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Core Network and Interoperability Testing (INT);
5G NAS Conformance Testing for the N1 interface;
(3GPP™ Release 16);
Part 2: Test Suite Structure (TSS) and Test Purposes (TP)

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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 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [2].

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).

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1 Scope

The present document provides the Test Suite Structure (TSS) and Test Purposes (TP) 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 [i.2] and ETSI ETS 300 406 [i.3].

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] ETSI TS 103 921-1: "Core Network and Interoperability Testing (INT); 5G NAS Conformance Testing for the N1 interface; (3GPPTM Release 16); Part 1: Protocol Implementation Conformance Statement (PICS)".

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

[i.3] 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:

Abstract Test Method (ATM): Refer to ISO/IEC 9646-1 [i.1].

Abstract Test Suite (ATS): Refer to ISO/IEC 9646-1 [i.1].

Implementation Under Test (IUT): Refer to ISO/IEC 9646-1 [i.1].

Test Purpose (TP): Refer to 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] and the following apply:

TS	Test System
TSS	Test Suite Structure

4 Test configurations

4.1 Introduction

Test purposes of the present document address the 5G functional entities UE and AMF that are accessible via the standardized N1 interface.

4.2 Test configuration using the N2/N1 interface

The N1 interface is located between the UE and the AMF. Following configurations are simplified to highlight tested interface and involved entities. Overall network infrastructure is shown under clause 4.3.

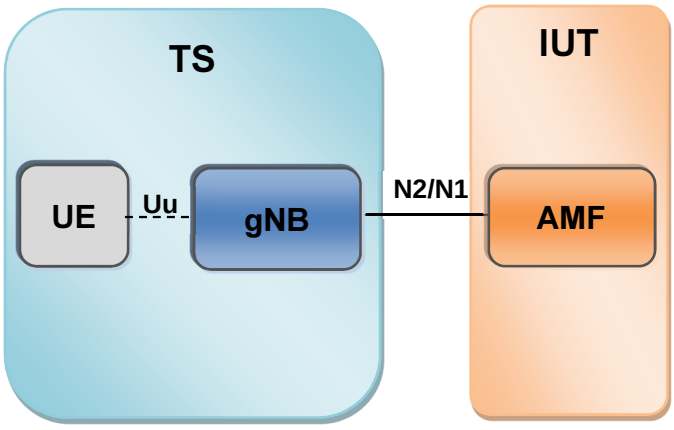

Figure 1: Test configuration CF_AMF_N2N1

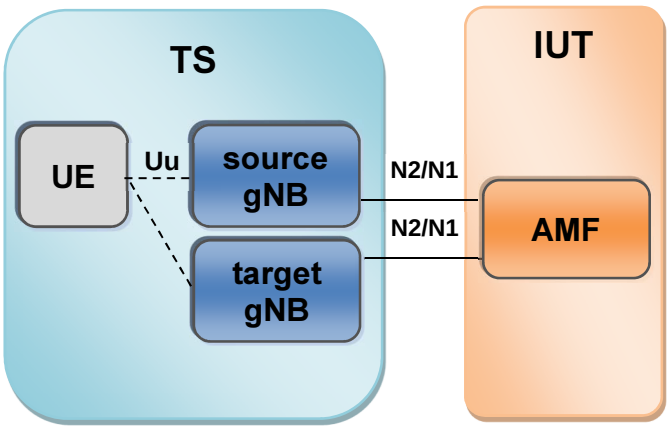

Figure 2: Test configuration CF_AMF_2N2N1

4.3 Network infrastructure

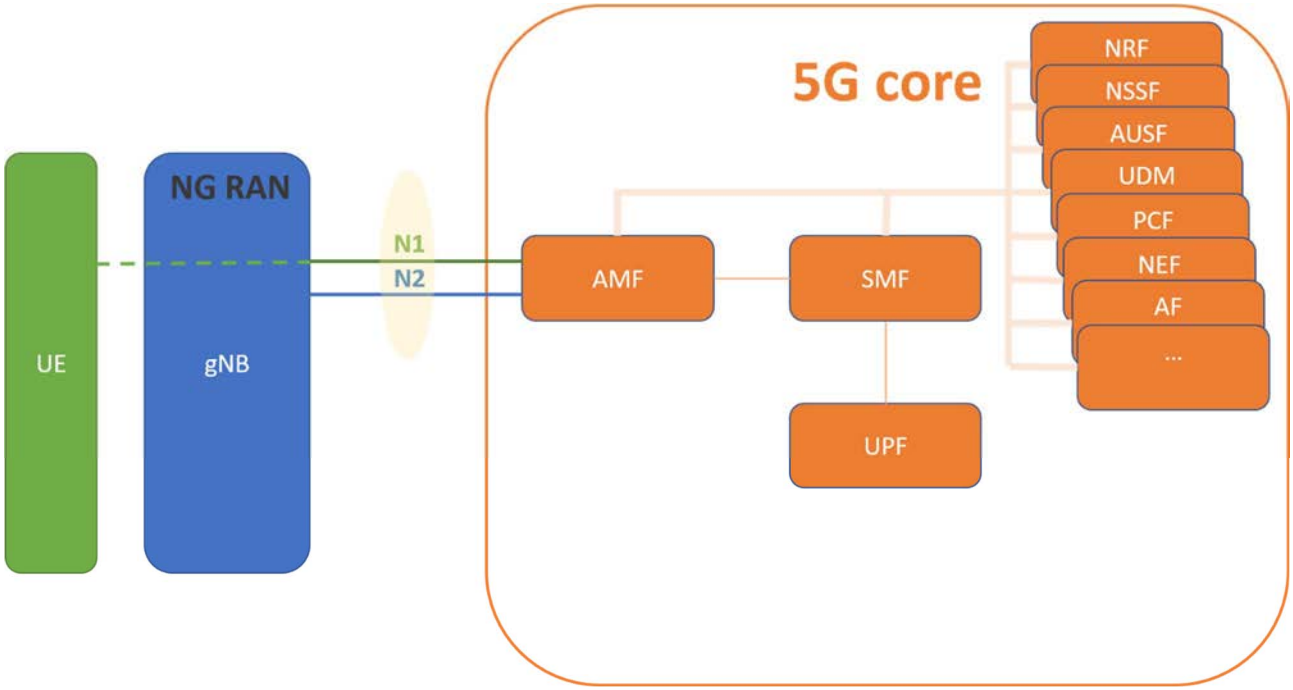

Figure 3: Network architecture

5 Test Suite Structure (TSS) and Test Purposes (TP)

5.1 Test Suite Structure

5.1.1 TP naming convention

TPs are numbered, starting at 01, within each group. Groups are organized according to the TSS.

