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GROUP SPECIFICATION

Mobile Edge Computing (MEC); Location API

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Foreword

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

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document focuses on the Mobile Edge 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 is defined in "RESTful Network API for Zonal Presence" published by the Open Mobile Alliance [5].

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>.

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

- [1] ETSI GS MEC 001: "Mobile Edge Computing (MEC); Terminology".
- [2] ETSI GS MEC 002: "Mobile Edge Computing (MEC); Technical Requirements".
- [3] ETSI GS MEC 003: "Mobile 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-ACR-V1-0-20151201-C: "RESTful Network API for Anonymous Customer Reference Management".
- [7] 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)".
- [8] IETF RFC 2818: "HTTP Over TLS".

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

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

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

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

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

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

NOTE: Available at <https://tools.ietf.org/html/rfc6750>.

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.

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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 1: Available at <https://github.com/OAI/OpenAPI-Specification>.

NOTE 2: OpenAPI Specification version 2.0 is recommended as it is the official release at the time of publication.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions 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 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

4 Overview

The present document specifies the Location Service API to support the requirements defined for Mobile 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 to referencing the OMA API [5], the present document contains application instructions on how to apply the OMA API [5] in the MEC environment, and application instructions on how the Anonymous Customer Reference (ACR) defined in [6] 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 [7] 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 Mobile edge platform or authorized applications. With location related information, the Mobile edge 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 Mobile edge host;
- the location information of all UEs currently served by the radio node(s) associated with the Mobile edge host;
- the location information of a certain category of UEs currently served by the radio node(s) associated with the Mobile edge 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 Mobile edge host.

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

5.2 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 Mobile edge host, or a subset of them, according to the desired deployment.

The OMA Zonal Presence API provides means to 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 to provide the Mobile edge Location Service.

5.3 Sequence diagrams

5.3.1 Introduction

Clauses 5.3.2 to 5.3.7 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 Mobile edge 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 Mobile edge application and Mobile edge platform can be Service Consumers. Location information can be provided by both Mobile edge platform and Mobile edge 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 API [5].

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.

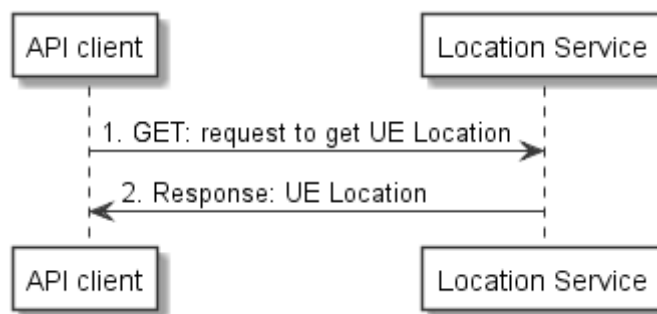


Figure 5.3.2-1: Flow of UE Location Lookup

- 1) The Mobile edge application looks up an UE location by sending a request to the resource representing the UE location, which includes the UE(s) identifier, e.g. UE IP address.
- 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 of a list of 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.

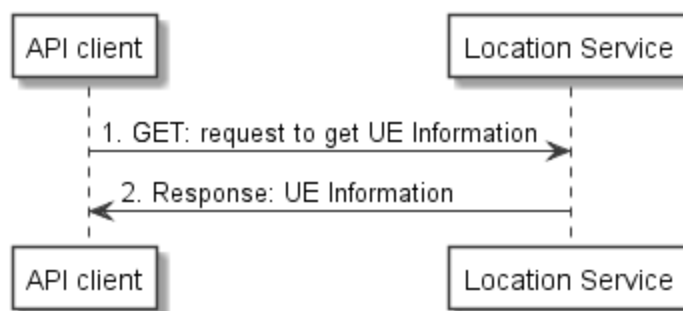


Figure 5.3.3-1: Flow of UE Information Lookup

- 1) The Mobile edge 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.
- 2) The Location Service returns a response with a message body including the list of UEs 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 acquiring up-to-date location information of a specific UE or a group of UEs in a period, which help the applications to track the UE(s). In this procedure, the Location Service will continue to report the subscribed information until the subscription is cancelled.

