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Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses
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Status of this Memo

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Abstract

This document specifies a Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) option for the civic (country, community and street) location of the client or the DHCP server.

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1. Terminology

In this document, the key words "MUST", "MUSTNOT", "REQUIRED", "SHALL", "SHALLNOT", "SHOULD", "SHOULDNOT", "RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as described in RFC 2119 [1] and indicate requirement levels for compliant implementations.

2. Introduction

Many end system services can benefit by knowing the approximate location of the end device. In particular, IP telephony devices need to know their location to contact the appropriate emergency response agency and to be found by emergency responders.

There are two common ways to identify the location of an object, either through geospatial coordinates or by so-called civic address. Geospatial coordinates indicate longitude, latitude and altitude, while civic addresses indicate a street address.

A related draft [13] describes a DHCPv4 [2] option for conveying geospatial information to a device. This draft describes how DHCPv4 and DHCPv6 [5] can be used to convey the civic location to devices. Both can be used simultaneously, increasing the chance to deliver accurate and timely location information to emergency responders.

End systems that obtain location information via the mechanism described here then use other protocol mechanisms to communicate this information to the emergency call center or to convey it as part of presence information.

Civic information is useful since it often provides additional, human-usable information particularly within buildings. Also, compared to geospatial information, it is readily obtained for most occupied structures and can often be interpreted even if incomplete. For example, for many large university or corporate campuses, geocoding information to building and room granularity may not be readily available.

Unlike geospatial information, the format for civic information differs from country to country. Thus, this draft establishes an IANA registry for civic location data fields. The initial set of data fields is derived from standards published by the United States National Emergency Number Association (NENA) [15]. It is anticipated that other countries can reuse many of the data elements.

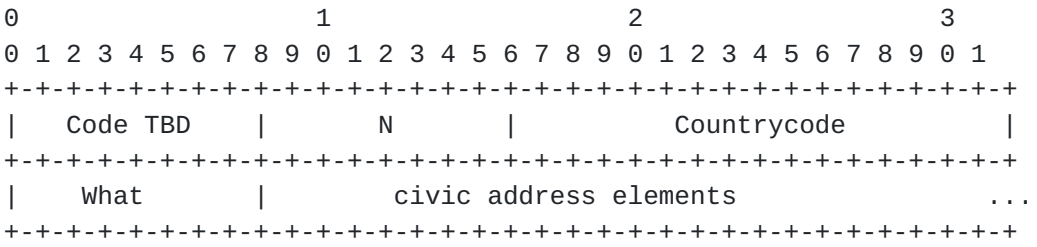
The same civic address information can often be rendered in multiple languages and scripts. For example, Korean addresses are often shown in Hangul, Latin and Kanji, while some older cities have multiple language variants (Munich, Muenchen and Monaco, for example). Since DHCPv4 and DHCPv6 do not currently support a mechanism to query for a specific script or language, the DHCP server SHOULD provide all common renderings to the client and MUST provide at least the rendering in the language and script appropriate to the location indicated. For example, for use in presence information, the target may be visiting from a foreign country and want to convey the

information in a format suitable for watchers in its home country. For emergency services, the rendering in the local language is likely to be most appropriate. To provide multiple renderings, the client repeats sequences of address elements, prefixing each with 'language' and/or 'script' element (see Section 3.3). The language and script remain in effect for subsequent elements until overridden by another language or script element.

The DHCP long-options mechanism described in RFC 3396 [8] MUST be used if the civic address option exceeds the maximum DHCP option size of 255 octets.

3. Format of the DHCP Civic Location Option

3.1 Overall Format for DHCPv4



Code TBD: The code for this DHCP option is TBD by IANA.

N: The length of this option is variable.

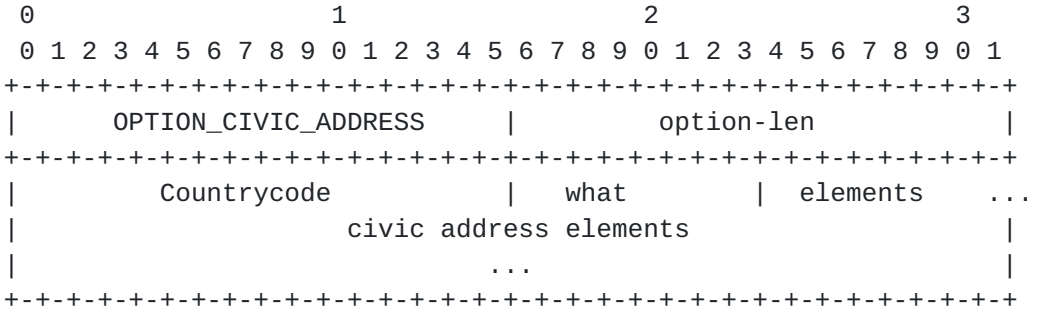
Countrycode: The two-letter ISO 3166 country code in capital ASCII letters, e.g., DE or US.

