                    RADIUS Extensions for Dual-Stack Lite
                   draft-ietf-softwire-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-softwire-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

Copyright Notice

Table of Contents

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.

```
          B4                           NAS                        AAA
           |                            |                       Server
           |                            |                          |
           |                            |                          |
           |                            |-----Access Request ------>|
           |                            |                          |
           |                            |<----Access Accept(        |
           |                            |        DS-Lite-Tunnel-Add  |
           |                            |        DS-Lite-Tunnel-Name) |
           |                            |                          |
           |------DHCPv6 Request----->|                          |
           |   (DS-Lite tunnel Option) |                          |
           |                            |                          |
           |<-----DHCPv6 Reply--------|                          |
           | (DS-Lite tunnel option)  |                          |

                 DHCPv6                        RADIUS
```
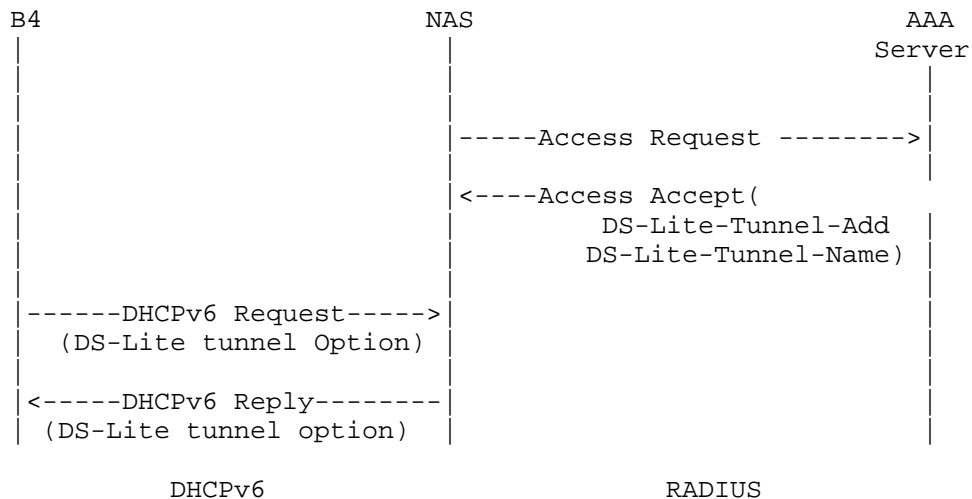
                 Figure 1: RADIUS and DHCPv6 Message Flow

   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-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-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
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |     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.
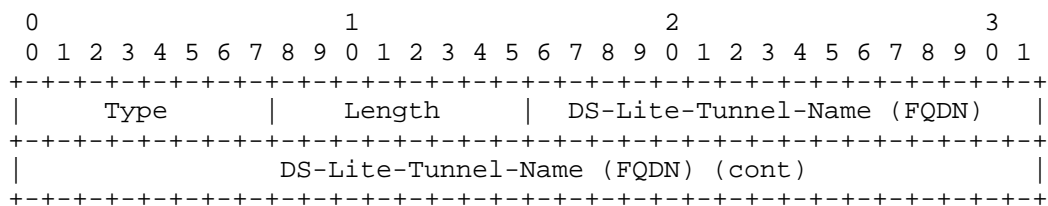
4.2.   DS-Lite-Tunnel-Name

   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.

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |    Length     |  DS-Lite-Tunnel-Name (FQDN)   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                DS-Lite-Tunnel-Name (FQDN) (cont)              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

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 Request	#	Attribute
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-softwire-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.

     [I-D.ietf-softwire-ds-lite-tunnel-option]
               Hankins, D. and T. Mrugalski, "Dynamic Host Configuration
               Protocol for IPv6 (DHCPv6) Option for Dual- Stack Lite",
               draft-ietf-softwire-ds-lite-tunnel-option-05 (work in
               progress), September 2010.

     [I-D.ietf-softwire-dual-stack-lite]
               Durand, A., Droms, R., Woodyatt, J., and Y. Lee, "Dual-
               Stack Lite Broadband Deployments Following IPv4
               Exhaustion", draft-ietf-softwire-dual-stack-lite-06 (work
               in progress), August 2010.

     [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.

Authors' Addresses

   Roberta Maglione
   Telecom Italia
   Via Reiss Romoli 274
   Torino 10148
   Italy

   Phone:
   Email: roberta.maglione@telecomitalia.it

   Alain Durand
   Juniper Networks
   1194 North Mathilda Avenue
   Sunnyvale, CA 94089-1206
   USA

   Phone:
   Fax:
   Email: adurand@juniper.net
   URI: