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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document specifies the mapping:

- performed by the AMF between HTTP responses (Status Codes and Protocol or Application Errors) returned by 5GC NFs to the AMF and 5GMM Cause values sent to UEs;
- performed by the SMF between HTTP responses (Status Codes and Protocol or Application Errors) returned by 5GC NFs to SMF and 5GSM Cause values sent to UEs;
- performed by the SMF between N4 errors returned by the UPF and 5GSM Cause values sent to UEs.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 29.244: "Interface between the Control Plane and the User Plane Nodes".
- [3] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".
- [4] 3GPP TS 29.531: "5G System; Network Slice Selection Services; Stage 3".
- [5] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".
- [6] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".
- [7] 3GPP TS 29.509: "5G System; Authentication Server Services; Stage 3".
- [8] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".
- [9] 3GPP TS 29.508: "5G System, Session Management Event Exposure Service; Stage 3".
- [10] 3GPP TS 29.540: "5G System; SMS Services; Stage3".
- [11] 3GPP TS 29.511: "5G System; Equipment Identity Register Services; Stage 3".
- [12] 3GPP TS 29.507: "5G System; Access and Mobility Policy Control Service; Stage 3".
- [13] 3GPP TS 29.525: "5G System; UE Policy Control Service; Stage 3".
- [xx] 3GPP TS 29.536: "5G System; Network Slice Admission Control Services; Stage 3".

3 Definitions, symbols and abbreviations

3.1 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

5GC	5G Core Network
AMF	Access and Mobility Management Function
HTTP	Hypertext Transfer Protocol
NF	Network Function
NSSF	Network Slice Selection Function
PCF	Policy Control Function
SMF	Session Management Function
UDM	Unified Data Management

4 Mapping between 5GC interfaces causes and 5GMM Cause Codes by AMF

4.1 General

This clause defines the mapping performed by the AMF between HTTP responses (status codes and Protocol or Application Errors) returned by NF services contacted by the AMF and the 5GMM cause values sent to UEs.

No mapping is required for:

- the Nsmsf_SMSservice_Activate, Nsmsf_SMSservice_Deactivate and Nsmsf_SMSservice_UplinkSMS operations described in 3GPP TS 29.540 [10].
- the Npcf_AMPolicyControl service operations described in 3GPP TS 29.507 [12].
- the Npcf_UEPolicyControl service operations described in 3GPP TS 29.525 [13].

4.2 Mapping between Nausf services causes and 5GMM causes

4.2.1 General

This clause defines the mapping performed by the AMF between HTTP responses (status codes and Protocol or Application Errors) returned by AUSF services to the AMF and the 5GMM cause values sent to UEs.

4.2.2 Mapping between Nausf_UEAuthentication service causes on N12 and 5GMM causes

4.2.2.1. General

This clause defines the mapping for the Nausf_UEAuthentication service (see 3GPP TS 29.509 [7]). It also contains the mapping in case of a 200 OK is returned but the Authentication has failed.

4.2.2.2 Mapping from HTTP to 5GMM causes values – Request rejected by AUSF

Table .4.2.2-1: Mapping from HTTP to 5GMM cause values – Request rejected by AUSF

HTTP status code on N12	Protocol or Application Error	5GMM cause to UE
403 Forbidden	SERVING_NETWORK_NOT_AUTHORIZED	Cause #11 – PLMN not allowed Cause #73 – Serving network not authorized Cause #12 – Tracking area not allowed Cause #15 – No suitable cells in tracking area (NOTE1)
	AUTHENTICATION_REJECTED	N/A (NOTE 2)
	INVALID_HN_PUBLIC_KEY_IDENTIFIER	N/A (NOTE 2)
	INVALID_HN_PUBLIC_KEY_IDENTIFIER	N/A (NOTE 2)
404 Not Found	CONTEXT_NOT_FOUND	N/A (NOTE 2)
	USER_NOT_FOUND	
504 Gateway Timeout	UPSTREAM_SERVER_ERROR	N/A (NOTE 2)
	NETWORK_FAILURE	N/A (NOTE 2)
500 Internal Server Error	AV_GENERATION_PROBLEM	N/A (NOTE 2)
501 Not Implemented	UNSUPPORTED_PROTECTION_SCHEME	N/A (NOTE 2)
NOTE 1: .One of these 5GMM causes may be used.		
NOTE 2: There is no corresponding mapping since the Authentication is rejected and the Authentication Reject message does not have a 5GMM cause.		

