Internet Engineering Task Force H. Levkowetz
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DHCP Option for Mobile IP Mobility Agents
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Status of this Memo

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Abstract

This document defines a new Dynamic Host Configuration Protocol (DHCP) option with sub-options. One sub-option may be used by a DHCP client to provide mobile IP related identity information to the DHCP server. Another sub-option may be passed from the DHCP Server to the DHCP Client to announce the presence of one or more mobile IP Mobility Agents. For each announced Mobility Agent, information is provided which is the same as that of the classical Mobile IP Agent Advertisement extension to ICMP Router Advertisements.

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1. Introduction

There exists a DHCP option to announce mobile IP home agent addresses, described in RFC 2132 [2]. There is however no option available to announce Mobile IP Foreign Agents. Furthermore, the existing home agent option provides home agent addresses, but no other pertinent information about the home agent.

Announcement of available Mobile IP Mobility Agents by means of DHCP provides possibilities for selective and individual assignment of Mobility Agents to Mobile Nodes. This in turn makes load-sharing and selective service offerings easier. This draft describes a DHCP option for announcing Mobility Agent information.

2. Requirements terminology

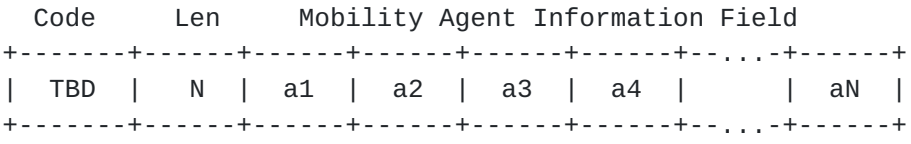
The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [8].

The Mobile IP related terminology used in this document is described in RFC 3220 [5].

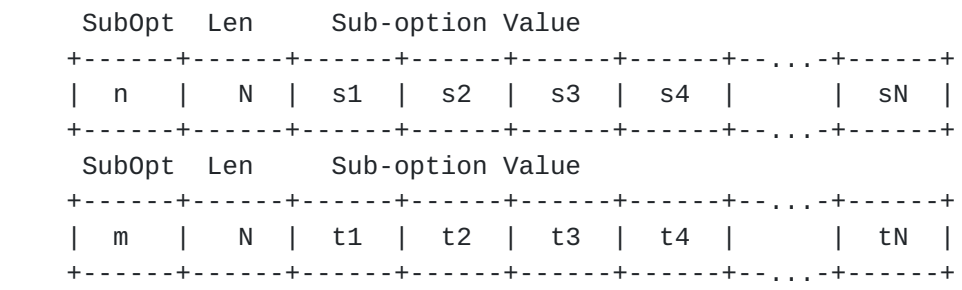
3. Mobility Agent Information Option

3.1 Option Definition

This document defines a new DHCP Option called the Mobility Agent Information Option. It is a "container" option for specific agent-supplied sub-options. The format of the Mobility Agent option is:



The option code TDB indicates that this is a Mobility Agent Information option. The length N gives the total number of octets in the Mobility Agent Information Field. The Mobility Agent Information field consists of a sequence of SubOpt/Length/Value tuples for each sub-option, encoded in the following manner:



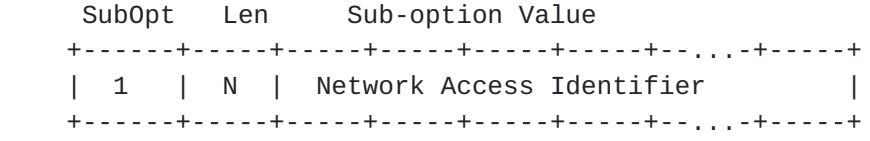
The Mobility Agent Information field shall NOT be terminated with a 255 sub-option. The length N of the DHCP Mobility Agent Information Option shall include all bytes of the sub-option code/length/value tuples. Since at least one sub-option must be defined, the minimum Mobility Agent Information length is two (2). The length N of the sub-options shall be the number of octets in only that sub-option's value field. A sub-option length may be zero. The sub-options need not appear in sub-option code order.

