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RADIUS Attribute for MAP

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Abstract

Mapping of Address and Port (MAP) is a stateless mechanism for running IPv4 over IPv6-only infrastructure. It provides both IPv4 and IPv6 connectivity services simultaneously during the IPv4/IPv6 co-existing period. The Dynamic Host Configuration Protocol for IPv6 (DHCPv6) MAP options has been defined to configure MAP Customer Edge (CE). However, in many networks, the configuration information may be stored in Authentication Authorization and Accounting (AAA) servers while user configuration is mainly from Broadband Network Gateway (BNG) through DHCPv6 protocol. This document defines a Remote Authentication Dial In User Service (RADIUS) attribute that carries MAP configuration information from AAA server to BNG. The MAP RADIUS attribute are designed following the simplify principle. It provides just enough information to form the correspondent DHCPv6 MAP option.

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1. Introduction

Recently providers start to deploy IPv6 and consider how to transit to IPv6. Mapping of Address and Port (MAP) [[I-D.ietf-software-map](#)] is a stateless mechanism for running IPv4 over IPv6-only infrastructure. It provides both IPv4 and IPv6 connectivity services simultaneously during the IPv4/IPv6 co-existing period. MAP has adopted Dynamic Host Configuration Protocol for IPv6 (DHCPv6) [[RFC3315](#)] as auto-configuring protocol. The MAP Customer Edge (CE) uses the DHCPv6 extension options [[I-D.mdt-software-map-dhcp-option](#)] to discover MAP Border Relay (in tunnel model only) and to configure relevant MAP rules.

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

Since the MAP configuration information is stored in AAA servers and user configuration is mainly through DHCPv6 protocol between BNGs and hosts/CEs, new RADIUS attributes are needed to propagate the information from AAA servers to BNGs. The MAP RADIUS attribute are designed following the simplify principle, while providing enough information to form the correspondent DHCPv6 MAP option. [[I-D.mdt-software-map-dhcp-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](#) [[RFC2119](#)].

The terms MAP CE and MAP Border Relay are defined in [[I-D.ietf-software-map](#)].

3. MAP Configuration process with RADIUS

The below Figure 1 illustrates how the RADIUS protocol and DHCPv6 cooperate to provide MAP CE with MAP configuration information.

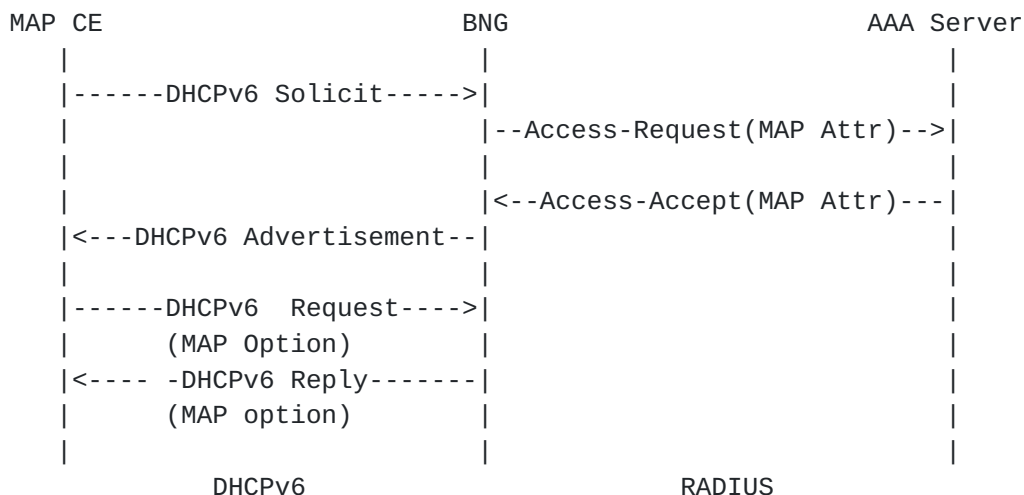
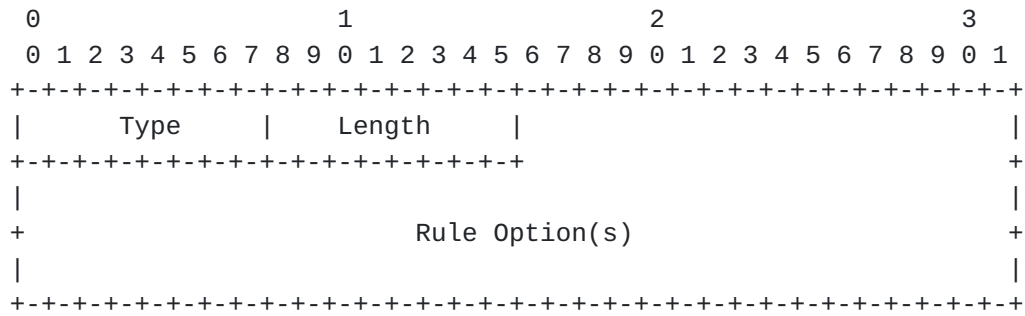