Table 1: TP identifier naming convention scheme

Identifier: **<TP>_<iut>_<scope>_<nn>**		
<tp> = Test Purpose:	fixed to "TP"	
<interface or protocol>	Interface or protocol: 5GNAS	
<iut> = type of IUT:	AMF	
<scope1> = group1	AUT	5GMM / Authentication procedure
	SEC	5GMM / Security mode control procedure
	IDN	5GMM / Identification procedure
	CON	5GMM / Generic UE configuration update procedure
	ULN	5GMM / Uplink NAS transport procedure
	DLN	5GMM / Downlink NAS transport procedure
	EST	5GMM / EMM Status
	NSA	5GMM / Network slice-specific authentication and authorization procedure
	REG	5GMM / Registration procedure
	DRG	5GMM / De-registration procedure
	SRV	5GMM / Service request procedure
	PAG	5GMM / Paging procedure
	NOT	5GMM / Notification procedure
	NPE	5GSM / Network-requested PDU session establishment procedure
	NPM	5GSM / Network-requested PDU session modification procedure
	NPR	5GSM / Network-requested PDU session release procedure
	UPA	5GSM / Network-requested PDU session authentication and authorization procedure
	UPE	5GSM / UE requested PDU session establishment procedure
	UPM	5GSM / UE requested PDU session modification procedure
	UPR	5GSM / UE requested PDU session release procedure
	SST	5GSM / Status procedure
<scope2> = group2	REQ	Request
	REJ	Reject
	ACC	Accept
	RES	Response
	ABN	Abnormal Case
<nn> = sequential number	(01 to 99)	

5.1.2 Test strategy

As the base specification in ETSI TS 124 501 [1] contains no explicit requirements for testing, the TPs were generated as a result of an analysis of the base standard and the PICS specification ETSI TS 103 921-1 [2].

5.1.3 TP structure

Each TP has been written in a manner which is consistent with all other TPs. The intention of this is to make the TPs more readable and checkable. A particular structure has been used which is illustrated in Table 2. Table 2 should be read in conjunction with any TP, i.e. each individual TP can be used as an example to facilitate the full comprehension of Table 2.

Table 2: Structure of a single TP

TP part	Text	Example
Header	**<Identifier>** **<clause number in base ETSI TS 124 501 [1]>** **<PICS reference>**	**see Table 1** **clause 8.2.6** **A.4/3**
Summary	*Short free text description of the test objective*	Verify that the IUT can successfully process all mandatory IEs in a REGISTRATION REQUEST received due to registration procedure
Configuration	*Test configuration as described in clause 4.2*	CF_AMF_N2N1
Initial condition (optional)	*Free text description of the condition that the IUT has reached before the test purpose applies.*	
Start point	Ensure that the IUT in the <state> *see ETSI TS 124 501 [1], clause 8.1* *and/or further actions before stimulus* *if the action is sending/receiving* *see below for message structure*	Having sent a REGISTRATION REQUEST
Stimulus	<**trigger**>, *see below for message structure* *or* <goal>	on receipt of a REGISTRATION REQUEST (see note 2)
Reaction	<**action**>. *if the action is sending* *see below for message structure* <next action>, *etc.*	sends, saves, does, etc.
Message structure	<message type> a) containing a(n) <IE name> IE (see note 4) b) indicating <coding of the field> and *back to a) or b)* (see note 3)	Message exchange, etc. (see note 2)
NOTE 1: Text in italics will not appear in TPs and text between <> is filled in for each TP and may differ from one TP to the next. NOTE 2: All messages are considered as "valid and compatible" unless otherwise specified in the test purpose. This includes the presence of all mandatory IEs as specified in ETSI TS 124 501 [1]. NOTE 3: An IE can be embedded into another IE. This is expressed by indentations, e.g. if Message1 contains IE1 and IE2 where IE1 has IE3 embedded this will be expressed like this: sends/receives Message 1 containing IE1 containing IE3 indicating ... containing IE2 indicating ...		

5.2 Test Purposes

5.2.0 Conventions

In the clauses below, the following rules apply:

- The wording "set to c_Constant" indicates that the value c_Constant is defined by the standard (e.g. Message Type values as described in ETSI TS 124 501 [1], Table 9.7.1: Message types for 5GS mobility management).
- The wording "indicating value c_Constant" indicates that the value c_Constant is defined by the context of the test purpose (retrieved from a previous message) or it can be set during the validation, as a PIXIT for instance.

Here are some examples:

- *authentication_request_message_identity* ***set to*** *AUTHENTICATION_REQUEST* where the constant AUTHENTICATION_REQUEST is described in ETSI TS 124 501 [1] Table 9.7.1: Message types for 5GS mobility management, its value is 01010110.

- *timer* ***indicating value*** *T_EXPIRY where T_EXPIRY* will be defined during the validation or can be retrieved from a previous message.

5.2.1 PICS references

All PICS items referred to in this clause are as specified in ETSI TS 103 921-1 [2] unless indicated otherwise by another numbered reference. PICS items are only meant for test selection, therefore only PICS items with status optional or conditional are explicitly mentioned.

5.2.2 N1 interface 5G NAS - AMF Role

5.2.2.1 Test selection

The IUT takes the role of the AMF; PICS A.2/1.