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 Mobile edge 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-date subscribed information to the ME 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. The UE Information can be to update the status changes or periodic notifications of UE information. 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.

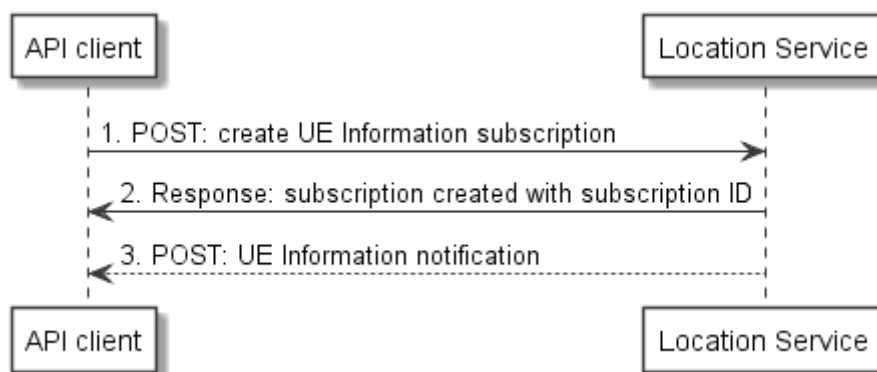


Figure 5.3.5-1: Flow of UE Information Subscribe

- 1) The Mobile edge 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 ME application by sending a message with the request body containing the UE Information notification to the callbackURL, which includes the UE information for the list of UEs in the location area.

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.

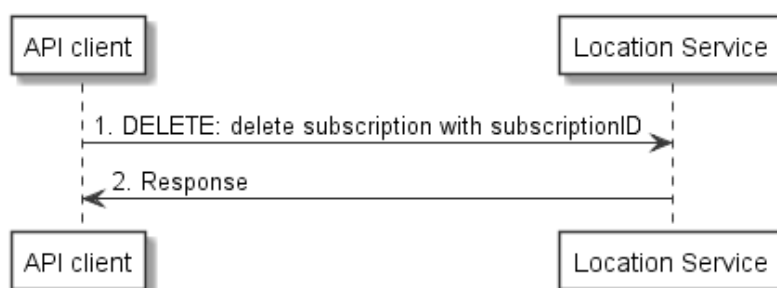


Figure 5.3.6-1: Flow of Location Subscribe Cancellation

- 1) The Mobile edge application unsubscribes the notification by sending a request to delete the resource URI containing the subscriptionId.
- 2) The Location Service returns a response if the subscription cancellation is accepted.

5.3.7 Radio Node Location Lookup

The Radio Node Location Lookup procedure enables an application to make a location enquiry about the radio nodes currently associated with the Mobile edge host. The Radio Node Location Lookup procedure is illustrated in figure 5.3.7-1.

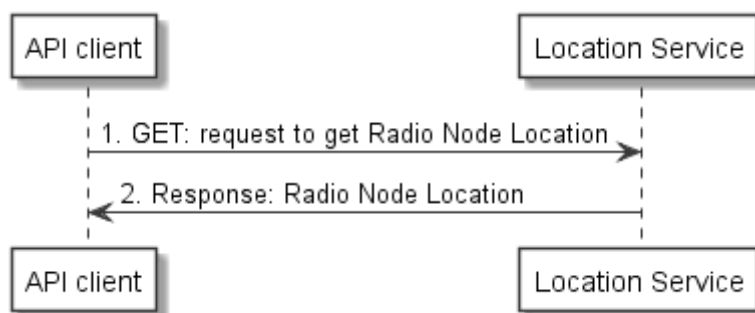


Figure 5.3.7-1: Radio Node Location Lookup

- 1) The Mobile edge application makes an enquiry about the radio nodes currently associated with the Mobile edge host by sending a request to the resource representing radio node information.
- 2) The Location Service returns a response with message body including the list of radio nodes currently associated with the Mobile edge host and the location of each radio node.

6 Data Model

6.1 Introduction

Data types from the API defined in [5] are reused. The following application instructions describe the mapping between the terminology used in the OMA specifications and the terminologies used in ETSI MEC and ETSI TS 129 171 [7].

