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T. Fujisaki
A. Matsumoto
J. Kato
S. Niinobe
NTT
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Distributing Default Address Selection Policy using DHCPv6
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Status of this Memo

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Abstract

This document describes a new DHCPv6 option for distributing default address selection policy information defined in RFC3484 to a client. With this option, site administrators can distribute address selection policy to control the node's address selection behavior.

1. Introduction

RFC3484 [RFC3484] describes algorithms for selecting a default address when a node has multiple destination and/or source addresses by using an address selection policy. However, there are some problems with the default address selection policy in RFC3484 [ID.arifumi-v6ops-addr-select-ps], and administrators can change the node's address selection behavior by distributing the policy. Practical usages are described in [ID.arifumi-ipv6-policy-dist]. This document describes an option for distributing default address selection policy information using DHCPv6.

2. Terminology

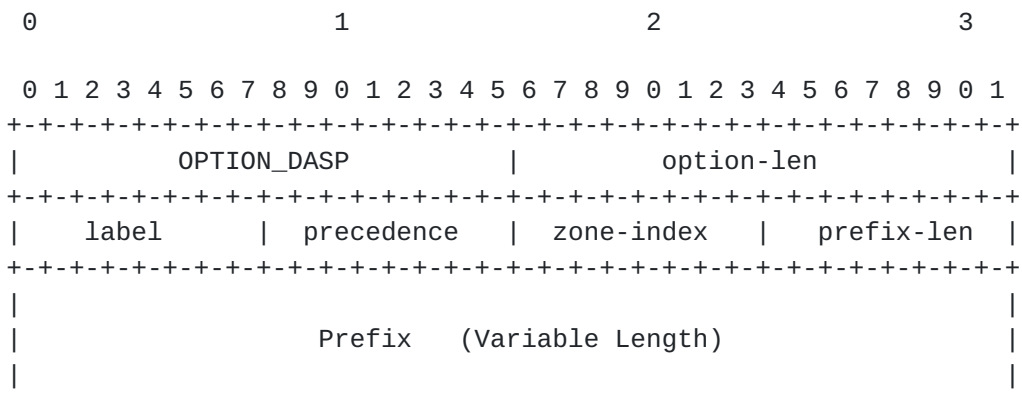
This document uses the terminology defined in [RFC2460] and the DHCP specification defined in [RFC3315]

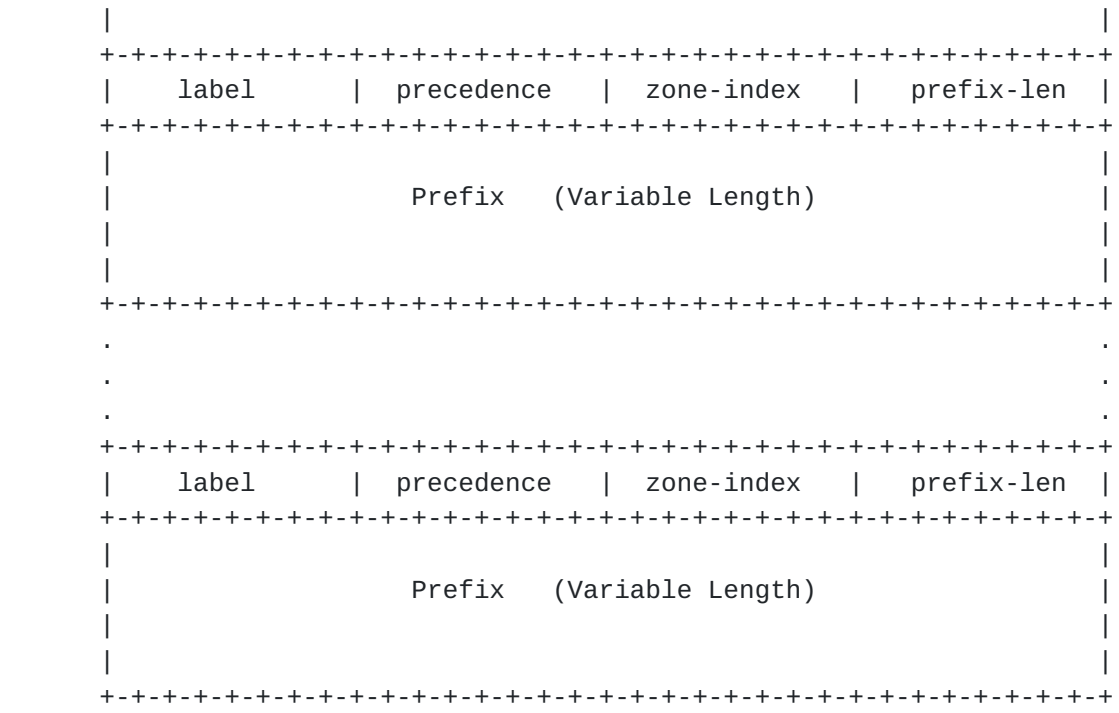
3. Default Address Selection Policy Option

The Default Address Selection Policy Option provides policy information for address selection rules. Specifically, it transmits a set of IPv6 source and destination address prefixes and some parameters that are used to control address selection as described in RFC 3484.