5.2.2.2 Registration procedure

TP Id	TP_5GNAS_AMF_REG_ACC_01
Test Objective	Verify that the IUT sends a REGISTRATION ACCEPT message containing the 5GS registration result, TAI list, 5G-GUTI and T3512 when initial registration is accepted by the network.
Reference	ETSI TS 124 501 [1], clauses 5.5.1.2.4 and 8.2.7
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/8_1

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF
        }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an INITIAL_UE_MESSAGE containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to NOT_SECURITY_PROTECTED,
                Registration_request_message_identity set to REGISTRATION_REQUEST,
                5GS_registration_type containing
                    5GS_registration_type_value set to INITIAL_REGISTRATION,
                    FOR indicating value 1, //Follow-on request pending
                5GS_mobile_identity containing
                    SUPI_format indicating value IMSI,
                    Type_of_idenity indicating value SUCI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    Routing_indicator indicating value PX_ROUTING_INDICATOR,
                    Protection_scheme_id indicating value PX_PROTECTION_SCHEME_ID,
                    Home_network_public_key_identifier indicating value
PX_HOME_NETWORK_PUBLIC_KEY_IDENTIFIER,
                    MSIN indicating value PX_MSIN
        from the GNB entity
    }
    then {
        the IUT sends a INITIAL_CONTEXT_SETUP_REQUEST containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
                Registration_accept_message_identity set to REGISTRATION_ACCEPT,
                5GS_registration_result containing
                    55GS_registration_result_value set to 3GPP_ACCESS,
                5G_GUTI containing
                    Type_of_identity set to 5G_GUTI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    AMF_Region_ID indicating value PX_AMF_REGION_ID,
                    AMF_Set_ID indicating value PX_AMF_SET_ID,
                    AMF_Pointer indicating value PX_AMF_POINTER,
                    5G_TMSI indicating value RV_5G_TMSI,
                TAI_list containing
                    Partial_tracking_area_list_1 containing
                        Type_of_list,
                        Number_of_elements,
```

```
                        MCC indicating value PX_MCC,
                        MNC indicating value PX_MNC,
                        TAC indicating value PX_TAC,
                T3512_value containing
                    Timer_value indicating value nonZeroValue
        to the GNB entity
    }
}
```

TP Id	TP_5GNAS_AMF_REG_ACC_02
Test Objective	Verify that the IUT sends a REGISTRATION ACCEPT message indicating SMS over NAS allowed when initial registration with SMS over NAS is requested and network allows SMS service.
Reference	ETSI TS 124 501 [1], clauses 5.5.1.2.4 and 8.2.7
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/8_1_3

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF
        }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an INITIAL_UE_MESSAGE containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to NOT_SECURITY_PROTECTED,
                Registration_request_message_identity set to REGISTRATION_REQUEST,
                5GS_registration_type containing
                    5GS_registration_type_value set to INITIAL_REGISTRATION,
                    FOR indicating value 1, //Follow-on request pending
                5GS_mobile_identity containing
                    SUPI_format indicating value IMSI,
                    Type_of_idenity indicating value SUCI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    Routing_indicator indicating value PX_ROUTING_INDICATOR,
                    Protection_scheme_id indicating value PX_PROTECTION_SCHEME_ID,
                    Home_network_public_key_identifier indicating value
PX_HOME_NETWORK_PUBLIC_KEY_IDENTIFIER,
                    MSIN indicating value PX_MSIN,
                5GS_update_type containing
                    SMS_over_NAS_transport_requested set to 1 //SMS over NAS supported
        from the GNB entity
    }
    then {
        the IUT sends a INITIAL_CONTEXT_SETUP_REQUEST containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                   security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
                Registration_accept_message_identity set to REGISTRATION_ACCEPT,
                5GS_registration_result containing
                    5GS_registration_result_value set to 3GPP_ACCESS,
                    SMS_over_NAS_transport_allowed set to 1, //SMS over NAS allowed
                5G_GUTI containing
                    Type_of_identity set to 5G_GUTI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    AMF_Region_ID indicating value PX_AMF_REGION_ID,
                    AMF_Set_ID indicating value PX_AMF_SET_ID,
                    AMF_Pointer indicating value PX_AMF_POINTER,
                    5G_TMSI indicating value RV_5G_TMSI,
                TAI_list containing
                    Partial_tracking_area_list_1 containing
                        Type_of_list,
                        Number_of_elements,
                        MCC indicating value PX_MCC,
                        MNC indicating value PX_MNC,
                        TAC indicating value PX_TAC,
                T3512_value containing
                    Timer_value indicating value nonZeroValue
        to the GNB entity
    }
}
```

TP Id	TP_5GNAS_AMF_REG_ACC_03
Test Objective	Verify that the IUT sends a REGISTRATION ACCEPT message indicating SMS over NAS not allowed when initial registration with SMS over NAS is requested and network does not support SMS service.
Reference	ETSI TS 124 501 [1], clauses 5.5.1.2.4 and 8.2.7
Configuration	CF_AMF_N2N1
PICS Selection	not PICS_A4/8_1_3

