

# **LOCAL DYNAMIC LOCATION INFORMATION UPDATING AND QUERYING METHOD FOR MOBILE NETWORK ENTITY**

## **Related Applications**

The present application claims the priority of Chinese patent application No. 201810027662.6, filed on January 11, 2018, and entitled “Local Dynamic Location Information Updating and Querying Method for Mobile Network Entity”, and the application is hereby included by reference.

## **Technical Field**

The present invention relates to the field of network technology and communication technology, in particular to a local dynamic location information updating and querying method for a mobile network entity.

## **Background Art**

The mobility management technology refers to management of location information, security and business continuity of a mobile terminal, so as to strive to make the contact between the terminal and the network achieve the best state, and provide a guarantee for the application of various network services.

High-speed mobility of a terminal will lead to the problem of rapid change of an IP address of the existing internet system, while a core idea of an information center network (ICN) is the separation of name from address. With a naming mechanism of ICN, each entity in the network acquires a unique entity identifier independent of location as its name, and through dynamic binding between the entity name and the current network address of the entity, the problem of rapid change of the IP address in the communication process can be solved. The updating and querying of a mapping relationship between the name and the network address is an indispensable link in data communication, and the performance directly influences the quality of network service.

It has become a trend to utilize a hierarchical structure to realize name resolution of ICN aiming at flat naming. The prior art proposes to adopt a flat analytical structure based on a hierarchical bloom filter, the structure builds multi-level nested container

spaces to facilitate system expansion, and in each container, the querying efficiency is improved through a bloom filter. However, in a mobile environment, when the location information is changed, the maintenance and management mechanisms of the existing container or distributed hash structure cannot effectively support the requirements of applications having a higher requirement on delay control and business continuity.

### **Summary of the Invention**

The technical problem to be solved in the present invention is as follows: after the existing network address of a communication side network entity in the communication session process is changed due to mobility of the communication side network entity, how to make the network device responsible for communication data transmission and forwarding rapidly query the current new address after movement of the communication side network entity. The communication message is timely forwarded to a new position through rapidly acquiring the new address information, to guarantee continuity of the communication session.

To achieve the above objective, the present invention provides a local dynamic location information updating and querying method for a mobile network entity. In the method, a distributed container with a hierarchical nested structure is adopted to handle with the registration and query of location information of a network entity, after the network entity is connected to a network attachment point after movement and allocated with a new network address, the new location information of the network entity is registered onto the container where the network entity is currently located, the position information at least contains the current network address information of the network entity, and the method includes:

step 1) when a network entity registers new location information onto a container where the network entity is currently located, updating and publishing, by the current container, the new location information to the container where the network entity is located before the movement;

step 2) when a network forwarding device learns that the network entity is not currently reachable, querying the container where the network entity is located before the movement for the new location information of the network entity; upon receipt of

the query request by the container where the network entity is located before the movement, acquiring the new location information of the network entity by querying within the container itself; and

step 3) according to the new location information of the entity obtained by the querying, modifying, by the network forwarding device, network address information in the communication session message and forwarding the session message.

As an improvement of the above method, step 1) specifically includes:

step 101) sending, by the network entity, registration information to the container CM\_new where the network entity is currently located, wherein the registration information content at least includes: network entity name, current valid location information, release serial number, and addressing information of the container CM\_old where the network entity is located before the movement;

step 102) after the container CM\_new receives the registration information, judging whether the release serial number in the registration information is updated, if so, then turning to step 103), otherwise, returning with failed registration, and ending the processing;

step 103) updating, by the container CM\_new, the corresponding entity location information and release serial number information managed and stored in the present container, returning the processing result to the network entity, wherein the processing result includes addressing information of the CM\_new container; and saving, by the network entity, the received addressing information of the CM\_new container;

step 104) judging, by the CM\_new container, whether the CM\_new container itself and the CM\_old in the registration information are the same container, if so, then ending the processing, otherwise, performing step 105);

step 105) sending, by the CM\_new container, the registration information received this time to the CM\_old container; and

step 106) after receiving the above registration information, judging, by the CM\_old container, whether the release serial number of the network entity name is newer than the serial number information currently stored in the present container, if so, then updating the entity location information and release serial number managed

and stored in the present container; otherwise, performing no updating and publishing.

As an improvement of the above method, the release serial number is maintained by the network entity, and is updated along with each release.

As an improvement of the above method, the addressing information of the container is the identifier or network address of the container.

The present invention has the following advantages:

Aiming at the session continuity requirements of the mobile communication service, the present invention discloses a local dynamic location information updating and querying method for a mobile network entity, to solve the problem of rapidly reacquiring the network position information of the mobile communication side when the communication side entity moves at different levels of speeds, so as to support the service requirements of resuming communication and keeping session continuity at a given time.

### **Brief Description of the Drawings**

Fig. 1 is a schematic diagram of flows of location information registration and local updating after the network entity moves.

### **Detailed Description of the Embodiments**

The present invention will be further described in combination with the accompanying drawing.

