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                   RADIUS Accounting for traffic classes
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Abstract

   This document specifies new attributes for RADIUS Accounting to
   enable NAS reporting of subsets of the total traffic in a user
   session.

Status of This Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

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   This Internet-Draft will expire on January 17, 2013.

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1. Introduction

   RADIUS Accounting [RFC2866] defines counters for octets and packets,
   both in the incoming and outgoing direction. Usage of these counters
   enables an operator create volume-based billing models and to execute
   proper capacity planning on its infrastructure.

   The Accounting model is based on the assumption that all traffic in a
   user session is treated equally; i.e. that there are no differences
   in the billing model of one class of traffic over another.

   Actual deployments suggest that this assumption is no longer valid.
   In particular, different traffic classes are defined with DSCP; and
   billing the use of these traffic classes separately is an
   understandable request.

   Plus, the introduction of dual-stack operation on links creates an
   understandable interest of getting separate statistics about the
   amount of IPv4 vs. IPv6 usage on a link; be it for billing or
   statistical reasons.

   This document defines Accounting attributes that supplement (but not
   replace) the accounting counters in RFC2866. It utilizes the new
   "extended attributes" in RADIUS ([I-D.ietf-radext-radius-extensions])
   to a) group accounting reports about traffic classes together and b)
   enable 64-Bit counts in a single attribute with the Integer64
   datatype.

1.1. Requirements Language

   In this document, several words are used to signify the requirements
   of the specification. The key words "MUST", "MUST NOT", "REQUIRED",
   "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT
   RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be
   interpreted as described in RFC 2119. [RFC2119]

2. Definitions

2.1. Acct-Traffic-Class attribute

   The attribute Acct-Traffic-Class is a TLV container for a group of
   sub-attributes which specify the class of traffic that is being
   reported about, and the amount of traffic in a user session that
   falls into this class.

      Attribute: 245.1 Acct-Traffic-Class

Type: TLV

Length: >3 octets

There can be multiple instances of this attribute in a Accounting-
Interim-Update or a Accounting-Stop packet. The attribute MUST NOT
be present in an Accounting-Start packet.

It is not required that the sum of all traffic in all instances is
the total sum of octets and packets in the user's session. I.e. the
traffic classes used in the Accounting packet do not need to
partition the total traffic in non-overlapping segments.

The total number of octets and packets in a user session continues to
be sent in the RFC2866 attributes.

2.1.1. Acct-Traffic-Class-Name attribute

The attribute Acct-Traffic-Class-Name, sub-attribute in the group
Acct-Traffic-Class, defines the class of traffic for which the other
attributes in the instance of Acct-Traffic-Class count octets and
packets. Every group instance MUST contain exactly one Acct-Traffic-
Class-Name.

Attribute: 245.1.2 Acct-Traffic-Class-Name

Type: STRING

Value: 1-250 octets

There are two options for the value of this attribute.

Option 1: Acct-Traffic-Class-Name string starting with the substring
"urn:". Usage of this option implies that the traffic name is in the
form of a URN and requires that a public specification of this URN
exists. That specification must include the type of traffic being
counted with this traffic class, and the exact definition of where in
the network packets the byte-count starts and ends. This document
defines a set of known, well-defined traffic accounting classes in an
IANA-managed registry in Section 2.2. New values for this registry
are assigned on expert review basis.

Option 2: Acct-Traffic-Class-Name string not starting with "urn:".
This option is for local use of special-purpose accounting as defined
by the NAS administrator, where no defined URN matches the meaning of
the traffic to be counted. The meaning of the content needs to be
communicated out-of-band between the NAS and RADIUS Server operator.
Example: Acct-Traffic-Class-Name = "UDP traffic to AS2606".

2.1.2. Acct-Traffic-Class-Input-Octets attribute

   The attribute Acct-Traffic-Class-Input-Octets, sub-attribute in the
   group Acct-Traffic-Class, carries the number of octets that belong to
   the class of traffic indicated by Acct-Traffic-Class-Name and have
   been sent to the entity for which the accounting packet was
   generated. It MUST occur at most once inside every instance of the
   Acct-Traffic-Class TLV. If a traffic parameter value is transmitted
   in this attribute in an Accouting-Request "Interim Update", then the
   final value of that traffic parameter MUST be reported in the
   corresponding Accounting-Request "Stop".

      Attribute: 245.1.3 Acct-Traffic-Class-Input-Octets

      Type: Integer64

      Value: number of octets sent to entity, matching the class of
      traffic

2.1.3. Acct-Traffic-Class-Output-Octets attribute

   The attribute Acct-Traffic-Class-Output-Octets, sub-attribute in the
   group Acct-Traffic-Class, carries the number of octets that belong to
   the class of traffic indicated by Acct-Traffic-Class-Name and have
   been sent from the entity for which the accounting packet was
   generated. It MUST occur at most once inside every instance of the
   Acct-Traffic-Class TLV. If a traffic parameter value is transmitted
   in this attribute in an Accouting-Request "Interim Update", then the
   final value of that traffic parameter MUST be reported in the
   corresponding Accounting-Request "Stop".

      Attribute: 245.1.4 Acct-Traffic-Class-Output-Octets

      Type: Integer64

      Value: number of octets sent from entity, matching the class of
      traffic

2.1.4. Acct-Traffic-Class-Input-Packets attribute

   The attribute Acct-Traffic-Class-Input-Packets, sub-attribute in the
   group Acct-Traffic-Class, carries the number of packets that belong
   to the class of traffic indicated by Acct-Traffic-Class-Name and have
   been sent to the entity for which the accounting packet was
   generated. It MUST occur at most once inside every instance of the
   Acct-Traffic-Class TLV. If a traffic parameter value is transmitted
   in this attribute in an Accouting-Request "Interim Update", then the
   final value of that traffic parameter MUST be reported in the

corresponding Accounting-Request "Stop".

