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Multi-access Edge Computing (MEC); Location API

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Foreword

This Group Specification (GS) has been produced by ETSI Industry Specification Group (ISG) Multi-access Edge Computing (MEC).

Modal verbs terminology

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1 Scope

The present document focuses on the MEC Location Service. It describes the related application policy information including authorization and access control, information flows, required information and service aggregation patterns. The present document specifies the necessary API with the data model and data format.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI GS MEC 001: "Multi-access Edge Computing (MEC); Terminology".

[2] ETSI GS MEC 002: "Mobile Edge Computing (MEC); Technical Requirements".

[3] ETSI GS MEC 003: "Multi-access Edge Computing (MEC); Framework and Reference Architecture".

[4] ETSI GS MEC 009: "Mobile Edge Computing (MEC); General principles for Mobile Edge Service APIs".

[5] OMA-TS-REST-NetAPI-ZonalPresence-V1-0-20160308-C: "RESTful Network API for Zonal Presence".

[6] OMA-TS-REST-NetAPI-TerminalLocation-V1-0-1-20151029-A: "RESTful Network API for Terminal Location".

[7] OMA-TS-REST-NetAPI-ACR-V1-0-20151201-C: "RESTful Network API for Anonymous Customer Reference Management".

[8] ETSI TS 129 171: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Location Services (LCS); LCS Application Protocol (LCS-AP) between the Mobile Management Entity (MME) and Evolved Serving Mobile Location Centre (E-SMLC); SLs interface (3GPP TS 29.171)".

[9] Void.

[10] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2".

NOTE: Available at https://www.rfc-editor.org/rfc/rfc5246.

[11] IETF RFC 6749: "The Oauth 2.0 Authorization Framework".

NOTE: Available at https://www.rfc-editor.org/rfc/rfc6749.

[12] IETF RFC 6750: "The Oauth 2.0 Authorization Framework: Bearer Token Usage".

NOTE: Available at https://www.rfc-editor.org/rfc/rfc6750.

[13] National Geospatial-Intelligence Agency (NGA) Standardization Document, World Geodetic System 1984, Its Definition and Relationships with Local Geodetic Systems, NGA.STND.0036-1.0.0-WGS84, 2014-07-08, Version 1.0.0.

NOTE: Available at https://earth-info.nga.mil/php/download.php?file=coord-wgs84.

[14] ETSI TS 123 032: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Universal Geographical Area Description (GAD) (3GPP TS 23.032).

[15] IETF RFC 6225: "Dynamic Host Configuration Protocol Options for Coordinate-Based Location Configuration Information".

NOTE: Available at https://www.rfc-editor.org/rfc/rfc6225.

[16] IETF RFC 8446: "The Transport Layer Security (TLS) Protocol Version 1.3".

NOTE: Available at https://www.rfc-editor.org/rfc/rfc8446.

[17] ETSI TS 129 572: "5G System;Location Management Services;Stage 3 (3GPP TS 29.572)".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] SCF 084.07.01: "Small cell zone services - RESTful bindings".

[i.2] SCF 152.07.01: "Small cell services API".

[i.3] OpenAPI™ Specification.

NOTE: Available at https://github.com/OAI/OpenAPI-Specification.

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GS MEC 001 [1] and the following apply:

Anonymous Customer Reference (ACR): Uniform Resource Identifier (URI) scheme describing an anonymous reference that can be mapped to a resource or user/user group

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GS MEC 001 [1] and the following apply:

ACR Anonymous Customer Reference

API	Application Programming Interface
E-SMLC	Evolved Serving Mobile Location Centre
ID	Identifier
LS	Location Service
OMA	Open Mobile Alliance
REST	Representational State Transfer
SCF	Small Cell Forum
UE	User Equipment
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
WGS	World Geodetic System

4 Overview

The present document specifies the Location Service API to support the requirements defined for Multi-access Edge Computing in ETSI GS MEC 002 [2]. The Location Service (LS) defined in the present document leverages the Zonal Presence service described in SCF 084.07.01 [i.1] and in SCF 152.07.01 [i.2]. The present document references some data types defined in the Open Mobile Alliance (OMA) specification "RESTful Network API for Zonal Presence" [5] and "RESTful Network API for Terminal Location" [6].

In addition, the present document contains application instructions on how the Anonymous Customer Reference (ACR) defined in [7] can be applied to fulfil the ETSI MEC requirement [Location-04] on addressing user categories defined in ETSI GS MEC 002 [2], and application instructions on how the 3GPP Cell Identifiers defined in ETSI TS 129 171 [8] can be mapped to the Access Point identifier of the OMA API [5].

