Network Working Group
INTERNET DRAFT

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VPN Identifier sub-option for the Relay Agent Information Option

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Status of this Memo

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Abstract

In some environments, a relay agent resides in a network element which also has access to one or more VPNs. If one DHCP server wishes to offer service to DHCP clients on those different VPNs the DHCP server needs to know the VPN on which each client resides. The vpn-id sub-option of the relay-agent-information option is used by the relay agent to tell the DHCP server the VPN for every DHCP request it passes on to the DHCP server, and is also used to properly forward

any DHCP reply that the DHCP server sends back to the relay agent.

1. Introduction

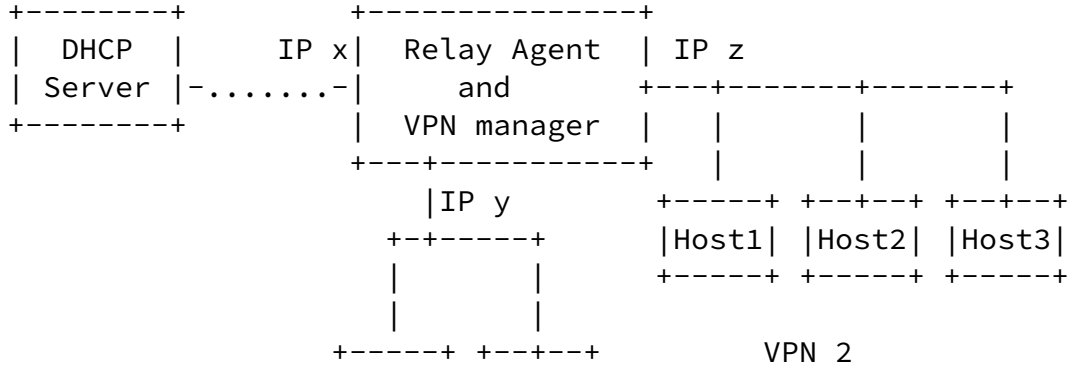
There exist situations where there are multiple VPNs serviced by one or more network elements which also contain relay agents. These VPNs contain DHCP clients, and there is a desire to allow one DHCP server to supply the full range of DHCP services to these DHCP clients.

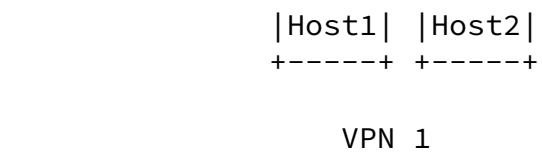
The network element which contains the relay agent typically is also the network element which knows about the VPN association of the DHCP client and could include this information in the relay-agent-information option in the client's DHCP requests. This document defines a sub-option for the relay-agent-information option which contains the vpn-id, and which allows the relay agent to communicate the VPN association to the DHCP server.

When the DHCP server sends its response to the relay agent for forwarding back to the DHCP client, the relay agent will also need to use the vpn-id sub-option to determine to which VPN to send the DHCP response.

This sub-option can also be used by the DHCP server to inform a relay agent that a particular DHCP client is associated with a particular VPN by sending the vpn-id sub-option to the relay agent in the relay-agent-information option back to the relay agent.

Consider the following architecture:





VPN 1

In this architecture, the relay agent knows the VPN for each of the DHCP clients, and inserts that information in the vpn-id sub-option in every DHCP request it forwards onto the DHCP server.

When the DHCP server copies over the relay-agent-information option from the request to the reply packet, it will copy over the vpn-id sub-option as well.

When the relay agent receives a DHCP reply packet from the server with a vpn-id sub-option, it will forward the packet onto the proper VPN based on the value of the vpn-id sub-option.

2.

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 [RFC 2119].

This document uses the following terms:

- "DHCP client"

  A DHCP client is an Internet host using DHCP to obtain configuration parameters such as a network address.

- "DHCP relay agent"

  A DHCP relay agent is a third-party agent that transfers BOOTP and DHCP messages between clients and servers residing on different subnets, per [RFC 951] and [RFC 1542].

- "DHCP server"

  A DHCP server is an Internet host that returns configuration parameters to DHCP clients.

- "downstream"

  Downstream is the direction from the access concentrator towards the subscriber.

- "upstream"

  Upstream is the direction from the subscriber towards the access concentrator.

- "VPN"

  Virtual private network. A network which appears to the client to be a private network.

- "VPN Identifier"

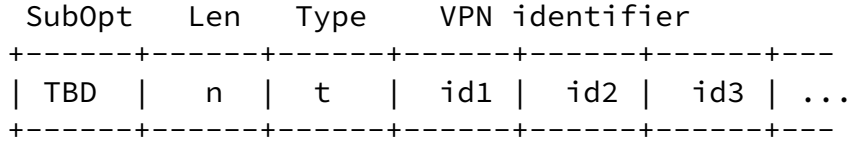
  The VPN-ID is defined by [RFC2685] to be a sequence of 14 hex digits.

