

Network Working Group
Internet Draft
Intended status: Standards Track
Expires: January 07, 2011

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July 05, 2010

RADIUS Attribute for Softwire Concentrator in IPv6 Transition

[draft-guo-radext-softwire-concentrator-00.txt](#)

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Abstract

6rd and DS-Lite are two most popular methods to provide both IPv4 and IPv6 connectivity services simultaneously during the IPv4/IPv6 co-existing period. Both mechanisms need to configure the softwire concentrator information on the host. In many networks, the information may be stored in AAA servers while user configuration is mainly through DHC protocol. This document defines several RADIUS attributes that carries softwire concentrator information.

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1. Introduction

Recently providers start to deploy IPv6 and consider how to transit to IPv6. 6rd [[I-D.ietf-software-ipv6-6rd](#)] and DS-Lite [[I-D.ietf-software-ds-lite](#)] are two most popular methods to provide both IPv4 and IPv6 connectivity services simultaneously during the IPv4/IPv6 co-existing period. 6rd is used to provide IPv6 connectivity service through IPv4-only infrastructure while DS-Lite is aiming to provide IPv4 connectivity service through IPv6-only network.

Both 6rd and DS-Lite adopt DHCP as auto-configuring protocol. In DS-Lite, The DHCPv6 options are used to discover the IPv6 address or name of the AFTR (i.e. software concentrator) [[I-D.ietf-software-ds-lite-tunnel-option](#)]. Similarly the 6rd CPE extends DHCP option to discover 6rd border relay (i.e. software concentrator) and to configuring IPv6 address and prefix.

In many networks, user configuration information may be managed by AAA servers, together with user Authentication, Authorization, and Accounting (AAA). Current AAA servers communicate using the RADIUS (Remote Authentication Dial In User Service, [[RFC2865](#)]) protocol. [[I-D.ietf-radext-ipv6-access](#)] describes a fixed line broadband network scenario in which the Broadband Network Gateways (BNGs) act as the access gateway of users (hosts or CPEs). The BNGs are assumed to embed a DHCPv6 server function that allows them to locally handle any DHCPv6 requests issued by hosts.

Since the 6rd/DS-Lite software concentrator information is stored in AAA servers and user configuration is mainly through DHC protocol between BNGs and hosts. New RADIUS attributes are needed to propagate these information from AAA servers to BNGs.

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](#) [[RFC2119](#)].

[3.](#) Softwire Concentrator Configuration with RADIUS

The below Figure 1 illustrates how the RADIUS protocol and DHCPv6 are cooperated to provide users/hosts with DS-Lite configuration. 6rd has the same operation.

