ENVELOPE

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

Predictive Connectivity Data API

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Table of contents

1 Introduction

This document specifies the Predictive Connectivity Data API following CAMARA specification version 0.1.0 (September 2025 - Fall25 meta-release).

The objective of this API is to provide the capability to get the estimation of connectivity delivered by the B5G network along a volume/area for a future date, time and height. With this API, developers can access mobile network coverage information, including vertical layers for airspace, customizable geographic queries, and network technology differentiation, offering insights based on data about mobile network coverage.

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
Predictive Connectivity Data	Retrieve an estimation of connectivity delivered by 4/5G networks along a volume/area for a future date, time and height.	NEF, NWDAF	Use case Dt-UC5 from the Dutch site.

3 Sequence Diagrams

3.1.1 Connectivity Data

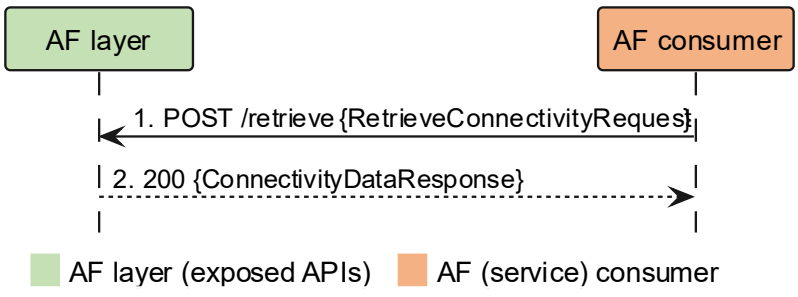

Figure 1 - Message flow for the **Connectivity Data** API

The message flow procedure for the *Connectivity Data* API is shown in Figure 1:

1. The AF consumer submits a request with body of type RetrieveConnectivityRequest.
2. The AF layer confirms the request with the payload ConnectivityDataResponse.

4 API definition

4.1 Resource structure

4.1.1 Resource URIs

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

{apiRoot}/{apiName}/

where apiName is set to predictive-connectivity-data

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

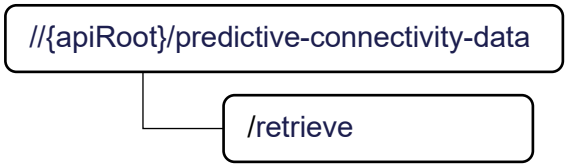

Figure 2 - Resource URI structure

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
Connectivity Data	/retrieve	POST	Retrieves the connectivity for a concrete area, specifying the required service level that has to be met in the whole area in the requested network type/s. Optionally, raw signal strength values can be included in the response if supported by the implementation.

4.2 Data model

4.2.1 RetrieveConnectivityRequest

Field	Data Type	Cardinality	Description
serviceLevel	string	1	Describes the requested communication service level.

			Possible service levels (*possibly more will be added*): • **C2**: Command and Control. • **STREAM_4K**: Streaming in 4K quality.
area	object	1	Base schema for all areas
→ **areaType**	string	1	Type of this area. Possible value: POLYGON.
startTime	date-time	1	Start date time. It must follow RFC 3339 and must have time zone.
endTime	date-time	1	End date time. It must follow RFC 3339 and must have time zone.
networkType	string	0..1	Specifies the type of connectivity for which to retrieve data. Allowed values: **5G**.
precision	integer	0..1	Precision required of response cells. Precision defines a geohash level and corresponds to the length of the geohash for each cell. More information at Geohash system" If not included the default precision level 7 is used by default. In case of using a not supported level by the MNO, the API returns the error response PREDICTIVE_CONNECTIVITY_DATA.UNSUPPORTED_PRECISION. minimum: 1 maximum: 12 default: 7
height	integer	0..1	Requested prediction height in metres above ground level. If a prediction height is specified, the response will include only the connectivity data for the layer containing that height. If no prediction height is specified, the response will include available prediction for all heights. minimum: 0 maximum: 250
includeSignalStrength	boolean	0..1	Optional parameter to request raw signal strength values in dBm for each layer. If set to true and supported by the implementation, the response will include signal strength data alongside connectivity quality information. If not supported by the implementation, this

			parameter will be ignored and only connectivity quality will be returned. default: false
sink	string	0..1	The address where the API response will be asynchronously delivered, using the HTTP protocol.
sinkCredential	object	0..1	A sink credential provides authentication or authorization information necessary to enable the delivery of events to a target.
→ **credentialType**	string	0..1	The type of the credential. Note: Type of the credential - MUST be set to ACCESSTOKEN for now