4.2.2.3 Mapping from HTTP to 5GMM cause values – Request accepted by AUSF

Table .4.2.2.3-1: Mapping from HTTP to 5GMM cause values – Request accepted by AUSF

HTTP status code on N12	Protocol or Application Error	5GMM cause to UE
200 OK	The "authResult" in "ConfirmationDataResponse" is set to "AUTHENTICATION_FAILURE" (see clause 6.1.6.2.8 of 3GPP TS 29.509 [7]).	Cause #3 – Illegal UE
	The "authResult" in "EapSession" is set to "AUTHENTICATION_FAILURE" (see clause 6.1.6.2.8 of 3GPP TS 29.509 [7]).	Cause #3 – Illegal UE

4.3 Mapping between Nsmf services causes and 5GMM causes

4.3.1 General

This clause defines the mapping performed by the AMF between HTTP responses (status codes and Protocol or Application Errors) returned by SMF services to the AMF and the 5GMM cause values sent to UEs.

The AMF may invoke SMF service operations upon receipt of:

- 5GSM messages (e.g. PDU Session establishment request) piggybacked in 5GMM UL NAS TRANSPORT message;
- 5GMM Service Request or Registration Request messages, to establish the user-plane resources of a PDU session.

A 5GMM cause is defined in:

- the DL NAS TRANSPORT message;
- the PDU session reactivation result error cause IE of a REGISTRATION ACCEPT or SERVICE ACCEPT message;
- the REGISTRATION REJECT or SERVICE REJECT message.

The AMF shall support mapping the status code and/or Protocol or Application Error received from the SMF to a 5GMM cause code, where 3GPP TS 24.501 [3] requires a 5GMM Cause to be included in the 5GMM message sent to the UE.

NOTE: REGISTRATION REJECT and SERVICE REJECT messages are rejected only due to 5GMM-specific reasons, i.e. not for problems specific to session management.

4.3.2 Mapping between Nsmf_PDUSession service causes on N11 and 5GMM causes

4.3.2.1 General

This clause defines the mapping for the Nsmf_PDUSession service (see 3GPP TS 29.502 [8]).

4.3.2.2 Mapping from HTTP to 5GMM Cause Values

Table 4.3.2.2-1: Mapping from HTTP to 5GMM cause values – Request rejected by SMF

HTTP status code on N11	Protocol or Application Error	5GMM cause to UE
200 OK	The upCnxState IE is set to DEACTIVATED and the Cause IE set to "INSUFFICIENT_UP_RESOURCES" (see clause 5.2.2.3.2.2 of 3GPP TS 29.502 [8]) (NOTE 2)	#92 - Insufficient user-plane resources for the PDU session
403 Forbidden	OUT_OF_LADN_SERVICE_AREA	#43 - LADN not available
403 Forbidden	PRIORITIZED_SERVICES_ONLY	#28 - Restricted service area
404 Not Found	CONTEXT_NOT_FOUND	N/A (NOTE 1)
504 Gateway Timeout	NETWORK_FAILURE	N/A (NOTE 1)
NOTE 1: An N1 SM cause is included by the SMF in the HTTP error response in this case.		
NOTE 2: This corresponds to the scenario where NG-RAN cannot establish user plane resources during the activation of the User Plane connection of a PDU session.		

4.4 Mapping between Nudm services causes and 5GMM causes

4.4.1 General

This clause defines the mapping performed by the AMF between HTTP responses (status codes and Protocol or Application Errors) returned by UDM services to AMF and the 5GMM cause values sent to UEs.

4.4.2 Mapping between Nudm_UEContextManagement service causes on N8 and 5GMM causes

4.4.2.1 General

This clause defines the mapping for the Nudm_UEContextManagement service is described in 3GPP TS 29.503 [5]).