3.2 Network Access Identifier Sub-Option

The Network Access Identifier (NAI) defined in RFC 2486 [3] is already used in Mobile IP as an alternative to the home address as an identifier of a mobile node [9].

The Network Access Identifier sub-option of the Mobility Agent Information Option MAY be used by the DHCP client to provide identifying information to the DHCP server, as part of the DHCPDISCOVER message. The server may then use this information in selecting mobility agent announcement parameters for the client.

The format of the Network Access Identifier sub-option is as follows:



The Network Access Identifier SHALL NOT contain a terminating zero octet.

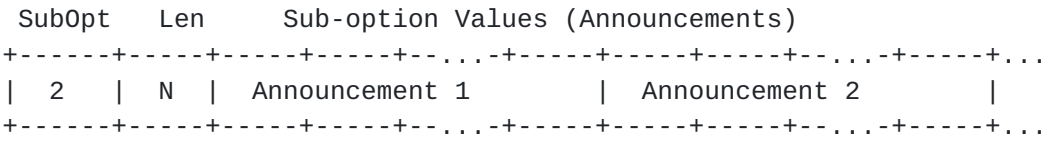
3.3 Mobility Agent Announcement Sub-Option

The Mobility Agent Announcement sub-option announces the address of one or more mobility agents, together with all the information about the mobility agent which is normally found in a Mobile IP Agent

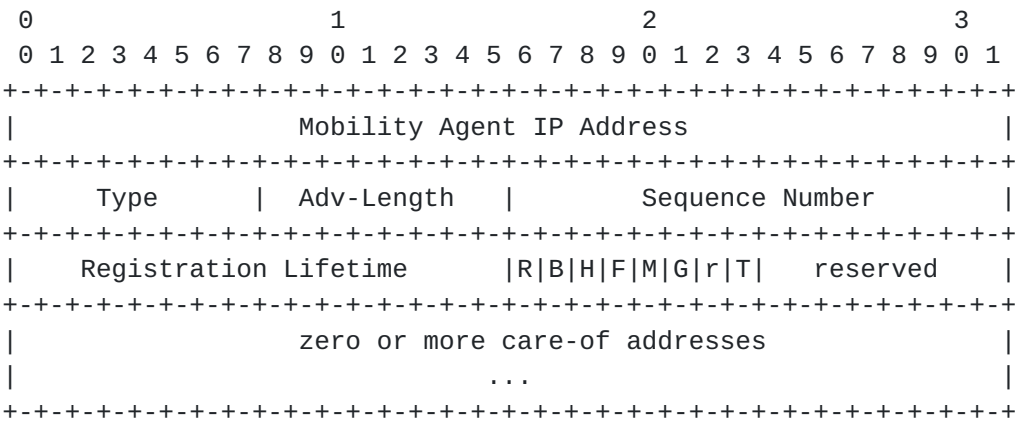
Advertisement extension to ICMP Router Advertisements as described in RFC 3220 [5].

All fields are defined so as to correspond to fields of the same name in a Mobility Agent Advertisement Extension as described in RFC 3220 [5], and if in the future additional bits are allocated from the 'reserved' field for the Mobility Agent Advertisement Extension, they should be equally valid in a DHCP Mobility Agent option.

This option may contain announcements of one or more Mobility Agents, in sequence. The length of each individual Mobility Agent Announcement is determined from the Adv-Length field of the announcement.



The format of one Mobility Agent Announcement is as follows [5]. (Note that no particular alignment is guaranteed for this sub-option value):



Agent IP Address
The address trough which the Mobile Node may reach the announced Mobility Agent in order to do a Mobile IP registration.

