

Dynamic Host Configuration Working
Group
Internet-Draft
Expires: April 29, 2006

M. Johnston
Intel Corporation
S. Venaas, Ed.
University of Southampton
October 26, 2005

DHCP Preboot eXecution Environment (PXE) Options
draft-ietf-dhc-pxe-options-02

Status of this Memo

By submitting this Internet-Draft, each author represents that any applicable patent or other IPR claims of which he or she is aware have been or will be disclosed, and any of which he or she becomes aware will be disclosed, in accordance with [Section 6 of BCP 79](#).

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/1id-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 April 29, 2006.

Copyright Notice

Copyright (C) The Internet Society (2005).

Abstract

We define DHCP options being used by PXE and EFI clients to uniquely identify booting client machines and their pre-OS runtime environment so the DHCP and/or PXE boot server can return the correct OS bootstrap image (or pre-boot application) name and server to the client.

Requirements Language

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](#) [[1](#)].

Table of Contents

1.	Introduction	3
2.	Revision history	3
3.	Option Definitions	4
3.1.	Client System Architecture Type Option Definition	4
3.2.	Client Network Interface Identifier Option Definition	4
3.3.	Client Machine Identifier Option Definition	5
3.4.	Options Requested by PXE Clients	5
4.	Acknowledgements	6
5.	IANA Considerations	6
6.	Security Considerations	6
7.	Normative References	6
	Authors' Addresses	7
	Intellectual Property and Copyright Statements	8

1. Introduction

These DHCP [2] options are being widely used by PXE compliant clients to uniquely identify booting client machines themselves and their pre-OS runtime environment so the DHCP and/or PXE boot server can return the correct OS bootstrap image (or pre-boot application) name and server to the client. In the past, this work was done by examining the network MAC address in the "chaddr" field in the BOOTP/DHCP header and keeping a database of MAC addresses on the BOOTP/DHCP server. This was deemed insufficient for large and complex networks for two main reasons. 1) Multiple laptops could end up with the same MAC address if the NIC was in a shared docking station. 2) Multiple network devices and MAC addresses could be used by one machine for redundancy or because of repairs. Another issue that came up was the machine that could change its pre-OS runtime environment. This issue caused the creation of another new option to identify the runtime environment so the correct binary image could be matched up with the booting machine. These options are defined in the PXE [3] and EFI [4] specifications and are being documented in this draft for completeness within the IETF. Comments about this Internet Draft should be sent to the dhcwg@ietf.org mailing list.

2. Revision history

Revision 00 to Revision 01

- o Changed all occurrences of "suboption" to "option".
- o Re-worded first sentence of Introduction to clarify that these options are in wide use by PXE clients.
- o Clarified external document references.
- o Added description of use of options 128 through 135.
- o Added IANA Considerations and Security Considerations sections.

Revision 01 to Revision 02

- o Changed and extended description of use of options 128 through 135.
- o Removed text on IANA registries since Informational.

3. Option Definitions

There are three DHCP options [5] defined for use by PXE clients.

3.1. Client System Architecture Type Option Definition

The format of the option is:

```

      Code  Len  16-bit Type
+-----+-----+-----+-----+
| 93 |   n   | n1  | n2  |
+-----+-----+-----+-----+
```

Octet "n" MUST be an even number greater than zero. Clients that support more than one architecture type MAY include a list of these types in their initial DHCP and PXE boot server packets. The list of supported architecture types MAY be reduced in any packet exchange between the client and server(s). Octets "n1" and "n2" encode a 16-bit architecture type identifier that describes the pre-boot runtime environment(s) of the client machine.

As of the writing of this document the following pre-boot architecture types have been requested.

Type	Architecture Name
----	-----
0	Intel x86PC
1	NEC/PC98
2	EFI Itanium
3	DEC Alpha
4	Arc x86
5	Intel Lean Client
6	EFI IA32

This option MUST be present in all DHCP and PXE packets sent by PXE compliant clients and servers.