> Attribute: 245.1.5 Acct-Traffic-Class-Input-Packets
>
> Type: Integer64
>
> Value: number of packets sent to entity, matching the class of traffic

2.1.5. Acct-Traffic-Class-Output-Packets attribute

The attribute Acct-Traffic-Class-Output-Packets, sub-attribute in the group Acct-Traffic-Class, carries the number of packets that belong to the class of traffic indicated by Acct-Traffic-Class-Name and have been sent from the entity for which the accounting packet was generated. It MUST occur at most once inside every instance of the Acct-Traffic-Class TLV. If a traffic parameter value is transmitted in this attribute in an Accouting-Request "Interim Update", then the final value of that traffic parameter MUST be reported in the corresponding Accounting-Request "Stop".

> Attribute: 245.1.6 Acct-Traffic-Class-Output-Packets
>
> Type: Integer64
>
> Value: number of packets sent from entity, matching the class of traffic

2.2. URN values for attribute Acct-Traffic-Class-Name

The following URN values are defined for RADIUS Accounting Traffic Classes:

Name: "urn:ietf:radius-accounting:ip:4"

> Purpose: volume count of IPv4 payloads
>
> Start of byte count: 1st byte of the IP header of the packet
>
> End of byte count: last byte of IP layer of the packet

Name: "urn:ietf:radius-accounting:ip:6"

> Purpose: volume count of IPv6 payloads
>
> Start of byte count: 1st byte of the IP header of the packet

End of byte count: last byte of IP layer of the packet

Name: "urn:ietf:radius-accounting:dscp:0"

Purpose: volume count of packet payloads with DSCP = 0

Start of byte count: 1st byte of the IP header of the packet

End of byte count: last byte of IP layer of the packet

Name: "urn:ietf:radius-accounting:tcp"

Purpose: volume count of TCP packets

Start of byte count: 1st byte of the TCP header of the packet

End of byte count: last byte of TCP layer of the packet

Name: "urn:ietf:radius-accounting:udp"

Purpose: volume count of UDP payloads

Start of byte count: 1st byte of the UDP header of the packet

End of byte count: last byte of UDP layer of the packet

(more values to be added...)

3. Example

A NAS is configured to create statistics regarding IPv6 usage of CPE
for statistical reasons, and of the amount of HTTP traffic sent to
the example.com web site for billing reasons.

User john@example.com starts a user session, transfers 1200 Bytes in
10 packets via IPv6 to the internet, and receives 4500 Bytes in 30
packets over IPv6 from the internet.

In the same session, The user visits the IPv4-only example.com web
site by sending 6000 bytes in 4 packets to the web site, and
receiving 450000 Bytes in 35 packets from the web site.

Then, the user terminates the session and an Accounting-Stop packet
is generated.

The NAS sends the recorded octet and packet values to his RADIUS
Accounting server. Since there is no URN value for "Traffic on
TCP/80 to example.com, all IP versions" for use in the Acct-Traffic-

Class-Name attribute, the NAS has been configured to indicate this
class of traffic in a corresponding custom string. The relevant
attributes in the Accounting-Stop packet are:

Acct-Traffic-Class

   Acct-Traffic-Class-Name = "urn:ietf:radius-accunting:ip:6"

   Acct-Traffic-Class-Input-Octets = 4500

   Acct-Traffic-Class-Output-Octets = 1200

   Acct-Traffic-Class-Input-Packets = 30

   Acct-Traffic-Class-Output-Packets = 10

Acct-Traffic-Class

   Acct-Traffic-Class-Name = "Traffic on TCP/80 to example.com, all
   IP versions"

   Acct-Traffic-Class-Input-Octets = 450000

   Acct-Traffic-Class-Output-Octets = 6000

   Acct-Traffic-Class-Input-Packets = 35

   Acct-Traffic-Class-Output-Packets = 4

4. Attribute Occurence Table

This table lists the allowed occurences of the previously defined
attributes in Accounting packets.

```
Start    Interim   Stop   Reply   Attribute
-----    -------   ----   -----   -------------------------------
0        0-n       0-s    0       Acct-Traffic-Class
0        0-m       0-t    0       Acct-Traffic-Class-Name
0        0-o       0-u    0       Acct-Traffic-Class-Input-Octets
0        0-p       0-v    0       Acct-Traffic-Class-Output-Octets
0        0-q       0-w    0       Acct-Traffic-Class-Input-Packets
0        0-r       0-x    0       Acct-Traffic-Class-Output-Packets
```

Figure 1: Attribute Occurence

Note 1: since all sub-attributes occur at most once inside any given
Acct-Traffic-Class TLV, the sub-attributes can not occur more often
than the TLV itself. I.e. $m<n$, $o<n$, $p<n$, $q<n$, and $r<n$.

Note 2: if Acct-Traffic-Class TLVs and their sub-attributes have been
sent in Interim-Updates, they MUST also occur in the subsequent Stop
packet; while the Stop packet MAY contain additional Acct-Traffic-
Class instances. I.e. in the table above: s>=n, t>=m, u>=o,
v>=p,w>=q, and x>=r.

5. Security Considerations

   Reveals user's traffic usage patterns. Shouldn't be sent
   unencrpyptedly.

6. IANA Considerations

   This document has actions for IANA. TBD later.

7. Normative References

   [RFC2866]   Rigney, C., "RADIUS Accounting",
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