6.2 Resource data types

6.2.1 Zonal presence data types

The data structures to be used in resource representations for the Location Service API consist in the following data types defined in [5], clause 5:

- **ZoneList**
A type containing list of zones;
- **ZoneInfo**
A type containing zone information;
- **AccessPointList**
A type containing list of access points;
- **AccessPointInfo**
A type containing access point information;
- **UserList**
A type containing list of users;
- **UserInfo**
A type containing user information.

6.2.2 Type: UserInfo

This type represents the information related to a user attached to an access point associated to the Mobile edge host, such access point is in scope of the Location Service instance.

The UserInfo data type extends the UserInfo data type defined in [5], and its elements shall follow the notations provided in table 6.2.2-1.

Table 6.2.2-1: Definition of type UserInfo

Attribute name	Data type	Cardinality	Description
address	AnyURI	1	Address of user (e.g. 'sip' URI, 'tel' URI, 'acr' URI) currently on the access point, see note 1.
accessPointId	String	1	The identity of the access point the user is currently on, see note 1.
zoneId	String	1	The identity of the zone the user is currently within, see note 1.
resourceURL	String	1	Self-referring URL, see note 1.
locationInfo	LocationInfo	0..1	The geographical coordinates where the user is, see note 2.
contextLocationInfo	String	0..1	Contextual information of a user location (e.g. aisle, floor, room number, etc.)
ancillaryInfo	String	0..1	Reserved for future use.
NOTE 1: As specified in [5], clause 5.2.2.7.			
NOTE 2: As specified in [5], clause 5.2.2.5.			

The address sub-element supports the representation of the UE's IP address, as specified in clause 6.6.2.

6.3 Subscription data types

The data structures to be used in subscriptions for the Location Service API consist in the following data types defined in [5], clause 5:

- NotificationSubscriptionList
A type containing list of zonal traffic, user tracking, and zone status subscription(s);
- ZonalTrafficSubscription
A root element named notificationSubscriptionList of type NotificationSubscriptionList is allowed in response bodies;
- UserTrackingSubscription
A type containing zonal traffic subscription;
- ZoneStatusSubscription
A type containing user tracking subscription.

6.4 Notifications data types

The data structures that define notifications for the Location Service API consist in the following data types defined in [5], clause 5:

- ZonalPresenceNotification
A type containing zonal presence notification;
- ZoneStatusNotification
A type containing zone status notification.

6.5 Referenced structured data types

The data structures that can be referenced from data structures defined in the previous clauses, but can neither be resource representations nor bound to any pub/sub mechanism, consist in the following data types defined in [5], clause 5:

- LocationInfo
A type containing location information with latitude, longitude and altitude, in addition the accuracy of the information is provided.

6.6 Mapping of Identifiers

6.6.1 accessPointId

With respect to identifiers assigned to access points in a cellular deployment, the accessPointId shall equal to an E-CGI concatenated with a Cell Portion ID as defined in ETSI TS 129 171 [7], i.e.:

- accessPointId = <E-CGI><Cell Portion ID>,

where the Cell Portion ID may not exist, if the cell does not contain portions.

6.6.2 userId

The Location Service allows using the UE's IP address as a user identifier. The OMA API [5] does not explicitly list IP address as a user identifier option (i.e. as part of the "address" Element of UserInfo). Therefore to satisfy the requirements of the Location Service, if a user identifier of type anyURI is in the form of an IP address, the "acr" scheme shall be used, followed by the UE's IP address, i.e.:

- address = acr:<UE's IP address>,

where the format of the UE's IP address shall be an IP literal encapsulated within square brackets or an IPv4 address in dotted-decimal form.

NOTE: The "acr" scheme can also be used to convey user identifiers other than an IP address, e.g. an alias.

7 API definition

7.1 Introduction

This clause defines the resources and operations of the Location Service API.

The resources and the operations defined by the Open Mobile Alliance Zonal Presence API [5] are reused. The relation with the resources defined in [5] and those used in this API is described in clause 7.2. The application instructions in clause 7.3 describe the mapping between the service descriptions of the MEC Location Service API (refer to clause 5) and the operations of the OMA Zonal Presence API [5].

7.2 Global definitions and relation with OMA resources

All the resources defined in [5], clause 6 are used in this API.

