



Evaluation and validation of connected
mobility in real open systems beyond
5GS

Edge Cloud – AsSessionWithQoS API

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1 NEF-AsSessionWithQoS

The **AsSessionWithQoS API** enables an Application Function (AF) to establish and manage application sessions with specific Quality of Service (QoS) according to 3GPP standards. The AF typically specifies the required QoS level by indicating a **5QI (5G QoS Identifier)**, and additional policies such as bandwidth limits can also be applied. This RESTful API defines the data models, resources, and procedures for creating and managing AS sessions with required QoS (3GPP TS 29.122, [subclause 5.14.1](#)). The session setup and policy enforcement are implemented via the PCF's **Npcf_PolicyAuthorization** standard call, with the **NEF** mediating the request to the PCF.

2 Sequence Diagram

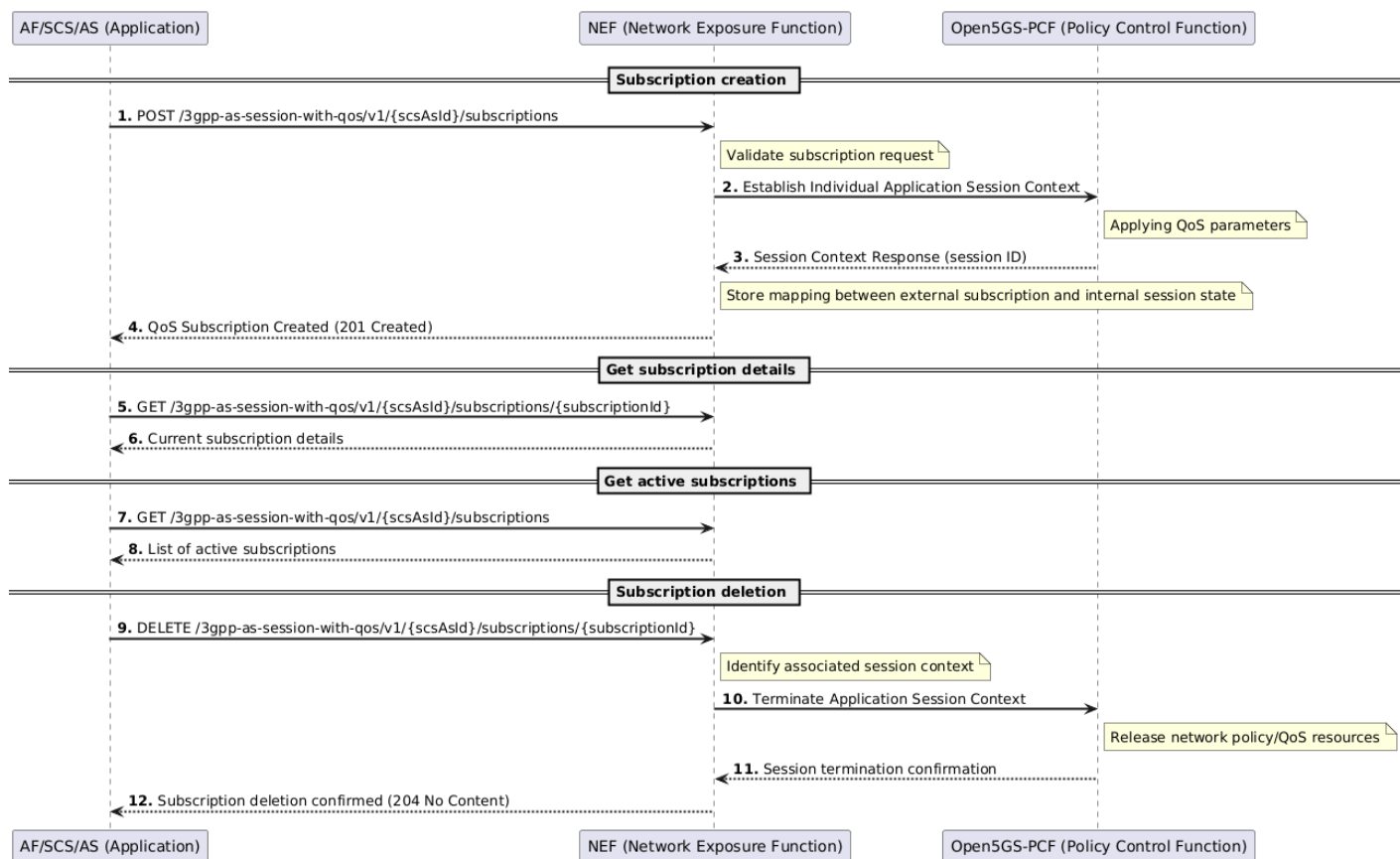


Figure 1. QoS sequence diagram

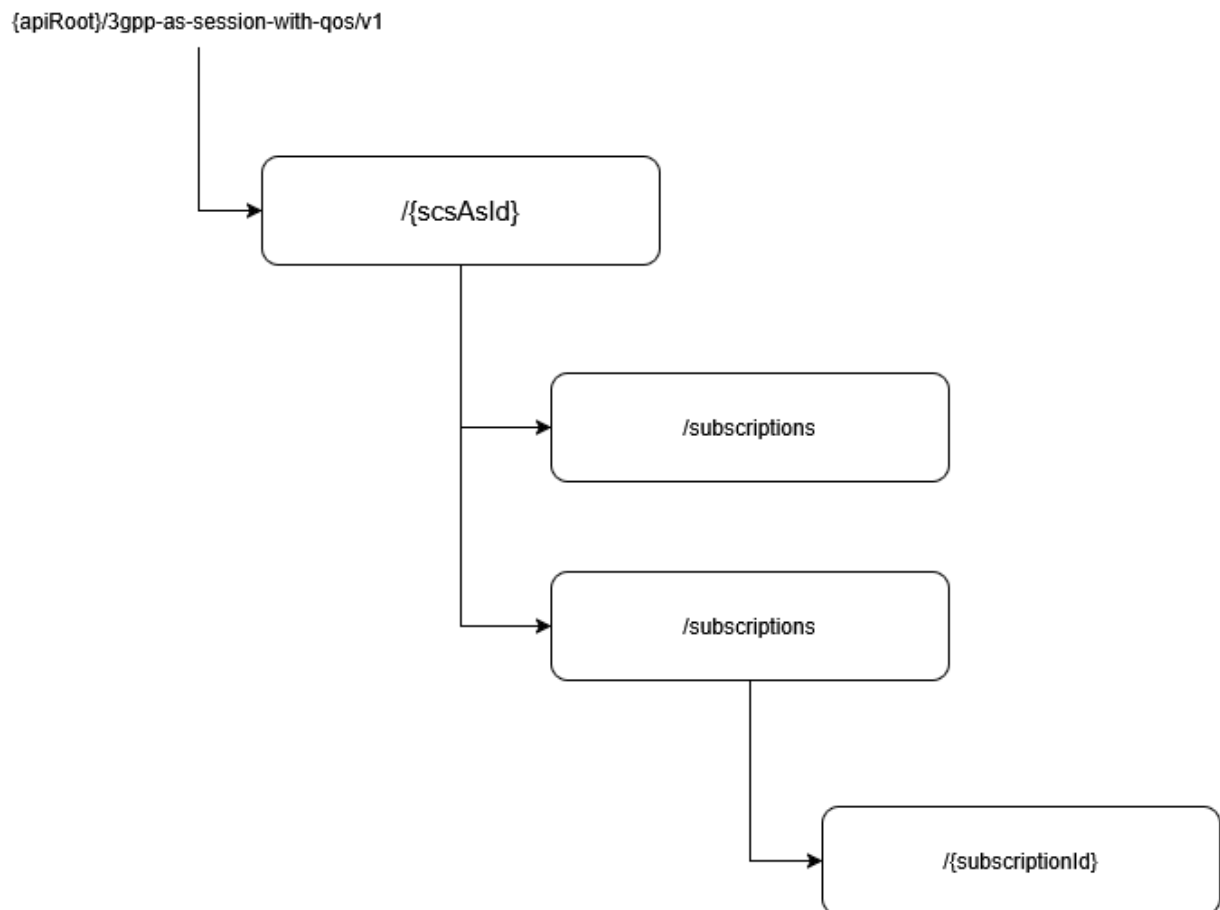
The following explanation corresponds to the sequence diagram shown in Figure 1.

1. AF/SCS/AS sends POST /3gpp-as-session-with-qos/v1/{scsAsId}/subscriptions to the NEF to create a QoS subscription.
2. NEF establishes an Individual Application Session Context on the PCF.
3. PCF returns the Session Context Response (session ID) to the NEF.
4. NEF replies to the AF with 201 Created, confirming the QoS subscription.
5. AF sends GET /3gpp-as-session-with-qos/v1/{scsAsId}/subscriptions/{subscriptionId} to retrieve a specific subscription.
6. NEF returns the current subscription details to the AF.
7. AF sends GET /3gpp-as-session-with-qos/v1/{scsAsId}/subscriptions to list all active subscriptions.
8. NEF returns the list of active subscriptions to the AF.
9. AF sends DELETE /3gpp-as-session-with-qos/v1/{scsAsId}/subscriptions/{subscriptionId} to remove the subscription/policy.
10. NEF instructs the PCF to terminate the Application Session Context.
11. PCF returns session termination confirmation to the NEF.
12. NEF responds to the AF with 204 No Content, confirming deletion.