3.2. Client Network Interface Identifier Option Definition

The format of the option is:

```

      Code  Len  Type Major Minor
+-----+-----+-----+-----+
| 94 |   3   |  t  |  M  |  m  |
+-----+-----+-----+-----+
```

Octet "t" encodes a network interface type. For now the only supported value is 1 for UNDI (Universal Network Device Interface).

Octets "M" and "m" describe the interface revision. To encode the UNDI revision of 2.11, "M" would be set to 2 and "m" would be set to 11 (0x0B).

Revision	Description
-----	-----
< 2.00	LANDesk service agent boot ROMs. No PXE APIs.
2.00	First generation PXE boot ROMs. (PXENV+) [3]
2.01	Second generation PXE boot ROMs. (!PXE) [3]
3.00	32/64-bit UNDI specification. (Alpha) [4] EFI boot services driver only. No EFI runtime support.
3.10	32/64-bit UNDI specification. (Beta) [4] First generation EFI runtime driver support.
3.20	32/64-bit UNDI specification. (Release) [4] Second generation EFI runtime driver support.

This option MUST be present in all DHCP and PXE packets sent by PXE compliant clients and servers.

[3.3.](#) Client Machine Identifier Option Definition

The format of the option is:

```

      Code  Len  Type  Machine Identifier
+----+-----+----+-----+ . . . +-----+
| 97 |  n  |  t  |      | . . . |      |
+----+-----+----+-----+ . . . +-----+
```

Octet "t" describes the type of the machine identifier in the remaining octets in this option. 0 (zero) is the only defined value for this octet at the present time and it describes the remaining octets as a 16-octet GUID. Octet "n" is 17 for type 0. (One definition of GUID can be found in [Appendix A](#) in the EFI specification [efi].)

This option MUST be present in all DHCP and PXE packets sent by PXE compliant clients and servers.

[3.4.](#) Options Requested by PXE Clients

All compliant PXE clients MUST include a request for DHCP options 128 through 135 in all DHCP and PXE packets. The format and contents of these options are NOT defined by the PXE specification. These

options MAY be present in the DHCP and PXE boot server replies and are meant for use by the downloaded network bootstrap programs. These options are NOT used by the PXE boot ROMs.

As options 128-135 are not officially assigned for PXE use (previous to November 2004 they were considered site-specific options, [6]), use of these options may conflict with other uses of these options.

4. Acknowledgements

The authors thank Bernie Volz for valuable input.

5. IANA Considerations

This document has no actions for IANA.

6. Security Considerations

This document in and by itself provides no security, nor does it impact existing security.

7. Normative References

- [1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [2] Droms, R., "Dynamic Host Configuration Protocol", [RFC 2131](#), March 1997.
- [3] Henry, M. and M. Johnston, "Preboot Execution Environment (PXE) Specification", September 1999, <<http://www.pix.net/software/pxeboot/archive/pxespec.pdf>>.
- [4] Intel Corp., "Extensible Firmware Interface Specification", December 2002, <http://developer.intel.com/technology/efi/main_specification.htm>.
- [5] Alexander, S. and R. Droms, "DHCP Options and BOOTP Vendor Extensions", [RFC 2132](#), March 1997.
- [6] Volz, B., "Reclassifying Dynamic Host Configuration Protocol version 4 (DHCPv4) Options", [RFC 3942](#), November 2004.

Authors' Addresses

Michael Johnston
Intel Corporation
MS. JF1-239 2111 NE 25th Ave.
Hillsboro, OR 97124
USA

Phone: +1 503-264-9703
Email: michael.johnston@intel.com

Stig Venaas
University of Southampton
School of Electronics and Computer Science
Southampton, Hampshire S017 1BJ
United Kingdom

Email: sv@ecs.soton.ac.uk

Intellectual Property Statement

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights 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; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in [BCP 78](#) and [BCP 79](#).

Copies of IPR disclosures made to the IETF Secretariat 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 implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at ietf-ipr@ietf.org.

Disclaimer of Validity

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM 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.

Copyright Statement

Copyright (C) The Internet Society (2005). This document is subject to the rights, licenses and restrictions contained in [BCP 78](#), and except as set forth therein, the authors retain all their rights.

Acknowledgment

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