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF
        }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an INITIAL_UE_MESSAGE containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to NOT_SECURITY_PROTECTED,
                Registration_request_message_identity set to REGISTRATION_REQUEST,
                5GS_registration_type containing
                    5GS_registration_type_value set to INITIAL_REGISTRATION,
                    FOR indicating value 1, //Follow-on request pending
                5GS_mobile_identity containing
                    SUPI_format indicating value IMSI,
                    Type_of_idenity indicating value SUCI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    Routing_indicator indicating value PX_ROUTING_INDICATOR,
                    Protection_scheme_id indicating value PX_PROTECTION_SCHEME_ID,
                    Home_network_public_key_identifier indicating value
PX_HOME_NETWORK_PUBLIC_KEY_IDENTIFIER,
                    MSIN indicating value PX_MSIN,
                5GS_update_type containing
                    SMS_over_NAS_transport_requested set to 1 //SMS over NAS supported
        from the GNB entity
    }
    then {
        the IUT sends a INITIAL_CONTEXT_SETUP_REQUEST containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
                Registration_accept_message_identity set to REGISTRATION_ACCEPT,
                5GS_registration_result containing
                    5GS_registration_result_value set to 3GPP_ACCESS,
                    SMS_over_NAS_transport_allowed set to 0, //SMS over NAS not allowed
                5G_GUTI containing
                    Type_of_identity set to 5G_GUTI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    AMF_Region_ID indicating value PX_AMF_REGION_ID,
                    AMF_Set_ID indicating value PX_AMF_SET_ID,
                    AMF_Pointer indicating value PX_AMF_POINTER,
                    5G_TMSI indicating value RV_5G_TMSI,
                TAI_list containing
                    Partial_tracking_area_list_1 containing
                        Type_of_list,
                        Number_of_elements,
                        MCC indicating value PX_MCC,
                        MNC indicating value PX_MNC,
                        TAC indicating value PX_TAC,
                T3512_value containing
                    Timer_value indicating value nonZeroValue
        to the GNB entity
    }
}
```

TP Id	TP_5GNAS_AMF_REG_ACC_04
Test Objective	Verify that the IUT includes the allowed NSSAI in the REGISTRATION ACCEPT message when the UE includes a requested NSSAI in the REGISTRATION REQUEST message and the network allows one or more S-NSSAIs from the requested NSSAI.
Reference	ETSI TS 124 501 [1], clauses 5.5.1.2.4 and 8.2.7
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/8_1

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF
        }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an INITIAL_UE_MESSAGE containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to NOT_SECURITY_PROTECTED,
                Registration_request_message_identity set to REGISTRATION_REQUEST,
                5GS_registration_type containing
                    5GS_registration_type_value set to INITIAL_REGISTRATION,
                    FOR indicating value 1, //Follow-on request pending
                5GS_mobile_identity containing
                    SUPI_format indicating value IMSI,
                    Type_of_idenity indicating value SUCI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    Routing_indicator indicating value PX_ROUTING_INDICATOR,
                    Protection_scheme_id indicating value PX_PROTECTION_SCHEME_ID,
                    Home_network_public_key_identifier indicating value
PX_HOME_NETWORK_PUBLIC_KEY_IDENTIFIER,
                    MSIN indicating value PX_MSIN
        from the GNB entity
    }
    then {
        the IUT sends a INITIAL_CONTEXT_SETUP_REQUEST containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                  security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
                Registration_accept_message_identity set to REGISTRATION_ACCEPT,
                5G_GUTI containing
                    Type_of_identity set to 5G_GUTI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    AMF_Region_ID indicating value PX_AMF_REGION_ID,
                    AMF_Set_ID indicating value PX_AMF_SET_ID,
                    AMF_Pointer indicating value PX_AMF_POINTER,
                    5G_TMSI indicating value RV_5G_TMSI,
                Allowed_NSSAI containing
                    S_NSSAI_1 containing
                        SST set to PX_SST_1,
                        SD set to PX_SD_1,
                        Mapped_HPLMN_SST set to PX_MAPPED_HPLMN_SST_1,
                        Mapped_HPLMN_SD set to PX_MAPPED_HPLMN_SD_1
        to the GNB entity
    }
}
```

TP Id	TP_5GNAS_AMF_REG_ACC_05
Test Objective	Verify that the IUT optionally includes rejected NSSAI in the REGISTRATION ACCEPT message when the network rejects one or more S-NSSAIs from the requested NSSAI.
Reference	ETSI TS 124 501 [1], clauses 5.5.1.2.4 and 8.2.7
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/8_1_2_3

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF
        }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an INITIAL_UE_MESSAGE containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
```

```
                security_header_type set to NOT_SECURITY_PROTECTED,
                Registration_request_message_identity set to REGISTRATION_REQUEST,
                5GS_registration_type containing
                    5GS_registration_type_value set to INITIAL_REGISTRATION,
                    FOR indicating value 1, //Follow-on request pending
                5GS_mobile_identity containing
                    SUPI_format indicating value IMSI,
                    Type_of_idenity indicating value SUCI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    Routing_indicator indicating value PX_ROUTING_INDICATOR,
                    Protection_scheme_id indicating value PX_PROTECTION_SCHEME_ID,
                    Home_network_public_key_identifier indicating value
PX_HOME_NETWORK_PUBLIC_KEY_IDENTIFIER,
                    MSIN indicating value PX_MSIN
        from the GNB entity
    }
    then {
        the IUT sends a INITIAL_CONTEXT_SETUP_REQUEST containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                 security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
                Registration_accept_message_identity set to REGISTRATION_ACCEPT,
                5G_GUTI containing
                    Type_of_identity set to 5G_GUTI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    AMF_Region_ID indicating value PX_AMF_REGION_ID,
                    AMF_Set_ID indicating value PX_AMF_SET_ID,
                    AMF_Pointer indicating value PX_AMF_POINTER,
                    5G_TMSI indicating value RV_5G_TMSI,
                Rejected_NSSAI containing
                    Rejected_S_NSSAI_1 containing
                        Cause_value,
                        SST set to PX_SST_Rejected,
                        SD set to PX_SD_Rejected
        to the GNB entity
    }
}
```

TP Id	TP_5GNAS_AMF_REG_REJ_01
Test Objective	Verify that the IUT rejects initial registration request due to general NAS level mobility management congestion control with 5GMM cause value #22 - congestion and assign a value for back-off timer T3346.
Reference	ETSI TS 124 501 [1], clauses 5.5.1.2.5 and 8.2.9
Configuration	CF_AMF_N2N1
PICS Selection	NONE
Initial Conditions	

with {
the UE isNotRegisteredTo the AMF and
the AMF isInOverloadedState
}	

Expected Behaviour	

ensure that {
when {
the IUT receives an INITIAL_UE_MESSAGE containing
NAS_PDU containing
extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
security_header_type set to NOT_SECURITY_PROTECTED,
Registration_request_message_identity set to REGISTRATION_REQUEST,
5GS_registration_type containing
5GS_registration_type_value set to INITIAL_REGISTRATION,
FOR indicating value 1, //Follow-on request pending
5GS_mobile_identity containing
SUPI_format indicating value IMSI,
Type_of_idenity indicating value SUCI,
MCC indicating value PX_MCC,
MNC indicating value PX_MNC,
Routing_indicator indicating value PX_ROUTING_INDICATOR,
Protection_scheme_id indicating value PX_PROTECTION_SCHEME_ID,
Home_network_public_key_identifier indicating value
PX_HOME_NETWORK_PUBLIC_KEY_IDENTIFIER,
MSIN indicating value PX_MSIN
from the GNB entity
}	