Throughout this flow, the NEF mediates all AF interactions with the PCF, exposing simple create, read, and delete operations for managing QoS application sessions.

3 AsSessionWithQoS API definition

3.1 Northbound APIs



All resource URIs of this API should have the following root:

- `{apiRoot}/3gpp-as-session-with-qos/v1`

"apiRoot" is set as described in clause 5.2.4. "apiName" shall be set to "3gpp-as-session-with-qos" and "apiVersion" shall be set to "v1" for the version defined in the present document. All resource URIs in the clauses below are defined relative to the above root URI.

3.1.1 Resources and Methods Overview

Resource name	Resource URI	HTTP method	Meaning
AS Session with Required QoS Subscriptions	{scsAsId}/subscriptions	GET	Get all or queried subscription resources for a given SCS/AS.
		POST	Create a new AS session.
Individual AS Session with Required QoS Subscription	{scsAsId}/subscriptions/{subscriptionId}	GET	Read a subscription resource for a given SCS/AS and a subscription Id.
		PUT	Modify a subscription resource for a given SCS/AS and a subscription Id.
		PATCH	Modify a subscription resource for a given SCS/AS and a subscription Id.
		DELETE	Delete a subscription resource for a given SCS/AS and a subscription Id.

3.1.2 Resource: AS Session with Required QoS Subscriptions

This resource allows the SCS/AS to read all active AS session with required QoS subscription resources, or create a new subscription resource for the SCS/AS.

Resource URI: {apiRoot}/3gpp-as-session-with-qos/v1/{scsAsId}/subscriptions

Resource	URI	Variables
Name	Data type	Definition
apiRoot	string	See clause 5.2.4.
scsAsId	string	Identifier of the SCS/AS.

3.1.2.1 GET

Allows reading all or queried active subscriptions for a given SCS/AS. The SCS/AS initiates the HTTP GET request and the SCEF responds.

3.1.3 URI Query Parameters

Name	Data type	Cardinality	Remarks	Applicability
ip-addr	array(IpAddr)	0..N	The IP address(es) of the requested UE(s).	enNB
ip-domain	string	0..1	The IPv4 address domain identifier. The attribute may only be provided if IPv4 address is included in the ip-addr query parameter.	enNB
mac-addr	array(MacAddr48)	0..N	The MAC address(es) of the requested UE(s).	enNB
NOTE: Either the "ip-addr" parameter or the "mac-addr" parameter may be provided at the same time. If multiple elements are provided in the array structure, then each element shall be treated as a separate query parameter.				

3.1.4 Data structures supported by the GET request/response by the resource

Request body	Data type	Cardinality	Remarks	
	none			
Response body	Data type	Cardinality	Response codes	Remarks
	array(AsSessionWithQoSSubscription)	0..N	200 OK	The subscription information related to the request URI is returned.
	none		307 Temporary Redirect	Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SCEF. Redirection handling is described in clause 5.2.10.
	none		308 Permanent Redirect	Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SCEF. Redirection handling is described in clause 5.2.10.

NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 also apply.

3.1.5 POST

Creates a new subscription resource for a given SCS/AS. The SCS/AS initiates the HTTP POST request and the SCEF responds.

3.1.6 Data structures supported by the POST request/response by the resource

Request body	Data type	Cardinality	Remarks	
	AsSessionWithQoSSubscription	1	Parameters to create a subscription for an AS session with required QoS for the service requirement.	
Response body	Data type	Cardinality	Response codes	Remarks
	AsSessionWithQoSSubscription	1	201 Created	The subscription was created successfully. The URI of the created resource shall be returned in the "Location" HTTP header.

NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 also apply.

3.1.7 Headers for 201 Response

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/3gpp-as-session-with-qos/v1/{scsAsId}/subscriptions/{subscriptionId}

3.1.8 PUT/PATCH/DELETE

Those http methods are not supported for this particular resource.

3.1.9 Resource: Individual AS Session with Required QoS Subscription

This resource allows an SCS/AS to query, update and delete an AS session with required QoS subscription.

