RADIUS Delegated-IPv6-Prefix Attribute

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Abstract

This document defines a RADIUS (Remote Authentication Dial In User Service) attribute that carries an IPv6 prefix that is to be delegated to the user. This attribute is usable within either RADIUS or Diameter.
1. Introduction

This document defines the Delegated-IPv6-Prefix attribute as a RADIUS [1] attribute that carries an IPv6 prefix to be delegated to the user, for use in the user’s network. For example, the prefix in a Delegated-IPv6-Prefix attribute can be delegated to another node through DHCP Prefix Delegation [2].

The Delegated-IPv6-Prefix attribute can be used in DHCP Prefix Delegation between the delegating router and a RADIUS server, as illustrated in the following message sequence.

```
<table>
<thead>
<tr>
<th>Requesting Router</th>
<th>Delegating Router</th>
<th>RADIUS Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Solicit-----------</td>
<td>-Request-----------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;--Accept(Delegated-IPv6-Prefix)--&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;--Advertise(Prefix)--&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Request(Prefix)----&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;--Reply(Prefix)-----</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHCP PD</td>
<td>RADIUS</td>
<td></td>
</tr>
</tbody>
</table>
```

The Framed-IPv6-Prefix attribute [4] is not designed to support delegation of IPv6 prefixes to be used in the user’s network, and therefore Framed-IPv6-Prefix and Delegated-IPv6-Prefix attributes may be included in the same RADIUS packet.

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 RFC 2119 [3].
3. Attribute Format

The format of the Delegated-IPv6-Prefix is:

```
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |    Length     |  Reserved     | Prefix-Length |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
Prefix
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
Prefix
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
Prefix
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
Prefix
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

**Type**

123 for Delegated-IPv6-Prefix

**Length**

The length of the entire attribute, in bytes. At least 4 (to hold Type/Length/Reserved/Prefix-Length for a 0-bit prefix), and no larger than 20 (to hold Type/Length/Reserved/Prefix-Length for a 128-bit prefix)

**Reserved**

Always set to zero by sender; ignored by receiver

**Prefix-Length**

The length of the prefix being delegated, in bits. At least 0 and no larger than 128 bits (identifying a single IPv6 address)

Note that the prefix field is only required to be long enough to hold the prefix bits and can be shorter than 16 bytes. Any bits in the prefix field that are not part of the prefix MUST be zero.

The Delegated-IPv6-Prefix MAY appear in an Access-Accept packet, and can appear multiple times. It MAY appear in an Access-Request packet as a hint by the NAS to the server that it would prefer these prefix(es), but the server is not required to honor the hint.
The Delegated-IPv6-Prefix attribute MAY appear in an Accounting-Request packet.

The Delegated-IPv6-Prefix MUST NOT appear in any other RADIUS packets.

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.

<table>
<thead>
<tr>
<th>Request Accept Reject Challenge Accounting</th>
<th>#</th>
<th>Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+</td>
<td>0+</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>123 Delegated-IPv6-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prefix</td>
</tr>
</tbody>
</table>

The meaning of the above table entries is as follows:

0   This attribute MUST NOT be present.
0+  Zero or more instances of this attribute MAY be present.
0-1 Zero or one instance of this attribute MAY be present.
1   Exactly one instance of this attribute MUST be present.
1+  One or more of these attributes MUST be present.

5. Diameter Considerations

When used in Diameter, the attribute defined in this specification can be used as a Diameter AVP from the Code space 1-255, i.e., RADIUS attribute compatibility space. No additional Diameter Code values are therefore allocated. The data types of the attributes are as follows:

Delegated-IPv6-Prefix          OctetString

The attribute in this specification has no special translation requirements for Diameter to RADIUS or RADIUS to Diameter gateways, i.e., the attribute is copied as is, except for changes relating to headers, alignment, and padding. See also RFC 3588 [5], Section 4.1, and RFC 4005 [6], Section 9.

The text in this specification describing the applicability of the Delegated-IPv6-Prefix attribute for RADIUS Access-Request applies in Diameter to AA-Request [6] or Diameter-EAP-Request [7].

The text in this specification describing the applicability of the Delegated-IPv6-Prefix attribute for RADIUS Access-Accept applies in Diameter to AA-Answer or Diameter-EAP-Answer that indicates success.
The text in this specification describing the applicability of the Delegated-IPv6-Prefix attribute for RADIUS Accounting-Request applies to Diameter Accounting-Request [6] as well.

The AVP flag rules [5] for the Delegated-IPv6-Prefix attribute are:

<table>
<thead>
<tr>
<th>AVP Attribute Name</th>
<th>Code</th>
<th>Value Type</th>
<th>MUST</th>
<th>MAY</th>
<th>NOT</th>
<th>NOT</th>
<th>Encr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delegated-IPv6-Prefix</td>
<td>123</td>
<td>OctetString</td>
<td>M</td>
<td>P</td>
<td>V</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

6. IANA Considerations

IANA assigned a Type value, 123, for this attribute from the RADIUS Attribute Types registry.

7. Security Considerations

Known security vulnerabilities of the RADIUS protocol are discussed in RFC 2607 [8], RFC 2865 [1], and RFC 2869 [9]. Use of IPsec [10] for providing security when RADIUS is carried in IPv6 is discussed in RFC 3162.

Security considerations for the Diameter protocol are discussed in RFC 3588 [5].

8. References

8.1. Normative References


9.2. Informative References


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