DHCP Option for Location Insertion

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Abstract

This document specifies a Dynamic Host Configuration Protocol option for the geographic location of the client. The location includes longitude, latitude and altitude, with accuracy indicators for each.
1.0 Introduction

This document specifies a Dynamic Host Configuration Protocol [1] Option for the geographic location of the client.

The DHCP server is assumed to have determined the location from the Circuit-ID RAIO defined (as SubOpt 1) in [2]. In order to translate the circuit (switch port identifier) into a location, the DHCP server is assumed to have access to a service that maps from circuit-ID to the location at which the circuit connected to that port terminates in the building; for example, the location of the wall jack.

1.1 Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC-2119 [3].

1.2 Motivation

As applications such as IP Telephony are replacing conventional telephony, users are expecting the same (or greater) level of services with the new technology. One service offered by conventional telephony that is missing, in any standardized fashion, within IP Telephony is for a user to be automatically located by emergency responders, in a timely fashion, when the user summons help (by dialing 911 in North America, for example). Unless strict administrative rules are followed, the mobility of a wired Ethernet device within a campus negates any opportunity for an emergency responder to locate the device with any degree of expediency. Users do not want to give up this mobility. Informing the host device of its geo-location at host configuration time will allow the device to utilize this geo-location information to inform others of it’s current geo-location, if the user and/or application so desires.

The goal of this option is to enable a wired Ethernet host to provide its location to an emergency responder, as one example.

Wireless hosts can utilize this option to gain knowledge of the location
of the radio access point used during host configuration, but will need some more exotic mechanisms, maybe GPS, or maybe a future DHCP option, which includes a list of geo-loc objects like what we define here, that has the locations of the radio access points that are close to the access-point.

1.3 Rationale

Longitude and Latitude are represented in fixed-point 2s-complement binary degrees, for the economy of a smaller option size compared to the string encoding of digits in [4]. The integer parts of these fields are 9 bits long to accommodate +/- 180 degrees. The fractional part is 25 bits long, better than the precision of 7 decimal digits of precision. Each parameter is 40 bits total, in length.

Altitude is represented in measurement units (MU) indicated by the MU field, which is 4 bits long. Two measurement units are defined here, meters (code=1) and floors (code=2), both of which are 2s-complement integers. Additional measurement units MAY be assigned by IANA. The floor of a building is often the relevant location information, and not necessarily computable from meters of altitude. The length of this field of 30 bits accommodates values greater than 8 decimal digits.

Each of these variables is preceded by an accuracy sub-field of 6 bits, indicating how many bits of the variable is considered accurate. This accuracy sub-field accommodates the [GEOPRIV] requirement to easily adjust the accuracy of a reported location. Contents beyond the claimed accuracy MAY be randomized to obscure greater precision that might be available.

2.0 Format of DHCP Location Option

| Opt Code | LoAcc | LoInt | LoFrac |
| LoFrac (cont) | LaAcc | LaInt |
| LaFrac | AltAcc | M |
| U | Altitude |

2.1 Elements

Opt Code: The DHCP option code is TBD by IANA.

LoAcc: Longitude accuracy. 6 bits indicating the number of reliable bits in the fixed-point value composed of LoInt | LoFrac.

LoInt: Longitude integer part of 2s-complement value. 9 bits

LoFrac: Longitude fraction part of 2s-complement value. 25 bits
LaAcc: Latitude accuracy. 6 bits indicating the number of reliable bits in the fixed-point value composed of LaInt | LaFrac.

LaInt: Latitude integer part of 2s-complement value. 9 bits

LaFrac: Latitude fraction part of 2s-complement value. 25 bits

AltAcc: Altitude accuracy. 6 bits indicating the number of reliable bits in the fixed-point value

MU: Measurement unit for altitude. Codes defined here are:

1: meters in 2s-complement integer
2: floors in 2s-complement integer

Other codes TBD by IANA.

Altitude: 30-bit value with format defined by the Measurement Unit.

3.0 Security Considerations

Where critical decisions might be based on the value of this GeoLoc option, DHCP authentication in [5] SHOULD be used to protect the integrity of the DHCP options.

4.0 IANA Considerations

The DHCP option code for the GeoLoc option is TBD.

Altitude Measurement Units beyond the two defined in this document are TBD.

5.0 References


6.0 Author Information

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