

Internet Engineering Task Force  
Internet-Draft  
Expires: April 9, 2006

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October 6, 2005

DHCPv4 option for PANA Authentication Agents  
draft-ietf-dhc-paa-option-00.txt

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Abstract

This document defines a new Dynamic Host Configuration Protocol version 4 (DHCPv4) option that contains a list of domain names or

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DHCPv4 PAA Option

October 2005

IPv4 addresses that can be mapped to one or more of PANA Authentication Agents (PAA). This is one of the many methods that a PANA Client (PaC) can use to locate PANA Authentication Agents (PAA).

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## [1.](#) Introduction

The Protocol for carrying Authentication for Network Access (PANA) [\[1\]](#) defines a new Extensible Authentication Protocol (EAP) lower layer that uses IP between the protocol end points.

The PANA protocol is run between a PANA Client (PaC) and a PANA Authentication Agent (PAA) in order to perform authentication and authorization for the network access service.

This document specifies a new DHCPv4 option [\[2\]](#) that allows PANA client (PaC) to discover PANA Authentication Agents (PAA). This is one of the many methods for locating PAAs: manual configuration is an example of another one.

## [2.](#) Terminology

This document uses the PANA terminology defined in [\[1\]](#).

This document uses the DHCP terminology defined in [\[2\]](#) and [\[3\]](#).

### [3.](#) Requirements

The keywords MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL, when they appear in this document, are to be interpreted as described in [\[4\]](#).

#### 4. DHCPv4 specification dependency

This document describes a new DHCPv4 option for obtaining a list of domain names or IPv4 addresses to locate a PANA Authentication Agent. This document should be read in conjunction with the DHCPv4 specifications [2] and [3].

Definitions for terms and acronyms not specifically defined in this document are defined in [2] and [3].

## [5.](#) PANA Authentication Agent DHCPv4 Option

This document defines a DHCPv4 option that carries either a 32-bit (binary) IPv4 address list or, preferably, a domain name list to be used by the PANA client to locate a PANA authentication Agent.

The option has two encodings, specified by the encoding byte ('enc') that follows the code byte. If the encoding byte has the value 0, it

is followed by a list of domain names, as described below ([Section 5.1](#)). If the encoding byte has the value 1, it is followed by one or more IPv4 addresses ([Section 5.2](#)). All implementations MUST support both encodings. The 'option-length' field indicates the total number of octets in the option following the 'option-length' field, including the encoding byte.

#### [5.1](#). PANA Authentication Agent Domain Name List

If the 'enc' byte has a value of 0, the encoding byte is followed by a sequence of labels, encoded according to [Section 3.1 of RFC 1035](#) [5], quoted below:

Domain names in messages are expressed in terms of a sequence of labels. Each label is represented as a one octet length field followed by that number of octets. Since every domain name ends with the null label of the root, a domain name is terminated by a length byte of zero. The high order two bits of every length octet must be zero, and the remaining six bits of the length field limit the label to 63 octets or less. To simplify implementations, the total length of a domain name (i.e., label octets and label length octets) is restricted to 255 octets or less.

[RFC 1035](#) encoding was chosen to accommodate future internationalized domain name mechanisms.

The option MAY contain multiple domain names, but these SHOULD refer to different NAPTR records, rather than different A records. Domain names MUST be listed in order of preference.

Use of multiple domain names is not meant to replace NAPTR and SRV records, but rather to allow a single DHCPv4 server to indicate multiple PANA Authentication Agents available in the same access network.

Clients MUST support compression according to the encoding in [Section 4.1.4](#) of [5].

If the length of the domain list exceeds the maximum permissible

within a single option (254 octets), then the domain list MUST be



represented in the DHCP message as specified in [6].

The DHCPv4 option for this encoding has the format shown in Fig. 1.

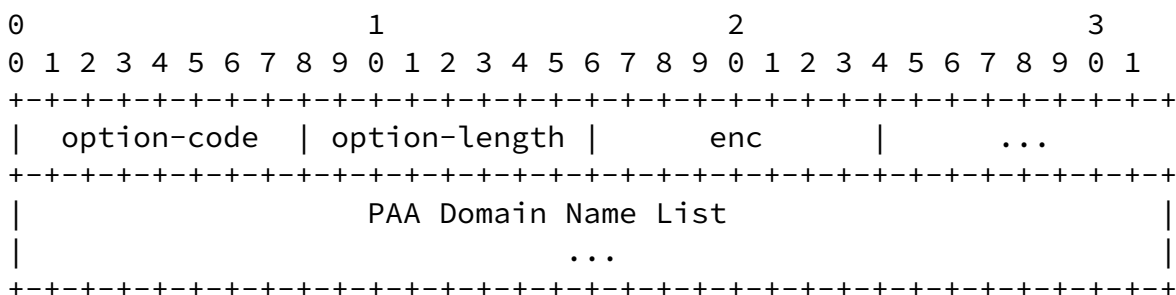


Figure 1: DHCPv4 option for PAA Domain Name List

option-code: OPTION\_PANA\_AGENT(TBD)

option-length: Number of octets following the 'option-length' field, including the encoding byte, in octets; variable.

enc: Encoding byte set to 0

PAA Domain Name List: The domain names of the PANA Authentication Agents for the client to use. The domain names are encoded according to [Section 3.1 of RFC 1035](#) [5].