The causes of the dramatic change from V2 to V3 are as follows:

1) To support the WebSocket feature, several new data types and resources need to be defined instead of being referenced from the OMA specifications, e.g. UserLocationEventSubscription, UserLocationPeriodicSubscription, etc.

2) Civic address and relative location are added to enhance the location services.

3) For better understanding, some modifications are implemented, including the combination of some similar procedures and deletion of redundant procedures.

5 Description of the service (informative)

5.1 Introduction

Location Service is a service to provide the location related information to the MEC platform or authorized applications. With location related information, the MEC platform or applications perform the active device location tracking, location-based service recommendation, etc., see ETSI GS MEC 002 [2]. The Location Service is registered and discovered over the Mp1 reference point defined in ETSI GS MEC 003 [3].

The Location Service supports the location retrieval mechanism, i.e. the location is reported only once for each location information request.

The Location Service supports the location subscribe mechanism, i.e. the location is able to be reported multiple times for each location request, periodically or based on specific events, such as location change.

The Location Service supports the anonymous location report, i.e. without the related UE ID information, e.g. for the statistics collection.

The Location Service supports the following location information:

- the location information of specific UEs currently served by the radio node(s) associated with the MEC host;
- the location information of all UEs currently served by the radio node(s) associated with the MEC host;

- the distance between specified UEs currently served by the radio node(s) associated with the MEC host;
- the distance between a specified location and a UE currently served by the radio node(s) associated with the MEC host;
- the location information of a certain category of UEs currently served by the radio node(s) associated with the MEC host;
- a list of UEs in a particular location area;
- the specific UEs which move in or out of a particular location area;
- information about the location of all radio nodes currently associated with the MEC host;
- subscriptions to location information are also offered, including periodic location information updates, updates on changes in distance and location updates relating to UEs in a particular location area.

The Location Service supports both geolocation, such as a geographical coordinates, and logical location, such as a Cell ID.

5.2 Relation with OMA

5.2.1 Void

5.2.2 Void

5.2.3 General

The Location Service before version 3.1.1 references the APIs and the data types defined in [5] and [6] with slight modifications on the URI of the service. Beginning with version 3.1.1, the LS defines its data types and APIs in support of other location information (e.g. civic address, relative location) and the websocket feature of the subscription. However, the present document still references some data types to avoid duplicate work. See clause 6.2.1 and clause 6.2.1A for detailed information.

5.3 Sequence diagrams

5.3.1 Introduction

Clauses 5.3.2 to 5.3.11 describe how the Service Consumers interact with the Location Service over LS API to obtain location information of a UE, a group of UEs or the radio nodes currently associated with the MEC host. The sequence diagrams that are relevant for the Location Service are presented.

The Service Consumers communicate with the Location Service over the LS API. Both the MEC application and MEC platform can be Service Consumers. Location information can be provided by both MEC platform and MEC application.

The Location Service API supports both queries and subscriptions (pub/sub mechanism) that can be used over RESTful API as per the mechanism in OMA APIs [5] and [6].

5.3.2 UE Location Lookup

The UE Location Lookup is the procedure for applications acquiring the current location information of a specific UE or a group of UEs.

The UE Location Lookup procedure is illustrated in figure 5.3.2-1.

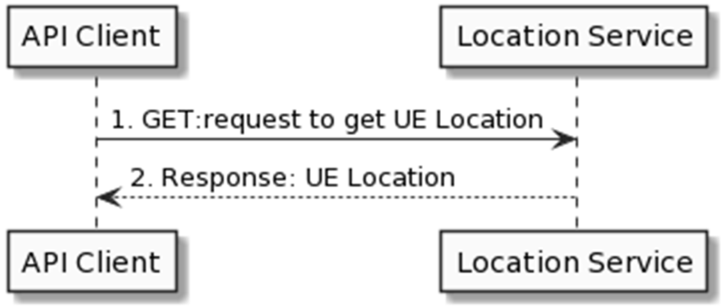

Figure 5.3.2-1: Flow of UE Location Lookup

1) The MEC application looks up UE location by sending a request to the resource representing the UE location, which includes location area information. The request may optionally include one or more query parameters specifying the sub-region of interest, the Access Point identifier and requirements on reporting timeliness and accuracy.

2) The Location Service returns a response with a message body including the UE location of the UE(s) according to the query parameters, if the UE location lookup is accepted.

5.3.3 Void

5.3.4 UE Location Subscribe

The UE Location Subscribe is the procedure for applications to request to receive notifications about some events happened, e.g. location information changes of a specific UE or a group of UEs or timer expiration, which for instance may help the applications to regularly track the UE(s) location. In this procedure, the Location Service will continue to report the subscribed information until the subscription is cancelled, or an optional specified time limit.