4.4.2.1 Mapping from HTTP to NAS cause values – Request rejected by UDM

Table 4.4.2.1-1: Mapping from HTTP to 5GMM cause values – Request rejected by UDM

HTTP status code on N8	Protocol or Application Error	5GMM cause to UE
403 Forbidden	UNKNOWN_5GS_SUBSCRIPTION	#27 – N1 mode not allowed
	ACCESS_NOT_ALLOWED	#15 "No suitable cells in tracking area", or #12 "Tracking area not allowed" or #72 – Non-3GPP access to 5GCN not allowed (NOTE)
	RAT_NOT_ALLOWED	#15 "No suitable cells in tracking area", or #13 "Roaming not allowed in this tracking area", or #12 "Tracking area not allowed" (NOTE)
	NO_PS_SUBSCRIPTION ROAMING_NOT_ALLOWED	#7 – 5GS services not allowed #11 "PLMN not allowed" or #13 "Roaming not allowed in this tracking area", (NOTE)
404 Not Found	CONTEXT_NOT_FOUND	#9 "UE identity cannot be derived by the network"
404 Not Found	USER_NOT_FOUND	#3 "Illegal UE"
422 Unprocessable Entity	UNPROCESSABLE_REQUEST	#111 protocol error unspecified
NOTE: Any of those NAS Cause Code values may be sent to the UE, depending on operator's choice.		

4.4.3 Mapping between Nudm_SubscriberDataManagement service causes on N8 and 5GMM causes

4.4.3.1 General

This clause defines the mapping for the Nudm_SubscriberDataManagement service is described in 3GPP TS 29.503 [5]).

4.4.3.2 Mapping from HTTP to NAS cause values – Request rejected by UDM due to N8 failure

Table 4.4.x.2-1: Mapping from HTTP to 5GMM cause values – Request rejected by UDM due to N8 failures when consuming Nudm_SubscriberDataManagement service

HTTP status code on N8	Protocol or Application Error	5GMM cause to UE
404 Not Found	USER_NOT_FOUND DATA_NOT_FOUND	#3 "Illegal UE" #27 "N1 mode not allowed"
NOTE: Any of those NAS Cause Code values may be sent to the UE, depending on operator's choice.		

4.5 Mapping between Neir services causes and 5GMM causes

4.5.1 General

This clause defines the mapping performed by the AMF between HTTP responses (status code and Protocol or Application Errors) returned by the EIR to the AMF and the 5GMM cause values sent to UEs.

4.5.2 Mapping between N5g-eir_EquipmentIdentityCheck Service causes on N17 and 5GMM causes

4.5.2.1 General

This clause defines the mapping for the N5g-eir_EquipmentIdentityCheck service (see 3GPP TS 29.511 [11]).

4.5.2.2 Mapping from HTTP to NAS cause values – Request accepted by EIR

Table 4.5.2.2-1: Mapping from HTTP to 5GMM cause values – Request accepted by EIR

HTTP Status on N17	Protocol or Application information	5GMM cause to UE
200 OK	Equipment Status is set to "BLACKLISTED", which indicates that the equipment is in the prohibited list.	#6 "Illegal ME"

4.6 Mapping between Nnssf services causes and 5GMM causes

4.6.1 General

This clause defines the mapping performed by the AMF between HTTP responses (Status Code and Protocol or Application Errors) returned by the NSSF to the AMF and the 5GMM cause values sent to UEs.

4.6.2 Mapping between Nnssf_NSSelection service causes on N22 and 5GMM causes

4.6.2.1 General

This clause defines the mapping for the Nnssf_NSSelection service (see 3GPP TS 29.531 [4]).

4.6.2.2 Mapping from HTTP to 5GMM Cause Values

Table 4.6.2.2-1: Mapping from HTTP to 5GMM cause values – Request rejected by NSSF

HTTP status code on N22	Protocol or Application Error	5GMM cause to UE
403 Forbidden	SNSSAI_NOT_SUPPORTED	#62 – No Network Slices available

5 Mapping between 5GC interfaces causes and 5GSM Cause Codes by SMF

5.1 General

This clause describes the mapping performed by the SMF between HTTP responses (status Code and Protocol or Application Errors) returned by NF services contacted by the SMF and the corresponding 5GSM cause values sent to UEs (in5GSMmessages).

No mapping is required for the Nsmf_PDUSession service over N11 since the SMF includes the 5GSM cause in 5GSM messages sent in N1 SM Information (see 3GPP TS 29.502 [5]).

No mapping is required for the Nsmf_PDUSession service over N16 since the 5GSM cause is generated at the H-SMF and provided to the V-SMF in N1 SM Information (see 3GPP TS 29.502 [9]).

