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RADIUS Extensions for Dual-Stack Lite
draft-ietf-software-dslite-radius-ext-00

Abstract

Dual-Stack Lite is a solution to offer both IPv4 and IPv6 connectivity to customers which are addressed only with an IPv6 prefix. DS-Lite requires to pre-configure the AFTR tunnel information on the B4 element. In many networks, the customer profile information may be stored in AAA servers while client configurations are mainly provided through DHC protocol. This document specifies two new RADIUS attributes to carry Dual-Stack Lite Address Family Transition Router (AFTR) IPv6 address and name; the RADIUS attributes are defined based on the equivalent DHCPv6 options already specified in draft-ietf-software-ds-lite-tunnel-option. These RADIUS attributes are meant to be used between the RADIUS Server and the NAS, they are not intended to be used directly between the B4 element and the RADIUS Server.

Status of this Memo

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1. Introduction

Dual-Stack Lite [I-D.ietf-softwire-dual-stack-lite] is a solution to offer both IPv4 and IPv6 connectivity to customers which are addressed only with an IPv6 prefix (no IPv4 address is assigned to the attachment device). One of its key components is an IPv4-over-IPv6 tunnel, but a DS-Lite Basic Bridging BroadBand (B4) will not know if the network it is attached to offers Dual-Stack Lite support, and if it did, would not know the remote end of the tunnel to establish a connection.

To inform the B4 of the AFTR's location, either an IPv6 address or Fully Qualified Domain Name (FQDN) may be used. Once this information is conveyed, the presence of the configuration indicating the AFTR's location also informs a host to initiate Dual-Stack Lite (DS-Lite) service and become a Softwire Initiator.

The draft draft-ietf-softwire-ds-lite-tunnel-option [I-D.ietf-softwire-ds-lite-tunnel-option] specifies two DHCPv6 options which are meant to be used by a Dual-Stack Lite client (Basic Bridging BroadBand element, B4) to discover its Address Family Transition Router (AFTR) address. In order to be able to populate such options the DHCPv6 Server must be pre-provisioned with the Address Family Transition Router (AFTR) address or name.

In Broadband environments, customer profile may be managed by AAA servers, together with user Authentication, Authorization, and Accounting (AAA). RADIUS protocol [RFC2865] is usually used by AAA Servers to communicate with network elements. [I-D.ietf-radext-ipv6-access] describes a typical broadband network scenario in which the Network Access Server (NAS) acts as the access gateway for the users (hosts or CPEs) and the NAS embeds a DHCPv6 Server function that allows it to locally handle any DHCPv6 requests issued by the clients.

Since the DS-Lite AFTR information can be stored in AAA servers and the client configuration is mainly provided through DHC protocol running between the NAS and the requesting clients, new RADIUS attributes are needed to send AFTR information from AAA server to the NAS.

This document aims at defining two new RADIUS attributes to be used for carrying the DS-Lite Tunnel Name and DS-Lite Tunnel Address, based on the equivalent DHCPv6 options already specified in [I-D.ietf-softwire-ds-lite-tunnel-option]

2. Terminology

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 [RFC2119].

The terms DS-Lite Basic Bridging BroadBand element (B4) and the DS-Lite Address Family Transition Router element (AFTR) are defined in [I-D.ietf-softwire-dual-stack-lite]

3. DS-Lite Configuration with RADIUS and DHCPv6

The Figure 1 illustrates how the RADIUS protocol and DHCPv6 work together to accomplish DS-Lite configuration on the B4 element.

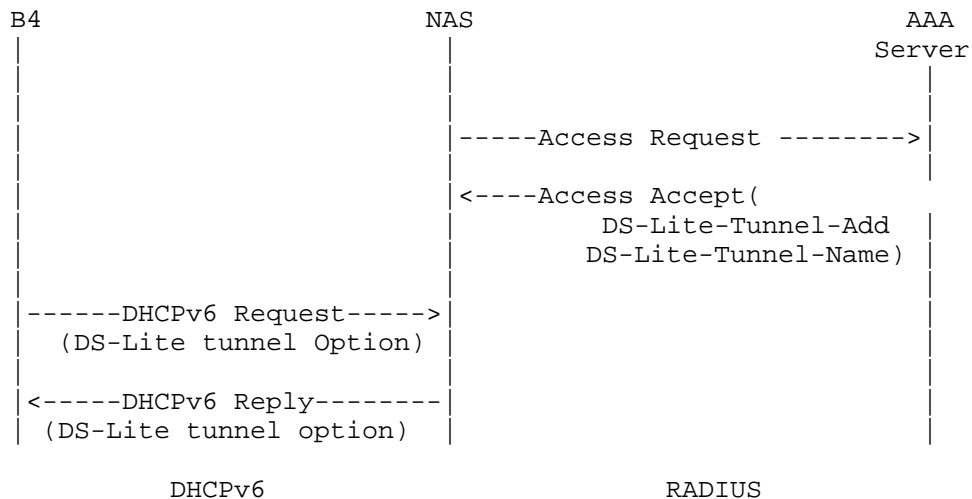


Figure 1: RADIUS and DHCPv6 Message Flow

The Network Access Server (NAS) operates as a client of RADIUS and as DHCP Server for DHC protocol. The NAS initially sends a RADIUS Access Request message to the RADIUS server, requesting authentication. Once the RADIUS server receives the request, it validates the sending client and if the request is approved, the AAA server replies with an Access Accept message including a list of attribute-value pairs that describe the parameters to be used for this session. This list may also contain the AFTR Tunnel IPv6 Address and/or the AFTR Tunnel Name. When the NAS receives a DHCPv6 client request containing the DS-Lite tunnel Option, the NAS shall use the address returned in the RADIUS DS-Lite-Tunnel-Addr attribute to populate the DHCPv6 OPTION_DS_LITE_ADDR option in the DHCPv6 reply

message.