The UE Location Subscribe procedure is illustrated in figure 5.3.4-1.

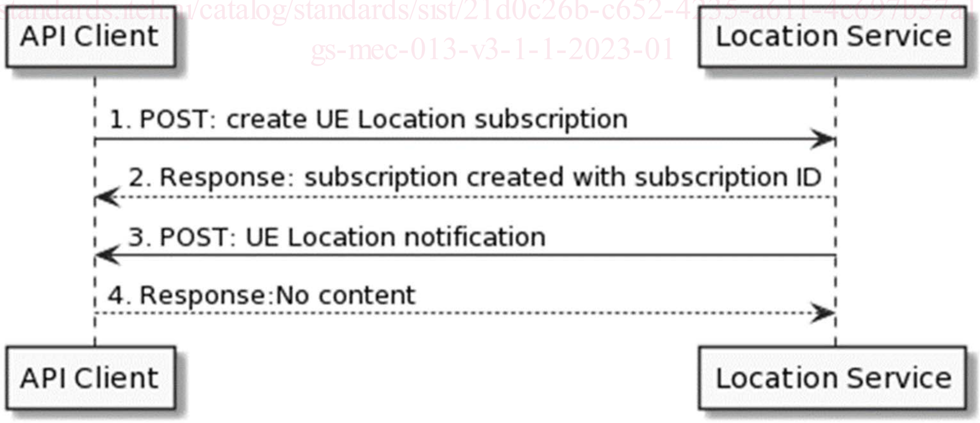

Figure 5.3.4-1: Flow of UE Location Subscribe

1) The MEC application subscribes to UE location notification by requesting the creation of a resource containing the subscription details, which includes UE(s) identifier, e.g. UE IP address, and a callbackURL for receiving the UE location.

2) The Location Service returns a response with resource URI containing the subscriptionId.

3) The Location Service reports the up-to-data subscribed information to the MEC application by sending a message with the message body containing the UE Location notification to the callbackURL, which includes location information.

4) The MEC application returns a response with the code 204.

5.3.5 Zone Location Event Subscribe

The Zone Location Event Subscribe is the procedure for API clients to receive notifications of UE location events related with a zone, e.g. UE entering the zone, UE leaving the zone. In this procedure, the Location Service will continue to report the subscribed information until the subscription is cancelled.

The Zone Location Event Subscribe procedure is illustrated in figure 5.3.5-1.

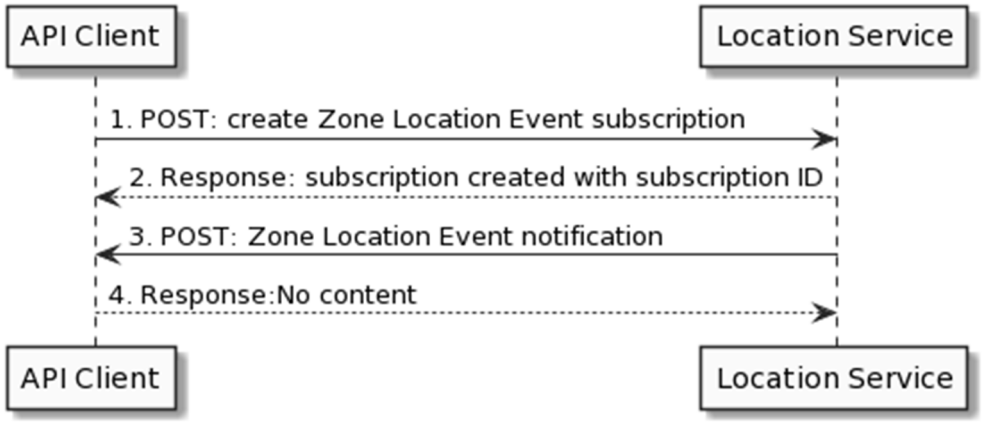

Figure 5.3.5-1: Flow of Zone Location Event Subscribe

1) The API Client (e.g. MEC application) subscribes to the Zone Location Event notification for azone by requesting the creation of a resource containing all subscription details, which includes zone Id and a callbackURL for receiving the notifications.

2) The Location Service returns a response with resource URI containing the subscriptionId.

3) The Location Service reports the subscribed information to the API Client by sending a message with the request body containing the UE location event related with the zone to the callbackURL.

4) The API Client returns a response with the code 204.

5.3.5A Zone Status Subscribe

The Zone Status Subscribe is the procedure for applications to receive notifications of the number of UEs reaching threshold or the status of access point changing. In this procedure, the Location Service will continue to report the subscribed information until the subscription is cancelled.

The Zone Status Subscribe procedure is illustrated in figure 5.3.5A-1.