```
    then {
        the IUT sends a DOWNLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
                Registration_reject_message_identity set to REGISTRATION_REJECT,
                5GMM_cause set to "Congestion 22",
                T3346_value containing
                    Timer_value indicating value nonZeroValue
        to the GNB entity
    }
}
```

TP Id	TP_5GNAS_AMF_REG_REJ_02
Test Objective	Verify that the IUT rejects initial registration request because all the S-NSSAI(s) included in the requested NSSAI are either rejected for current PLMN, rejected for the current registration area or rejected due to failed or revoked NSSAIs.
Reference	ETSI TS 124 501 [1], clauses 5.5.1.2.5 and 8.2.9
Configuration	CF_AMF_N2N1
PICS Selection	NONE
Initial Conditions	

with {
the UE isNotRegisteredTo the AMF
}	

Expected Behaviour	

ensure that {
when {
the IUT receives an INITIAL_UE_MESSAGE containing
NAS_PDU containing
Registration_request_message_identity set to REGISTRATION_REQUEST,
5GS_registration_type containing
5GS_registration_type_value set to INITIAL_REGISTRATION,
FOR indicating value 1, //Follow-on request pending
Requested_NSSAI indicating value PX_NSSAI_REVOKED
from the GNB entity
}
then {
the IUT sends a DOWNLINK_NAS_TRANSPORT containing
NAS_PDU containing
Registration_reject_message_identity set to REGISTRATION_REJECT,
5GMM_cause set to "No network slice available 62"
to the GNB entity
}
}	

5.2.2.3 De-registration procedure

5.2.2.3.1 UE initiated de-registration

TP Id	TP_5GNAS_AMF_DRG_ACC_01
Test Objective	Verify that the IUT, upon receiving a DEREGISTRATION REQUEST message containing the De-registration type IE with Normal de-registration from the UE, sends a DEREGISTRATION ACCEPT message.
Reference	ETSI TS 124 501 [1], clauses 5.5.2.2.3, 8.2.12 and 8.2.13
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/9_1
Initial Conditions	

with {
the UE isRegisteredTo the AMF
}	

Expected Behaviour	

ensure that {
when {
the IUT receives an UPLINK_NAS_TRANSPORT containing
NAS_PDU containing
extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
security_header_type set to NOT_SECURITY_PROTECTED,
Deregistration_request_message_identity set to DEREGISTRATION_REQUEST,
Deregistration_type containing
Switch_off_value set to NORMAL_DEREGISTRATION,	

```
                    Reregistration_required_value set to REREGISTRATION_NOT_REQUIRED,
                    Access_type set to 3GPP_ACCESS,
                5GS_mobile_identity containing
                    Type_of_identity set to 5G_GUTI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    AMF_Region_ID indicating value PX_AMF_REGION_ID,
                    AMF_Set_ID indicating value PX_AMF_SET_ID,
                    AMF_Pointer indicating value PX_AMF_POINTER,
                    5G_TMSI indicating value RV_5G_TMSI
        from the GNB entity
    }
    then {
        the IUT sends a DOWNLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
                Deregistration_accept_message_identity set to DEREGISTRATION_ACCEPT
        to the GNB entity
    }
}
```

TP Id	TP_5GNAS_AMF_DRG_ACC_02
Test Objective	Verify that the IUT, upon receiving a DEREGISTRATION REQUEST message containing the De-registration type IE with Switch-off from the UE, does not send a DEREGISTRATION ACCEPT message and IUT completes de-registration procedure.
Reference	ETSI TS 124 501 [1], clauses 5.5.2.2.3, 8.2.12 and 8.2.13
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/9_1
Initial Conditions	

