



## RADIUS Attributes

Remote Authentication Dial-In User Service (RADIUS) attributes are used to define specific authentication, authorization, and accounting (AAA) elements in a user profile, which is stored on the RADIUS daemon.

This appendix describes the following types of RADIUS attributes supported in Broadband Network Gateway (BNG):

- [RADIUS IETF Attributes, on page 1](#)
- [RADIUS Vendor-Specific Attributes, on page 3](#)
- [RADIUS ADSL Attributes, on page 6](#)
- [RADIUS ASCEND Attributes, on page 7](#)
- [RADIUS Disconnect-Cause Attributes, on page 7](#)

## RADIUS IETF Attributes

### IETF Attributes Versus VSAs

RADIUS Internet Engineering Task Force (IETF) attributes are the original set of 255 standard attributes that are used to communicate AAA information between a client and a server. Because IETF attributes are standard, the attribute data is predefined and well known; thus all clients and servers who exchange AAA information via IETF attributes must agree on attribute data such as the exact meaning of the attributes and the general bounds of the values for each attribute.

RADIUS vendor-specific attributes (VSAs) derived from one IETF attribute-vendor-specific (attribute 26). Attribute 26 allows a vendor to create an additional 255 attributes however they wish. That is, a vendor can create an attribute that does not match the data of any IETF attribute and encapsulate it behind attribute 26; thus, the newly created attribute is accepted if the user accepts attribute 26.

**Table 1: Supported RADIUS IETF Attributes**

| Name                  | Value   | Type |
|-----------------------|---------|------|
| Acct-Delay-Time       | integer | 41   |
| Acct-Input-Giga-Words | integer | 52   |
| Acct-Input-Octets     | integer | 42   |
| Acct-Input-Packets    | integer | 47   |

| Name                          | Value    | Type |
|-------------------------------|----------|------|
| Acct-Interim-Interval         | integer  | 85   |
| Acct-Link-Count               | integer  | 51   |
| Acct-Output-Giga-Words        | integer  | 53   |
| Acct-Output-Octets            | integer  | 43   |
| Acct-Output-Packets           | integer  | 48   |
| Acct-Status-Type              | integer  | 40   |
| Acct-Terminate-Cause          | integer  | 49   |
| CHAP-Challenge                | binary   | 40   |
| CHAP-Password                 | binary   | 3    |
| Delegated-IPv6-Prefix         | binary   | 123  |
| Dynamic-Author-Error-Cause    | integer  | 101  |
| Event-Timestamp               | integer  | 55   |
| Filter-Id                     | string   | 11   |
| Framed-Interface-Id           | binary   | 96   |
| Framed-IP-Address             | ipv4addr | 8    |
| Framed-IPv6-Route             | string   | 99   |
| Framed-Pool                   | string   | 88   |
| Framed-Protocol               | integer  | 7    |
| Framed-Route                  | string   | 22   |
| Nas-Identifier                | string   | 32   |
| NAS-IP-Address                | ipv4addr | 4    |
| NAS-IPv6-Address              | string   | 95   |
| NAS-Port                      | integer  | 5    |
| Reply-Message                 | binary   | 18   |
| Service-Type                  | integer  | 6    |
| Session-Timeout               | integer  | 27   |
| Stateful-IPv6-Address-Pool    | binary   | 123  |
| X-Ascend-Client-Primary-DNS   | ipv4addr | 135  |
| X-Ascend-Client-Secondary-DNS | ipv4addr | 136  |

### Filter-Id

Filter-ID specifies the access control list (ACL) that is applied to the subscriber interface. The format of the Filter-Id attribute is as follows:

```
Filter-Id = <ACL-Name> <in | out>
```

Where, **in** and **out** indicate the direction of the ACL feature to be applied. **ACL in** is mapped to the input direction (IPv4 Ingress), and **ACL out** is mapped to the output direction (IPv4 Egress) of the CP-UP session programming interface. You can configure only one attribute per direction.

### Session-Timeout

Session-Timeout sets the maximum number of seconds of service to be provided to the user before the session terminates. Session-Timeout attribute can be sent as part of CoA request, Access-Accept, or Access-Challenge messages.

You can enable session-timeout using the user-profile on a RADIUS server. For example:

```
user1 Cleartext-Password := "cisco"
  Session-timeout = 90'
```

Once the timer expires, the subscriber is removed from the server.