No mapping is required for the Nsmf_EventExposure service specified in 3GPP TS 29.508 [9]

5.2 Mapping between Npcf service causes on N7 and 5GSM causes

5.2.1 General

This clause defines the mapping performed by the SMF between HTTP responses (status code and Protocol or Application Errors) returned by the PCF to the SMF and the 5GSM causes sent to UEs.

5.2.2 Mapping between Npcf_SMPolicyControl Service causes on N7 and 5GSM causes

5.2.2.1 General

This clause defines the mapping for the Npcf_SMPolicyControl service (see 3GPPTS 29.512 [6]).

5.2.2.2 Mapping from HTTP to 5GSM cause values – Request rejected by PCF

Table 5.2.2.2-1: Mapping from HTTP to 5GSM cause values – Request rejected by PCF

HTTP status code on N7	Protocol or Application Error	5GSM cause to UE
400 Bad Request	USER_UNKNOWN	Cause #29 - User authentication or authorization failed
	ERROR_INITIAL_PARAMETERS	Cause #31 - Request rejected, unspecified
	ERROR_TRIGGER_EVENT	Cause #31 - Request rejected, unspecified
403 Forbidden	ERROR_TRAFFIC_MAPPING_INFO_REJECTED	Cause #29 - User authentication or authorization failed
	POLICY_CONTEXT_DENIED	Cause #29 - User authentication or authorization failed (NOTE)
	VALIDATION_CONDITION_NOT_MET	Cause #29 - User authentication or authorization failed
NOTE:	Upon receiving the cause POLICY CONTEXT DENIED, the SMF may reject the request, or it may accept the request based on the local policy.	

5.3 Mapping between Nudm service causes on N10 and 5GSM causes

5.3.1 General

This clause defines the mapping performed by the SMF between HTTP responses (status codes and Protocol or Application Errors) returned by the UDM to the SMF and the 5GSM causes sent to UEs.

5.3.2 Mapping between Nudm_UEContextManagement service causes on N10 and 5GSM causes

5.3.2.1 General

This clause defines the mapping for the Nudm_UEContextManagement service (see 3GPP TS 29.503 [5]).

5.3.2.2 Mapping from HTTP to 5GSM cause values – Request rejected by UDM due to N10 failures

Table 5.3.2.2-1: Mapping from HTTP to 5GSM cause values – Request rejected by UDM due to N10 failures

HTTP status code on N10	Protocol or Application Error	5GSM cause to UE
403 Forbidden	ROAMING_NOT_ALLOWED	#29 "User authentication or authorization failed"
	DNN_NOT_ALLOWED	#27 "Missing or unknown DNN" or #67 "Insufficient resources for specific slice and DNN" #70 "Missing or unknown DNN in a slice" (NOTE)
404 Not Found	USER_NOT_FOUND	#29 "User authentication or authorization failed"
NOTE: Any of those NAS Cause Code values may be sent to the UE, depending on operator's choice.		

5.3.3 Mapping between Nudm_SubscriberDataManagement service causes on N10 and 5GSM causes

5.3.3.1 General

This clause defines the mapping for the Nudm_SubscriberDataManagement service (see 3GPP TS 29.503 [5]).

5.3.3.2 Mapping from HTTP to 5GSM cause values – Request rejected by UDM due to N10 failures

Table 5.3.3.2-1: Mapping from HTTP to 5GSM cause values – Request rejected by UDM due to N10 failures when consuming Nudm_SubscriberDataManagement service

HTTP status code on N10	Protocol or Application Error	5GSM cause to UE
404 Not Found	USER_NOT_FOUND	#29 "User authentication or authorization failed"
	DATA_NOT_FOUND	#33 "Requested service option not subscribed"
NOTE: Any of those NAS Cause Code values may be sent to the UE, depending on operator's choice.		

5.4 Mapping between N4 causes and 5GSM causes

5.4.1 General

N4 error handling and cause codes are defined in 3GPP TS 29.244 [2].

The receipt of an N4 error may trigger error handling in SMF. This clause defines the mapping performed by the SMF between when an error received on N4 interface cannot be resolved by SMF and results in the SMF sending a 5GSM message to the UE.

