

Dynamic Host Configuration  
Internet-Draft  
Expires: September 6, 2004

T. Chown  
University of Southampton  
S. Venaas  
UNINETT  
A. Vijayabhaskar  
Hewlett-Packard STSD-I  
March 8, 2004

Renumbering Requirements for Stateless DHCPv6  
draft-ietf-dhc-stateless-dhcpv6-renumbering-00

Status of this Memo

This document is an Internet-Draft and is in full conformance with all provisions of [Section 10 of RFC2026](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/lid-abstracts.txt>.

The list of Internet-Draft Shadow Directories can be accessed at <http://www.ietf.org/shadow.html>.

This Internet-Draft will expire on September 6, 2004.

Copyright Notice

Copyright (C) The Internet Society (2004). All Rights Reserved.

Abstract

IPv6 hosts using Stateless Address Autoconfiguration are able to automatically configure their IPv6 address and default router settings. However, further settings are not available. If such hosts wish to automatically configure their DNS, NTP or other specific settings the stateless variant of the Dynamic Host Configuration Protocol for IPv6 (DHCPv6) could be used. This combination of Stateless Address Autoconfiguration and stateless DHCPv6 could be used quite commonly in IPv6 networks. However, hosts using such a combination currently have no means by which to be

informed of changes in stateless DHCPv6 option settings, e.g. the addition of a new NTP server address, changes in DNS search paths, or full site renumbering. This document is presented as a problem statement from which a solution should be proposed in a subsequent document.

Table of Contents

- [1.](#) Introduction . . . . . [3](#)
- [2.](#) Problem Statement . . . . . [3](#)
- [3.](#) Renumbering Scenarios . . . . . [4](#)
- [3.1](#) Site renumbering . . . . . [4](#)
- [3.2](#) Changes to a DHCPv6-assigned setting . . . . . [4](#)
- [4.](#) Renumbering Requirements . . . . . [4](#)
- [5.](#) Solution Space . . . . . [5](#)
- [6.](#) Summary . . . . . [5](#)
- [7.](#) Security Considerations . . . . . [5](#)
- Normative References . . . . . [6](#)
- Authors' Addresses . . . . . [6](#)
- Intellectual Property and Copyright Statements . . . . . [7](#)

## 1. Introduction

IPv6 hosts using Stateless Address Autoconfiguration [[1](#)] are able to automatically configure their IPv6 address and default router settings. While Stateless Address Autoconfiguration for IPv6 allows automatic configuration of these settings, it does not provide a mechanism for additional, non IP-address settings to be automatically configured.

The full version of the Dynamic Host Configuration Protocol for IPv6 (DHCPv6) [[2](#)] is designed to provide both stateful address assignment to IPv6 hosts, as well as additional (non IP-address) configuration including DNS, NTP and other specific settings. A full stateful DHCPv6 server allocates the addresses and maintains the clients bindings to keep track of client leases.

If hosts using Stateless Address Autoconfiguration for IPv6 wish to automatically configure their DNS, NTP or other specific settings the stateless variant [[3](#)] of DHCPv6 could be used. The stateless variant of DHCPv6 is more lightweight. It does not do address assignment, instead it only provides additional configuration parameters like DNS resolver addresses. It does not maintain state about the information assigned to clients; the additional parameters do not have an explicit life-time associated with them in the same way that IP addresses do, and hence the DHCPv6 server does not need to maintain the state of the clients.

This combination of Stateless Address Autoconfiguration and stateless DHCPv6 could be used quite commonly in IPv6 networks. In the absence of an alternative method for DNS, NTP and other options to be automatically configured, it may become the most common combination for statelessly configuring hosts.

## 2. Problem Statement

A problem however lies in the ability, or lack of ability, of clients using this combination to be informed of (or to deduce) changes in DHCPv6 assigned settings.

While a DHCPv6 server unicasts Reconfigure message to individual clients to trigger the clients to initiate Information-request/reply configuration exchanges to update their configuration settings, the stateless variant of DHCPv6 cannot use the Reconfigure mechanism because it does not maintain a list of IP addresses (leases) to send the unicast messages to.

Thus events including the following cannot be handled:

- o Full site renumbering
- o DNS server change of address
- o NTP server change of address
- o Changes in DNS search paths

It would be highly desirable that a host using the combination of Stateless Address Autoconfiguration and stateless DHCPv6 could handle a renumbering or reconfiguration event, whether planned or unplanned by the network administrator.

### [3. Renumbering Scenarios](#)

There are two main scenarios for changes to DHCPv6-assigned settings, that would require the client to initiate an Information-request/reply exchange to update the configuration.

