ETSI GS MEC 013 V2.1.1 (2019-09)

Multi-access Edge Computing (MEC); Location API

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Contents

Intellectual Property Rights 5
Foreword 5
Modal verbs terminology 5
1 Scope 6
2 References 6
2.1 Normative references 6
2.2 Informative references 7
3 Definition of terms, symbols and abbreviations 7
3.1 Terms 7
3.2 Symbols 7
3.3 Abbreviations 7
4 Overview 8
5 Description of the service (informative) 8
5.1 Introduction 8
5.2 Relation with OMA APIs 9
5.2.1 Relation with OMA API for Zonal Presence 9
5.2.2 Relation with OMA API for Terminal Location 9
5.3 Sequence diagrams 9
5.3.1 Introduction 9
5.3.2 UE Location Lookup 9
5.3.3 UE Information Lookup 10
5.3.4 UE Location Subscribe 10
5.3.5 UE Information Subscribe 11
5.3.6 Subscribe Cancellation 12
5.3.7 Radio Node Location Lookup 12
5.3.8 UE Tracking Subscribe 12
5.3.9 UE Distance Lookup 13
5.3.10 UE Distance Subscribe 13
5.3.11 UE Area Subscribe 14
6 Data Model 15
6.1 Introduction 15
6.2 Resource data types 15
6.2.1 Zonal presence data types 15
6.2.1A Terminal location data types 15
6.2.2 Type: UserInfo 15
6.3 Subscription data types 16
6.3.1 Zonal presence data types 16
6.3.2 Terminal Location data types 16
6.3.3 Type: NotificationSubscriptionList 17
6.4 Notifications data types 17
6.4.1 Zonal presence data types 17
6.4.2 Terminal location data types 17
6.5 Referenced structured data types 18
6.5.1 Introduction 18
6.5.2 Type: TimeStamp 18
6.5.3 Type: LocationInfo 18
6.6 Mapping of Identifiers 19
6.6.1 accessPointId 19
6.6.2 userId 20
7 API definition 20
7.1 Introduction 20
7.2 Global definitions and relation with OMA resources 20

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https://standards.iteh.ai/catalog/standards/sist/9436ec04-05e7-4854-972f-56e3113b5701/etsi-gs-mec-013-v2.1.1-2019-09

7.3 Mapping of services to API functions 21
7.3.1 Introduction....21
7.3.2 UE Location Lookup 21
7.3.2.1 Definition 21
7.3.2.2 Example: Two steps method to retrieve the geographical coordinates of an access point a specific user is connected to (informative)....22
7.3.3 UE Information Lookup....23
7.3.3.1 Definition 23
7.3.3.2 Example: Retrieve UE Information for all the users (informative)....23
7.3.3.3 Example: Retrieve UE Information for the users in a zone (informative)....24
7.3.3.4 Example: Retrieve UE Information for the users in an access point of a zone (informative) 25
7.3.4 UE Location Subscribe 25
7.3.4.1 Definition 25
7.3.4.2 Example: create a UE Location subscription (informative) 26
7.3.4.3 Example: client notification about UE Location change (informative)....26
7.3.5 UE Information Subscribe 27
7.3.5.1 Definition 27
7.3.5.2 Example: create a UE Information subscription (informative) 27
7.3.5.3 Example: client notification about UE Information change (informative)....28
7.3.6 Subscribe Cancellation 28
7.3.6.1 Definition 28
7.3.6.2 Example: cancelling a UE Location subscription (informative) 29
7.3.6.3 Example: cancelling a UE Information subscription (informative) 29
7.3.6.4 Example: cancelling a UE Tracking subscription (informative) 29
7.3.6.5 Example: cancelling a UE Distance subscription (informative)....29
7.3.6.6 Example: cancelling a UE Area subscription (informative)....30
7.3.7 Radio Node Location Lookup....30
7.3.7.1 Definition 30
7.3.7.2 Example: Retrieve a list of radio nodes associated to a zone (informative)....30
7.3.8 UE Tracking Subscribe....31
7.3.8.1 Definition 31
7.3.8.2 Example: create a UE Tracking subscription (informative)....31
7.3.8.3 Example: client notification about UE Tracking change (informative) 32
7.3.9 UE Distance Lookup....33
7.3.9.1 Definition 33
7.3.9.2 Example: Distance between a terminal and a location (informative)....33
7.3.9.3 Example: Distance between two terminals (informative) 33
7.3.10 UE Distance Subscribe 34
7.3.10.1 Definition 34
7.3.10.2 Example: create a UE Distance subscription (informative) 34
7.3.10.3 Example: client notification about UE Tracking change (informative) 35
7.3.11 UE Area Subscribe....35
7.3.11.1 Definition 35
7.3.11.2 Example: create a UE Area subscription (informative)....36
7.3.11.3 Example: client notification about UE Area change (informative) 36

Annex A (informative): Complementary material for API utilisation 38

History 39

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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.