3. VPN identifier sub-option definition

The vpn-id sub-option MAY be used by any DHCP relay agent which desires to specify the VPN from which a DHCP client request was sent.

The vpn-id sub-option contains a generalized VPN identifier.

The format of the option is:



Type:	0	NVT ASCII VPN identifier
	1	RFC2685 VPN-ID
	2-255	Not Allowed

There are two types of identifiers which can be placed in the vpn-id sub-option. The first type of identifier which can be placed in the vpn-id sub-option is an NVT ASCII string. It MUST NOT be terminated with a zero byte.

The second type of identifier which can be placed in the vpn-id sub-option is an RFC2685 VPN-ID [RFC 2685], which is typically 14 hex digits in length (though it can be any length as far as the vpn-id sub-option is concerned).

A relay agent which recieves a DHCP request from a DHCP client on a VPN SHOULD include a vpn-id sub-option in the relay-agent-information option that it inserts in the DHCP packet prior to forwarding it on to the DHCP server.

The value placed in the vpn-id sub-option SHOULD be sufficient for the relay agent to properly route any DHCP reply packet returned from

the DHCP server to the DHCP client for which it is destined. Servers supporting this sub-option MUST return an identical copy of the sub-option in the relay-agent-info option to any relay-agent that sends it.

In the event that a vpn-id option and a vpn-id sub-option are both received in a particular DHCP client packet, the information from the vpn-id sub-option MUST be used in preference to the information in the vpn-id option.

Relay agents which include this sub-option when forwarding DHCP client requests MUST discard DHCPOFFER or DHCPACK packets that do not contain this sub-option in their associated relay-agent-info options.

In some cases, a DHCP server may use the vpn-id sub-option to inform a relay agent that a particular DHCP client is associated with a particular VPN. It does this by sending the vpn-id sub-option with the appropriate information to the relay agent in the relay-agent-information option. If the relay agent is unable to honor the DHCP server's requirement to place the DHCP client into that VPN it MUST drop the packet and not send it back to the DHCP client.

4. Security

Message authentication in DHCP for intradomain use where the out-of-band exchange of a shared secret is feasible is defined in [RFC 3118]. Potential exposures to attack are discussed in section 7 of the DHCP protocol specification in [RFC 2131].

The vpn-id sub-option could be used by a client in order to obtain an IP address from a VPN other than the one on which it resides. This attack can be partially prevented by the relay agent not forwarding any DHCP packet which already contains a relay-agent-information option.

Any program which unicasts a DHCP packet to the DHCP server with a relay-agent-information option in it with a vpn-id for a different VPN would cause the DHCP server to allocate an address from that different VPN, but since the DHCP server cannot (in general) communicate directly back to the program that sent in the malicious DHCP packet, the entire cycle of creating a lease will not be completed. Certainly many leases could be offered, which would result in a form of address-pool exhaustion.

Servers that implement the vpn-id sub-option MUST by default disable use of the feature; it must specifically be enabled through configuration. Moreover, a server SHOULD provide the ability to selectively enable use of the feature under restricted conditions, e.g.,

by enabling use of the option only from explicitly configured client-ids, enabling its use only by clients on a particular subnet, or restricting the VPNs from which addresses may be requested.

5. IANA Considerations

IANA has assigned the value of TBD for the VPN Identifier sub-option from the DHCP Relay Agent Sub-options space [RFC 3046] for the VPN Identifier sub-option defined in Section 3.

This document defines a number space for the type byte of the vpn-id sub-option. Certain allowable values for this byte are defined in this specification (see Section 3). New values may only be defined by IETF Consensus, as described in [RFC 2434]. Basically, this means that they are defined by RFCs approved by the IESG.

Moreover, any changes or additions to the type byte codes MUST be made concurrently in the type byte codes of the vpn-id option. The type bytes and data formats of the vpn-id option and vpn-id sub-option MUST always be identical.

6. Acknowledgments

None (yet).

7. References

[RFC 2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119, March 1997.

[RFC 2131] Droms, R., "Dynamic Host Configuration Protocol", RFC 2131, March 1997.

[RFC 2132] Alexander, S., Droms, R., "DHCP Options and BOOTP Vendor Extensions", Internet RFC 2132, March 1997.

[RFC 2685] Fox, B., Gleeson, B., "Virtual Private Networks Identifier", Internet RFC 2685, September 1999.

[RFC 3046] Patrick, M., "DHCP Relay Agent Information Option", RFC 3046, January 2001.

[RFC 3118] Droms, R. "Authentication for DHCP Messages", RFC 3118, June 2001.

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