4. Attributes

This section specifies the format of the two new RADIUS attributes.

4.1. DS-Lite-Tunnel-Addr

Description

The DS-Lite-Tunnel-Addr RADIUS attribute contains a 128 bit IPv6 address that identifies the location of the remote tunnel endpoint, expected to be located at an AFTR. The NAS shall use the address returned in the RADIUS DS-Lite-Tunnel-Addr attribute to populate the DHCPv6 OPTION_DS_LITE_ADDR option [I-D.ietf-software-ds-lite-tunnel-option].

This attribute MAY be used in Access-Accept packets and it MAY be present in Accounting-Request records where the Acct-Status-Type is set to Start, Stop or Interim-Update. The DS-Lite-Tunnel-Addr RADIUS attribute and MUST NOT appear more than once in a message.

A summary of the DS-Lite-Tunnel-Addr RADIUS attribute format is shown below. The fields are transmitted from left to right.

0																1																2																3															
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	2	3	4	5	6	7	8	9																								
Type																Length																DS-Lite-Tunnel-Addr																															
																DS-Lite-Tunnel-Addr (IPv6 Address)(cont)																																															

Type:

TBA1 for DS-Lite-Tunnel-Addr.

Length:

16 octets

DS-Lite-Tunnel-Addr:

A 128-bit IPv6 address of the DS-Lite AFTR.

4.2. DS-Lite-Tunnel-Name

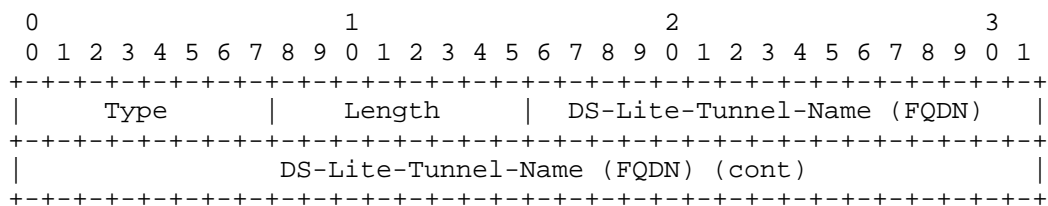
Description

The DS-Lite-Tunnel-Name RADIUS attribute contains a Fully Qualified

Domain Name that refers to the AFTR the client is requested to establish a connection with. The NAS shall use the name returned in the RADIUS DS-Lite-Tunnel-Name attribute to populate the DHCPv6 OPTION_DS_LITE_NAME option [I-D.ietf-softwire-ds-lite-tunnel-option]

This attribute MAY be used in Access-Accept packets and it MAY be present in Accounting-Request records where the Acct-Status-Type is set to Start, Stop or Interim-Update. The DS-Lite-Tunnel-Name RADIUS attribute and MUST NOT appear more than once in a message.

A summary of the DS-Lite-Tunnel-Name RADIUS attribute format is shown below. The fields are transmitted from left to right.



Type:

TBA2 for DS-Lite-Tunnel-Name.

Length:

Length in octets of the DS-Lite-Tunnel-Name (FQDN)

DS-Lite-Tunnel-Name:

A single Fully Qualified Domain Name of the remote tunnel endpoint, located at the DS-Lite AFTR.

5. Table of attributes

The following table provides a guide to which attributes may be found in which kinds of packets, and in what quantity.

Request	Accept	Reject	Challenge	Accounting	#	Attribute
				Request		
0-1	0-1	0	0	0-1	TBA1	DS-Lite-Tunnel-Addr
0-1	0-1	0	0	0-1	TBA2	DS-Lite-Tunnel-Name

The following table defines the meaning of the above table entries.

- 0 This attribute MUST NOT be present in packet.
- 0+ Zero or more instances of this attribute MAY be present in packet.
- 0-1 Zero or one instance of this attribute MAY be present in packet.

6. Security Considerations

This document has no additional security considerations beyond those already identified in [RFC2865]

[I-D.ietf-software-dual-stack-lite] discusses DS-Lite related security issues.

7. IANA Considerations

This document requests the allocation of two new Radius attribute types from the IANA registry "Radius Attribute Types" located at <http://www.iana.org/assignments/radius-types>

DS-Lite-Tunnel-Addr - TBA1
DS-Lite-Tunnel-Name - TBA2

8. Normative References

- [I-D.ietf-radext-ipv6-access]
Lourdelet, B., Dec, W., Sarikaya, B., Zorn, G., and D. Miles, "RADIUS attributes for IPv6 Access Networks", draft-ietf-radext-ipv6-access-02 (work in progress), July 2010.
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Hankins, D. and T. Mrugalski, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Option for Dual- Stack Lite", draft-ietf-software-ds-lite-tunnel-option-05 (work in progress), September 2010.
- [I-D.ietf-software-dual-stack-lite]
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- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2865] Rigney, C., Willens, S., Rubens, A., and W. Simpson,
"Remote Authentication Dial In User Service (RADIUS)",
RFC 2865, June 2000.

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