April 2023

TECHNIQUES FOR OBTAINING INDOOR LOCATION MAP AND UNIFORM RESOURCE IDENTIFIER FROM AN ACCESS NETWORK

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ABSTRACT

Many times, when a user is in a building and not aware of layout of the building, it becomes very difficult for the user to know in which part of the building the user is currently standing. While Third Generation Partnership Project (3GPP)/cellular systems offer various methods for determining the position of a wireless device of a user (often referred to as a user equipment (UE), the resulting positioning coordinates (e.g., Global Positioning System (GPS) coordinates) are of not of much use to the user. Presented herein are techniques through which a UE can be provided a user-friendly visual indication of the current location of the UE inside an unfamiliar building, layout, or other geographical area.

DETAILED DESCRIPTION

There are many situations in which a user might desire to determine their location within a geographical environment, such as within a building, a mall, a sporting arena, or the like. Current cellular-based techniques for determining user equipment (UE) location are limited to providing GPS coordinates, or the like, which, on their own, are not particularly useful or informative for providing a user an indication of their location with respect to the geographical environment in which they are located.

This proposal presents techniques through which a UE can query the access network for an indoor location uniform resource indicator (URI) and an indoor map for the geographical environment at which the UE is located. Different UE queries can be envisioned in accordance with the techniques of this proposal. For example, in some instances, a UE can query the access network for the indoor location URI of all devices using the same identity credentials. In another example, a UE can query the access network for the indoor location URI of all devices in the UDN group.

The access network can interface with an indoor positioning function for generating the map. Thus, the access network, in coordination with the indoor positioning systems can generate the location URI and facilitate delivery of the location URI to the UE, along with a map (e.g., an indoor map) indicating the geographical environment of the user/UE.

In some instances, request for the location URI can be performed via Non-Access Stratum (NAS) signaling, IPv6 Neighbor Discovery (ND) processes, and/or Dynamic Host Configuration Protocol (DHCP) signaling. An application configured for the UE can interface with the 5G driver for obtaining the location URI and opening the link in the map provided to the UE. Figure 1, below, illustrates an example call flow for providing a UE a location URI and map in accordance with the techniques of this proposal.

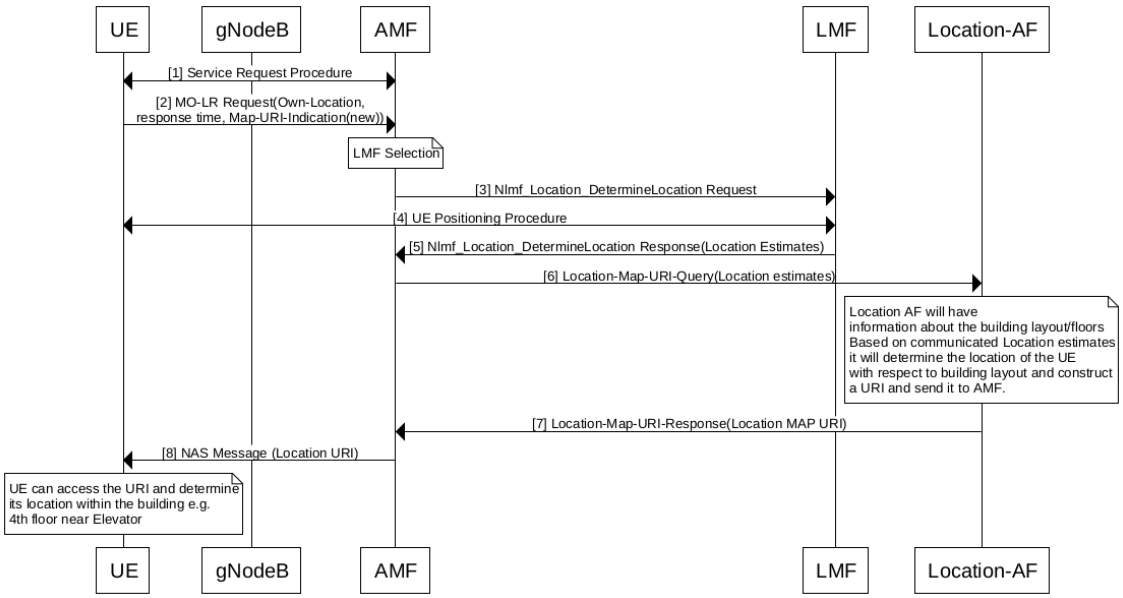

Figure 1: UE Location Call Flow

Broadly, as shown in Figure 1, the UE can initiate a mobile originating location request (MO-LR) in which the UE requests its own location. The request can include an indication identifying that the request is associated with an assisted MAP-URI. Upon receiving the request, the network can trigger an MO-LR procedure to determine the UE location.

Thereafter, upon obtaining the location of the UE, the Access and Mobility Management Function (AMF) can query an application function (directly or via a Network

Exposure Function (NEF)). Based on the 5G core determined location of the UE, the location application function (AF) can determine the location of the UE with respect to the geographical environment (e.g., building) in which the UE is currently located, with respect to nearby landmarks, and/or the like. The location AF can then construct a URI that can provide a description regarding the UE's location, along with a map of the environment or surrounding area (e.g., UE is on the second floor, near an elevator, etc.).

Thus, through techniques proposed herein, a UE can request location information from a 5G core network by leveraging 3GPP signaling in order to determine its (indoor) location. As noted above, reliance on GPS may not be an option in many indoor environments and furthermore can increase battery drain of wireless devices. In contrast, the proposed approach provides for the ability for a UE to obtain an indoor map from a 5G network in the form of a URI, along with the relative placement or position of the UE within a map. Such techniques can be very useful for a user that may be walking into a new environment and can obtain an indoor map of the environment and use the map for indoor navigation of the environment.