The "URL Base URL" defined in [5] as:

http://{serverRoot}/zonalPresence/{apiVersion}/{zoneOwnerId}

shall be replaced by the following URI root:

{apiRoot}/location/{apiVersion}/

"apiRoot" is discovered using the service registry, it includes the scheme ("http" or "https"), host and optional port, and an optional prefix string. The "apiVersion" shall be set to "v1" for the current version of the specification. It includes the scheme ("http" or "https"), host and optional port, and an optional prefix string. The API shall support HTTP over TLS (also known as HTTPS, defined in IETF RFC 2818 [8]). TLS version 1.2 as defined in IETF RFC 5246 [9] shall be supported. HTTP without TLS is not recommended.

All resource URIs defined in [5], clause 6 are re-defined for this API relative to the above root URI. Therefore, the URI variables "serverRoot" and "zoneOwnerId" defined for the resources in [5] are not used in this API, and shall be discarded.

This API shall require the use of the OAuth 2.0 client credentials grant type according to IETF RFC 6749 [10] with bearer tokens according to IETF RFC 6750 [11]. See ETSI GS MEC 009 [4], clause 7.16 for more information. How the token endpoint and client credentials are provisioned into the Mobile edge applications is out of scope of the present document.

The resource URI structure presented in [5], clause 5.1 and the summary tables therein shall apply for this API as well, except for the URI root, which shall be replaced by the one defined above.

7.3 Mapping of services to API functions

7.3.1 Introduction

This clause describes how the resources and operations defined by the OMA Zonal Presence API [5] shall be used in order to realize the operations of the present API.

7.3.2 UE Location Lookup

7.3.2.1 Definition

The UE Location Lookup (clause 5.3.2) of a single UE shall be realized by requesting the resource "Individual user information" defined in [5], clause 6.6.

The request URI shall be:

{apiRoot}/location/v1/users/{userId}

where {apiRoot} is defined in clause 7.2 and {userId} is the identifier of the user (e.g. tel:+19585550199, acr:alias1234, acr:10.0.0.1).

The response shall contain an instance of the UserInfo data type, associated to the user that matches with the userId provided in the request. If no locationInfo or contextLocationInfo sub-elements are included in the returned UserInfo instance, then the location may be inferred from the resource "Individual access point information" ([5], clause 6.4), requested using the accessPointId sub-element included in UserInfo as variable in the request URI of the "Individual access point information" resource.

7.3.2.2 Example: Two steps method to retrieve the geographical coordinates of an access point a specific user is connected to (informative)

In this example, the client issues a request to fetch the user location of a certain user identified by its IP address. If the UserInfo element in the response contains any of the locationInfo or contextLocationInfo subelements, then the procedure may stop, otherwise an additional request for the access point information may be issued.

Request 1

```
GET /exampleAPI/location/v1/users/acr%3A10.0.0.1 HTTP/1.1
Host: example.com
Accept: application/json
```

Response 1

```
HTTP/1.1 200 OK
Date: Sun, 01 Jan 2017 00:38:59 GMT
Content-Type: application/json
Content-Length: nnnn
```

```
{ "userInfo": {
  "address": "acr:10.0.0.1",
  "accessPointId": "00101000000000000000000000000001",
  "zoneId": "zone01",
  "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.1"
}}
```

Request 2

```
GET /exampleAPI/location/v1/zones/zone01/accessPoints/00101000000000000000000000000001 HTTP/1.1
Host: example.com
Accept: application/json
```

Response 2

```
HTTP/1.1 200 OK
Date: Sun, 01 Jan 2017 00:38:59 GMT
Content-Type: application/json
Content-Length: nnnn
```

```
{ "accessPointInfo": {
  "accessPointId": "00101000000000000000000000000001",
  "locationInfo": {
    "latitude": "80.123",
    "longitude": "70.123",
    "altitude": "10.0",
    "accuracy": "0"
  },
  "connectionType": "Macro",
  "operationStatus": "Serviceable",
  "numberOfUsers": "15",
  "interestRealm": "LA",
  "resourceURL": "http://example.com/exampleAPI/location/v1/zones/zone01/accessPoints/ap001"
}}
```

7.3.3 UE Information Lookup

7.3.3.1 Definition

The UE Information Lookup (clause 5.3.3) shall be realized by requesting the resource "User list" defined in [5], clause 6.5.

