Softwire WG Internet-Draft Intended status: Standards Track Expires: January 1, 2015 I. Farrer Deutsche Telekom AG Q. Sun Y. Cui Tsinghua University June 30, 2014

DHCPv4 over DHCPv6 Source Address Option draft-fsc-softwire-dhcp4o6-saddr-opt-00

Abstract

DHCPv4 over DHCPv6 [<u>I-D.ietf-dhc-dhcpv4-over-dhcpv6</u>] describes a mechanism for dynamically configuring IPv4 over an IPv6-only network. For DHCPv4 over DHCPv6 to function with some IPv4-over-IPv6 softwire mechanisms, the operator must obtain information about the IPv4 address and Port Set ID allocated to the DHCP 406 client, as well as the /128 IPv6 prefix that the client will use as the source of IPv4-in-IPv6 tunnel. This memo defines a DHCPv6 container option and two DHCPv6 sub-options, to communicate the source tunnel IPv6 address between the DHCP 406 client and server. It is designed to work in conjunction with the IPv4 address allocation process.

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1. Introduction

Deterministic IPv4-over-IPv6 transition technologies are prescriptive in the location of the tunnel endpoint within the home network. The tunnel endpoint should usually be configured on either the home gateway device, or sourced from a specific IPv6 tunnel prefix allocated to the home network (and in some cases, both). [<u>I-D.ietf-softwire-map-dhcp</u>] describes a DHCPv6 based mechanism for provisioning these deterministic softwires.

This document describes a mechanism to inform the service provider of the binding between the dynamically allocated IPv4 address and Port Set ID (learnt through DHCPv4 over DHCPv6) and the IPv6 address that the Softwire Initiator will use for accessing IPv4-over-IPv6 services. It is used with DHCPv4 over DHCPv6 [<u>I-D.ietf-dhc-dhcpv4-over-dhcpv6</u>] message flows to communicate the binding over the IPv6-only network. The service provider can then use this binding information to provision other functional elements in their network accordingly (such as the border router).

The mechanism allows much more flexibility in the location of the IPv4-over-IPv6 tunnel endpoint, as the IPv6 address is dynamically

signalled back to the service provider. The DHCP 406 client and tunnel client could be run on end devices attached to any routable IPv6 prefix allocated to an end-user, located anywhere within an arbitrary home network topology.

This memo describes extensions to [<u>I-D.ietf-softwire-map-dhcp</u>] to enable the provisioning and tunnel management of softwire initiators configured through DHCPv4 over DHCPv6.

Current mechanisms suitable for extending to incorporate DHCPv4 over DHCPv6 with dynamic IPv4 address leasing include [I-D.ietf-softwire-map] and [I-D.ietf-softwire-lw4over6].

2. 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 [RFC2119].

3. Solution Overview

The solution described in this document extends the Softwire46 container approach in [I-D.ietf-softwire-map-dhcp] by defining a new container type: OPTION S46 CONT DHCP406. The container is used to carry the sub-options necessary for softwire configuration. A client can indicate its support for dynamic softwire configuration by including the OPTION S46 CONT DHCP406 option code within the Option Request Option.

Two new DHCPv6 sub-options are also described in this memo: OPTION DHCP406 SADDR HINT and OPTION DHCP406 SADDR. They are intended to be used alongside the normal IPv4 address allocation message flow in the context of DHCPv4 over DHCPv6 [I-D.ietf-dhc-dhcpv4-over-dhcpv6].

It is a two-way communication process. The OPTION DHCP406 SADDR HINT is used by the DHCP 406 server to optionally indicate to the client a preferred IPv6 prefix for binding the received IPv4 configuration and sourcing tunnel traffic. This may be necessary if there are multiple IPv6 prefixes in use in the customer network, or if the specific IPv4-over-IPv6 transition mechanism requires the use of a particular prefix for any reason. When the client has selected the IPv6 address to bind the IPv4 configuration to, it passes the address back to the DHCP 406 server through OPTION DHCP406 SADDR.

A softwire client also requires an address or addresses for the Border Router (softwire tunnel concentrator). This is used as the destination address for the client IPv4-in-IPv6 encapsulated traffic.

Section 4.2 of [I-D.ietf-softwire-map-dhcp] describes the OPTION S46 BR option. This option SHOULD be included as an encapsulated option within OPTION S46 CONT DHCP406.

This mechanism MUST be used with DHCPv4 over DHCPv6. The DHCP client MUST request the 4o6 Server Address option first to get DHCPv4 over DHCPv6 enabled, as in [I-D.ietf-dhc-dhcpv4-over-dhcpv6]. Then the OPTION S46 CONT DHCP406 MAY be included in DHCPv4-query and DHCPv4-response messages.