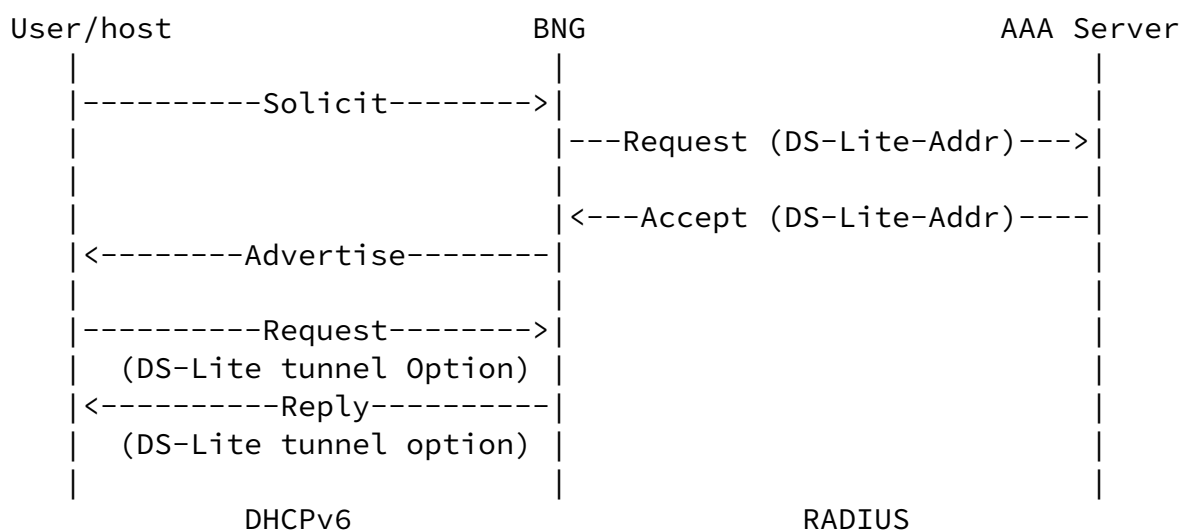


Figure 1: the cooperation between DHCPv6 and RADIUS

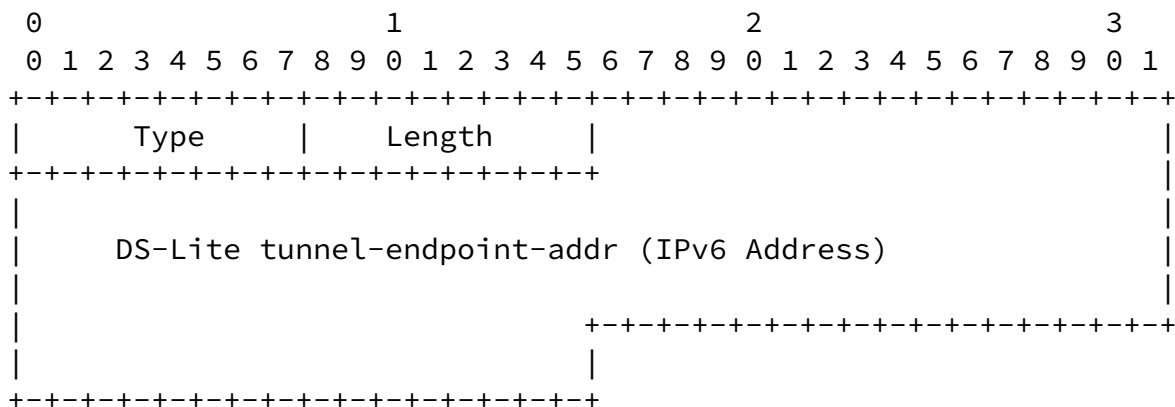
BNGs act as a bridge between user and AAA server. First, a BNG receives a user DHCPv6 solicit. It initiates the BNG to request correspondent user authentication relevant from an AAA server using RADIUS protocol. A DS-Lite-Addr request may be also sent in the same message. If the user authentication is approved by the AAA server, an Accept message is acknowledged with the DS-Lite-Addr attribute, defined in the next Section. After the BNG responds to the user with an Advertise message, the user requests for a DS-Lite tunnel Option. Then, the BNG can reply the user using DHCPv6 protocol.

[4.](#) Attributes

This section defines three RADIUS attributes that carries softwire concentrator information. DS-Lite-Addr Attribute and DS-Lite-Name Attribute can be used in DS-Lite scenario independently. 6rd Attribute should be used in the 6rd scenario.

4.1. DS-Lite-Add Attribute

The DS-Lite-Add Attribute is structured as follows:



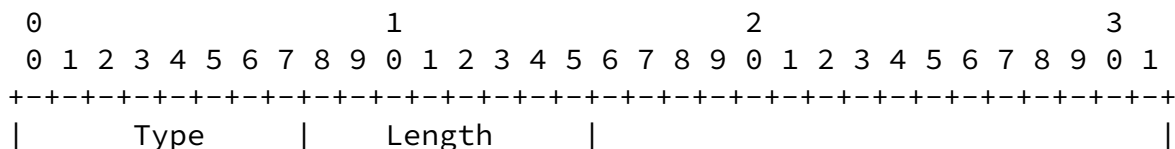
Type TBD1

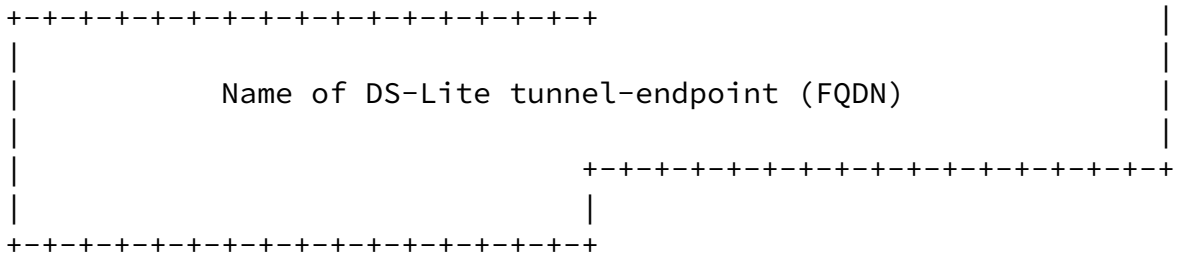
Length 18

| | |
|------------------------------|--|
| DS-Lite tunnel-endpoint-addr | The address of DS-Lite is used to establish tunnel. In the DS-Lite scenarios the Address Family Transition Router element (AFTR) is an IPv6 address. |
|------------------------------|--|

4.2. DS-Lite-Name Attribute

The DS-Lite-Name Attribute is structured as follows:





Type TBD2

Length The length of the entire attribute, in bytes.

Name of DS-Lite tunnel-endpoint The Fully Qualified Domain Name of software concentrator. In the DS-Lite scenarios, it is the domain name of Address Family Transition Router element (AFTR).

4.3. 6rd Attribute

The 6rd Attribute is structured as follows:



Type TBD3

Length the length of the DHCP option in octets (22 octets with one BR IPv4 address).

IPv4MaskLen The number of high-order bits that are identical across all CE IPv4 addresses within a given 6rd

domain. This may be any value between 0 and 32. Any value greater than 32 is invalid.

| | |
|------------------|--|
| 6rdPrefixLen | The IPv6 Prefix length of the Service Provider's 6rd IPv6 prefix in number of bits. The 6rdPrefixLen MUST be less than or equal to 128. |
| 6rdPrefix | The Service Provider's 6rd IPv6 prefix represented as a 16 octet IPv6 address. The bits after the 6rdPrefixlen number of bits in the prefix SHOULD be set to zero. |
| 6rdBRIPv4Address | One or more IPv4 addresses of the 6rd Border Relay(s) for a given 6rd domain. |

[4.4.](#) 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+ | 0+ | 0 | 0 | 0+ | TBD1 | DS-Lite-Addr |
| 0+ | 0+ | 0 | 0 | 0+ | TBD2 | DS-Lite-Name |
| 0+ | 0+ | 0 | 0 | 0+ | TBD3 | 6rd |

[5.](#) Diameter Considerations

This attribute is usable within either RADIUS or Diameter [[RFC3588](#)]. Since the Attributes defined in this document will be allocated from the standard RADIUS type space, no special handling is required by Diameter entities.

[6.](#) Security Considerations

In DS-Lite scenarios, the RADIUS protocol is run over IPv6. In 6rd scenarios, the RADIUS protocol is run over IPv4. Known security vulnerabilities of the RADIUS protocol are discussed in [RFC 2607](#) [[RFC2607](#)], [RFC 2865](#) [[RFC2865](#)], and [RFC 2869](#) [[RFC2869](#)]. Use of IPsec

[RFC4301] for providing security when RADIUS is carried in IPv6 is discussed in [RFC 3162](#) [RFC3162].

Security considerations for the Diameter protocol are discussed in [RFC 3588](#) [RFC3588].

[7.](#) IANA Considerations

This document requires the assignment of two new RADIUS Attribute Types in the "Radius Types" registry (currently located at <http://www.iana.org/assignments/radius-types> for the following attributes:

- o DS-Lite-Add
- o DS-Lite-Name
- o 6rd

IANA should allocate these numbers from the standard RADIUS Attributes space using the "IETF Review" policy [RFC5226].

[8.](#) Acknowledgments

The authors would like to thank Maglione Roberta, Telecom Italia, for valuable comments.

[9.](#) Change Log [RFC Editor please remove]

[draft-guo-radext-softwire-concentrator-00](#), original version, 2010-07-05.

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