The request URI shall be:

{apiRoot}/location/v1/users

where {apiRoot} is defined in clause 7.2.

The request may be further refined by filtering the request by the zoneId and/or the accessPointId.

The response shall contain an instance of the UserList data type, which in turn includes all the UserInfo instances that match the filtering criteria specified in the request.

7.3.3.2 Example: Retrieve UE Information for all the users (informative)

In this example, the client issues a request to retrieve a list of all the users connected to all the access points associated to all the zones.

Request

```
GET /exampleAPI/location/v1/users HTTP/1.1
Host: example.com
Accept: application/json
```

Response

```
HTTP/1.1 200 OK
Date: Sun, 01 Jan 2017 00:38:59 GMT
Content-Type: application/json
Content-Length: nnnn
```

```
{ "userList": {
  "user": [
    {
      "address": "acr:10.0.0.1",
      "accessPointId": "00101000000000000000000000000001",
      "zoneId": "zone01",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.1"
    }
  ]
}}
```



```

    },
    {
      "address": "acr:10.0.0.2",
      "accessPointId": "00101000000000000000000000000001",
      "zoneId": "zone01",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.2"
    },
    {
      "address": "acr:10.0.0.3",
      "accessPointId": "00101000000000000000000000000002",
      "zoneId": "zone01",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.3"
    },
    {
      "address": "acr:10.0.0.4",
      "accessPointId": "00101000000000000000000000000004",
      "zoneId": "zone02",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.4"
    },
    {
      "address": "acr:10.0.0.5",
      "accessPointId": "00101000000000000000000000000005",
      "zoneId": "zone02",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.5"
    }
  ],
  "resourceURL": "http://example.com/exampleAPI/location/v1/users"
}}

```

7.3.3.3 Example: Retrieve UE Information for the users in a zone (informative)

In this example, the client issues a request to retrieve a list of all the users connected to all the access points associated to the zone specified in the request.

Request

```

GET /exampleAPI/location/v1/users?zoneId=zone01 HTTP/1.1
Host: example.com
Accept: application/json

```

Response

```

HTTP/1.1 200 OK
Date: Sun, 01 Jan 2017 00:38:59 GMT
Content-Type: application/json
Content-Length: nnnn

{"userList": {
  "user": [
    {
      "address": "acr:10.0.0.1",
      "accessPointId": "00101000000000000000000000000001",
      "zoneId": "zone01",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.1"
    },
    {
      "address": "acr:10.0.0.2",
      "accessPointId": "00101000000000000000000000000001",
      "zoneId": "zone01",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.2"
    },
    {
      "address": "acr:10.0.0.3",
      "accessPointId": "00101000000000000000000000000002",
      "zoneId": "zone01",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.3"
    }
  ],
  "resourceURL": "http://example.com/exampleAPI/location/v1/users"
}}

```

7.3.3.4 Example: Retrieve UE Information for the users in an access point of a zone (informative)

In this example, the client issues a request to retrieve a list of all the users connected to the access points specified in the request associated to the specified zone.

Request

```
GET /exampleAPI/location/v1/users?zoneId=zone01&accessPointId=00101000000000000000000000000001
HTTP/1.1
Host: example.com
Accept: application/json
```

Response

```
HTTP/1.1 200 OK
Date: Sun, 01 Jan 2017 00:38:59 GMT
Content-Type: application/json
Content-Length: nnnn
```

```
{ "userList": {
  "user": [
    {
      "address": "acr:10.0.0.1",
      "accessPointId": "00101000000000000000000000000001",
      "zoneId": "zone01",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.1"
    },
    {
      "address": "acr:10.0.0.2",
      "accessPointId": "00101000000000000000000000000001",
      "zoneId": "zone01",
      "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A10.0.0.2"
    }
  ],
  "resourceURL": "http://example.com/exampleAPI/location/v1/users"
}}
```

7.3.4 UE Location Subscribe

7.3.4.1 Definition

The UE Location Subscribe (clause 5.3.4) shall follow the "User tracking notification" procedure defined in [5], clause 5.3.3. The creation of the resource "User tracking change notification" shall be requested as defined in [5], clause 6.9. The request URI shall be:

{apiRoot}/location/v1/subscriptions/userTracking

where {apiRoot} is defined in clause 7.2.

