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Registering self-generated IPv6 Addresses in DNS using DHCPv6
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Abstract

In networks that are centrally managed, self-generated addresses cause some traceability issues due to their decentralized nature. One of the most important issues in this regard is the inability to register such addresses in DNS. This document defines a mechanism to register self-generated addresses in DNS through a DHCPv6 server.

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1. Introduction

In several common network scenarios, IPv6 addresses are self-generated by the end-hosts by appending a self-generated interface identifier to a network-specified prefix. Examples of self-generated addresses include those created using IPv6 Stateless Address Configuration [[RFC4862](#)], temporary addresses [[RFC4941](#)] and Cryptographically Generated Addresses (CGA) [[RFC3972](#)] etc. In several tightly controlled networks, hosts with self-generated addresses may face some limitations. One such limitation is related to the inability of nodes with self-generated addresses to register their IPv6-address-to-FQDN bindings in DNS. This is related to the fact that, in such networks, only certain nodes (e.g. The DHCPv6 server) are allowed to update these bindings in order to prevent end-hosts from registering arbitrary addresses for their FQDNs or associating their addresses with arbitrary domain names.

For nodes that obtain their addresses through DHCPv6, a solution has been specified in [[RFC4704](#)]. The solution works by including a Client FQDN option in the SOLICIT, REQUEST, RENEW or REBIND messages during the process of acquiring an address through DHCPv6. This document provides an analogous mechanism to register self-generated addresses in DNS.

A new ADDR-REGISTRATION-REQUEST DHCPv6 message type is defined to initiate the address registration request, and two new Status codes is defined to indicate registration errors on the server side.

2. 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 [[RFC2119](#)].

3. Solution Overview

After successfully assigning a self-generated IPv6 address on one of its interfaces, an end-host implementing this specification SHOULD send an ADDR-REGISTRATION-REQUEST message to a DHCPv6 address registration server. After receiving the address registration request, the DHCPv6 server registers the IPv6 address to FQDN binding towards a configured DNS server. An acknowledgement MAY be sent back to the end host to indicate whether or not the registration operation succeeded..

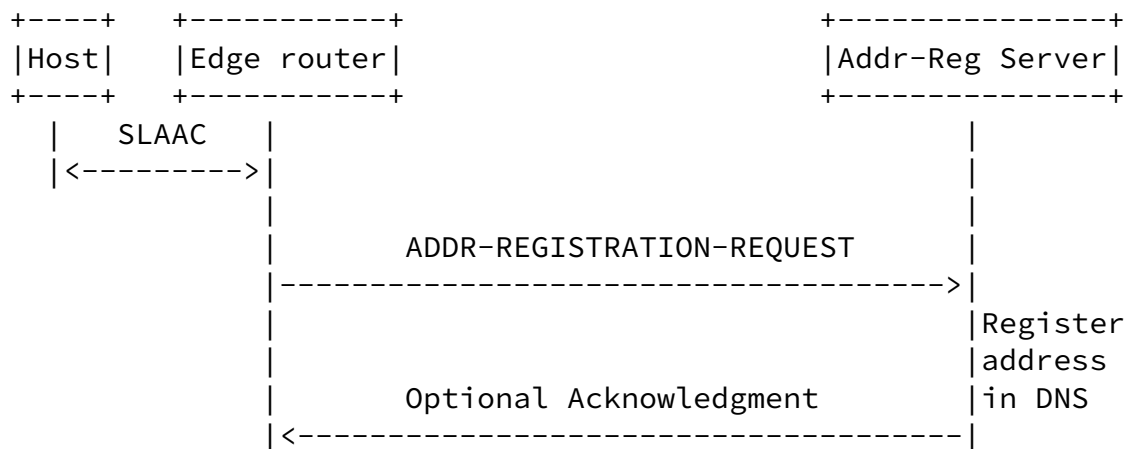
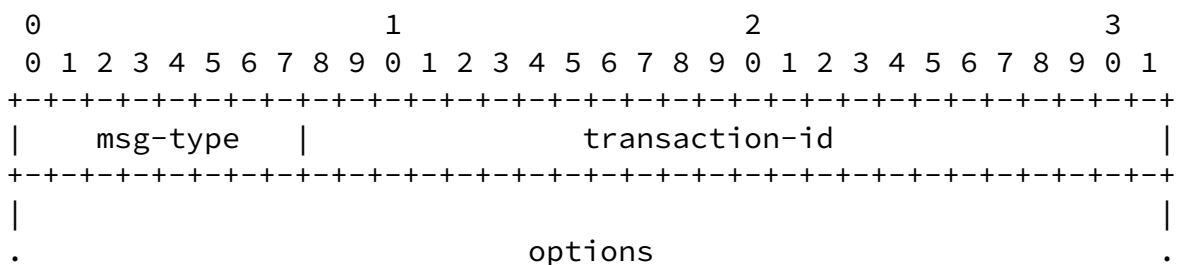