4. IPv6/IPv4 Binding Message Flow

The following diagram shows the client/server message flow and how the container OPTION S46 CONT DHCP406 and its sub-options are used. In each step, the relevant DHCPv4 message is given above the arrow and the relevant options below the arrow. The DHCPv4 messages are encapsulated in DHCPv4-query or DHCPv4-response message, and those options are included in the 'options' filed of the DHCPv4-query or DHCPv4-response message.

	DHCP 406			
	Cl	ient Serv	/er	
		DHCPDISCOVER		
Step) 1	>		
		ORO with OPTION_S46_CONT_DHCP406		
	_	DHCPOFFER		
Step) 2			
		OPIION_S46_CONI_DHCP406 containing OPIION_S46_BR,		
		OPIION_DHCP406_SADDR_HINI (CIPV6-prefix-hint with		
		Service provider's preferred prefix)		
		DHCPREQUEST		
Step	3	>		
		<pre>OPTION_S46_CONT_DHCP406 containing OPTION_S46_BR, </pre>		
		<pre>OPTION_DHCP406_SADDR (cipv6-bound-prefix with </pre>		
		client's bound /128 IPv6 address)		
Step	Л			
	94	OPTION S/6 CONT DHCP/06 containing OPTION S/6 BR		
		OPTION_DHCP406_SADDR (cipy6-bound-prefix with		
		client's hound /128 TPv6 prefix)		
		1		

IPv6/IPv4 Binding Message Flow

The DHCP 406 Server and Client MAY implement the OPTION_S46_CONT_DHCP406 option and its sub-options. A client that intends to dynamically configure softwires SHOULD include the code of OPTION_S46_CONT_DHCP406 in the ORO when it sends a DHCPDISCOVER message. If so, this container option MUST be present along with relevant sub-options in all future DHCPv4 over DHCPv6 transactions. The OPTION_S46_BR_SHOULD be included in the container.

When a DHCP 406 Server replies with a DHCPOFFER message, it SHOULD include the OPTION_S46_CONT_DHCP406 option with the OPTION_S46_BR, but it MAY include the OPTION_DHCP406_SADDR_HINT. The OPTION_DHCP406_SADDR_HINT is used by the server to indicate a preferred prefix that the client should use to bind IPv4 configuration to. If received this sub-option, the client MUST perform a longest prefix match between cipv6-prefix-hint and all prefixes configured on the device. The selected prefix MUST then be used to bind the received IPv4 configuration to. Otherwise, the client can select any valid /128 IPv6 prefix.

The OPTION_DHCP406_SADDR is used by the client to inform the DHCP 406 Server of the IPv6 prefix that it has bound the IPv4 configuration to. The client MUST put the selected IPv6 address into this suboption and include the OPTION_S46_CONT_DHCP406 in the DHCPv4-response message when it sends the DHCPREQUEST message.

5. DHCPv6 Options

5.1. DHCPv4 over DHCPv6 Source Address Hint Option

Θ	1	2	3			
0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	901234567	8901			
+-	-+	-+-+-+-+-+-+-+-+-+-	+-+-+-+-+			
OPTION_DHCP406_SA	DDR_HINT	option-length				
+-						
cipv6-boundlen						
+-+-+-+-+-+-+-+	cipv6-bound-p	orefix				
	(variable ler	ngth)				
+-						

- o option-code: OPTION_DHCP406_SADDR_HINT (TBA1)
- o option-length: 2 + length of cipv6-prefix-hint, specified in bytes.
- o cipv6-hintlen: 8-bit field expressing the bit mask length of the IPv6 prefix specified in cipv6-prefix-hint.
- cipv6-prefix-hint: The IPv6 prefix that the server uses to indicate the preferred prefix that the client should use to bind IPv4 configuration to.

5.2. DHCPv4 over DHCPv6 Source Address Option

The format of DHCPv4 over DHCPv6 Source address option is defined as follows:

0 3 1 2 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 OPTION DHCP406 SADDR | option-length | cipv6-src-address + + (128 bits)

- o option-code: OPTION DHCP406 SADDR (TBA2)
- o option-length: 16.
- o cipv6-src-address: The IPv6 address that the client is using to bind the allocated IPv4 configuration to.

5.3. DHCPv4 over DHCPv6 Softwire Container Option

The DHCP 406 Container option specifies the container used to group the relevant options and parameters for configuring the client.

o option-code: OPTION S46 CONT DHCP406 (TBA3)

- o option-length: 2 + length of encapsulated options (specified in bytes)
- encapsulated-options: options for configuring the DHCP 406 Softwire client.

<u>6</u>. Security Considerations

TBD

7. IANA Considerations

IANA is requested to allocate the DHCPv6 option code: OPTION_DHCP406_SADDR_HINT, OPTION_DHCP406_SADDR and OPTION_S46_CONT_DHCP406.

8. Acknowledgements

9. References

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