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Contents

Intellectual Property Rights	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	4
1 Scope	5
2 References	5
3 Definitions, symbols and abbreviations	5
3.1 Abbreviations	5
4 Mapping between 5GC interfaces causes and 5GMM Cause Codes by AMF.....	6
4.1 General	6
4.2 Mapping between Nausf services causes and 5GMM causes.....	6
4.2.1 General.....	6
4.3 Mapping between Nsmf services causes and 5GMM causes	7
4.3.1 General.....	7
4.3.2 Mapping between Nsmf_PDUSession service causes on N11 and 5GMM causes	8
4.3.2.1 General	8
4.3.2.2 Mapping from HTTP to 5GMM Cause Values.....	8
4.4 Mapping between Nudm services causes and 5GMM causes	9
4.4.1 General.....	9
4.4.2 Mapping between Nudm_UEContextManagement service causes on N8 and 5GMM causes.....	9
4.4.2.1 General	9
4.4.2.1 Mapping from HTTP to NAS cause values – Request rejected by UDM.....	9
4.5 Mapping between Neir services causes and 5GMM causes	10
4.5.1 General.....	10
4.5.2 Mapping between N5g-eir_EquipmentIdentityCheck Service causes on N17 and 5GMM causes	10
4.5.2.1 General	10
4.5.2.2 Mapping from HTTP to NAS cause values – Request accepted by EIR.....	10
4.6 Mapping between Nnssf services causes and 5GMM causes.....	10
4.6.1 General.....	10
4.6.2 Mapping between Nnssf_NSSelection service causes on N22 and 5GMM causes	10
4.6.2.1 General	10
4.6.2.2 Mapping from HTTP to 5GMM Cause Values.....	10
5 Mapping between 5GC interfaces causes and 5GSM Cause Codes by SMF.....	11
5.1 General	11
5.2 Mapping between Npcf service causes on N7 and 5GSM causes	11
5.2.1 General.....	11
5.2.2 Mapping between Npcf_SMPolicyControl Service causes on N7 and 5GSM causes	11
5.2.2.1 General	11
5.2.2.2 Mapping from HTTP to 5GSM cause values – Request rejected by PCF.....	11
5.3 Mapping between Nudm service causes on N10 and 5GSM causes	11
5.3.1 General.....	11
5.3.2 Mapping between Nudm_UEContextManagement service causes on N10 and 5GSM causes	12
5.3.2.1 General	12
5.3.2.2 Mapping from HTTP to 5GSM cause values – Request rejected by UDM due to N10 failures.....	12
5.4 Mapping between N4 causes and 5GSM causes	12
5.4.1 General.....	12
5.4.2 Mapping from N4 to 5GSM cause values.....	12
Annex A (informative): Change history	14
History	15

Foreword

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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".

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].

4.2 Mapping between Nausf services causes and 5GMM causes

4.2.1 General

This subclause 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 subclause 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 subclause 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 subclause 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 subclause 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 subclause 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 subclause 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 subclause 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 subclause 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	#7 – 5GS services 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	#15 "No suitable cells in tracking area" or #12 "Tracking area not allowed" or #11 "PLMN not allowed" (NOTE)
	ROAMING_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.		

4.5 Mapping between Neir services causes and 5GMM causes

4.5.1 General

This subclause 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 subclause 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"	#6 "Illegal ME"

4.6 Mapping between Nnssf services causes and 5GMM causes

4.6.1 General

This subclause 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 subclause 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	#90 - Payload was not forwarded. (NOTE 1) #15 - No suitable cells in tracking area. (NOTE 2)
NOTE 1: This 5GMM cause may be sent when the AMF receives the error from the NSSF during the PDU session establishment procedure.		
NOTE 2: This 5GMM cause may be sent when the AMF receives the error from the NSSF during the Registration procedure.		

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 subclause 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 subclause defines the mapping for the Npcf_SMPolicyControl service (see 3GPP TS 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 #45 – Syntactical error in packet filter(s)
	ERROR_TRIGGER_EVENT	Cause #45 – Syntactical error in packet filter(s)
403 Forbidden	TRAFFIC_MAPPING_INFO_REJECTED	Cause #44 – Semantic errors in packet filter(s)
	ERROR_CONFLICTING_REQUEST	Cause #26 "Insufficient resources"

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

5.3.1 General

This subclause 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 subclause 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
404 Not Found	USER_NOT_FOUND	#29 "User authentication or authorization failed"

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 subclause 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	Insufficient resources Network Failure Insufficient resources for specific slice
77	System failure	#31	Request rejected, unspecified

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	003	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

History

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