```
with {
the UE isRegisteredTo the AMF
        }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an UPLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to NOT_SECURITY_PROTECTED,
                Deregistration_request_message_identity set to DEREGISTRATION_REQUEST,
                Deregistration_type containing
                    Switch_off_value set to SWITCH_OFF,
                    Reregistration_required_value set to REREGISTRATION_NOT_REQUIRED,
                    Access_type set to 3GPP_ACCESS,
                5GS_mobile_identity containing
                    Type_of_identity set to 5G_GUTI,
                    MCC indicating value PX_MCC,
                    MNC indicating value PX_MNC,
                    AMF_Region_ID indicating value PX_AMF_REGION_ID,
                    AMF_Set_ID indicating value PX_AMF_SET_ID,
                    AMF_Pointer indicating value PX_AMF_POINTER,
                    5G_TMSI indicating value RV_5G_TMSI
        from the GNB entity
    }
    then {
        the IUT not sends a DOWNLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
                Deregistration_accept_message_identity set to DEREGISTRATION_ACCEPT
        to the GNB entity
    }
}
```

5.2.2.3.2 Network initiated de-registration

TP Id	TP_5GNAS_AMF_DRG_REQ_01
Test Objective	Verify that the IUT initiates network de-registration by sending a DEREGISTRATION REQUEST message containing De-registration type IE with re-registration not required and the access type based on the UE's registration status (3GPP access only). NOTE: explicit network deregistration triggered by O&M - deactivation of UE
Reference	ETSI TS 124 501 [1], clauses 5.5.2.3.1 and 8.2.14
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/9_2
Initial Conditions	

with {
the UE isRegisteredTo the AMF
}	

Expected Behaviour	

ensure that {
when {
the IUT indicate a UE deactivation
}
then {
the IUT sends a DOWNLINK_NAS_TRANSPORT containing
NAS_PDU containing
extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
security_header_type set to NOT_SECURITY_PROTECTED,
Deregistration_request_message_identity set to DEREGISTRATION_REQUEST,
Deregistration_type containing
Switch_off_value set to NORMAL_DEREGISTRATION,
Reregistration_required_value set to REREGISTRATION_NOT_REQUIRED,
Access_type set to 3GPP_ACCESS
to the GNB entity
}
}	

TP Id	TP_5GNAS_AMF_DRG_REQ_02
Test Objective	Verify that the IUT initiates network de-registration by sending a DEREGISTRATION REQUEST message and if UE does not send DEREGISTRATION ACCEPT then IUT retransmits DEREGISTRATION REQUEST message after timer T3522 expiration. NOTE: explicit network deregistration triggered by O&M - UE deregistration.
Reference	ETSI TS 124 501 [1], clauses 5.5.2.3.1 and 8.2.14
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/9_2
Initial Conditions	

with {
the UE isRegisteredTo the AMF
}	

Expected Behaviour	

ensure that {
when {
the IUT indicate a UE deregistration and
the IUT sends a DOWNLINK_NAS_TRANSPORT containing
NAS_PDU containing
Deregistration_request_message_identity set to DEREGISTRATION_REQUEST
to the GNB and
the IUT does not receives an UPLINK_NAS_TRANSPORT containing
NAS_PDU containing
Deregistration_accept_message_identity set to DEREGISTRATION_ACCEPT
from the GNB entity
}
then {
the IUT sends a DOWNLINK_NAS_TRANSPORT containing
NAS_PDU containing
extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
security_header_type set to NOT_SECURITY_PROTECTED,
Deregistration_request_message_identity set to DEREGISTRATION_REQUEST,
Deregistration_type containing
Switch_off_value set to NORMAL_DEREGISTRATION,
Reregistration_required_value set to REREGISTRATION_NOT_REQUIRED,
Access_type set to 3GPP_ACCESS
to the GNB entity
}
}	

TP Id	TP_5GNAS_AMF_DRG_REQ_03
Test Objective	Verify that the IUT initiates network de-registration by sending DEREGISTRATION REQUEST message containing De-registration type IE with re-registration required and the access type based on the UE's registration status (3GPP access only). NOTE 1: UE sends DEREGISTRATION ACCEPT and starts with re-registration procedure NOTE 2: explicit network deregistration triggered by O&M - UE deregistration
Reference	ETSI TS 124 501 [1], clauses 5.5.2.3.1, 5.5.2.3.2 1st paragraph and 8.2.14
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/9_2
Initial Conditions	

with {
the UE isRegisteredTo the AMF
}	

Expected Behaviour	

ensure that {
when {
the IUT indicate a UE deregistration
}
then {
the IUT sends a DOWNLINK_NAS_TRANSPORT containing
NAS_PDU containing
extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
security_header_type set to NOT_SECURITY_PROTECTED,
Deregistration_request_message_identity set to DEREGISTRATION_REQUEST,
Deregistration_type containing
Switch_off_value set to NORMAL_DEREGISTRATION,
Reregistration_required_value set to REREGISTRATION_REQUIRED,
Access_type set to 3GPP_ACCESS
to the GNB entity
}
}	

5.2.2.4 Authentication procedure

TP Id	TP_5GNAS_AMF_AUT_REQ_01
Test Objective	Verify that the IUT sends an AUTHENTICATION REQUEST message correctly upon receipt of a NAS Registration without an active security context.
Reference	ETSI TS 124 501 [1], clauses 5.4.1.3.2 and 8.2.1
Configuration	CF_AMF_N2N1
PICS Selection	NONE
Initial Conditions	

with {
the UE isNotRegisteredTo the AMF
}	

Expected Behaviour	

ensure that {
when {
the IUT receives an INITIAL_UE_MESSAGE containing
NAS_PDU containing
extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
security_header_type set to NOT_SECURITY_PROTECTED,
registration_request_message_identity set to REGISTRATION_REQUEST,
5GS_registration_type,
5GS_mobile_identity
}
then {
the IUT sends an DOWNLINK_NAS_TRANSPORT containing
NAS_PDU containing
extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
security_header_type set to NOT_SECURITY_PROTECTED,
authentication_request_message_identity set to AUTHENTICATION_REQUEST,
ngKSI containing
nas_key_set_identifier set to "111",
Authentication_parameter_RAND,
Authentication_parameter_AUTN
to the UE entity
}
}	

TP Id	TP_5GNAS_AMF_AUT_REQ_02
Test Objective	Verify that the IUT sends an AUTHENTICATION REJECT message correctly upon receipt of an AUTHENTICATION RESPONSE message indicating a wrong ARP IEI.
Reference	ETSI TS 124 501 [1], clauses 5.4.1.3.5 and 8.2.5
Configuration	CF_AMF_N2N1
PICS Selection	NONE

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF and
event AUTHENTICATION_REQUEST occurs
            }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an UPLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                security_header_type set to NOT_SECURITY_PROTECTED,
                authentication_response_message_identity set to AUTHENTICATION_RESPONSE,
                authentication_response_parameter containing
                    Authentication_response_parameter_IEI indicating value PX_WRONG_ARP_IEI
        from the UE entity
    }
    then {
        the IUT sends an DOWNLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                security_header_type set to NOT_SECURITY_PROTECTED,
                authentication_reject_message_identity set to AUTHENTICATION_REJECT
        to the UE entity
    }
}
```

TP Id	TP_5GNAS_AMF_AUT_REQ_03
Test Objective	Verify that the IUT stops re-sending an AUTHENTICATION REQUEST message if no AUTHENTICATION RESPONSE message is received on the fifth expiry of timer T3560.
Reference	ETSI TS 124 501 [1], clauses 5.4.1.3.7 b) and Table 10.3.1
Configuration	CF_AMF_N2N1
PICS Selection	NONE

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF
and . at time point start_initial_T3560 : event AUTHENTICATION_REQUEST occurs
and ! 6s after start_initial_T3560 : event AUTHENTICATION_REQUEST occurs
and ! 12s after start_initial_T3560 : event AUTHENTICATION_REQUEST occurs
and ! 18s after start_initial_T3560 : event AUTHENTICATION_REQUEST occurs
            }
```

Expected Behaviour