Figure 1: the cooperation between DHCPv6 and RADIUS

BNGs act as a client of RADIUS and as a DHCPv6 server for DHCPv6 protocol. First, a BNG receives a DHCPv6 Solicit message from the MAP CE. It initiates the BNG to request correspondent user authentication relevant from an AAA server using RADIUS protocol. A MAP configuration request may also be sent in the same message. If the user authentication is approved by the AAA server, an Access-Accept message is acknowledged with the IPv6-MAP-Configuration Attribute, defined in the next Section. After the BNG responds to the user with an Advertisement message, the user requests for a MAP Option. Then, the BNG can reply the user using the DHCPv6 protocol.

In the abovementioned scenario, the Access-Request packet contains a Service-Type attribute with the value Authorize Only (17), thus according to [\[RFC5080\]](#) the Access-Request packet MUST contain a State attribute.

Figure 2 describes another scenario, in which the authentication operation is not coupled with DHCPv6. In the authentication stage, which may be initiated by other user behavior, such as PPP dial-up, the BNG obtains the MAP configuration information from the AAA server through the RADIUS protocol. When the user requests the MAP Option, the BNG replies with a MAP option in DHCPv6 Reply message.



Type

TBD

Length

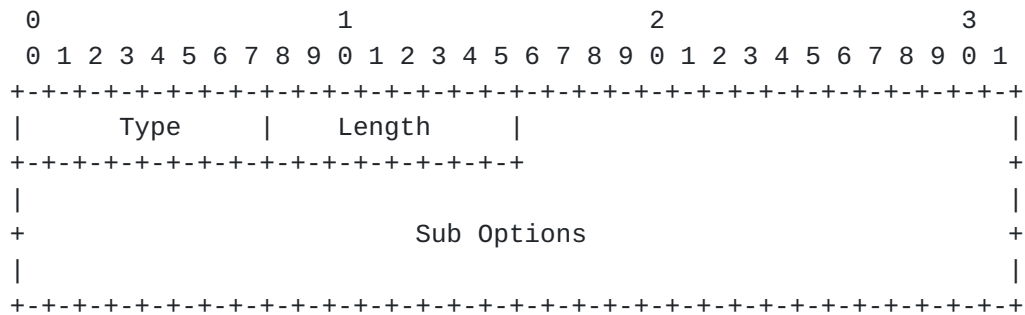
2 + the length of the Rule option(s)

Sub Option

a variable field that may contains one or more Rule option(s), defined in [Section 4.2](#).

4.2. IPv6 MAP Options

Depending on deployment scenario, one Default Mapping rule and zero or more other type Mapping Rules MUST be included in one IPv6-MAP-Configuration Attribute.