For session deletion due to session-timeout, the reason of disconnect can be observed as “Session-Timeout” in accounting messages. For example,

```
(5) Sent Access-Accept Id 7 from 10.1.35.10:1812 to 10.1.32.83:16384 length 0
(5)   Session-Timeout = 90

(8)   Acct-Terminate-Cause = Session-Timeout
(8)   Ascend-Disconnect-Cause = Session-Timeout
```

### Verification:

You can verify the session-timeout configuration using the **show subscriber session detail** command:

#### show subscriber session detail

```
"subcfgInfo": {
  "committedAttrs": {
    "attrs": {
      "accounting-list": "automation-aaaprofile",
      "acct-interval": "2000",
      "addr-pool": "automation-poolv4",
      "ipv4-mtu": "1400",
      "ppp-ipcp-reneg-ignore": "true",
      "ppp-ipv6cp-reneg-ignore": "true",
      "ppp-lcp-reneg-ignore": "true",
      "session-acct-enabled": "true",
      "session-timeout": "90",
      "vrf": "automation-vrf"
    }
  },
}
```

## RADIUS Vendor-Specific Attributes

The Internet Engineering Task Force (IETF) draft standard specifies a method for communicating vendor-specific information between the network access server and the RADIUS server by using the vendor-specific attribute (attribute 26). Attribute 26 encapsulates vendor specific attributes, thereby, allowing vendors to support their own extended attributes otherwise not suitable for general use.

The Cisco RADIUS implementation supports one vendor-specific option using the format recommended in the specification. Cisco's vendor-ID is 9, and the supported option has vendor-type 1, which is named "cisco-avpair." The value is a string of this format:

```
protocol : attribute sep value *
```

"Protocol" is a value of the Cisco "protocol" attribute for a particular type of authorization; protocols that can be used include IP, IPX, VPDN, VOIP, SHELL, RSVP, SIP, AIRNET, OUTBOUND. "Attribute" and "value" are an appropriate attribute-value (AV) pair defined in the Cisco TACACS+ specification, and "sep" is "=" for mandatory attributes and "\*" for optional attributes. This allows the full set of features available for TACACS+ authorization to also be used for RADIUS.

The following example shows how to cause a user logging in from a network access server to have immediate access to EXEC commands:

```
cisco-avpair= "shell:priv-lvl=15"
```

Attribute 26 contains these three elements:

- Type
- Length
- String (also known as data)
  - Vendor-ID
  - Vendor-Type
  - Vendor-Length
  - Vendor-Data



**Note** It is up to the vendor to specify the format of their VSA. The Attribute-Specific field (also known as Vendor-Data) is dependent on the vendor's definition of that attribute.

**Table 2: Supported Cisco Vendor-Specific RADIUS Attributes**

| Name                       | Value   | Type | Present in AAA message type            |
|----------------------------|---------|------|----------------------------------------|
| accounting-list            | string  | 1    | Access-accept, CoA, Accounting-request |
| acct-input-gigawords-ipv4  | integer | 1    | Accounting-request                     |
| acct-input-octets-ipv4     | integer | 1    | Accounting-request                     |
| acct-input-packets-ipv4    | integer | 1    | Accounting-request                     |
| acct-input-gigawords-ipv6  | integer | 1    | Accounting-request                     |
| acct-input-octets-ipv6     | integer | 1    | Accounting-request                     |
| acct-input-packets-ipv6    | integer | 1    | Accounting-request                     |
| acct-output-gigawords-ipv4 | integer | 1    | Accounting-request                     |
| acct-output-octets-ipv4    | integer | 1    | Accounting-request                     |
| acct-output-packets-ipv4   | integer | 1    | Accounting-request                     |

| Name                       | Value   | Type | Present in AAA message type        |
|----------------------------|---------|------|------------------------------------|
| acct-output-gigawords-ipv6 | integer | 1    | Accounting-request                 |
| acct-output-octets-ipv6    | integer | 1    | Accounting-request                 |
| acct-output-packets-ipv6   | integer | 1    | Accounting-request                 |
| addrv6                     | string  | 1    | Access-accept, Accounting-request  |
| circuit-id-tag             | string  | 1    | Access-accept, Accounting-request  |
| cisco-nas-port             | string  | 2    | Access-accept, Accounting-request  |
| client-mac-address         | string  | 1    | Access-accept, Accounting-request  |
| command                    | string  | 1    | CoA                                |
| connect-progress           | string  | 1    | Accounting-request                 |
| delegated-ipv6-pool        | string  | 1    | Access-accept                      |
| dhcp-client-id             | string  | 1    | Accounting-request                 |
| dhcp-vendor-class          | string  | 1    | Access-request, Accounting-request |
| disc-cause-ext             | string  | 1    | Accounting-request                 |
| disconnect-cause           | string  | 1    | Accounting-request                 |
| inacl                      | string  | 1    | Access-accept                      |
| intercept-id               | integer | 1    | Access-accept                      |
| ip-addresses               | string  | 1    | Access-request, Accounting-request |
| ipv6_inacl                 | string  | 1    | Access-accept, CoA                 |
| ipv6_outacl                | string  | 1    | Access-accept, CoA                 |
| ipv6-dns-servers-addr      | string  | 1    | Access-accept                      |
| ipv6-mtu                   | integer | 1    | Access-accept                      |
| ipv6-strict-rpf            | integer | 1    | Access-accept                      |
| ipv6-unreachable           | integer | 1    | Access-accept                      |
| md-dscp                    | integer | 1    | Access-accept                      |
| md-ip-addr                 | ipaddr  | 1    | Access-accept                      |
| md-port                    | integer | 1    | Access-accept                      |
| outacl                     | string  | 1    | Access-accept                      |
| parent-session-id          | string  | 1    | Accounting-request                 |

