



# Failure/Exception Handling Framework Support

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## Feature Summary and Revision History

### Summary Data

*Table 1: Summary Data*

Applicable Product(s) or Functional Area	AMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled – Always-on
Related Documentation	Not Applicable

### Revision History

*Table 2: Revision History*

Revision Details	Release
First introduced.	2021.04.0

# Support for Failure/Exception Handling Framework

AMF can now handle errors that occur during procedures. The messaging between the AMF-Service and the protocols have enough information so that when an error reaches the AMF-Service, it can determine:

- Whether the error was internal (for example, node selection failure, NRF discovery failure) or a NOT OK status code was returned by a protocol.
- The protocol or entity that generated the error.
- An error code itself

## Error Handling on UDM Interface

### SDM Errors

The following errors are expected on UDM interface during the GET Operation, and causes the actions described below:

**Table 3: SDM Errors - 1**

Application Error	Description	NAS Cause Code	Action
<b>404 Not Found</b>			
DATA_NOT_FOUND	The requested UE subscription data is not found/does not exist. This error is applicable to all Nudm_SDM GET operations.	#7, 5GS services not allowed	Registration Reject
USER_NOT_FOUND	The user does not exist.	#7, 5GS services not allowed	Registration Reject

The following errors are not expected. If they occur, it is either due to a logic miss or a complicated race condition.

**Table 4: SDM Errors - 2**

Application Error	Description	Response to UE
<b>404 Not Found</b>		
CONTEXT_NOT_FOUND	It is used during the modification of an existing subscription when no corresponding context exists.	Need to respond with cause #9, UE Identity Not Derived By Network

## UECM Errors

The following errors are expected on UECM interface during the POST Operation, and causes the actions described below:

**Table 5: UECM Errors - 1**

Application Error	Description	NAS Cause Code/Action
<b>403 Forbidden</b>		
UNKNOWN_5GS_SUBSCRIPTION	No 5GS subscription is associated with the user.	#7, 5GS services not allowed
NO_PS_SUBSCRIPTION	No PS (5GS, EPS, GPRS) subscription is associated with the user.	#7, 5GS services not allowed
ROAMING_NOT_ALLOWED	The subscriber is not allowed to roam within that PLMN.	#13, Roaming not allowed in the tracking area
ACCESS_NOT_ALLOWED	Access type is not allowed for the user.	#7, 5GS services not allowed
RAT_NOT_ALLOWED	RAT is not allowed for the user.	#7, 5GS services not allowed
INVALID_GUAMI	The AMF is not allowed to modify the registration information stored in the UDM as it is not the registered AMF.	#15, No suitable cells in tracking area
<b>404 Not Found</b>		
USER_NOT_FOUND	The user does not exist in the HPLMN.	#7, 5GS services not allowed
CONTEXT_NOT_FOUND	It is used when no corresponding context exists.	#15, No suitable cells in tracking area

The following errors are not expected. If they occur, it is due to a logic error. Since AMF always rejects a message in this state, the error should be logged, and the call must be rejected with NO SUITABLE CELLS IN TRACKING AREA.

**Table 6: UECM Errors - 2**

Application Error	Description	Response to UE
<b>422 Unprocessable Entity</b>		
UNPROCESSABLE_REQUEST	The request cannot be processed due to semantic errors when trying to process a patch method.	Registration Reject with Cause #111, protocol error unspecified

# Error Handling on AUSF Interface

**Table 7: AUSF Interface Errors**

Application Error	Description	NAS Cause Code	Response to UE
<b>403 Forbidden</b>			
SERVING_NETWORK_NOT_AUTHORIZED	The serving network is not authorized. For example, serving PLMN	#11, PLMN not allowed	Registration Reject
AUTHENTICATION_REJECTED	The user cannot be authenticated with this authentication method. For example, only SIM data available	#3, Illegal UE	Registration Reject
INVALID_HN_PUBLIC_KEY_IDENTIFIER	Invalid HN public key identifier received.	#3, Illegal UE	Registration Reject
INVALID_SCHEME_OUTPUT	SUCI cannot be decrypted with received data.	#3, Illegal UE	Registration Reject
<b>404 Not Found</b>			
CONTEXT_NOT_FOUND	The AUSF cannot find the resource corresponding to the URI provided by the NF Service Consumer.	#7, 5GS services not allowed	Registration Reject
USER_NOT_FOUND	The user does not exist in the HPLMN.	#7, 5GS services not allowed	Registration Reject
<b>501 Not implemented</b>			
UNSUPPORTED_PROTECTION_SCHEME	The received protection scheme is not supported by HPLMN.	#11, PLMN not allowed	Registration Reject

The following errors are temporary. The AMF rejects the request from the UE so that it can try another network.

**Table 8: Temporary Errors**

AUSF Application Error	HTTP Status Code	Description
UPSTREAM_SERVER_ERROR	504 Gateway Timeout	Registration Reject with cause #15, No suitable cells in tracking area

AUSF Application Error	HTTP Status Code	Description
NETWORK_FAILURE	504 Gateway Timeout	Registration Reject with cause #15, No suitable cells in tracking area
AV_GENERATION_PROBLEM	500 Internal Server Error	Registration Reject with cause #15, No suitable cells in tracking area

## Internal Errors on UDM/AUSF Interfaces

Table 9: Internal Errors

Error	Description	Reject Cause/Action
Timeout	The AMF does not get a response from UDM.	Registration Reject with cause #15, No suitable cells in tracking area
Timeout	5The AMF does not get a response from AUSF.	Drop the message

## Error Handling for Protocol Data – NAS

Table 10: NAS Error Handling

Protocol Data Error	AMF Handling
N1 message is too short to contain a complete message type information element.	Ignore the message.
N1 message with message type not defined or not implemented.	Return a status message with cause #97, message type non-existent or not implemented.
AMF cannot parse N1 message. It is a request message.	AMF formulates a reject message and sends it to UE.
AMF cannot parse N1 message as mandatory IE is missing. It is a response message.	Stop retransmission timer and treat it as transmission failure. Formulate and send 5GMM status message to UE with cause #96, invalid mandatory information.
Limit on repetition of information elements is exceeded.	AMF handles the contents of the information elements appearing first up to the limit of repetitions and ignores all subsequent repetitions of the information element.
N1 message with optional IEs that have incorrect syntax.	AMF ignores optional IEs and accepts rest of the message.

<b>Protocol Data Error</b>	<b>AMF Handling</b>
Conditional IE errors.	For Conditional IE handling, AMF sends MM status message with cause #100 CONDITIONAL_IE_ERROR