Type

1 Default Mapping Rule

2 Basic Mapping Rule (Not Forwarding Mapping Rule)

3 Forwarding Mapping Rule (Not Basic Mapping Rule)

4 Basic & Forwarding Mapping Rule

Length

2 + the length of the sub options

Sub Option

a variable field that contains necessary sub options defined in [Section 4.3](#) and zero or several optional sub options, defined in [Section 4.4](#).

4.3. Sub Options for MAP Rule Option

Different from [[I-D.mdt-software-map-dhcp-option](#)], EA-Len, Embedded-Address (EA) length, is not present at all, because it can be calculated by the combine of prefix4len, prefix6-len, excluded ports and off bits.

4.3.1. Rule-IPv6-Prefix Sub Option

The Rule-IPv6-Prefix Sub Option is necessary for every MAP Rule option. It should appear for once and only once.

The IPv6 Prefix sub option is follow the framed IPv6 prefix designed in [[RFC3162](#)].



SubType

1 (SubType number, for the Rule-IPv6-Prefix6 sub option)

SubLen

20 (the length of the Rule-IPv6-Prefix6 sub option)

Reserved

Reserved for future usage. It should be set to all zero.

prefix6-len

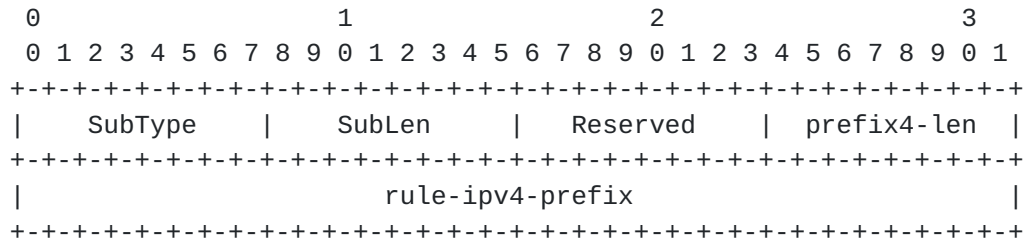
length of the IPv6 prefix, specified in the rule-ipv6-prefix field, expressed in bits

rule-ipv6-prefix

a 128-bits field that specifies an IPv6 prefix that appears in a MAP rule

"For the encapsulation mode the Rule IPv6 prefix can be the full IPv6 address of the BR." [[I-D.ietf-software-map](#)]

4.3.2. Rule-IPv4-Prefix Sub Option



SubType

2 (SubType number, for the Rule-IPv4-Prefix6 sub option)

SubLen

8 (the length of the Rule-IPv4-Prefix6 sub option)

Reserved

Reserved for future usage. It should be set to all zero.

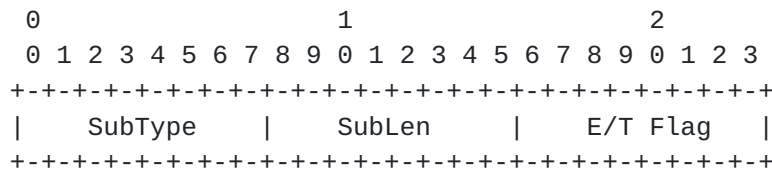
Prefix4-len

length of the IPv6 prefix, specified in the rule-ipv6-prefix field, expressed in bits

rule-ipv4-prefix

a 32-bits field that specifies an IPv4 prefix that appears in a MAP rule

4.3.3. Encapsulation/Translation Flag Sub Option



SubType

3 (SubType number, for the rule-id sub option)

