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Enhanced IPv6 Stateless Address autoconfiguration draft-luo-6man-ipv6-ra-prefix-flag-00

Abstract

This document specifies new flag in the format of a Prefix Information Option, IPv6 routers advertise the address refresh capability and address generation mechanism to IPv6 hosts.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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Table of Contents

1. Introduction

The IPv6 Neighbor Discovery (ND) Protocol [RFC4861] specifies router advertisement message contains Prefix Information Option, [RFC4862] specifies Stateless Address Autoconfiguration (SLAAC), On the other hand, Dynamic Host Configuration Protocol for IPv6 (DHCPv6) [RFC8415] is used when a site requires tighter control over exact address assignments.

IPv6 hosts generate addresses composed of prefix advertised by router, an Interface Identifier(IID) in [RFC4291] typically embeds the link-layer address. In [RFC4941], the concept of a temporary address is proposed for privacy concerns, the host randomly generates a temporary identification and the temporary address is regenerated on a periodic basis. [RFC6724] recommends the host needs to prefer the temporary address above the public address. Various new forms of IIDs have been defined, including Cryptographically Generated Addresses (CGAs) [RFC4982] of Secure Neighbor Discovery (SEND) [RFC3971] and others.

The security and privacy implications of different IPv6 IIDs are discussed, and [RFC8064] recommends semantically opaque address as the default scheme for generating IPv6 stable addresses with SLAAC. Otherwise, the mechanism of temporary address generation and address selection are widely used by most operating systems.

This document specifies a new flag in the format of a Prefix Information Option, IPv6 routers advertise the address refresh capability and address generation mechanism to IPv6 hosts. Despite hosts choose any IIDs generation forms, according to address refresh capability, it is easy to perform extending lifetime of temporary address and public address. [RFC7136] specifies IIDs MUST be viewed as an opaque bit string by third parties, except in the local context, the address generation flag provides a mechanism in different kinds of application scenarios, such as authorized network and location service network.

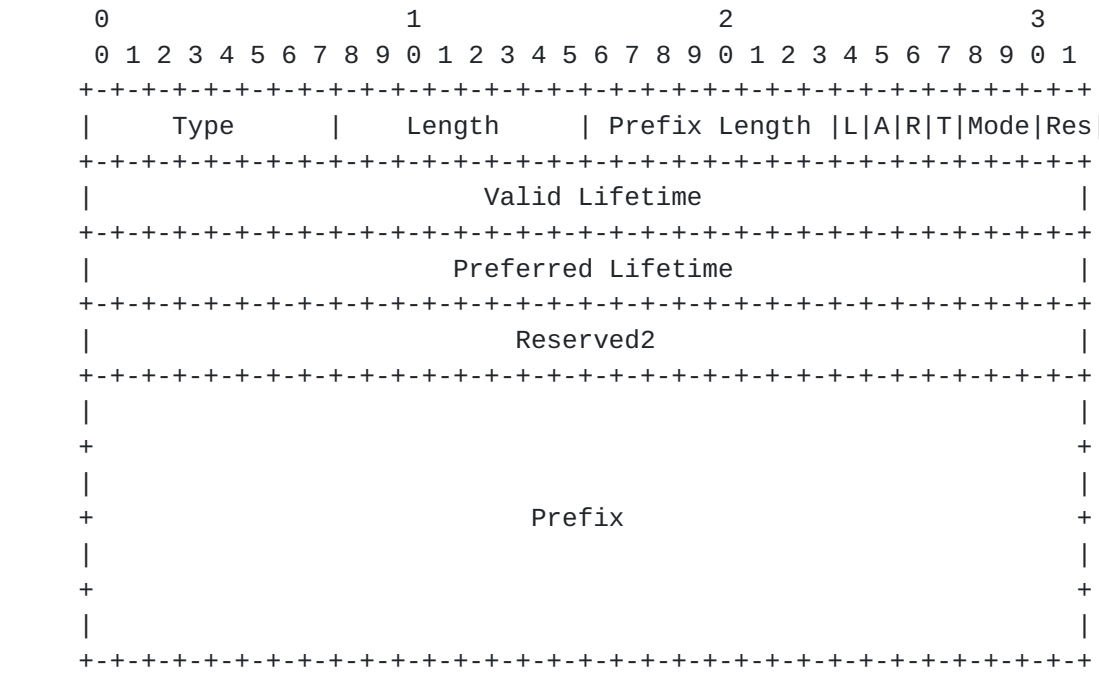
2. Specification of Requirements

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 [RFC2119].

3. Algorithm Specification

In a local context, when hosts need authentication to access the network, most routers offer the capability of flow monitoring and quality of service based on host IPv6 address, stable address is required here. Instead of letting host freely generate an address, it is better to specify that the address time is forced to refresh. Furthermore, routers can choose the address generation mechanism to advertise, including CGA, stable and semantically opaque address, address based on location.

3.1. Prefix Information Option



This format represents the following changes over that originally specified for Neighbor Discovery [RFC4861] [RFC6275]:

T 1-bit address time refresh flag. When set, indicates that the address generated by this prefix must be refreshed.

Mode 3-bit unsigned integer indicating the address generation mode, the follow mode values are currently defined:

0 default addresses mode
1 [RFC7217] stable,opaque addresses mode
2 [RFC3972] CGA mode

Reserved1 Reduced from a 5-bit field to a 1-bit field to

account for the addition of the above bit.

3.2. Router Specification

A router sends Router Advertisement messages periodically or in response to Router Solicitation. Prefix information Option specifies prefix and corresponding flags which is used for stateless address autoconfiguration. In each prefix information option:

a) If the router does not specify the address refresh flag and generation mode , it must be set to 0.

b) If the Autonomous flag is set to 0, the address refresh flag and generation mode should be set to 0.

c) According to the network configuration, the address refresh flag or generation mode should be set to an appropriate value.

3.3. Host Specification

Upon receipt of a valid Router Advertisement message:

a) If the Autonomous flag is set to 0, the address refresh flag and address generation mode should be silently ignored.

b) If the prefix is link-local prefix, the address refresh flag and address generation mode should be silently ignored.

c) If the Prefix Information Option is valid to generate address:

1) The host must expand the time of address when the address refresh flag is set to 1.

2) The generate mode should be ignored if the host does not support.

3) The generation mode flag is set to 0, the address is generated by default.

4) Host should generate address as the mode described.

4. Security Considerations

This document specifies a new flag in the format of a Prefix Information Option, IPv6 routers to advertise the address refresh capability and address generation mechanism to IPv6 hosts. The inclusion of additional bit fields provides extend information of

network, it shares the security issues of NDP that are documented in [RFC4861]. It recommends the existed scheme for generating IPv6 address with SLAAC, such that the security and privacy issues of IIDs are mitigated.

5. IANA Considerations

This document does not include an IANA request.

6. Normative References

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