The request shall contain an instance of the UserTrackingSubscription data type, which includes the address of the user to monitor, and optionally the events intended for tracking (e.g. zone enter, zone exit, zone transfer).

The response shall contain an instance of the UserTrackingSubscription data type and the location of the created resource.

NOTE: The subscription may be updated as per the method defined in [5], clause 5.3.3.

7.3.4.2 Example: create a UE Location subscription (informative)

In this example, the client issues a request to create a UE Location subscription for a certain user identified by its IP address. The subscription is meant to receive a notification about the "transferring" user event, i.e. when the requested UE transfers from one access point to another within the zone. If no user event is included in the request, then the subscription is created for all the events (zone enter, zone exit and zone transfer).

Request

```
POST /exampleAPI/location/v1/subscriptions/userTracking HTTP/1.1
Content-Type: application/json
Content-Length: nnnn
Accept: application/json
Host: example.com

{"userTrackingSubscription": {
  "clientCorrelator": "0123",
  "callbackReference": {"notifyURL": "http://clientApp.example.com/location_notifications/123456"},
  "address": "acr:10.0.0.1",
  "userEventCriteria" : "Transferring"
}}
```

Response

```
HTTP/1.1 201 Created
Content-Type: application/json
Location: http://example.com/exampleAPI/location/v1/subscriptions/userTracking/subscription123
Content-Length: nnnn
Date: Sun, 01 Jan 2017 00:38:59 GMT

{"userTrackingSubscription": {
  "clientCorrelator": "0123",
  "resourceURL":
    "http://example.com/exampleAPI/location/v1/subscriptions/userTracking/subscription123",
  "callbackReference": {"notifyURL": "http://clientApp.example.com/location_notifications/123456"},
  "address": "acr:10.0.0.1",
  "userEventCriteria" : "Transferring"
}}
```

7.3.5 UE Information Subscribe

7.3.5.1 Definition

The UE Information Subscribe (clause 5.3.5) shall follow the "Zonal traffic notification" procedure defined in [5], clause 5.3.2. The creation of the resource "Zonal traffic change notification" shall be requested as defined in [5], clause 6.7. The request URI shall be:

{apiRoot}/location/v1/subscriptions/zonalTraffic

where {apiRoot} is defined in clause 7.2.

The request shall contain an instance of the zonalTrafficSubscription data type, which shall include the identifier of the zone to monitor, and optionally the interest realm of the access points within the zone and the user events intended for tracking (e.g. zone enter, zone exit, zone transfer). The response shall contain an instance of the zonalTrafficSubscription data type and the location of the created resource.

NOTE: The subscription may be updated as per the method defined in [5], clause 5.3.2.

7.3.5.2 Example: create a UE Information subscription (informative)

In this example, the client issues a request to create a UE Information subscription for a certain zone. The subscription is meant to receive a notification about the "transferring" user event, i.e. when any UE transfers from one access point to another within the zone. If no user event is included in the request, then the subscription is created for all the events (zone enter, zone exit and zone transfer).

Request

```
POST /exampleAPI/location/v1/subscriptions/zonalTraffic HTTP/1.1
Content-Type: application/json
Content-Length: nnnn
Accept: application/json
Host: example.com

{"zonalTrafficSubscription": {
  "clientCorrelator": "0123",
  "callbackReference": {"notifyURL": "http://clientApp.example.com/location_notifications/123456"},
```

```

    "zoneId": "zone01",
    "interestRealm": "LA",
    "userEventCriteria": "Transferring"
  }}

```

Response

```

HTTP/1.1 201 Created
Content-Type: application/json
Location: http://example.com/exampleAPI/location/v1/subscriptions/zonalTraffic/subscription123
Content-Length: nnnn
Date: Sun, 01 Jan 2017 00:38:59 GMT

```

```

{"zonalTrafficSubscription": {
  "clientCorrelator": "0123",
  "resourceURL":
    "http://example.com/exampleAPI/location/v1/subscriptions/zonalTraffic/subscription123",
  "callbackReference": {"notifyURL": "http://clientApp.example.com/location_notifications/123456"},
  "zoneId": "zone01",
  "interestRealm": "LA",
  "userEventCriteria": "Transferring"
}}

```

7.3.6 Subscribe Cancellation

7.3.6.1 Definition

The Subscribe Cancellation (clause 5.3.6) shall follow the cancellation methods defined in the "User tracking notification" procedure defined in [5], clause 5.3.3 and in the "Zonal traffic notification" procedure defined in [5], clause 5.3.2, respectively to cancel the UE Location subscription and to cancel the UE Information subscription.

