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Accounting on Softwires
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Abstract

   For access network operators, accounting information are crucial:
   they provide information for billing and give an overview of the
   traffic usage. This document defines the requirements for accounting
   information needed on Softwires.

1. Motivation

   The Softwires WG is working on a solution to bring IPvX connectivity
   over an IPvY network [RFC4925]. This solution may be deployed and
   managed by access network operators to provide for example IPvX
   continuity of service. Operators should then consider the Softwires
   solution as an extension of their access network service.

   For operators, AAA [RFC2865] is the key feature for access network
   deployment: Authentication verifies user credentials, Authorization
   ensures access network integrity and Accounting provides information
   for billing and network management. Information from accounting
   usually includes measurements of in and out octets and packets
   [RFC2867].

   As an alternative access network, the Softwires solution should
   provide similar AAA features. For instance accounting on the
   softwire should gives to the operator measurements of the traffic
   generated by the user using this access network. In a dual stack
   (IPvX and IPvY) network, the operator may want to manage information
   about the comparative usage of both protocols, for example for
   billing purpose. When the softwire is used to access IPvX over IPvY,
   accounting information will be specific to IPvX. Operators should be
   able to differentiate for which version of IP such information are
   relevant. This differentiation may become important if such
   operators offer a softwire solution for both IPvX over IPvY and IPvY
   over IPvX access networks.

2. Study case

   In this section is given an example of IPv6 access over IPv4 network
   which is similar to the Hub-and-Spokes problem stated in the
   Softwires WG ([RFC4925]). The Point6box architecture uses L2TP
   [RFC2661] and PPP for IPv6 tunneling over IPv4 (see Figure 1).
   Radius manages AAA parameters for the access network created by the
   tunnel. On the server side, PPP sends to RADIUS accounting
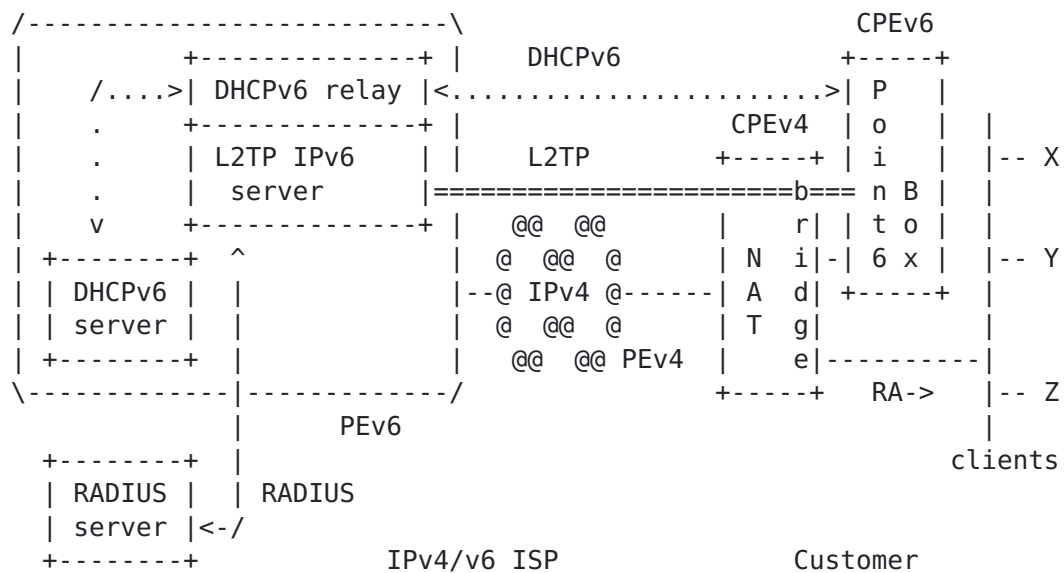   information measuring the traffic generated by the customer.

```
     /---------------------------\                      CPEv6
     |          +--------------+ |    DHCPv6             +-----+
     |     /....>| DHCPv6 relay |<........................>| P   |
     |     .    +--------------+ |            CPEv4     | o   |  |
     |     .    | L2TP IPv6    | |    L2TP        +-----+ | i   |  |-- X
     |     .    |  server      |=======================b=== n B |  |
     |     v    +--------------+ |   @@  @@        |    r| | t o |  |
     | +--------+  ^             |   @  @@  @      | N  i|-| 6 x |  |-- Y
     | | DHCPv6 |  |             |--@ IPv4 @------| A  d| +-----+  |
     | | server |  |             |   @  @@  @      | T  g|          |
     | +--------+  |             |    @@   @@ PEv4  |    e|----------|
     \------------|-------------/             +-----+   RA->   |-- Z
                  |       PEv6                                    |
       +--------+  |                                            clients
       | RADIUS |  | RADIUS
       | server |<-/
       +--------+          IPv4/v6 ISP            Customer
```