It is to be noted that the actual data model and data format which is functional for the present API re-uses the definitions in "RESTful Network API for Zonal Presence" [5] and "RESTful Network API for Terminal Location" [6] published by the Open Mobile Alliance.

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.

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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: "Multi-access Edge Computing (MEC); Technical Requirements".

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

[4] ETSI GS MEC 009: "Multi-access Edge Computing (MEC); General principles for MEC 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] IETF RFC 2818: "HTTP Over TLS".

NOTE: Available at https://tools.ietf.org/html/rfc2818.

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

NOTE: Available at https://tools.ietf.org/html/rfc5246.

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

NOTE: Available at https://tools.ietf.org/html/rfc6749.

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

NOTE: Available at https://tools.ietf.org/html/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 http://earth-info.nga.mil/GandG/publications/NGA_STND_0036_1_0_0_WGS84/NGA.STND.0036_1.0.0_WGS84.pdf.

[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://tools.ietf.org/html/rfc6225.

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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.

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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 Location Service is accessible through the API defined in the Open Mobile Alliance (OMA) specification "RESTful Network API for Zonal Presence" [5]. In addition, the LS offers capabilities of the API defined by the OMA specification "RESTful Network API for Terminal Location" [6].

In addition to referencing the OMA APIs [5] and [6], the present document contains application instructions on how to apply these OMA APIs in the MEC environment, and 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].

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;

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- 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 APIs

5.2.1 Relation with OMA API for Zonal Presence

The Zonal Presence service utilizes the concept of "zone", defined in OMA API [5]. According to the definition therein, a zone lends itself to be used to group all the radio nodes that are associated to a MEC host, or a subset of them, according to the desired deployment.

The OMA Zonal Presence API provides means for an application to retrieve information about a zone, the access points associated to the zones and the users that are connected to the access points. In addition, the OMA Zonal Presence API, allows authorized application to subscribe to a notification mechanism, reporting about user activities within a zone.

In the present document, clauses 6 and 7 define how the OMA Zonal Presence API is used in providing the MEC Location Service.

5.2.2 Relation with OMA API for Terminal Location

The OMA Terminal Location API [6] provides means for an application to retrieve information about the location of a terminal or group of terminals, as well as the distance between terminals, or distance of a terminal from a given location. In addition, the OMA Terminal Location API allows authorized application to subscribe to a notification mechanism, reporting about terminal location activities.

In the present document, clauses 6 and 7 define how the OMA Terminal Location API is used in providing the MEC Location Service.

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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. In this procedure, the Location Service will report the lookup result once on each request.

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

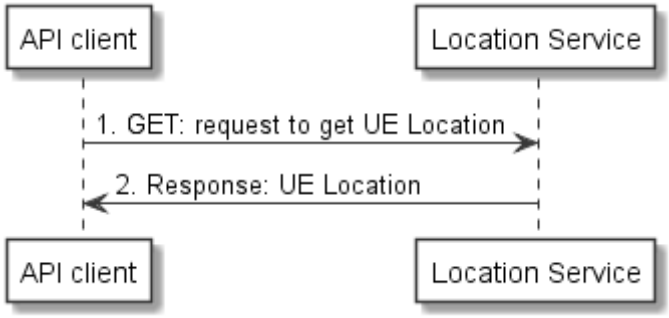

Figure 5.3.2-1: Flow of UE Location Lookup

1) The MEC application looks up one or more UE locations by sending a request to the resource representing UE locations, which includes the identifier for each UE, e.g. UE IP address. The request includes one or more query parameters specifying the UE or UEs of interest, and requirements on reporting timeliness and accuracy.

2) The Location Service returns a response with a message body including the location information of the UE(s) if the UE location lookup is accepted.

5.3.3 UE Information Lookup

The UE Information Lookup is the procedure for applications acquiring information pertaining to one or more UEs in a particular location. In this procedure, the Location Service will report the lookup result once on each request.