Figure 1: Address Registration Procedure

4. DHCPv6 ADDR-REGISTRATION-REQUEST Message

The DHCPv6 client sends an ADDR-REGISTRATION-REQUEST message to a server to request an address to be registered in the DNS. The format of the ADDR-REGISTRATION-REQUEST message is described as follows:



(variable)	
msg-type	Identifies the DHCPv6 message type; Set to ADDR-REGISTRATION-REQUEST (TBA1).
transaction-id	The transaction ID for this message exchange.
options	Options carried in this message.

DHCPv6 ADDR-REGISTRATION-REQUEST message

The ADDR-REGISTRATION-REQUEST message MUST NOT contain server-identifier option and MUST contain the IA_NA option and the DHCPv6 FQDN option [[RFC4704](#)].

Clients MUST discard any received ADDR-REGISTRATION-REQUEST messages. Servers MUST discard any ADDR-REGISTRATION-REQUEST messages that do not include a Client Identifier option or that do include a Server

Identifier option.

5. DHCPv6 Address Registration Procedure

The DHCPv6 protocol is used as the address registration protocol when a DHCPv6 server performs the role of an address registration server. The DHCPv6 IA_NA option [[RFC3315](#)] and the DHCPv6 FQDN option [[RFC4704](#)] are reused in order to fulfill the address registration interactions.

5.1. DHCPv6 Address Registration Request

The end-host sends a DHCPv6 ADDR-REGISTRATION-REQUEST message to the address registration server to the All_DHCP_Relay_Agents_and_Servers multicast address (ff02::1:2).

The end-host MUST include a Client Identifier option in the ADDR-REGISTRATION-REQUEST message to identify itself to the server. The DHCPv6 ADDR-REGISTRATION-REQUEST message MUST contain exactly one IA_NA option and exactly one FQDN option. The IA_NA option MUST contain at least one IA Address option.

After receiving this ADDR-REGISTRATION-REQUEST message, the address registration server MUST register the binding between the provided FQDN and address(es) in DNS. If the DHCPv6 server does not support address registration function, a Reply message with includes a Status Code option with the value the RegistrationNotSupported (TBA2) MAY be sent back to the initiated client.

5.2. Acknowledging successful registration

After all the addresses have been successfully registered in DNS, the address registration server MAY send a Reply message as the response to registration requests. The server generates a Reply message and includes a Status Code option with value Success, a Server Identifier option with the server's DUID, and a Client Identifier option with the client's DUID. For each IA in the Release message for which the server does not succeed in registering, the server adds an IA option using the IAID from the ADDR-REGISTRATION-REQUEST message, and includes a Status Code option with the value RegistrationDenied (TBA3) in the IA option. No other options are included in the IA option.

6. Security Considerations

An attacker may attempt to register large number of addresses in

quick succession in order to overwhelm the address registration server. These attacks may be prevented generic DHCPv6 protection by using the AUTH option [[RFC3315](#)] or Secure DHCPv6 [[I-D.ietf-dhc-secure-dhcpv6](#)].

7. IANA Considerations

This document defines a new DHCPv6 message, the ADDR-REGISTRATION-REQUEST message (TBA1) described in [Section 5](#), that requires an allocation out of the registry defined at

<http://www.iana.org/assignments/dhcpv6-parameters/>

This document defines two new DHCPv6 Status code, the

RegistrationNotSupported (TBA2) and RegistrationDenied (TBA3) described in [Section 6](#), that requires an allocation out of the registry defined at

<http://www.iana.org/assignments/dhcpv6-parameters/>

[8.](#) Acknowledgements

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