What: The 'what' element describes which location the DHCP refers to. Currently, three options are defined: the location of the DHCP server (a value of 0), the location of the network element believed to be closest to the client (1) or the location of the client (2). Option (2) SHOULD be used, but may not be known. Options (1) and (2) SHOULD NOT be used unless it is known that the DHCP client is in close physical proximity to the server or network element.

Civic address element: Zero or more elements comprising the civic address, with the format described below (Section 3.3).

3.2 Overall Format for DHCPv6

The DHCPv6 [5] civic address option refers generally to the client as a whole.



option-code: OPTION_CIVIC_ADDRESS (TBD)

option-len: Length of the Countrycode, 'what' and civic address elements.

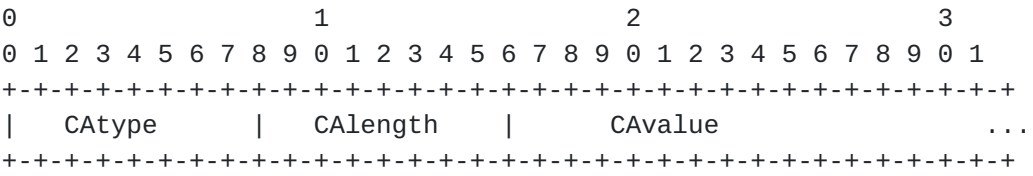
Countrycode: See above (Section 3.1).

What: See above (Section 3.1).

Civic address element: See above (Section 3.1).

3.3 Element Format

For both DHCPv4 and DHCPv6, each civic address element has the following format:



CAtype: A one-octet descriptor of the data civic address value.

CAlength: The length, in octets, of the CAvalue, not including the CAlength field itself. Data SHOULD be encoded in mixed case, following the customary spelling.

CAvalue: The civic address value, encoded as UTF-8 [6], and written in uppercase letters where applicable. The script indication is written in mixed-case, with the first letter a capital letter.

Elements SHOULD be included in numeric order from lowest to highest of their CAtype if the server only provides one language and script rendition. In general, an element is labeled in its language and script by the most recent 'language tag' (CAtype = 0) element preceding it. Since not all elements depend on the script and language, a client accumulates the elements by CAtype and then selects the most desirable language and script rendition if there are multiple elements for the same CAtype.

3.4 Civic Address Components

Since each country has different administrative hierarchies, with often the same (English) names, this specification adopts a simple hierarchical notation that is then instantiated for each country. We assume that five levels are sufficient for sub-national divisions

above the street level.

All elements are OPTIONAL and can appear in any order. Abbreviations do not need a trailing period.

CAtype	label	description
1	A1	national subdivisions (state, region, province, prefecture)
2	A2	county, parish, gun (JP), district (IN)
3	A3	city, township, shi (JP)
4	A4	city division, borough, city district, ward, chou (JP)
5	A5	neighborhood, block
6	A6	street

Table 1

For specific countries, the administrative sub-divisions are described below.

CA (Canada): The mapping to NENA designations is shown in parentheses. A1=province (STA); A2=county (CNA); A3=city or town (MCN); A6=street (STN).

DE (Germany): A1=state (Bundesstaat); A2=county (Regierungsbezirk); A3=city (Stadt, Gemeinde); A6=street (Strasse). Street suffixes (STS) are used only for designations that are a separate word (e.g., Marienthaler Strasse).

JP (Japan): A1=metropolis (To, Fu) or prefecture (Ken, Do); A2=city (Shi) or rural area (Gun); A3=ward (Ku) or village (Mura); A4=town (Chou or Machi); A5=city district (Choume); A6=block (Banchi or Ban).

KR (Korea): A1=province (Do); A2=county (gun); A3=city or village (ri); A4=urban district (gu); A5=neighborhood (dong); A6=street (no, ro, ga or gil).

US (United States): The mapping to NENA designations is shown in parentheses. A1=state (STA), using the the two-letter state and possession abbreviations recommended by the United States Postal Service Publication 28 [14], Appendix B; A2=county (CNA); A3=civic community name (city or town) (MCN); A6=street (STN). A4 and A5 are not used. The civic community name (MCN) reflects the political boundaries. These may differ from postal delivery assignments for historical or practical reasons.

