ENVELOPE

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

ATSSS API Specification

HORIZON JU Innovation Actions | 101139048 |
ENVELOPE - HORIZON-JU-SNS-2023

Co-funded by the European Union

6GSNS

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1 Introduction

The present document focuses on the ATSSS Multi-Connectivity Service, specifically addressing the ATSSS-T API within the ENVELOPE architecture. It specifies the API procedures and associated data models required to enable vertical applications (e.g., CAM Application Providers) to request and manage multi-connectivity services.

The objective of the ATSSS-T API is to:

- Ensure seamless multi-connectivity across heterogeneous networks (5G and Wi-Fi).
- Optimize traffic steering by dynamically applying ATSSS rules based on real-time conditions.
- Improve network resilience and performance by supporting redundancy, load balancing, and intelligent path selection.

2 API Overview

API name	Description	Modules Involved	Use Cases
ATSSS-T	Enables a vertical service to request via ATSSS policy function multi-connectivity service for its data traffic.	ATSSS Policy Function, AF	GR-UC-1

3 Sequence Diagram

The following subsection illustrates the sequential interaction of the ENVELOPE ATSSS-T API.

3.1 ATSSS-T

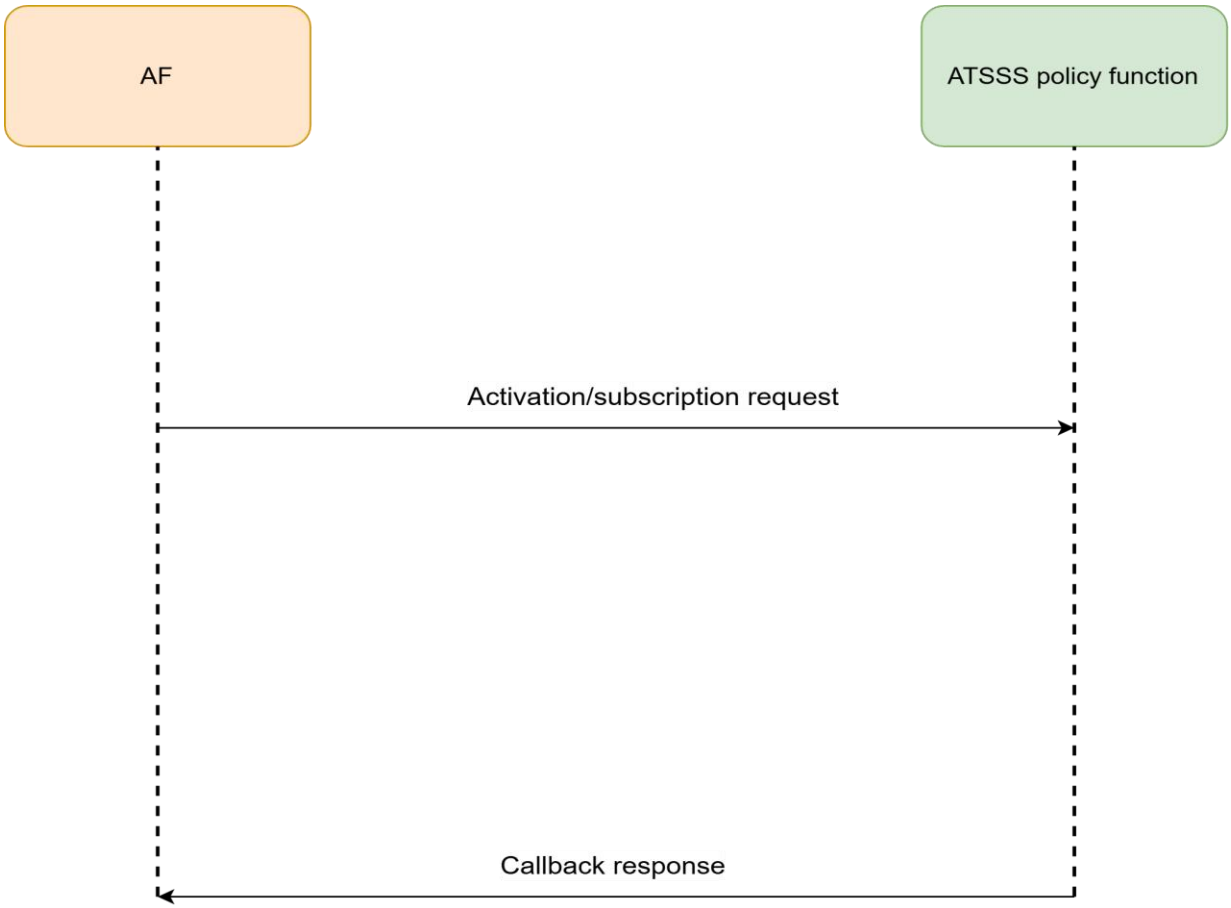

Figure 1. Message flow for the *ATSSS T* API

1. Vertical application sends an activation/subscription request to the ATSSS policy function through ENVELOPE interface, ATSSS-T.
2. The ATSSS policy function sends a callback response with the following notification: (i) whether the requested rule is feasible or not, (ii) when it can be activated.
3. This session will expire after a fixed time.
4. If the AF wants to send a new rule it will trigger a new subscription.

4 API definition

4.1 Resource structure

4.1.1 Resource URIs

The root of the resource URIs of the ATSSS-T API shall be:

{apiRoot}/{apiName}/

where apiName is set to **atsss-t**

The resource URI structure of this API is introduced in Figure 2.

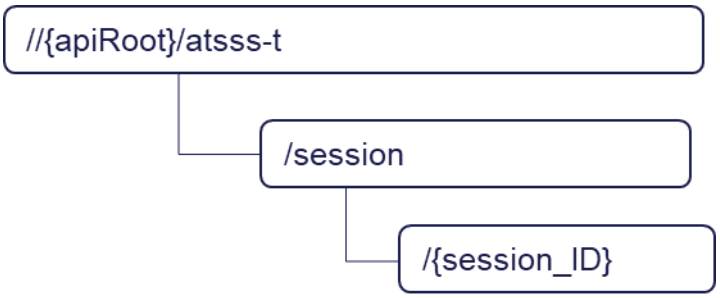

Figure 2. Resource URI structure for the ATSSS-T API

Table 1 introduces an overview of the resources and of the methods.

Table 1. Resources and methods overview

Resource name	Resource URI	HTTP method	Description
ATSSS-T	atsss-t/session	POST	Allows an AF to request multi-connectivity for its data traffic via ATSSS Policy Function