                  Figure 1: Point6Box Service Architecture

[3](#). Problem statement

   The accounting information defined for tunnels [[RFC2867](#)] includes
   attributes Acct-{Input,Output}-Octets and Acct-{Input,Output}-Packets
   for traffic measurements. These attributes do not depend of the
   version of IP used by the monitored traffic. Operators may not be
   able to differenciate IPv4 from IPv6 traffic in their accounting
   statistics. This non-differentiation even leads to mis-usages: In
   the current PPP implementation from BSD, the values of these
   attributes are only based on IPv4 statistics collected from IPCP
   protocol. No statistics are collected for IPv6 from IPV6CP.

   This proposal should decide which attributes may be candidate for IP-
   version differentiation. In operating system MIBs, values for in/out
   octets on a network interface are independent of the IP version.
   Having such values for each version may be usefull for monitoring and
   billing purpose. However the differentiation is done for in/out IPv4
   and IPv6 packets on a network interface. Operators can extract from
   these values some hints about the usage of each version of the IP
   protocol but can not give quantitative report of bandwidth usage.

4. Proposed solutions

4.1. Summing accounting informations

In the Point6Box solution, the PPP negociation only initiates the
IPV6CP protocol on the tunnel. The PPP statistics handling requires
some modifications to get IPv6-specific accounting information in
Radius attributes. A minor modification of the code may consist in
filling the RADIUS attributes with the sum of both IPCP and IPV6CP
values. But still no differentiation is made on the version of IP
used. Such solution do not match the requirements stated before.

4.2. Differentiation based on context

A RADIUS accounting entry, as defined in [RFC2867] and updated by
[RFC3162], also includes the NAS-IP-Address and NAS-IPv6-Address
attributes, which gives the IP address of the NAS used as the
softwire endpoint. Based on this information, an operator can decide
if this softwire is based on IPv4 or IPv6. In the case of provider
only deploying IPv6 over IPv4 and IPv4 over IPv6 softwires, the
nature of the traffic reported in the accounting information depends
of which attribute between NAS-IP-Address and NAS-IPv6-Address is
set. If NAS-IP-Address is set in the accounting entry, accounted
traffic is IPv6. If NAS-IPv6-Address is set in the accounting entry,
accounted traffic is IPv4. However, this solution requires extra
checking when building accounting report and obviously does not work
in case of IPvX over IPvX softwires.

4.3. Differentiation based on Attributes

Another solution is to have separate accounting attributes for IPv4
and IPv6. The accounting information should then be provided
depending on the softwire access:

o IPv4-only access: Only IPv4 accounting values are provided. IPv6
   accounting values should be filled as null,

o IPv6-only access: Only IPv6 accounting values are provided. IPv4
   accounting values should be filled as null,

o Dual stack IPv4 and IPv6 access: Values for both protocols should
   be provided.

5. Security Considerations

The Point6Box approach and the proposed extension of RADIUS only use
already existing protocols and add supplementary attributes. No new
security issue should be introduced.

6. Normative References

[RFC2661]   Townsley, W., Valencia, A., Rubens, A., Pall, G., Zorn,
            G., and B. Palter, "Layer Two Tunneling Protocol "L2TP"",
            RFC 2661, August 1999.

[RFC2865]   Rigney, C., Willens, S., Rubens, A., and W. Simpson,
            "Remote Authentication Dial In User Service (RADIUS)",
            RFC 2865, June 2000.

[RFC2866]   Rigney, C., "RADIUS Accounting", RFC 2866, June 2000.

[RFC2867]   Zorn, G., Aboba, B., and D. Mitton, "RADIUS Accounting
            Modifications for Tunnel Protocol Support", RFC 2867,
            June 2000.

[RFC3162]   Aboba, B., Zorn, G., and D. Mitton, "RADIUS and IPv6",
            RFC 3162, August 2001.

[RFC4925]   Li, X., Dawkins, S., Ward, D., and A. Durand, "Softwire
            Problem Statement", RFC 4925, July 2007.

Appendix A. Revision History

   Changes between -01 and -02:

   o Fix section "Differentiation based on context" by introducing NAS-
      IPv6-Address from RFC3162. Thanks to D.Romascanu for pointing
      that during the review of the Softwires Hub-and-spoke framework
      document.

   o Update some authors new employers

   Changes between -00 and -01:

   o Add new solution in Section 4.2.

   o Moved paragraph about system MIBs in Section 3.

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