## 5.2. PANA Authentication Agent IPv4 Address List

If the 'enc' byte has a value of 1, the encoding byte is followed by a list of IPv4 addresses indicating one or more PANA Authentication Agents available to the PANA client. PAAs MUST be listed in order of preference.

The DHCPv4 option for this encoding has the format shown in Fig. 2.

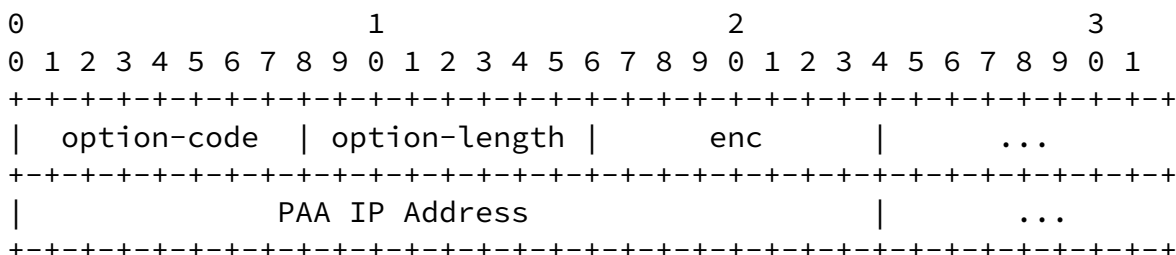


Figure 2: DHCPv4 option for PAA IPv4 Address List

option-code: OPTION\_PANA\_AGENT(TBD)

option-length: Number of octets following the 'option-length' field, including the encoding byte in octets; Must be a multiple

of 4 plus one.

enc: Encoding byte set to 1

**PAA IP Address:** IPv4 address of a PAA for the PaC to use. The PAAs are listed in the order of preference for use by the PaC.

## 6. Client Operation

The client requests PAA DHCPv4 Option in a Parameter Request List as described in [\[2\]](#) and [\[3\]](#).

If the PAA DHCPv4 option provided in response by the DHCPv4 server contains multiple domain names, the client MUST try the records in the order listed. The client only resolves the subsequent domain names if attempts to contact the first one failed or denote a domain administratively prohibited by client policy.

If the PAA DHCPv4 option provided in response by the DHCPv4 server contains multiple IP addresses, the client MUST try the records in the order listed.

## [7.](#) DHCPv4 Server Operation

If a DHCPv4 server is configured with both PAA domain name list and PAA IP address list, the DHCPv4 server should respond to the request with the domain name list to be used by the PANA client.

A DHCP server MUST NOT mix the two list types (domain names and IPv4 address) in the same DHCPv4 message, even if it sends two different instances of the same option.

## [8.](#) Security Considerations

The security considerations in [\[1\]](#) and [\[2\]](#) apply. If an adversary manages to modify the response from a DHCP server or insert its own response, a PANA Client could be led to contact a rogue PANA Agent, possibly one that then intercepts call requests or denies service.

## [9.](#) IANA Considerations

IANA assignment for the following DHCPv4 option code is needed.

Option Name	Value
OPTION_PAA_AGENT	TBD

## 10. Future Work

Defining similar options for DHCPv6 [\[7\]](#).

## 11. Normative References

- [1] Forsberg, D., Ohba, Y., Patil, B., Tschofenig, H., and A. Yegin, "Protocol for Carrying Authentication for Network Access (PANA), [draft-ietf-pana-pana-08](#) (work in progress)", November 2005.

- [2] Droms, R., "Dynamic Host Configuration Protocol", [RFC 2131](#), March 1997.
- [3] Alexander, S. and R. Droms, "DHCP Options and BOOTP Vendor Extensions", [RFC 2132](#), March 1997.
- [4] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [5] Mockapetris, P., "Domain names - implementation and specification", STD 13, [RFC 1035](#), November 1987.
- [6] Lemon, T. and S. Cheshire, "Encoding Long Options in the Dynamic Host Configuration Protocol (DHCPv4)", [RFC 3396](#), November 2002.
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## Acknowledgment

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