```
ensure that {
    when {
        . at time point start_trigger_T3560 : event AUTHENTICATION_REQUEST occurs
    }
    then {
        ! 6s after start_trigger_T3560 : the IUT aborts AUTHENTICATION_REQUEST procedure
        Note 1: "It is not expected to receive another AUTHENTICATION message on the N2N1
interface."
    }
}
```

TP Id	TP_5GNAS_AMF_AUT_REQ_04
Test Objective	Verify that the IUT sends an IDENTITY REQUEST message correctly upon receipt of an AUTHENTICATION FAILURE message indicating a 5GMM cause value #20 - MAC failure.
Reference	ETSI TS 124 501 [1], clauses 5.4.1.3.7 c) and 8.2.4
Configuration	CF_AMF_N2N1
PICS Selection	NONE

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF and
the IUT sends an DOWNLINK_NAS_TRANSPORT containing
        NAS_PDU containing
            security_header_type set to INTEGRITY_PROTECTED,
            authentication_parameter_AUTN containing
                AUTN indicating value PX_WRONG_MAC_CODE
to the UE entity
            }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an UPLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                security_header_type set to INTEGRITY_PROTECTED,
                authentication_failure_message_identity set to AUTHENTICATION_FAILURE,
                5GMM_cause set to MAC_failure
        from the UE entity
    }
    then {
        the IUT sends an DOWNLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                security_header_type set to INTEGRITY_PROTECTED,
                identity_request_message_identity set to IDENTITY_REQUEST,
                identity_type set to SUCI
        to the UE entity
    }
}
```

TP Id	TP_5GNAS_AMF_AUT_REQ_05
Test Objective	Verify that the IUT sends a new AUTHENTICATION REQUEST message with new ngKSI value to re-initiate the 5G AKA based primary authentication upon receipt of an AUTHENTICATION FAILURE message indicating a 5GMM cause value #71 - ngKSI already in use.
Reference	ETSI TS 124 501 [1], clauses 5.4.1.3.7 e) and 8.2.4
Configuration	CF_AMF_N2N1
PICS Selection	NONE

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF and
the IUT sends an DOWNLINK_NAS_TRANSFER containing
        NAS_PDU containing
            extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
            security_header_type set to NOT_SECURITY_PROTECTED,
            spare_half_octet,
            authentication_request_message_identity set to AUTHENTICATION_REQUEST,
            ngKSI containing
                nas_key_set_identifier set to "111", //value for nas_key_set_identifier was
already used before
            spare_half_octet,
            ABBA,
            Authentication_parameter_RAND,
            Authentication_parameter_AUTN
to the UE entity
            }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an UPLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                security_header_type set to INTEGRITY_PROTECTED,
                authentication_failure_message_identity set to AUTHENTICATION_FAILURE,
                5GMM_cause set to ngKSI_already_in_use
        from the UE entity
    }
```

```
    then {
        the IUT sends an DOWNLINK_NAS_TRANSFER containing
                NAS_PDU containing
                    extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                    security_header_type set to NOT_SECURITY_PROTECTED,
                    spare_half_octet,
                    authentication_request_message_identity set to AUTHENTICATION_REQUEST,
                    ngKSI containing
                        nas_key_set_identifier indicating value PX_NON_DEFAULT_NGKSI,
                    spare_half_octet,
                    ABBA,
                    Authentication_parameter_RAND,
                    Authentication_parameter_AUTN
        to the UE entity
    }
}
```

TP Id	TP_5GNAS_AMF_AUT_ABN_01
Test Objective	Verify that the IUT sends a new IDENTITY REQUEST message to obtain the SUCI from the UE upon receipt of an AUTHENTICATION FAILURE message indicating a 5GMM cause value #26 - non-5G authentication unacceptable.
Reference	ETSI TS 124 501 [1], clauses 5.4.1.3.7, 8.2.4, 5.4.3.2 and 8.2.21.1
Configuration	CF_AMF_N2N1
PICS Selection	NONE

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF and
the IUT sends an DOWNLINK_NAS_TRANSFER containing
        NAS_PDU containing
            extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
            security_header_type set to NOT_SECURITY_PROTECTED,
            spare_half_octet,
            authentication_request_message_identity set to AUTHENTICATION_REQUEST,
            ngKSI containing
                nas_key_set_identifier set to "111",
            spare_half_octet,
            ABBA,
            Authentication_parameter_RAND,
            Authentication_parameter_AUTN
to the UE entity
            }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives an UPLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                security_header_type set to INTEGRITY_PROTECTED,
                authentication_failure_message_identity set to AUTHENTICATION_FAILURE,
                5GMM_cause set to "Non-5G authentication unacceptable 26"
        from the UE entity
    }
    then {
        the IUT sends an DOWNLINK_NAS_TRANSFER containing
                NAS_PDU containing
                    extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                    security_header_type set to NOT_SECURITY_PROTECTED,
                    spare_half_octet,
                    identity_request_message_identity set to IDENTITY_REQUEST,
                    5GS_identity_type_IEI set to "SUCI"
        to the UE entity
    }
}
```

5.2.2.5 Security mode control procedure

TP Id	TP_5GNAS_AMF_AUT_SEQ_01
Test Objective	Verify that the IUT sends a SECURITY MODE COMMAND message correctly to indicate NAS security mode procedure upon receipt of a NAS AUTHENTICATION RESPONSE.
Reference	ETSI TS 124 501 [1], clause 5.4.1.2
Configuration	CF_AMF_N2N1
PICS Selection	NONE
Initial Conditions	

```
with {
the UE isNotRegisteredTo the AMF and
event AUTHENTICATION_REQUEST occurs with {
    argument replaced by the AUTHENTICATION_REQUEST containing
        security_header_type set to INTEGRITY_PROTECTED_WITH_NEW_5G_NAS_SECURITY_CONTEXT
}
            }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives a UPLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                security_header_type set to INTEGRITY_PROTECTED_WITH_NEW_5G_NAS_SECURITY_CONTEXT,
                authentication_response_message_identity set to AUTHENTICATION_RESPONSE
    from the UE entity
    }
    then {
    the IUT sends an DOWNLINK_NAS_TRANSPORT containing
        NAS_PDU containing
            extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
            security_header_type set to INTEGRITY_PROTECTED_WITH_NEW_5G_NAS_SECURITY_CONTEXT,
            security_mode_command_message_identity set to SECURITY_MODE_COMMAND,
            selected_NAS_security_algorithms,
            ngKSI containing
                nas_key_set_identifier set to "111",
            replayed_UE_security_capabilities
    to the UE entity
    }
}
```