The UE Information Lookup procedure is illustrated in figure 5.3.3-1.

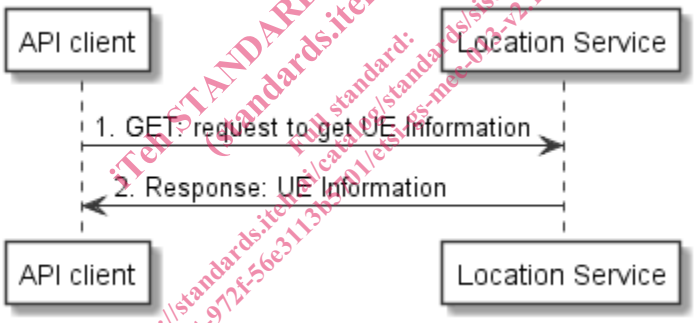

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Figure 5.3.3-1: Flow of UE Information Lookup

1) The MEC application looks up UE information in a particular area by sending a request to the resource representing the UE Information, 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 information of the UE(s) according to the query parameters in the location area, if the UE information lookup is accepted.

5.3.4 UE Location Subscribe

The UE Location Subscribe is the procedure for applications to request to receive notifications about location information changes of a specific UE or a group of UEs, 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.

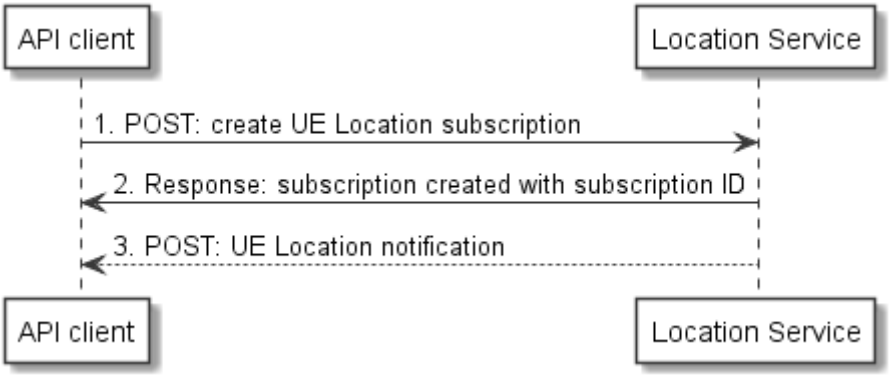

Figure 5.3.4-1: Flow of UE Location Subscribe

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.

5.3.5 UE Information Subscribe

The UE Information Subscribe is the procedure for applications to receive notifications of UE Information updates for the list of UEs in a particular location. Notifications can be to update status changes of UE information, e.g. UE entering the specified area. In this procedure, the Location Service will continue to report the subscribed information until the subscription is cancelled.

The UE Information Subscribe procedure is illustrated in figure 5.3.5-1.

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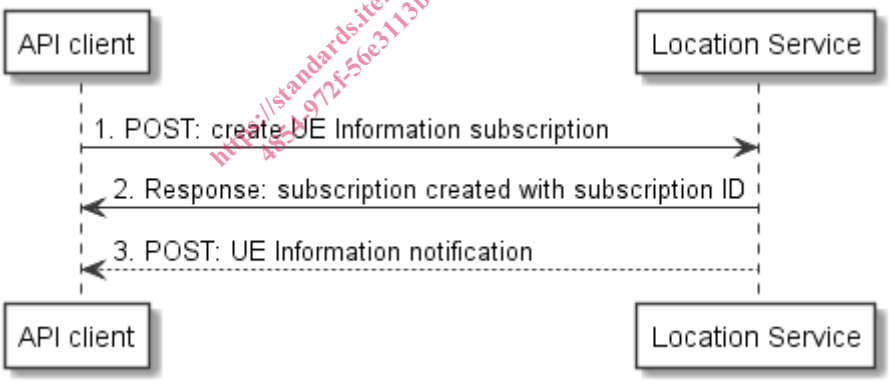

Figure 5.3.5-1: Flow of UE Information Subscribe

1) The MEC application subscribes to the UE information notification for a particular area by requesting the creation of a resource containing all subscription details, which includes location area information and a callbackURL for receiving the UE information.

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

3) The Location Service reports the subscribed information to the MEC application by sending a message with the request body containing the UE Information notification to the callbackURL, which includes the UE information for each UE in the location area.