ATSSS-T	atsss-t/session/{session_ID}	GET	Retrieves details of an active ATSSS session, including applied steering rules
ATSSS-T	atsss-t/session/{session_ID}	DELETE	Ends an ongoing ATSSS session

4.2 Data model

4.2.1 AtsssTSession data type

Table 2. AtsssTSession data type

Field	Data Type	Cardinality	Description
serviceID	string	1	Unique identifier of the requesting vertical service
callbackUri	uri		Allows asynchronous notification for updating the AF about ATSSS session establishment
flowFilter	structure (inlined)	1	Traffic flow criteria
→ srcIP	string	1	Source IP address of the traffic flow
→ dstIP	string	1	Destination IP address of the traffic flow
→ srcPort	integer	0..1	Source port number (optional)
→ dstPort	integer	0..1	Destination port number (optional)
→ protocol	string	0..1	Transport protocol (e.g., TCP, UDP)
steeringPolicy	structure (inlined)	1	Defines the traffic steering policy for multi-connectivity
→ method	string (enum)	1	Traffic steering method. Possible values: • minRTT - prioritize access with the lowest RTT • load-balancing - distribute traffic according to the split ratio
→ splitRatio	structure (inlined)	1	Information about traffic distribution (access percentages). Applicable only when method = *load-balancing*
→ → 3GPP	integer	1	percentage being sent over 3GPP
→ → N3GPP	integer	1	percentage being sent over non-3GPP
duration	integer	1	Duration of the service request in seconds

4.2.2 AtsssTSessionRsp data type

Table 3. AtsssTSessionRsp data type

Field	Data Type	Cardinality	Description
sessionID	string	1	Unique identifier of the instantiated ATSSS session
serviceID	string	1	Identifier of the requesting vertical service
status	string (enum)	1	Status of the session. Possible values: accepted, rejected

4.2.3 AtsssTReport data type

Table 4. AtsssTReport data type

Field	Data Type	Cardinality	Description
sessionID	string	1	Unique identifier of the instantiated ATSSS session
serviceID	string	1	Identifier of the requesting vertical service
startTime	string (ISO-8601 timestamp)	1	Timestamp indicating when the session started (e.g., 2025-10-17T11:32:45Z).
status	string (enum)	1	Status of the session. Possible values: active, failed, ongoing
accessNetworks	Structure (inlined)	1	defines the networks involved in this session
→ accessId	Uint	1	Unique identifier for the access network connection
→ accessType	Uint	1	Numeric value (0 to 255) corresponding to specific type of access network as following: 0 = Unknown.