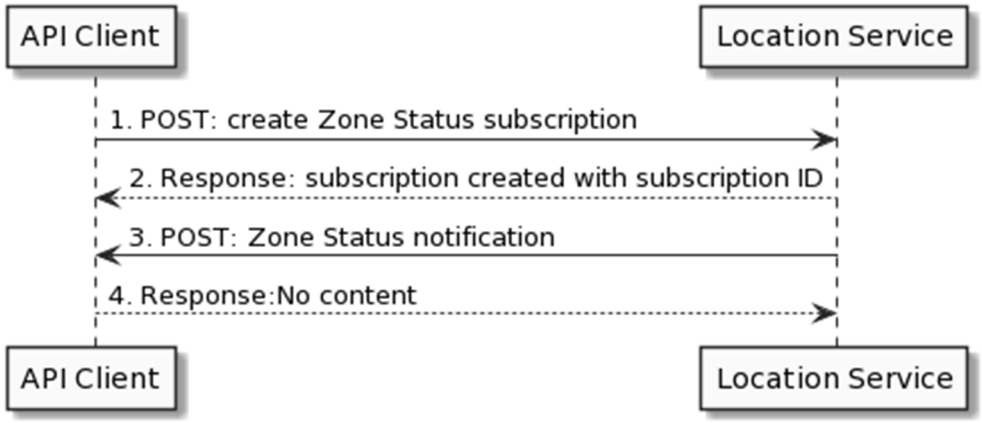

Figure 5.3.5A-1: Flow of Zone Status Subscribe

1) The API Client (e.g. MEC application) subscribes to the Zone Status notification for a particular area by requesting the creation of a resource containing all subscription details, which includes zone Id and a callbackURL for receiving the notifications.

2) The Location Service returns a response with resource URI containing the subscriptionId.

3) The Location Service reports the subscribed information to the API Client by sending a message with the request body containing the zone status notification to the callbackURL.

4) The API Client returns a response with the code 204.

5.3.6 Subscribe Cancellation

The Subscribe Cancellation is the procedure for applications to cancel the subscription, with which the Location Service stop reporting the subscribed information to the application.

The Subscribe Cancellation procedure is illustrated in figure 5.3.6-1.

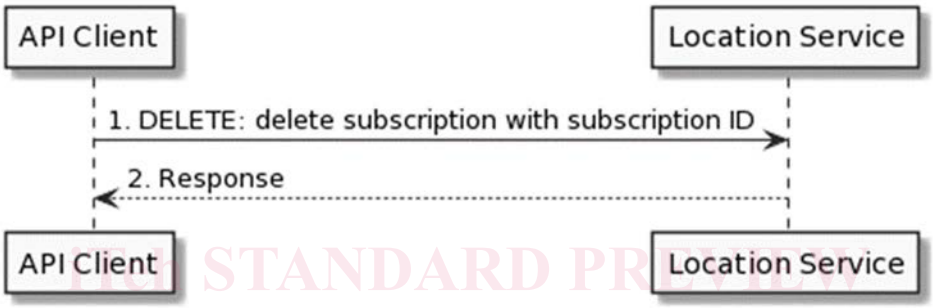

Figure 5.3.6-1: Flow of Location Subscribe Cancellation

1) The MEC application unsubscribes to notifications by sending a request to delete the resource URI containing the subscriptionId.

2) The Location Service returns a successful response if the subscription cancellation is accepted.

5.3.6A Zone List Lookup

The Zone List Lookup procedure enables an API client to make an enquiry about all the zones currently associated with the MEC host. The Zone List Lookup procedure is illustrated in figure 5.3.6A-1.

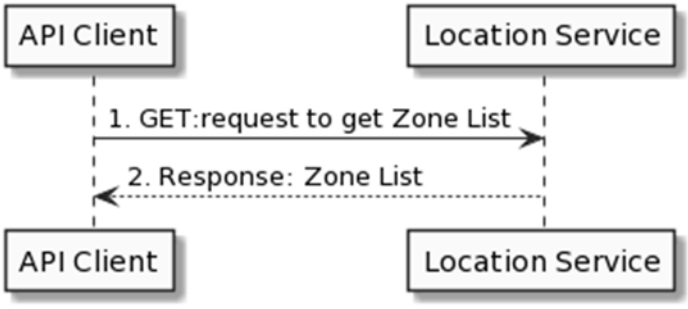

Figure 5.3.6A-1: Zone List Lookup

1) The API Client (e.g. MEC application) makes an enquiry about the zones currently associated with the MEC host by sending a request to the resource representing zones information.

2) The Location Service returns a response with message body including the list of zones currently associated with the MEC host.