



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

Performance Metrics API

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1 Introduction

The present document focuses on the Performance Metrics service. This document specifies the API with the data model and data format. We follow a similar approach of CAMARA specifications that target easy-to-use APIs.

The objective of the Performance Metrics API is to expose periodic network performance metrics (e.g., uplink/downlink throughput) so that vertical applications (server side) can monitor the current performance of a given device.

2 API Overview

API name	Description	Modules Involved	Use Cases
Name of the API	Short summary of the API	List of 5GS or other modules interacting with this API	List of Use Cases using the API
Performance metrics	Periodic network performance metrics (uplink/downlink throughput)	NEF, NWDAF, UPF	Dt-UC3, Dt-UC4, Dt-UC5

3 Sequence Diagrams

3.1.1 Network performance metrics

The *PerformanceMetrics* API is a new API developed in the ENVELOPE project to expose periodic network performance metrics (e.g., uplink/downlink throughput) to vertical applications.

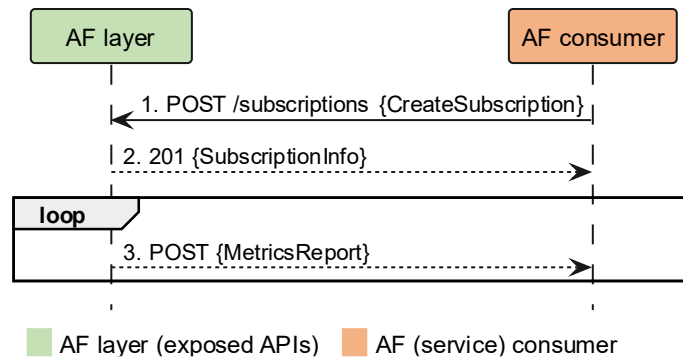


Figure 1 - Message flow for the *PerformanceMetrics* API

The message flow procedure for the *PerformanceMetrics* API is partially based on 3GPP¹² and follows a similar approach of CAMARA³ specifications that target easy-to-use APIs. This API has the following steps (as shown in Figure 1):

1. The AF consumer subscribes to periodic *PerformanceMetrics* notifications for a specified UE by giving a list of performance metrics such as uplink/downlink rates (throughput).
2. The AF layer confirms the subscription creation request.
3. Finally, the *PerformanceMetrics* *MetricsReport* is sent in the form of a periodic notification at the pre-defined AF consumer server endpoint.

4 API definition

4.1 Resource structure

4.1.1 Resource URIs

The root of the resource URIs of this API shall be:

¹ 3GPP TS 29.522 V17.14.0 (2024-06), Technical Specification, 3rd Generation Partnership Project; 5G System; Network Exposure Function Northbound APIs; Stage 3; Release 17

² 3GPP TS 23.288 V17.12.0 (2024-06), Technical Specification, 3rd Generation Partnership Project; 5G System; Architecture enhancements for 5G System (5GS) to support network data analytics services; Stage 3; Release 17

³ <https://camaraproject.org/connectivity-insights/>

{apiRoot}/{apiName}/

where apiName is set to performance-metrics

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

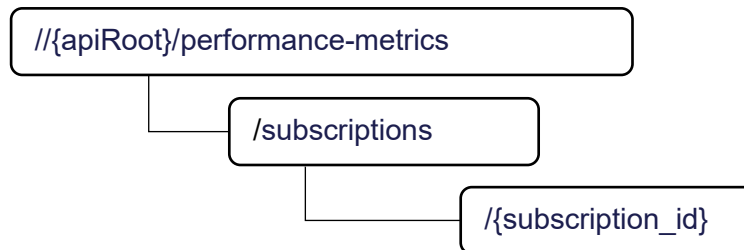


Figure 2 - Resource URI structure for the PerformanceMetrics API

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
Performance metrics subscription	performance-metrics/subscriptions	POST	Creates a new subscription
Individual performance metrics subscription	performance-metrics/subscriptions/{subscription_id}	DELETE	Delete a subscription

4.2 Data model

4.2.1 CreateSubscription data type

Table 2. CreateSubscription data type

Field	Data Type	Cardinality	Description
uelp	integer	1	The IPv4 address of the device (corresponding to the UE's PDU session to receive metrics for)
metricsSelection	array of strings	1..N	The metrics the consumer wishes to receive updates for. Possible values: "uplink_rate", "downlink_rate"
expiresAt	date-time	0..1	The time when the subscription should expire (RFC3339)
Interval	integer	1	The interval at which one wishes to receive updates
webhook	uri	1	Allows asynchronous notifications for receiving periodic metrics reports
→ notificationURI	uri	1	URI for asynchronous notifications.
→ notificationAuthToken	string	1	Authentication token.

4.2.2 SubscriptionInfo data type

Table 3. SubscriptionInfo data type

Field	Data Type	Cardinality	Description
subscriptionId	string	1	Identifier for this subscription
metricsSelection	array of strings	1..N	The metrics the consumer wishes to receive updates for. Possible values: "uplink_rate", "downlink_rate"

4.2.3 MetricsReport data type

Table 4. MetricsReport data type

Field	Data Type	Cardinality	Description
status	string	1	The status of this metrics report. Possible values: "UeNotFound", "FetchError", "Ok"
timestamp	string	1	The timestamp of the data with on which this report is based
subscriptionId	string	1	The performance metrics subscription id associated with this report
ulRate	integer	1	The uplink (UL) rate in bits/s
dlRate	integer	1	The downlink (DL) rate in bits/s

4.2.4 ErrorInfo data type

Table 5. ErrorInfo 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: Performance metrics subscriptions

The resource URI is: {apiRoot}/performance-metrics/subscriptions

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

Create a subscription to receive periodic UE's network performance (UL/DL) metrics.

Parameters: no parameters

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

Request body	Data type	Cardinality	Notes
	CreateSubscription	1	

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

Response body	Data type	Cardinality	Response Codes	Notes
	SubscriptionInfo	1	201	Subscription created
	ErrorInfo	0..1	404	UE not found
	ErrorInfo	0..1	422	Validation Error
	ErrorInfo	0..1	500	Internal server error

4.3.1.1.1.1 Callback

Important: this endpoint is to be implemented by the API consumer. The Performance Metrics server will call this endpoint (given during subscription creation by the 'webhook' field) whenever a new periodic Metrics Report is available.

Parameters: no parameters

Table 8. Data structures supported by the callback of this resource

Request body	Data type	Cardinality	Notes
	MetricsReport	1	

4.3.2 Resource: Individual performance metrics subscription

The resource URI is: {apiRoot}/performance-metrics/subscriptions/{subscription_id}

4.3.2.1 Resource methods

4.3.2.1.1 DELETE

Delete a performance metrics subscription.

Parameters support by this method are listed in Table 9.

Table 9. URI parameters supported by the DELETE method on this resource

Name	Data type	Cardinality	Notes
subscriptionId	string	1	Subscription identifier that was obtained from the create event subscription operation

Table 10. Data structures supported by the DELETE response on this resource

Response body	Data type	Cardinality	Response Codes	Notes
		1	204	Subscription deleted
	ErrorInfo	0..1	404	Subscription not found
	ErrorInfo	0..1	422	Validation Error
	ErrorInfo	0..1	500	Internal server error