorrect contents				
1.7	Responding to messages (where a reaction is foreseen) with semantically incorrect contents with status messages (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #95 "semantically incorrect message?	7.8	o	
o.1: At least one of these options shall be supported. o.2: At least one of these options shall be supported. o.3: o, if A6/1.6.2 are supported, else N/A.				
NOTE: Messages other than PDU SESSION ESTABLISHMENT REQUEST, PDU SESSION MODIFICATION REQUEST, PDU SESSION RELEASE REQUEST.				

History

Document history		
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