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Dynamic Host Configuration Working Group
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New Option Review Guidelines for DHCP
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Abstract

This document outlines deficiencies that have become evident since [RFC 2131](#) and [RFC 2132](#) were published regarding the allocation of new option codes, the review of drafts covering these new option codes, and the availability of option codes for new parameters. The document then presents proposals for correcting these deficiencies.

1. Introduction

The rapid and wide-spread adoption of DHCP for IPv4 has lead to an increasing number of new DHCP option and message type drafts under DHC WG review. Experience with the current IANA option code allocation process and the DHC WG draft review process has identified a number of deficiencies, namely:

- * We're rapidly going through the remaining option codes, and face the possibility of exhausting the remaining codes before the wide-spread adoption of IPv6 is achieved.

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- * There are no guidelines to help the DHC WG and the DHCP community at large gauge the impact of the addition of new message types and options. Some message types and options that have been proposed require changes to the DHCP protocol itself and/or current implementations. Because the adoption of such message types or options has a greater impact on the DHCP community, these message types and options require more scrutiny by the DHC WG and IESG.
- * Because some options or message types could change the DHCP protocol itself, we need a method of explicitly communicating the change of DHCP versions among implementations. Today, we have no such method.
- * There is no provision to preserve compatibility with earlier versions of the protocol.

Inter-operability testing at Connectathon (1997-2000) has shown a reduction in the level of interoperability between implementations. These interoperability problems were found to be due to confusion among implementors about how certain features of the protocol should be implemented. Improvement (tightening) of the general [RFC 2131](#) and [RFC 2132](#) drafts as well as the tightening of new option drafts (using the guidelines defined in this document) will help prevent these interoperability problems from occurring as new implementations appear.

The specification of a [RFC 2132](#)-form option to carry the DHCP protocol version and a proposal for a new, larger option namespace is discussed in a companion document, "A New Option Namespace for DHCP" [\[8\]](#).

[1.1](#) Conventions Used in the Document

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](#) [\[5\]](#).

[2.](#) Review Guidelines

We tackle the message type and option code review problem by defining a set of categories based upon the impact the adoption of an option or new message type will have on the DHCP community. Option or new message drafts appropriately categorized aid

reviewers by helping them evaluate the draft. Once the DHC WG and the draft author(s) agree on the category of the proposed option or message type, that category will be listed explicitly in the abstract of the option or message draft.

2.1. Hints for selecting the correct review category

Read the following hints and select the one which best describes your option or message type, then proceed to Table 1 at the end of this section for the suggested option review category. If, after reading the following hints, you cannot find one that fits your option or message type, read each of the category sections (2.2-2.5) carefully. If you still are not sure which category your option or message type belongs in, you can ask the DHC WG (if it still exists) or the IESG for help in selecting the right category.

- A) This option has no relationship to other existing or proposed options. It would not require change of existing DHCP client, server, or BOOTP relay agent implementations. It would not change the version of the DHCP protocol. Its introduction would not invalidate previous version(s) of the DHCP protocol. The proposed option provides data which is non-implementation specific and unrelated to network configuration.
- B) This message type has no relationship to other existing or proposed message types. It would not require change of existing DHCP client, server, or BOOTP relay agent implementations. It would not change the version of the DHCP protocol. The message type is useful to the DHCP community at large.
- C) This option has no relationship to other existing or proposed options or message types. It would not require change of existing DHCP client, server, or BOOTP relay agent implementations. It would not change the version of the DHCP protocol. Its introduction would not invalidate previous version(s) of the DHCP protocol [8]. The information it carries is network or system configuration related, but only for a particular implementation or set of implementations from the same vendor.
- D) This option has no relationship to other existing or proposed options or message types. It would not require change of existing DHCP client, server, or BOOTP relay agent implementations. It would not change the version of the DHCP protocol. Its introduction would not invalidate previous

version(s) of the DHCP protocol [8]. It carries network or system configuration data with is of general usefulness.

- E) This option would have a implicit or explicit relationship between it and other existing options or other proposed options. It MAY change the behavior of existing DHCP client, server, and/or BOOTP relay agent implementations. It would not change the DHCP protocol version. Its introduction would not invalidate previous version(s) of the DHCP protocol [8].