Additional CA types appear in many countries and are simply omitted where they are not needed or known:

CAtype	NENA	Description	Examples
0		language	i-default [3]
16	PRD	leading street direction	N
17	POD	trailing street suffix	SW
18	STS	street suffix	AVE, PLATZ
19	HNO	house number	123
20	HNS	house number suffix	A, 1/2
21	LMK	landmark or vanity address	SHADELAND CRESCENT APTS
22	LOC	additional location information	APT 17
23	NAM	name (residence and office occupant)	JOE'S BARBERSHOP
24	ZIP	postal/zip code	10027-1234

	25	placetype	office	
	26	floor	4	
	27	room number	450F	
	128	script	Latn	
	255	reserved		

The CA types labeled in the second column correspond to items from the NENA "Recommended Formats & Protocols For ALI Data Exchange, ALI Response & GIS Mapping" [15], but are applicable to most countries. The "NENA" column refers to the data dictionary name in Exhibit 18 of [15].

The "language" item (CAtype 0) optionally identifies the language used for presenting the address information, drawing from the tags for identifying languages in [7]. If omitted, the default value for this tag is "i-default" [3].

The "script" item (CAtype 128) optionally identifies the script used for presenting the address information, drawing from the tags for identifying scripts in ISO 15924 [11]. If omitted, the default value for this tag is "Latn".

The NAM object is used to aid user location ("Joe Miller" "Alice's Dry Cleaning"). It does not identify the person using a communications device, but rather the person or organization associated with the address.

For POD and PRD, in English-speaking countries, the abbreviations N, E, S, W, and NE, NW, SE, SW should be used.

STS designates a street suffix. In the United States (US), the abbreviations recommended by the United States Postal Service Publication 28 [14], Appendix C, SHOULD be used.

The "type of place" item (CAtype 25) describes the type of place described by the civic coordinates. For example, it describes whether it is a home, office, street or other public space. The values are drawn from the items in the rich presence [16] document. This information makes it easy, for example, for the DHCP client to then populate the presence information. Since this is an IANA-registered token, the language and script designations do not apply for this element.

4. Example

Rather than showing the precise byte layout of a DHCP option, we show a symbolic example below, representing the civic address of the Munich city hall in Bavaria, Germany. The city and state name are also conveyed in English and Italian in addition to German; the other items are assumed to be common across all languages. All languages use the latin script.

CAtype	CAvalue
0	de
128	Latn
1	Bayern
2	Oberbayern
3	M=U+00FCnchen
6	Marienplatz
19	8
21	Rathaus
24	80331
25	public
0	en
1	Bavaria
3	Munich
0	it
1	Baviera
3	Monaco

5. Security Considerations

The information in this option may be used for a variety of tasks. In some cases, integrity of the information may be of great importance. In such cases, DHCP authentication in RFC3118 [4] SHOULD be used to protect the integrity of the DHCP options.

6. IANA Considerations

This document requests that IANA register a new DHCPv4 and DHCPv6 option code for the Civic Address .

This document establishes a new IANA registry for CAtypes designating civic address components. According to RFC 2434 [12], this registry operates under the "Specification Required" rules. The IANA registration needs to include the following information:

CAType: Numeric identifier, assigned by IANA.

Brief description: Short description identifying the meaning of the element.

Reference to published specification: A stable reference to an RFC or other permanent and readily available reference, in sufficient detail so that interoperability between independent implementations is possible.

Country-specific considerations: If applicable, notes whether the element is only applicable or defined for certain countries.

Normative References

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[3] Alvestrand, H., "IETF Policy on Character Sets and Languages", BCP 18, RFC 2277, January 1998.

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[5] Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C. and M. Carney, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", RFC 3315, July 2003.

[6] Yergeau, F., "UTF-8, a transformation format of ISO 10646", STD 63, RFC 3629, November 2003.

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[10] Sugano, H. and S. Fujimoto, "Presence Information Data Format (PIDF)", draft-ietf-impp-cpim-pidf-08 (work in progress), May 2003.

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Informative References

[12] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 2434, October 1998.

[13] Polk, J., Schnizlein, J. and M. Linsner, "Dynamic Host Configuration Protocol Option for Coordinate-based Location Configuration Information", draft-ietf-geopriv-dhcp-lci-option-03 (work in progress), December 2003.

[14] United States Postal Service, "Postal Addressing Standards", November 2000.

[15] National Emergency Number Assocation, "NENA Recommended Formats and Protocols For ALI Data Exchange, ALI Response and GIS Mapping", NENA NENA-02-010, January 2002.

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