Resource URI: {apiRoot}/3gpp-as-session-with-qos/v1/{scsAsId}/subscriptions/{subscriptionId}

Resource URI Variables

Name	Data type	Definition
apiRoot	string	See clause 5.2.4.
scsAsId	string	Identifier of the SCS/AS of type ScsAsId.
subscriptionId	string	Identifier of the subscription resource of type string. The subscriptionId corresponds to the stage 2 TLTRI.

3.1.10 GET

The GET method allows to read a subscription resource. The SCS/AS shall initiate the HTTP GET request message, and the SCEF shall respond to the message.

3.1.11 Data structures supported by the GET request/response by the resource

Request body	Data type	Cardinality	Remarks	
	none			
	Data type	Cardinality	Response codes	Remarks
Response body	AsSessionWithQoSSubscription	1	200 OK	The subscription information related to the resource URI is returned.
	none		307 Temporary Redirect	Temporary redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SCEF. Redirection handling is described in clause 5.2.10.
	none		308 Permanent Redirect	Permanent redirection, during subscription retrieval. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SCEF. Redirection handling is described in clause 5.2.10.

NOTE: The mandatory HTTP error status codes for the GET method listed in table 5.2.6-1 also apply.

3.1.12 DELETE

The DELETE method deletes the AsSessionWithQoSSubscription resource and terminates the related subscription. The SCS/AS shall initiate the HTTP DELETE request message and the SCEF shall respond to the message.

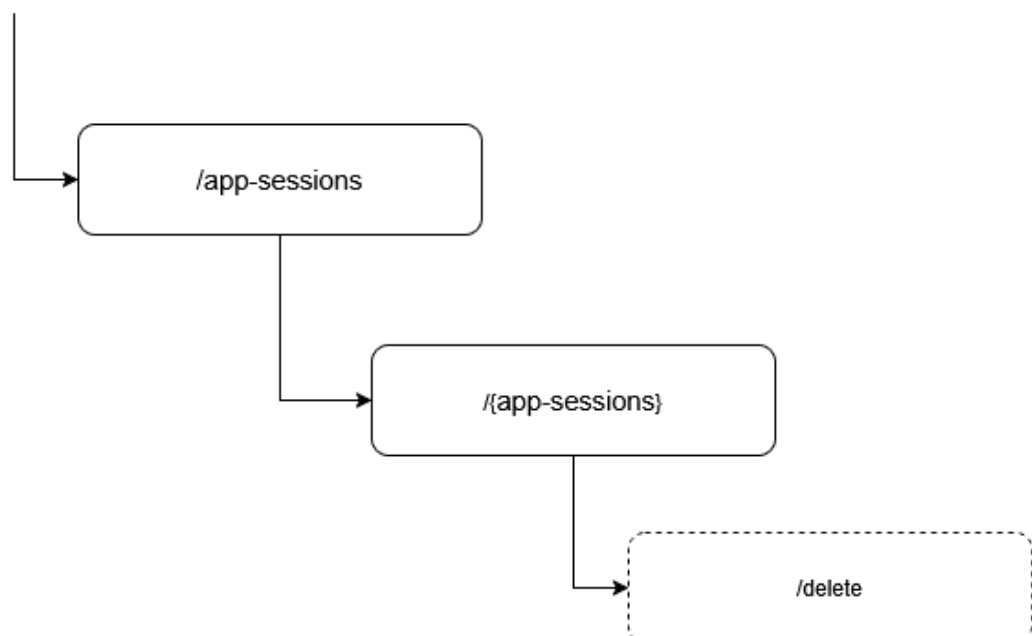
3.1.13 Data structures supported by the GET request/response by the resource

Request body	Data type	Cardinality	Remarks	
	none			
Response body	Data type	Cardinality	Response codes	Remarks
	none		204 No Content	The subscription was terminated successfully. The response body shall be empty.
	UserPlaneNotificationData	1	200 OK	The subscription was terminated successfully. The user plane notification data shall be included in the response.
	none		307 Temporary Redirect	Temporary redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SCEF. Redirection handling is described in clause 5.2.10.
	none		308 Permanent Redirect	Permanent redirection, during subscription termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative SCEF. Redirection handling is described in clause 5.2.10.
NOTE: The mandatory HTTP error status codes for the DELETE method listed in table 5.2.6-1 also apply.				

For more information about Data types or error responses, please refer to **3GPP_TS_29.122v17**.

3.2 Southbound APIs

{apiRoot}/npcf-policyauthorization/v1



Use this base URL for all endpoints:

- {apiRoot}/npcf-policyauthorization/v1

Set apiRoot as defined in 3GPP TS 29.501. Use apiName = "npcf-policyauthorization" and apiVersion = "v1". All resource paths below are relative to this base URL. HTTP/2 shall be used for this API as specified in 3GPP TS 29.500.