In the present invention, a distributed container with a hierarchical nested structure is adopted to handle with the registration and querying management of the position information of a network entity (UE). When the UE changes its associated network attachment points due to movement, regardless of the movement direction and range, the UE will finally fall within the management of a group of nested containers, and update location information within a global range based on the container architecture. Assuming that after UE moves, the registration of location information is handled by a certain level of container (denoted as level  $i$ ) in the nested structure, then an implementation example of the processes of registration, updating and querying of the UE location information in the container is as follows:

After the network entity is connected to a network attachment point after

movement and allocated with a new network address, the registration and updating processes of the new location information of the network entity are as follows:

(1) the network entity is interacted with the bottom layer of container where the network entity is currently located, to perform registration of the new location information. The registration request information content includes: network entity name, current valid location information, release serial number, and addressing information of the container (denoted as CM\_old) where the network entity is located before the movement. The bottom layer of container forwards the above received location information registration request to the i-level container where the bottom-layer of container is located.

(2) the i-level container is responsible for handling with the registration information. Firstly, the i-level container checks whether the release serial number of the received network entity name is newer than the release serial number corresponding to the network entity currently stored in the present container, and stores and updates the received UE location information with an updated release serial number. If the storage and updating are successful, then the bottom-layer container returns the processing result of the registration to the network entity, and the processing result also carries the communication addressing information of the i-level container.

(3) the i-level container judges whether the i-level container itself and “the container where the network entity is located before the movement” in the registration information are the same container, if so, the transmission is ended, otherwise, the registration request is continuously forwarded to “the container where the network entity is located before the movement” in the registration information.

(4) after the container where the network entity is located before the movement receives the above registration information, the container only stores and updates the location information of the network entity with an updated release serial number.

(5) the network entity saves the communication addressing information of the container in the received registration processing result, to take the communication addressing information as the “addressing information of the container where the network entity is located before the movement” in the new location registration

information.

The querying process is as follows:

(1) when the network forwarding device on the UE communication data transmission path finds that the UE is not reachable, the network forwarding device can initiate a query request of the UE location information to the bottom-layer container where the UE is located before the UE moves, the bottom-layer container forwards the above query request to the i-level container where the present container is located, and the i-level container finishes the query of the UE location information.

(2) according to the new location information of the entity obtained through query, the network forwarding device modifies the network address information in the communication session message and forwards the session message.

Finally, it should be noted that, the above embodiments are merely used for explaining technical solutions of the present invention, rather than for limiting the present invention. Although the present invention has been described in detail with reference to embodiments, those skilled in the art should understand that, any modifications or equivalent substitutions made to the technical solutions of the present invention all do not depart from spirit and scope of the technical solutions of the present invention, and should be encompassed in the scope of claims of the present invention.

## CLAIMS

1. A local dynamic location information updating and querying method for a mobile network entity, wherein in the method, a distributed container with a hierarchical nested structure is adopted to handle with the registration and query of location information of a network entity, after the network entity is connected to a network attachment point after movement and allocated with a new network address, the new location information of the network entity is registered onto the container where the network entity is currently located, the position information at least contains the current network address information of the network entity, and the method comprises:

step 1) when a network entity registers new location information onto a container where the network entity is currently located, updating and publishing, by the current container, the new location information to the container where the network entity is located before the movement;

step 2) when a network forwarding device learns that the network entity is not currently reachable, querying the container where the network entity is located before the movement for the new location information of the network entity; upon receipt of the query request by the container where the network entity is located before the movement, acquiring the new location information of the network entity by querying within the container itself; and

step 3) according to the new location information of the entity obtained by the querying, modifying, by the network forwarding device, network address information in the communication session message and forwarding the session message.

2. The local dynamic location information updating and querying method for a mobile network entity of claim 1, wherein step 1) specifically comprises:

step 101) sending, by the network entity, registration information to the container CM\_new where the network entity is currently located, wherein the registration information content at least includes: network entity name, current valid location information, release serial number, and addressing information of the container CM\_old

where the network entity is located before the movement;

step 102) after the container CM\_new receives the registration information, judging whether the release serial number in the registration information is updated, if so, then turning to step 103), otherwise, returning with failed registration, and ending the processing;

step 103) updating, by the container CM\_new, the corresponding entity location information and release serial number information managed and stored in the present container, returning the processing result to the network entity, wherein the processing result includes addressing information of the CM\_new container; and saving, by the network entity, the received addressing information of the CM\_new container;

step 104) judging, by the CM\_new container, whether the CM\_new container itself and the CM\_old in the registration information are the same container, if so, then ending the processing, otherwise, performing step 105);

step 105) sending, by the CM\_new container, the registration information received this time to the CM\_old container; and

step 106) after receiving the above registration information, judging, by the CM\_old container, whether the release serial number of the network entity name is newer than the serial number information currently stored in the present container, if so, then updating the entity location information and release serial number managed and stored in the present container; otherwise, performing no updating and publishing.

3. The local dynamic location information updating and querying method for a mobile network entity of claim 2, wherein the release serial number is maintained by the network entity, and is updated along with each release.

4. The local dynamic location information updating and querying method for a mobile network entity of claim 2, wherein the addressing information of the container is the identifier or network address of the container.