Type
16. This is the same value as for the type field in a Mobility Agent Advertisement Extension as described in RFC 3220 [5]. If other Mobility Agent Advertisement Extensions are defined in the future, this field will make it possible to differentiate

between them without using new DHCP option numbers.

Adv-Length
(6 + 4*N), where 6 accounts for the number of bytes in the Sequence Number, Registration Lifetime, flags, and reserved fields, and N is the number of care-of addresses advertised for the Mobility Agent.

Sequence Number
The count of Mobility Agent DHCP announcements made since the DHCP server was initialized (RFC 3220, Section 2.3.2 [5]).

Registration Lifetime
The longest lifetime (measured in seconds) that this agent is willing to accept in any Registration Request. A value of 0xffff indicates infinity.

R
Registration required. Registration with this foreign agent (or another foreign agent listed in this DHCP option) is required even when using a co-located care-of address.

B
Busy. The foreign agent will not accept registrations from additional mobile nodes.

H
Home agent. This agent offers service as a home agent on the link on which this mobility agent announcement is sent.

F
Foreign agent. This agent offers service as a foreign agent on the link on which this mobility agent announcement is sent.

M
Minimal encapsulation. This agent implements receiving tunneled datagrams that use minimal encapsulation [7].

G
GRE encapsulation. This agent implements receiving tunneled datagrams that use GRE encapsulation [6].

r
Sent as zero; ignored on reception. SHOULD NOT be allocated for any other uses.

T
Foreign agent supports reverse tunneling [11].

reserved
Sent as zero; ignored on reception.

Care-of Address(es)
The foreign agent care-of address(es) provided by this foreign agent. An DHCP Mobility Agent Announcement MUST include at least one care-of address if the 'F' bit is set. The number of care-of addresses present is determined by the Length field in the Extension.

4. Mobility Agent Option Usage

The requesting and sending of this option follows the rules for DHCP options in RFC 2131 [1]

5. Security Considerations

DHCP provides an authentication mechanism, as described in RFC 3118 [4], which may be used if authentication is required before offering the Mobility Agent option described here. On the other hand, Mobile IP Agent Advertisements as described in RFC 3220 [5] requires no authentication for Agent Advertisement and Agent Solicitation messages.

By providing Agent Advertisements by means of DHCP as an alternative to extended ICMP Router Advertisement messages it is possible to do so more selectively, and it does not offer any new threat to the internet.

6. IANA Considerations

The value for the DHCP Mobility Agent Information option code defined in Section 3 must be assigned from the numbering space defined for public DHCP Options in RFC 2939 [10].

This document defines a new numbering space for the sub-options of the DHCP_MIP_OPTION option, and defines sub-options 1 and 2 of this numbering space, according to Section 3.2 and Section 3.3.

Normative References

[1] Droms, R., "Dynamic Host Configuration Protocol", RFC 2131, March 1997.

[2] Alexander, S. and R. Droms, "DHCP Options and BOOTP Vendor Extensions", RFC 2132, March 1997.

[3] Aboba, B. and M. Beadles, "The Network Access Identifier", RFC 2486, January 1999.

[4] Droms, R. and W. Arbaugh, "Authentication for DHCP Messages", RFC 3118, June 2001.

[5] Perkins, C., "IP Mobility Support for IPv4", RFC 3220, January 2002.

Informative References

[6] Hanks, S., Li, T., Farinacci, D. and P. Traina, "Generic Routing Encapsulation (GRE)", RFC 1701, October 1994.

[7] Perkins, C., "Minimal Encapsulation within IP", RFC 2004, October 1996.

[8] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[9] Calhoun, P. and C. Perkins, "Mobile IP Network Access Identifier Extension for IPv4", RFC 2794, March 2000.

[10] Droms, R., "Procedures and IANA Guidelines for Definition of New DHCP Options and Message Types", BCP 43, RFC 2939, September 2000.

[11] Montenegro, G., "Reverse Tunneling for Mobile IP, revised", RFC 3024, January 2001.

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