It shall be realized by requesting the deletion of the corresponding subscription resource, represented by the subscription's identifier, and shall be returned by the server to the client as a {subscriptionId} variable upon the subscription creation. The request URI to delete a UE Location subscription shall be:

{apiRoot}/location/v1/subscriptions/userTracking/{subscriptionId}

whereas the request URI to delete a UE Information subscription shall be:

{apiRoot}/location/v1/subscriptions/zonalTraffic/{subscriptionId}

where, in both the above cases, {apiRoot} is defined in clause 7.2 and {subscriptionId} shall be the subscription's identifier.

7.3.6.2 Example: cancelling a UE Location subscription (informative)

In this example, the client issues a request to cancel a UE Location subscription.

Request

```

DELETE /exampleAPI/location/v1/subscriptions/userTracking/subscription123 HTTP/1.1
Accept: application/json
Host: example.com

```

Response

```

HTTP/1.1 204 No Content
Date: Sun, 01 Jan 2017 00:38:59 GMT

```

7.3.6.3 Example: cancelling a UE Information subscription (informative)

In this example, the client issues a request to cancel a UE Information subscription.

Request

```
DELETE /exampleAPI/location/v1/subscriptions/zonalTraffic/subscription123 HTTP/1.1
Accept: application/json
Host: example.com
```

Response

```
HTTP/1.1 204 No Content
Date: Sun, 01 Jan 2017 00:38:59 GMT
```

7.3.7 Radio Node Location Lookup

7.3.7.1 Definition

The Radio Node Location Lookup (clause 5.3.7) shall be realized by requesting the resource "Access point list" defined in [5], clause 6.3.

The request URI shall be:

{apiRoot}/location/v1/zones/{zoneId}/accessPoints

where {apiRoot} is defined in clause 7.2 and {zoneId} is the identifier of the zone which the access point is associated to (e.g. zone01).

The response shall contain an instance of the AccessPointList data type, which in turn shall include all the AccessPointInfo instances for all the access points associated to the zone specified in the request.

7.3.7.2 Example: Retrieve a list of radio nodes associated to a zone (informative)

In this example, the client issues a request to retrieve a list of all the access points associated to the zone specified in the request.

Request

```
GET /exampleAPI/location/v1/zones/zone01/accessPoints HTTP/1.1
Host: example.com
Accept: application/json
```

Response

```
HTTP/1.1 200 OK
Date: Sun, 01 Jan 2017 00:38:59 GMT
Content-Type: application/json
Content-Length: nnnn
```

```
{ "accessPointList": {
  "zoneId": "zone01",
  "accessPoint": [
    {
      "accessPointId": "00101000000000000000000000000001",
      "locationInfo": {
        "latitude": "80.123",
        "longitude": "70.123",
        "altitude": "10.0",
        "accuracy": "0"
      },
      "connectionType": "Macro",
      "operationStatus": "Serviceable",
      "numberOfUsers": "15",
      "interestRealm": "LA",
      "resourceURL": "http://example.com/exampleAPI/location/v1/zones/zone01/accessPoints/ap001"
    }
  ]
}
```

Annex A (informative): Complementary material for API utilisation

To complement the definitions for each method and resource defined in the interface clauses of the present document, ETSI MEC ISG is providing for the Location API a supplementary description file compliant to the OpenAPI Specification [i.3].

In case of discrepancies between the supplementary description file and the related data structure definitions in the present document, the data structure definitions take precedence.

The supplementary description file, relating to the present document, is located at https://forge.etsi.org/rep/gitweb.cgi/MEC.GS_013.git.

History

Document history		
V1.1.1	July 2017	Publication