TP Id	TP_5GNAS_AMF_SEC_ACC_01
Test Objective	Verify that the IUT, upon receiving the NAS SECURITY MODE COMPLETE message after completing the NAS Authentication and Security procedure, successfully completes the registration process by accepting the registration.
Reference	ETSI TS 124 501 [1], clause 5.4.2 and 8.2.25
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/2
Initial Conditions	

```
with {
the UE isNotRegisteredTo the AMF
                }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives a UPLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                security_header_type set to INTEGRITY_PROTECTED_WITH_NEW_5G_NAS_SECURITY_CONTEXT,
                security_mode_complete_message_identity    set to SECURITY_MODE_COMPLETE
        from the UE entity
    }
    then {
        the IUT sends a INITIAL_CONTEXT_SETUP_REQUEST containing
           NAS_PDU containing
               extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
               security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
               Registration_accept_message_identity set to REGISTRATION_ACCEPT,
               5GS_registration_result containing
                   55GS_registration_result_value set to 3GPP_ACCESS,
               5G_GUTI containing
                   Type_of_identity set to 5G_GUTI,
                   MCC indicating value PX_MCC,
                   MNC indicating value PX_MNC,
```

```
                    AMF_Region_ID indicating value PX_AMF_REGION_ID,
                    AMF_Set_ID indicating value PX_AMF_SET_ID,
                    AMF_Pointer indicating value PX_AMF_POINTER,
                    5G_TMSI indicating value RV_5G_TMSI,
                TAI_list containing
                    Partial_tracking_area_list_1 containing
                        Type_of_list,
                        Number_of_elements,
                        MCC indicating value PX_MCC,
                        MNC indicating value PX_MNC,
                        TAC indicating value PX_TAC,
                T3512_value containing
                    Timer_value indicating value nonZeroValue
        to the GNB entity
    }
}
```

TP Id	TP_5GNAS_AMF_SEC_REJ_01
Test Objective	Verify that the IUT, upon receiving the NAS SECURITY MODE REJECTED message after a failed NAS Authentication and security procedure, successfully aborts the registration process by rejecting the registration.
Reference	ETSI TS 124 501 [1], clause 5.4.2 and 8.2.25
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A4/2

Initial Conditions

```
with {
the UE isNotRegisteredTo the AMF
                }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives a UPLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5GS_MOBILITY_MANAGEMENT_MESSAGE,
                security_header_type set to INTEGRITY_PROTECTED_WITH_NEW_5G_NAS_SECURITY_CONTEXT,
                security_mode_reject_message_identity set to SECURITY_MODE_REJECT,
                5GMM_cause set to "UE security capabilities mismatch 23"
    from the UE entity
    }
    then {
        the IUT sends a DOWNLINK_NAS_TRANSPORT containing
           NAS_PDU containing
               extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
               security_header_type set to INTEGRITY_PROTECTED_AND_CIPHERED,
               Registration_reject_message_identity set to REGISTRATION_REJECT,
               5GMM_cause set to "UE security capabilities mismatch 23",
               T3346_value containing
                   Timer_value indicating value nonZeroValue
        to the GNB entity
    }
}
```

5.2.2.6 NAS transport procedures

TP Id	TP_5GNAS_AMF_DLN_ACC_01
Test Objective	Verify that the IUT correctly handles a UL NAS transport message containing a PDU SESSION ESTABLISHMENT REQUEST from the UE and responds with a DL NAS transport message containing a PDU SESSION ESTABLISHMENT ACCEPT.
Reference	ETSI TS 124 501 [1], clause 5.4.5 and 8.2.10, 8.2.11
Configuration	CF_AMF_N2N1
PICS Selection	PICS_A5/6

Initial Conditions

```
with {
the UE isRegisteredTo the AMF
               }
```

Expected Behaviour

```
ensure that {
    when {
        the IUT receives a UPLINK_NAS_TRANSPORT containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                  security_header_type set to NOT_SECURITY_PROTECTED,
                uL_NAS_TRANSPORT_message_identity set to UL_NAS_TRANSPORT,
                payload_container containing
                    payload_container_type set to "N1 SM information",
                    number_of_optional_IEs set to 1,
                    optional_IE_1 set to "PDU SESSION ESTABLISHMENT REQUEST",
                old_PDU_session_ID
    from the UE entity
    }
    then {
        the IUT sends an PDU_SESSION_RESOURCE_SETUP_REQUEST containing
            NAS_PDU containing
                extended_protocol_discriminator set to 5G_MOBILITY_MANAGEMENT_MESSAGES,
                   security_header_type set to NOT_SECURITY_PROTECTED,
                dL_NAS_TRANSPORT_message_identity set to DL_NAS_TRANSPORT,
                payload_container containing
                    payload_container_type set to "N1 SM information",
                    number_of_optional_IEs set to 1,
                    optional_IE_1 set to "PDU SESSION ESTABLISHMENT ACCEPT",
                pDU_session_ID
    to the UE entity
    }
}
```

Annex A (normative): TDL-TO source files

Each TP in clause 5 above has been written in TDL-TO and thus in a structured manner which is consistent with all other TPs. The TDL-TO text files for all test purposes are released in the ETSI forge repository: https://forge.etsi.org/rep/int/5g-core/nas/-/tree/main/test_purposes.

History

Document history		
V1.1.1	April 2025	Publication