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RADIUS Attribute for 6rd

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Abstract

6rd is One of the most popular methods to provide both IPv4 and IPv6 connectivity services simultaneously during the IPv4/IPv6 co-existing period. The DHCP 6rd option has been defined to configure 6rd CPE. But in many networks, the configuration information may be stored in AAA servers while user configuration is mainly from Broadband Network Gateway (BNG) through DHC protocol. This document defines a RADIUS attribute that carries 6rd configuration information from AAA server to BNG.

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1. Introduction

Recently providers start to deploy IPv6 and consider how to transit to IPv6. 6rd [RFC5969] is one of the 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 legacy IPv4-only infrastructure. 6rd adopt DHCP as auto-configuring protocol. The 6rd CPE extends DHCP option to discover 6rd border relay and to configure IPv6 prefix and address.

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. In a fixed line broadband network, the Broadband Network Gateways (BNGs) act as the access gateway of users (hosts or CPEs). The BNGs are assumed to embed a DHCP server function that allows them to locally handle any DHCP requests issued by hosts.

Since the 6rd configuration 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 the 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. 6rd Configuration with RADIUS

The below Figure 1 illustrates how the RADIUS protocol and DHCP are cooperated to provide users/hosts with 6rd configuration.

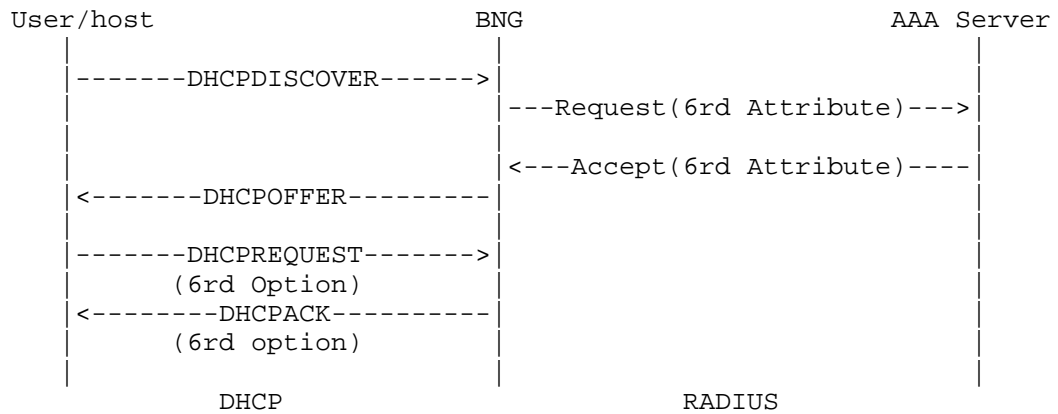


Figure 1: the cooperation between DHCP and RADIUS

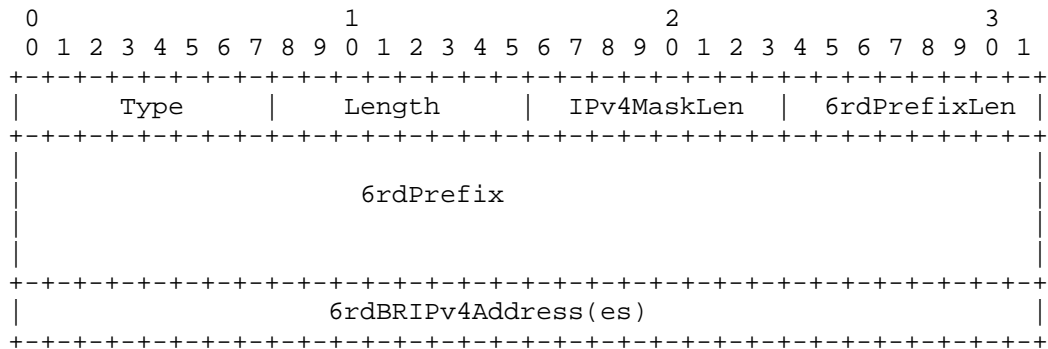
BNGs act as a bridge between user and AAA server. First, a BNG receives a user DHCPDISCOVER. It initiates the BNG to request correspondent user authentication relevant from an AAA server using RADIUS protocol. A 6rd request may be also sent in the same message. If the user authentication is approved by the AAA server, an Accept message is acknowledged with the 6rd Attribute, defined in the next Section. After the BNG responds to the user with an Advertise message, the user requests for a 6rd Option. Then, the BNG can reply the user using DHCP protocol.

4. Attributes

This section defines 6rd attribute which is used in the 6rd scenario.

4.1. 6rd Attribute

The 6rd Attribute is structured as follows:



Type TBD

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.

4.2. 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+	0+	0	0	0+	TBD	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 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 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-softwire-6rd-radiusattrib-00, renaming and deleting DS-lite contents, 2010-10-18.

draft-guo-radext-softwire-concentrator-00, original version, 2010-07-05.

10. References

10.1. Normative References

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- [RFC5969] Townsley W., et al., "IPv6 Rapid Deployment on IPv4 Infrastructures (6rd) -- Protocol Specification", RFC5969, August 2010.

10.2. Informative References

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