Examples of implicit/explicit option relationships:

Option	Related Options
-----	-----
Vendor Class Identifier	Encapsulated vendor option(s)
User Class Identifier	Standard option's scope

- F) This message type would have a implicit or explicit relationship between it and other existing message types or options. Its adoption MAY change the behavior of existing DHCP client, server, and/or BOOTP relay agent implementations. It would not change the DHCP protocol version. Its introduction would not invalidate previous version(s) of the DHCP protocol [8].
- G) The addition of this option would change Table 3, "Fields and options used by DHCP servers" and/or Table 5, "Fields and options used by DHCP clients" in RFC 2131 [1], and thus change the DHCP protocol. Pre-existing versions / implementations would continue to interoperate.
- H) The addition of this option or message type would invalidate previous versions of the DHCP protocol [8], preventing client, server, and/or BOOTP relay agents implementing the earlier version(s) from functioning.

Table 1: Linking Hints to Review Category

Guidelines	Review Category
-----	-----
A	None. Use SLP or an other alternative to to register and deliver your information.
B	Category One
C	None. Use your Vendor-specific option space for your option.

D	Category One
E	Category Two
F	Category Two
G	Category Three
H	Category Four

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2.2. Category One

Options in this category MUST NOT require changes to the DHCP protocol, server, client, or BOOTP relay agent implementations. They MUST NOT be dependent on other options being present or absent. Earlier versions/implementations of the protocol continue to interoperate in the presence of these options. Administrative tools and DHCP protocol debugging tools which generically support the default option types MAY need to be reconfigured in order to permit management of the new option. Options of this type are "payload" options, and MUST be of one of the default option types for the option block form ([RFC 2132](#) or RFC TBD_NS [8]).

Acceptance criteria:

Working group/IETF community review:	Yes.
IANA option number registration:	Yes.
Inter-operability testing (2 or more implementations)	No.
DHCP protocol version change [8]:	No.

2.3. Category Two

Options in this category MUST NOT require changes to the DHCP protocol. They MAY require changes to server, client, relay agent implementations, administrative tools, and DHCP protocol debugging tools. They MAY depend on the presence or absence of other options, as long as those other options are NOT in Table 3 or Table 5 of [RFC 2131](#) [1]. Any dependence on other options MUST be made explicit in the new options draft. Existing versions / implementations of the protocol continue to interoperate in the presence of messages containing category two options. Options of this type are "affect implementation" options.

An option MUST be designed in such a way as a reply/response from non-compliant implementations can be easily distinguished from those of compliant implementations. An option MUST NEVER change the interpretation of existing options. The option draft author MUST specify a compliant implementation's behavior if that implement-

ation receives a reply/response from a non-compliant implementation.

Acceptance criteria:

Working group/IETF community review:	Yes.
IANA option number registration:	Yes.
Inter-operability testing (2 or more implementations)	Yes.
DHCP protocol version change [8]:	No.

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2.4. Category Three

Options in this category EXPLICITLY change the DHCP protocol. They WILL require changes to server, client, and/or relay agent implementations. They MAY depend on the presence or absence of other options. Any dependence on other options MUST be made explicit in the new option draft. The addition of such options result in changes to Table 3, "Fields and options used by DHCP servers" and/or Table 5, "Fields and options used by DHCP clients" in [RFC 2131](#) [1]. Existing versions / implementations of the protocol continue to interoperate in the presence of traffic containing category three options. Administrative tools MUST be changed to support options of this type. DHCP protocol debugging tools would need to be updated to recognize these options. Options of this type are known as "affect protocol" options. The acceptance of a Category Three option results in incrementing the DHCP version option value (see a companion document, "A New Option Namespace for DHCP" for details on the DHCP version option [8]).

An option MUST be designed in such a way as a reply/response from non-compliant implementations can be easily distinguished from those of compliant implementations. The option draft author MUST specify a compliant implementation's behavior if that implementation receives a reply/response from a non-compliant implementation. An option MUST NEVER change the interpretation of existing options. Category Three option implementations can easily detect a non-compliant implementation due to the absence of the DHCP version option or a lower than expected version number [8].

Acceptance criteria:

Working group/IETF community review:	Yes.
IANA option number registration:	Yes.
Inter-operability testing (2 or more implementations)	Yes.
DHCP protocol version change [8]:	Yes.

2.5. Category Four

Options in this category would EXPLICITLY change the DHCP

protocol in a non-backward compatible manner. They would require changes to ALL DHCP client, server, and/or BOOTP relay agent implementations. They INVALIDATE one or more of the previous versions of the BOOTP/DHCP protocol.

Because category four options invalidate previous versions of the protocol, they are NOT candidates for acceptance. Changes to the the DHCP protocol MUST BE backward compatible.

Acceptance criteria:

Working group/IETF community review:	N/A.
IANA option number registration:	N/A.
Inter-operability testing (2 or more implementations)	N/A.
DHCP protocol version change [8]:	N/A.

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3. Security Considerations

Not Applicable.

4. Acknowledgements

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8. Expiration

This document will expire on January 31, 2001.