#### [3.1 Site renumbering](#)

One of the fundamental principles of IPv6 is that sites receive their IPv6 address allocations from an ISP using provider assigned (PA) address space. There is currently no provider independent (PI) address space in IPv6. A site wishing to change ISP must thus renumber its network. Any such site renumbering will require hosts to reconfigure both their own address and default router settings as well as their stateless DHCPv6-assigned settings.

### [3.2](#) Changes to a DHCPv6-assigned setting

An administrator may need to change one or more stateless DHCPv6-assigned settings, e.g. an NTP server, DNS server, or the DNS search path. This may be required if a new, additional DNS server is brought online, is moved to a new network (prefix), or an existing server is decommissioned or known to be unavailable.

## [4.](#) Renumbering Requirements

Ideally, any of the above scenarios should be handled automatically by the hosts on the network. For this to be realised, a method is required for the hosts to be informed that they should request new stateless DHCPv6-assigned setting information.

The solution to the problem may depend on whether the renumbering or configuration change is a planned or unplanned one, from the perspective of the network administrator. There is already work underway in understanding the planned renumbering [\[4\]](#) scenario for

IPv6 networks. However, there is currently no mechanism in stateless DHCPv6 to even handle planned renumbering events.

The unplanned renumbering event, which may be more common in smaller, unmanaged networks, is more difficult to cater for. Ideally, any solution for the problem should consider planned and unplanned events.

The solution should also be secure, such that additional security concerns are not added to the stateless DHCPv6 networking environment.

## [5.](#) Solution Space

Solutions should be designed and presented in a separate document. An initial, brief set of candidate solutions might include:

- o Adding a Reconfigure message mechanism that would work in the stateless DHCPv6 environment. This could enable planned or unplanned events, but may require a multicast mechanism to be realised.

- o Conveying a valid lifetime timer to clients for stateless DHCPv6-assigned settings. This could primarily enable planned events, but with a small time-out it could to some extent handle unplanned events at the expense of the additional request traffic.
- o Using some form of Router Advertisement as a hint to request new stateless DHCPv6-assigned settings. Using only an observed new Router Advertisement prefix as a hint to re-request settings would not handle changes that are purely to NTP, DNS or other options.

## 6. Summary

This document presents a problem statement for how IPv6 hosts that use the combination of Stateless Address Autoconfiguration and stateless DHCPv6 may be informed of renumbering events or other changes to the settings that they originally learnt through stateless DHCPv6. A short list of candidate solutions is presented, which the authors hope may be expanded upon in subsequent documents.

## 7. Security Considerations

There are no security considerations in this problem statement per se. However, whatever mechanism is designed or chosen to address this problem should avoid the introduction of new security concerns for (stateless) DHCPv6.

Chown, et al.

Expires September 6, 2004

[Page 5]

---

Internet-Draft

Renumbering for Stateless DHCPv6

March 2004

## Normative References

- [1] Thomson, S. and T. Narten, "IPv6 Stateless Address Autoconfiguration", [RFC 2462](#), December 1998.
- [2] Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C. and M. Carney, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", [RFC 3315](#), July 2003.
- [3] Droms, R., "A Guide to Implementing Stateless DHCPv6 Service", [draft-ietf-dhc-dhcpv6-stateless-01](#) (work in progress), October 2003.
- [4] Baker, F., "Procedures for Renumbering an IPv6 Network without a

Flag Day", [draft-baker-ipv6-renumber-procedure-01](#) (work in progress), October 2003.

#### Authors' Addresses

Tim Chown  
University of Southampton  
School of Electronics and Computer Science  
Southampton, Hampshire S017 1BJ  
United Kingdom

E-Mail: [tjc@ecs.soton.ac.uk](mailto:tjc@ecs.soton.ac.uk)

Stig Venaas  
UNINETT  
Trondheim NO 7465  
Norway

E-Mail: [venaas@uninett.no](mailto:venaas@uninett.no)

Vijayabhaskar A K  
Hewlett-Packard STSD-I  
29, Cunningham Road  
Bangalore 560052  
India

E-Mail: [vijayak@india.hp.com](mailto:vijayak@india.hp.com)

Chown, et al.

Expires September 6, 2004

[Page 6]

---

Internet-Draft

Renumbering for Stateless DHCPv6

March 2004

#### Intellectual Property Statement

The IETF takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it

has made any effort to identify any such rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in [BCP-11](#). Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementors or users of this specification can be obtained from the IETF Secretariat.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights which may cover technology that may be required to practice this standard. Please address the information to the IETF Executive Director.

#### Full Copyright Statement

Copyright (C) The Internet Society (2004). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assignees.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION

HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

#### Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.