3.2.1 Resources and Methods Overview

Resource name	Resource URI	HTTP method or custom operation	Description
Application Sessions	/app-sessions	POST	Npcf_PolicyAuthorization_Create. Creates a new Individual Application Session Context resource and may create the child Events Subscription sub-resource.
	/app-sessions/pccsf-restoration	PccsfRestoration (POST)	P-CSCF restoration. It indicates that P-CSCF restoration needs to be performed.
Individual Application Session Context	/app-sessions/{appSessionId}	PATCH	Npcf_PolicyAuthorization_Update. Updates an existing Individual Application Session Context resource. It can also update an Events Subscription sub-resource.
		GET	Reads an existing Individual Application Session Context resource.
	/app-sessions/{appSessionId}/delete	delete (POST)	Npcf_PolicyAuthorization_Delete. Deletes an existing Individual Application Session Context resource and the child Events Subscription sub-resource.
Events Subscription	/app-sessions/{appSessionId}/events-subscription	PUT	Npcf_PolicyAuthorization_Subscribe. Creates a new Events Subscription sub-resource or modifies an existing Events Subscription sub-resource.
		DELETE	Npcf_PolicyAuthorization_Unsubscribe. Deletes an Events Subscription sub-resource.

3.2.2 Resource: Application Sessions

The Application Sessions resource represents all application session contexts that exist in the Npcf_PolicyAuthorization service at a given PCF instance.

Resource URI: {apiRoot}/npcf-policyauthorization/v1/app-sessions

3.2.3 POST

3.2.4 Data structures supported by the POST request by the resource

Data type	P	Cardinality	Description
AppSessionContext	M	1	Contains the information for the creation of a new Individual Application Session Context resource.

3.2.5 Data structures supported by the POST response by the resource

Data type	P	Cardinality	Response codes	Description
AppSessionContext	M	1	201 Created	Successful case. The creation of an Individual Application Session Context resource is confirmed and a representation of that resource is returned.
n/a			303 See Other	The result of the HTTP POST request would be equivalent to the existing Application Session Context. The HTTP response shall contain a Location header field set to the URI of the existing individual Application Session Context resource.
ProblemDetails	O	0..1	400 Bad Request	(NOTE 2)
ExtendedProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
ProblemDetails	O	0..1	500 Internal Server Error	(NOTE 2)

NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the POST method shall also apply.

NOTE 2: Failure cases are described in clause 5.7.

3.2.6 Headers supported by the 201 Response Code on this resource

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}

3.2.7 Resource: Individual Application Session Context

The Individual Application Session Context resource represents a single application session context that exists in the Npcf_PolicyAuthorization service.

Resource URI: {apiRoot}/npcf-policyauthorization/v1/app-sessions/{appSessionId}

3.2.8 POST(DELETE)

Operation name	Custom operation URI	Mapped HTTP method	Description
delete	/app-sessions/{appSessionId}/delete	POST	Npcf_PolicyAuthorization_Delete. Deletes an existing Individual Application Session Context resource and the child Events Subscription sub-resource.

3.2.9 Data structures supported by the POST Response Body on this resource

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The Individual Application session context resource was deleted.
AppSessionContext	M	1	200 OK	Successful case. The Individual Application Session Context resource was deleted and a partial representation of that resource containing event notification information is returned.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection, during Individual Application Session Context termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative PCF (service) instance. Applicable if the feature "ES3XX" is supported.
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection, during Individual Application Session Context termination. The response shall include a Location header field containing an alternative URI of the resource located in an alternative PCF (service) instance. Applicable if the feature "ES3XX" is supported.
ProblemDetails	O	0..1	404 Not Found	(NOTE 2)
NOTE 1: In addition, the HTTP status codes which are specified as mandatory in table 5.2.7.1-1 of 3GPP TS 29.500 [5] for the POST method shall also apply.				
NOTE 2: Failure cases are described in clause 5.7.				

For more information about the Data types or error responses refer to **3GPP_TS_29.514v17**.

4 AsSessionWithQoS API swagger

https://redocly.github.io/redoc/?url=https://raw.githubusercontent.com/FRONT-research-group/NEF-QoS/refs/heads/main/ASessionWithQoS-openapi.yaml#tag/AsSessionWithQoS-API-Subscription-level-CRUD-Operations/operation/create_subscription_3gpp_as_session_with_qos_v1__scsAsId__subscriptions_post

5 AsSessionWithQoS github repository

<https://github.com/FRONT-research-group/NEF-QoS>