4.2.2 ConnectivityDataResponse

Field	Data Type	Cardinality	Description
layerThickness	number	1	Thickness in meters of each layer.
timedConnectivityData	object	1	Time ranges along with the connectivity data for the cells within it. The request startTime or the request endTime have to be fully covered by the intervals. For example, if the intervals are 1-hour long and the input date range were [2024-01-03T11:25:00Z to 2024-01-03T12:45:00Z] it would contain 2 intervals (Interval from 2024-01-03T11:00:00Z to 2024-01-03T12:00:00Z and interval from 2024-01-03T12:00:00Z to 2024-01-03T13:00:00Z).
→ **startTime**	date-time	1	Interval start time. It must follow RFC 3339 and must have time zone.
→ **startTime**	date-time	1	Interval end time. It must follow RFC 3339 and must have time zone.
→ **cellConnectivityData**	Array of CellConnectivity Data	1	Connectivity data for the different cells in a concrete time range.
status	string	1	Represents the state of the response for the input polygon defined in the request, the possible values are: SUPPORTED_AREA,

			PART_OF_AREA_NOT_SUPPORTED, AREA_NOT_SUPPORTED, OPERATION_NOT_COMPLETED
statusInfo	string	0..1	Information about the status, mandatory when property status is OPERATION_NOT_COMPLETED for adding extra information about the error.
requestedHeight	integer	0..1	The height in meters above ground level that was requested in the request. This property is only present if a specific height was requested.

4.2.3 CellConnectivityData

Field	Data Type	Cardinality	Description
geohash	string	1	Coordinates of the cell represented as a string using the Geohash system, encoding a geographic location into a short string. The value length, and thus, the cell granularity, is determined by the request body property precision. example: ezdmemd
layerConnectivities	Array of strings	1	Sequence of connectivity quality values in each of the layers in which the vertical space over the area determined by the geohash is decomposed. All layers are considered having the same layerThickness meters and are ordered consecutively in the array starting from the ground (First layer will start at 0 meters AGL). So the layer at index = N would comprise the heights, referenced to AGL, among N * layerThickness meters and (N+1) * layerThickness meters. If a specific height was requested, this array will contain only one element corresponding to the connectivity for the layer at

			that height. The possible connectivity values are: GC: Means good connectivity. Service level met even in unfavorable conditions. MC: Means marginal connectivity. Service level might not be met. NC: Means no connectivity. Service level not met. ND: No connectivity data. NOTE: These connectivity values are relative to the serviceLevel and networkType specified in the request.
layerSignalStrengths	Array of numbers (float)	0..1	Predicted signal strength values in dBm for each layer. This array is optional and will only be present if the includeSignalStrength parameter was set to true in the request and is supported by the implementation. The array follows the same structure as layerConnectivities, with each element corresponding to the signal strength in dBm for the same layer index. All layers are considered having the same layerThickness meters and are ordered consecutively starting from the ground (First layer starts at 0 meters AGL). A null value indicates no signal strength data is available for that layer. If a specific height was requested, this array will contain only one element corresponding to the signal strength for the layer at that height. example: -85.5 Signal strength value in dBm, or null if no data is available

4.2.4 AcceptedAsyncResponse

Field	Data Type	Cardinality	Description
operationId	string	1	The unique identifier of the asynchronous operation that is returned when the operation is initiated.

4.2.5 ErrorInfo

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: Connectivity Data

Resource URI: {apiRoot}/predictive-connectivity-data/retrieve

4.3.1.1 Resource methods

4.3.1.1.1 POST – Obtain connectivity information in the specified area

Retrieves the connectivity for a concrete area, specifying the required service level that has to be met in the whole area in the requested network type/s. Optionally, raw signal strength values can be included in the response if supported by the implementation.

Parameters:

Name	Data Type	Cardinality	Notes
x-correlator	string	0..1	Correlation id for the different services

Request body	Data type	Cardinality	Notes
	RetrieveConnectivityRequest	1	

	Data type	Cardinality	Response Codes	Notes
Response body	ConnectivityDataResponse	1	200	Connectivity data result.
	AcceptedAsyncResponse		202	Connectivity data requested. This response is returned when the behaviour of the API is asynchronous.
	ErrorInfo	0..1	400	Problem with the client request
	ErrorInfo	0..1	401	Authentication problem with the client request
	ErrorInfo	0..1	403	Client does not have sufficient permission
	ErrorInfo	0..1	404	Not found
	ErrorInfo	0..1	422	Additional problems with the client request other than INVALID_ARGUMENT (code 400)
	ErrorInfo	0..1	429	Too many requests