5.4.2 Mapping from N4 to 5GSM cause values

Table 5.4.2-1: Mapping from N4 to 5GSM cause values – Request rejected by SMF due to N4 failures

N4 Cause Code		5GSM cause to UE	
Cause value Decimal	Error description	Cause value	Error description
64	Request rejected (reason not specified)	#31	Request rejected, unspecified
74	PFCP entity in congestion	#26 #38 #69 #67	Insufficient resources Network Failure Insufficient resources for specific slice Insufficient resources for specific slice and DNN
77	System failure	#31	Request rejected, unspecified

5.5 Mapping between Nnsacf services causes and 5GSM causes

5.5.1 General

This clause defines the mapping performed by the SMF between HTTP responses (Status Code and Protocol or Application Errors) returned by the NSACF to the SMF and the 5GSM cause values sent to UEs.

5.5.2 Mapping between Nnsacf_NSAC service causes on N81 and 5GSM causes

5.5.2.1 General

This clause defines the mapping for the Nnsacf_NSAC service (see 3GPP TS 29.536 [14]).

5.5.2.2 Mapping from HTTP to 5GSM Cause Values

Table 5.X.2.2-1: Mapping from HTTP to 5GSM cause values – Request rejected by NSACF

HTTP status code on N81	Protocol or Application Error	5GSM cause to UE
403 Forbidden	ALL_SLICE_FAILED	#69 –Insufficient resources for specific slice

Annex A (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2018-10	CT4#86Bis					First version of this new TS including: C4-187375 (Skeleton) C4-187378 (N11 – 5GMM) C4-187391 (N8 – 5GMM – Request rejected) C4-187589 (Scope) C4-187390 (N4 – 5GMM)	0.1.0
2018-12	CT4#87					The following agreed documents are included: C4-188418 (NSSF) C4-188484 (Nsmf_PDUSession N11 and N16) C4-188486 (Cause 5GMM) C4-188609 (N4) C4-188637 (N8 and 5GMM) C4-188638 (EIR) C4-188640 (N10 and 5GSM) C4-188641 (N7) C4-188642 (Nausf) C4-188643 (N11 5GMM) C4-188647 (Clean-up) (Conclusion from C4-188384 was wrongly reported to be included in 5GSM General Clause while it applied to 5GMM – corrected by Rapporteur). C4-188648 (General 5GSM)	0.2.0
2018-12	CT#82	CP-183104				Sent for information and approval	1.0.0
2018-12	CT#82	CP-183104				Approved in CT#82	15.0.0
2019-03	CT#83	CP-190031	0001	2	F	Corrections on cause mapping in clause 4	15.1.0
2019-03	CT#83	CP-190031	0003	1	F	Mapping between N11 causes and 5GMM causes	15.1.0
2019-03	CT#83	CP-190031	0008	1	F	Remove EN's in 5.2.2.2	15.1.0
2019-03	CT#83	CP-190031	0004	2	F	Corrections to 5GMM and 5GSM causes mappings	15.1.0
2019-06	CT#84	CP-191037	0012	-	F	Cause mapping updates	15.2.0
2019-06	CT#84	CP-191037	0013	1	F	Correction on cause mapping regarding no subscription	15.2.0
2019-06	CT#84	CP-191037	0014	2	F	Essential Correction on Error mapping for NSSF Services	15.2.0
2019-06	CT#84	CP-191037	0015	1	F	Essential Correction on mapping for N4 to SBI	15.2.0
2019-06	CT#84	CP-191037	0016	1	F	Cause mapping corrections	15.2.0
2019-06	CT#84	CP-191037	0017	1	F	Add a mapping for N10	15.2.0
2019-12	CT#86	CP-193036	0019	2	F	Add new mapping towards Cause #62 (No Network Slices available)	16.0.0
2020-06	CT#88e	CP-201034	0020	1	F	Correction of the mapping between PCF service causes and 5GSM causes	16.1.0
2021-03	CT#91e	CP-210027	0022	1	D	Use of inclusive terminology	17.0.0
2021-03	CT#91e	CP-210028	0023	1	F	ERROR CONFLICTING REQUEST	17.0.0
2021-06	CT#92e	CP-211146	0024		F	Editorial Correction	17.1.0
2021-09	CT#93e	CP-212230	0025	1	B	Cause Mapping for NSAC	17.2.0
2021-12	CT#94e	CP-213086	0026	-	F	Mapping for the cause from Nudm_SubscriberDataManagement	17.3.0

History

Document history		
V17.3.0	May 2022	Publication