| Name                       | Value   | Type | Present in AAA message type        |
|----------------------------|---------|------|------------------------------------|
| pppoe_session_id           | integer | 1    | Accounting-request                 |
| primary-dns                | ipaddr  | 1    | Access-accept                      |
| remote-id-tag              | string  | 1    | Access-request, Accounting-request |
| sa                         | string  | 1    | Access-accept, CoA                 |
| sd                         | string  | 1    | RADIUS CoA                         |
| secondary-dns              | ipaddr  | 1    | Access-accept                      |
| service-name               | string  | 1    | Accounting-request                 |
| Stateful-IPv6-Address-Pool | string  | 1    | Access-accept                      |
| username                   | string  | 1    | Access-request, Accounting-request |
| user-plane-ip-address      | string  | 1    | Access-request, Accounting-request |
| vrf                        | string  | 1    | Access-accept                      |
| vrf-id                     | string  | 1    | Access-accept                      |

## Vendor-Specific Attributes for Account Operations

Table 3: Supported Vendor-Specific Attributes for Account Operations

| RADIUS AVP                        | Value  | Type | Action              |
|-----------------------------------|--------|------|---------------------|
| subscriber:command=account-update | string | 1    | account update      |
| subscriber:sa=<service-name>      | string | 1    | service activate    |
| subscriber:sd=<service-name>      | string | 1    | service de-activate |

## RADIUS ADSL Attributes

Table 4: Supported RADIUS ADSL Attributes

| Name             | Value  | Type |
|------------------|--------|------|
| Agent-Circuit-Id | string | 1    |
| Agent-Remote-Id  | string | 2    |

# RADIUS ASCEND Attributes

Table 5: Supported RADIUS Ascend Attributes

| Name                        | Value    | Type |
|-----------------------------|----------|------|
| Ascend-Client-Primary-DNS   | ipv4addr | 135  |
| Ascend-Client-Secondary-DNS | ipv4addr | 136  |
| Ascend-Connection-Progress  | integer  | 196  |
| Ascend-Disconnect-Cause     | integer  | 195  |

## RADIUS Disconnect-Cause Attributes

Disconnect-cause attribute values specify the reason a connection was taken offline. The attribute values are sent in Accounting request packets. These values are sent at the end of a session, even if the session fails to be authenticated. If the session is not authenticated, the attribute can cause stop records to be generated without first generating start records.

lists the cause codes, values, and descriptions for the Disconnect-Cause (195) attribute.



**Note** The Disconnect-Cause is incremented by 1000 when it is used in RADIUS AVPairs; for example, disc-cause 4 becomes 1004.

Table 6: Supported Disconnect-Cause Attributes

| Cause Code | Value                  | Description                                                                                                    |
|------------|------------------------|----------------------------------------------------------------------------------------------------------------|
| 2          | Unknown                | Reason unknown.                                                                                                |
| 3          | Call-Disconnect        | The call has been disconnected.                                                                                |
| 11         | Lost-Carrier           | Loss of carrier.                                                                                               |
| 21         | Idle-Timeout           | Timeout waiting for user input.<br><b>Note</b><br>Codes 21, 100, 101, 102, and 120 apply to all session types. |
| 28         | EXEC-Process-Destroyed | EXEC process destroyed.                                                                                        |
| 33         | Insufficient-Resources | Insufficient resources.                                                                                        |

| Cause Code | Value                      | Description                                                                                 |
|------------|----------------------------|---------------------------------------------------------------------------------------------|
| 40         | Timeout-PPP-LCP            | PPP LCP negotiation timed out.<br><b>Note</b><br>Codes 40 through 49 apply to PPP sessions. |
| 41         | Failed-PPP-LCP-Negotiation | PPP LCP negotiation failed.                                                                 |
| 42         | Failed-PPP-PAP-Auth-Fail   | PPP PAP authentication failed.                                                              |
| 45         | PPP-Remote-Terminate       | PPP received a Terminate Request from remote end.                                           |
| 47         | NCP-Closed-PPP             | PPP session closed because there were no NCPs open.                                         |
| 52         | Invalid-IP-Address         | IP address is not valid for Telnet host.                                                    |
| 100        | Session-Timeout            | Session timed out.                                                                          |
| 150        | RADIUS-Disconnect          | Disconnected by RADIUS request.                                                             |
| 151        | Local-Admin-Disconnect     | Administrative disconnect.                                                                  |
| 170        | PPP-Authentication-Timeout | PPP authentication timed out.                                                               |