SubLen

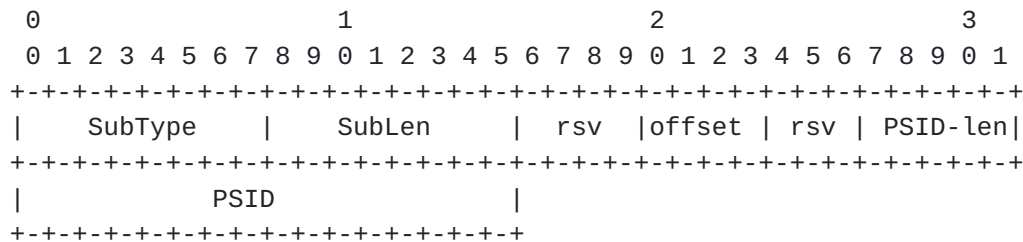
3 (the length of the rule-id sub option)

E/T Flag

indicate the MAP transport mode: encapsulation or translation.
all 0 for encapsulation, all 1 for translation.

If this sub option is not present, the following default values are to be assumed: encapsulation mode.

4.3.4. Map Port Parameter Sub Option



SubType

4 (SubType number, for the Map port parameter sub option)

SubLen

6 (the length of the Map port parameter sub option)

Reserved

Reserved for future usage. It should be set to all zero.

PSID (Port-set ID) Offset

4 bits long field that specifies the numeric value for the MAP algorithm's excluded port range/offset bits (A-bits), as per section 5.1.1 in [[I-D.ietf-softwire-map](#)]. Default must be set to 4.

PSID-len

Bit length value of the number of significant bits in the PSID field. (also known as 'k'). When set to 0, the PSID field is to be ignored. After the first 'a' bits, there are k bits in the port number representing valid of PSID. Subsequently, the address sharing ratio would be 2^k .

PSID

Explicit 16-bit (unsigned word) PSID value. The PSID value algorithmically identifies a set of ports assigned to a CE. The first k-bits on the left of this 2-octets field is the PSID value. The remaining (16-k) bits on the right are padding zeros.

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	#	Attribute
0-1	0-1	0	0	Request 0-1	TBD1	IPv6-MAP- Configuration

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.
1	Exactly one instance of this attribute MUST be present in packet.

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

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 Attributes Types in the "Radius Types" registry (currently located at <http://www.iana.org/assignments/radius-types> for the following attributes:

- o IPv6-MAP-Configuration TBD1

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

8. Acknowledgments

The authors would like to thank for valuable comments.

9. References

9.1. Normative References

- [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.
- [RFC3162] Aboba, B., Zorn, G., and D. Mitton, "RADIUS and IPv6", [RFC 3162](#), August 2001.
- [RFC3315] Droms, R., Bound, J., Volz, B., Lemon, T., Perkins, C., and M. Carney, "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", [RFC 3315](#), July 2003.
- [RFC3588] Calhoun, P., Loughney, J., Guttman, E., Zorn, G., and J., Arkko, "Diameter Base Protocol", [RFC 3588](#), September 2003.

- [RFC4301] Kent, S. and K. Seo, "Security Architecture for the Internet Protocol", [RFC 4301](#), December 2005.
- [RFC5080] Nelson, D. and DeKok A., "Common Remote Authentication Dial In User Service (RADIUS) Implementation Issues and Suggested Fixes", [RFC 5080](#), December 2007.
- [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", [RFC 5226](#), May 2008.
- [RFC6158] DeKok, A. and G. Weber, "RADIUS Design Guidelines", [RFC 6158](#), March 2011.
- [I-D.ietf-softwire-map]
O. Troan, et al., "Mapping of Address and Port (MAP)", [draft-ietf-softwire-map](#), working in progress.
- [I-D.mdt-softwire-map-dhcp-option]
T. Mrugalski, et al., "DHCPv6 Options for Mapping of Address and Port", [draft-mdt-softwire-map-dhcp-option](#), working in progress.

[9.2. Informative References](#)

- [RFC2607] Aboba, B. and J. Vollbrecht, "Proxy Chaining and Policy Implementation in Roaming", [RFC 2607](#), June 1999.
- [RFC2869] Rigney, C., Willats, W., and P. Calhoun, "RADIUS Extensions", [RFC 2869](#), June 2000.

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