			1 =Any IEEE802.11-based WLAN technology. 2 = Any 3GPP-based Cellular technology. 3 = Any Fixed Access. 11 = IEEE802.11 a/b/g WLAN. 12 = IEEE 802.11 a/b/g/n WLAN. 13 = IEEE 802.11 a/b/g/n/ac WLAN. 14 = IEEE 802.11 a/b/g/n/ac/ax WLAN (Wi-Fi 6). 15 = IEEE 802.11 b/g/n WLAN. 31 = 3GPP GERAN/UTRA (2G/3G). 32 = 3GPP E-UTRA (4G/LTE). 33 = 3GPP NR (5G)
steeringPolicy	structure (inlined)	1	Defines the traffic steering policy for multi-connectivity
→ method	string (enum)	1	Traffic steering method. Possible values: • minRTT - prioritize access with the lowest RTT • load-balancing - distribute traffic according to the split ratio
→ splitRatio	structure (inlined)	1	Information about traffic distribution (access percentages). Applicable only when method = *load-balancing*
→ → 3GPP	integer	1	percentage being sent over 3GPP
→ → N3GPP	integer	1	percentage being sent over non-3GPP
duration	integer	1	Duration of the service request in seconds

4.2.4 ErrorResponse data type

Table 5. ErrorResponse data type

Field	Data Type	Cardinality	Description
status	integer	1	HTTP status code returned along with this error response
code	string	1	Code given to this error
message	string	1	Detailed error description

4.3 API operations

4.3.1 Resource: ATSSS-T multi-connectivity session request

The resource URI is: atsss-t/session

The content of the methods requests and response is JSON and it is indicated by setting the content type "application/json".

4.3.1.1 Resource methods

4.3.1.1.1 POST

Requests a multi-connectivity service for its traffic

Parameters: no parameters

Table 6. Data structures supported by the POST request on this resource

	Data type	Cardinality	Notes
Request body	AtsssTSession	1	

Table 7. Data structures supported by the POST response on this resource

	Data type	Cardinality	Response Codes	Notes
Response body	AtsssTSessionRsp	1	201	Session created
	ErrorResponse	0..1	400	Bad Request
	ErrorResponse	0..1	401	Unauthorized
	ErrorResponse	0..1	403	Forbidden
	ErrorResponse	0..1	409	Conflict
	ErrorResponse	0..1	500	Internal server error
	ErrorResponse	0..1	501	Not Implemented

4.3.1.1.2 GET

Retrieves details of an active ATSSS session

Parameters: **session_ID**

Table 8. Data structures supported by the GET response on this resource

	Data type	Cardinality	Response Codes	Notes
Response body	AtsssTReport	1	200	Retrieve session details
	ErrorResponse	0..1	400	Bad Request
	ErrorResponse	0..1	401	Unauthorized
	ErrorResponse	0..1	403	Forbidden
	ErrorResponse	0..1	409	Conflict
	ErrorResponse	0..1	500	Internal server error
	ErrorResponse	0..1	501	Not Implemented

4.3.1.1.3 DELETE

Ends an ongoing ATSSS session

Parameters: **session_ID**

Table 9. Data structures supported by the DELETE response on this resource

	Data type	Cardinality	Response Codes	Notes
Response body	AtsssTRsp	1	200 OK	Subscription deleted
	ErrorResponse	0..1	400	Invalid input for createSession operation
	ErrorResponse	0..1	401	Unauthorized
	ErrorResponse	0..1	403	Forbidden
	ErrorResponse	0..1	409	Conflict
	ErrorResponse	0..1	500	Internal server error
	ErrorResponse	0..1	501	Not Implemented

4.3.1.1.4 Callback Notification

Important: this endpoint is to be implemented by the API consumer. The ATSSS API service will call this endpoint (given during subscription creation by the 'callbackUri' field) whenever the ATSSS session is successfully established

Parameters: no parameters

Table 10. Data structures supported by the callback of this resource

	Data type	Cardinality	Notes
Request body	AtsssTReport	1	