Each end node is expected to configure its policy table, as described in RFC 3484, in a manner consistent with the Default Address Selection Policy option information.

The format of the Default Address Selection Policy option is given below:





[Fig. 1]

Fields:

option-code: OPTION_DASP (TBD)

option-len: The total length of the label fields, precedence fields, zone-index fields, prefix-len fields, and prefix fields in octets.

label: An 8-bit unsigned integer; this value is used to make a combination of source address prefixes and destination address prefixes.

precedence: An 8-bit unsigned integer; this value is used for sorting destination addresses.

zone-index: An 8-bit unsigned integer; this value is used to specify zones for scoped addresses.

prefix-len: An 8-bit unsigned integer; the number of leading bits in the prefix that are valid. The value ranges from 0 to 128. The Prefix field is 0, 4, 8, 12, or 16 octets, depending on the length.

Prefix: A variable-length field containing an IP address or the prefix of an IP address. IPv4-mapped address [mapped] must be used to represent an IPv4 address as a prefix value.

4. Appearance of this Option

The Default Address Selection Policy option MUST NOT appear in any messages other than the following ones : Solicit, Advertise, Request, Renew, Rebind, Information-Request, and Reply.

5. Implementation Considerations

- The value 'label' is passed as an unsigned integer, but there is no special meaning for the value, that is whether it is a large or small number. It is used to select a preferred source address prefix corresponding to a destination address prefix by matching the same label value within this DHCP message. DHCPv6 clients need to convert this label to a representation specified by each implementation (e.g., string).

- Currently, the value label, precedence, and zone indices are defined as 8-bit unsigned integers. In almost all cases, this value will be enough.

- The 'precedence' is used to sort destination addresses. There might be some cases where precedence values will conflict when a client already has a selection policy configured or a client receives multiple policies from multiple DHCP servers (e.g., when a home gateway in a user network is connected to multiple upstream ISPs). In such cases, manual configuration of the policy will be necessary.

6. Discussion

- The 'zone index' value is used to specify a particular zone for scoped addresses. This can be used effectively to control address selection in the site scope (e.g., to tell a node to use a specified source address corresponding to a site-scoped multicast address). However, in some cases such as a link-local scope address, the value specifying one zone is only meaningful locally within that node. There might be some cases where the administrator knows which clients are on the network and wants specific interfaces to be used though. However, it is hard to use

this value in general case.

- We also proposed a policy distribution option using a Router Advertisement message defined in RFC2461 [RFC2461]. There was a discussion that using DHCPv6 was more suitable to distribute a selection policy, because such policy should be distributed under the site administrator's centralized control.

- There may be some demands to control the use of temporary addresses described in RFC3041 [RFC3041] (e.g., informing not to use a temporary address when it communicate within the an organization's network). Since a temporary address cannot represent as an IPv6 address and its prefix, some semantics to specify the temporary address will be necessary to control it (such as a flag to indicate a temporary address or a special representation for temporary address in prefix field).

7. Security Considerations

A rogue DHCPv6 server could issue bogus default address selection policies to a client. This might lead to incorrect address selection by the client, and the affected packets might be blocked at an outgoing ISP because of ingress filtering.

To guard against such attacks, both DCHP clients and servers SHOULD use DHCP authentication, as described in section 21 of RFC 3315, "Authentication of DHCP messages."

8. IANA Considerations

IANA is requested to assign option codes to OPTION_DASP from the option-code space as defined in section "DHCPv6 Options" of RFC 3315.

Appendix A. RFC3484 implementation status

Today, many operating systems implement address selection mechanism defined in RFC3484. Many of them, however, implement the specification partially. We summarize current implementation status of RFC 3484 at http://www.nttv6.net/dass/.

9. References

[ID.arifumi-ipv6-policy-dist]
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Authors' Addresses

Tomohiro Fujisaki
NTT PF Lab
3-9-11 Midori-Cho
Musashino-shi, Tokyo 180-8585
Japan

Phone: +81 422 59 7351
Email: fujisaki.tomohiroi@lab.ntt.co.jp

Arifumi Matsumoto
NTT PF Lab
3-9-11 Midori-Cho
Musashino-shi, Tokyo 180-8585
Japan

Phone: +81 422 59 3334
Email: arifumi@nttv6.net

Jun-ya Kato
NTT PF Lab
3-9-11 Midori-Cho
Musashino-shi, Tokyo 180-8585
Japan

Phone: +81 422 59 2939
Email: kato@syce.net

Shirou Niinobe
NTT PF Lab
3-9-11 Midori-Cho
Musashino-shi, Tokyo 180-8585
Japan

Phone: +81 422 59 4949
Email: nin@syce.net

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