



# PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement

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The PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement feature provides a method by which the digital subscriber line access multiplexer (DSLAM) sends the DSL Remote-ID tag in the discovery phase as an identifier for the authentication, authorization, and accounting (AAA) access request on an Fast or Gigabit Ethernet interface, thereby simulating ATM-based broadband access, but using cost-effective Fast or Gigabit Ethernet instead. This Remote-ID tag is useful for troubleshooting, authentication, and accounting.

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## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [www.cisco.com/go/cfn](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

# Prerequisites for the PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement

It is recommended that you be familiar with the following documents before configuring this feature:

- RFC 2516: [A Method for Transmitting PPP over Ethernet \(PPPoE\)](#)
- DSL Forum 2004-71: [Solution for a Remote-ID in PPPoE Discovery Phase](#)

See the [Additional References](#), on page 8 for more information.

## Information About the PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement

### Differences Between ATM and Fast or Gigabit Ethernet-Based Broadband Access Networks

Broadband DSLAM and Broadband Remote Access Server (BRAS) vendors need to provide Fast or Gigabit Ethernet-based networks as an alternative to an ATM access network, with a DSLAM bridging the ATM-DSL local loop to the Fast or Gigabit Ethernet-based broadband access network and allowing Fast or Gigabit Ethernet-based connectivity to the BRAS. There is no unique mapping between the subscriber Line-ID tag and the interface in an Fast or Gigabit Ethernet broadband access network, as there is in an ATM-based broadband network, where the ATM VC is associated to a subscriber line. During the authentication phase that initiates the PPP access and AAA accounting requests, the BRAS includes a NAS-Port-ID attribute in RADIUS authentication packets that identifies the DSL for the subscriber

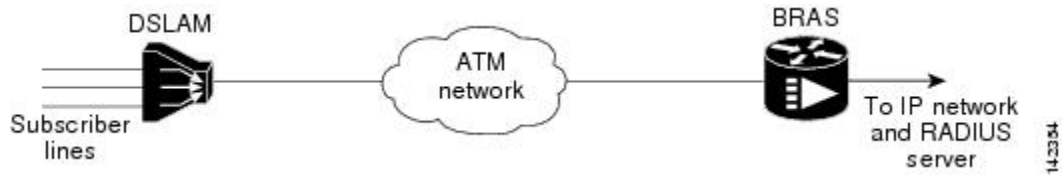
### DSL Forum 2004-71 Solution for Remote-ID in PPPoE Discovery Phase

DSL Forum 2004-71 defines a method whereby the DSLAM sends the DSL Remote-ID tag in the PPP over Ethernet (PPPoE) discovery phase to apply the same subscriber mapping capability to Fast or Gigabit Ethernet interfaces that is possible on ATM interfaces. This method adds support for the PPPoE server acting as a BRAS to report the Remote-ID tag as a new vendor specific attribute (VSA) (AAA\_AT\_REMOTE\_ID) in AAA authentication and accounting requests. If the **radius-server attribute 31 remote-id** command is configured on the BRAS, the Remote-ID tag will be sent to a RADIUS server as the Calling Station-ID tag (attribute 31).

## Remote-ID Tag in Fast or Gigabit Ethernet-Based Broadband Access Networks

Traditional ATM-based DSL broadband access networks have the topology shown in The figure below.

**Figure 1: ATM-Based DSL Broadband Access Network**

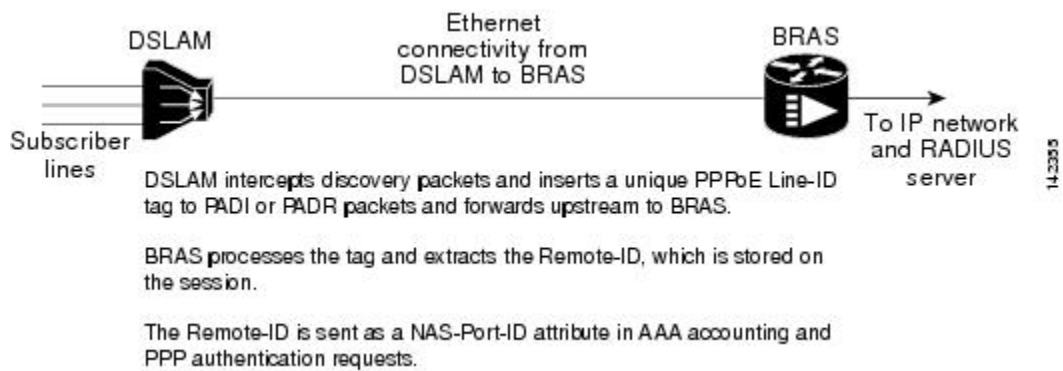


In terms of logical connectivity, there is a one-to-one mapping of the DSL subscriber line to the end user and the ATM virtual circuit (VC) used to carry the PPP session through the DSLAM and to the BRAS, where this VC information is converted into a NAS-Port-ID tag for use in RADIUS packets.

The simple mapping available from an ATM-based broadband network between the physical line in the DSL local loop to the end user and a virtual circuit (from DSLAM to BRAS) is not available for a Fast or Gigabit Ethernet-based network. To solve this problem, the PPPoE Remote-ID Tag Processing feature uses a PPPoE intermediate agent function on the DSLAM to attach a tag to the PPPoE discovery packets. The BRAS then receives the tagged packet, decodes the tag, and inserts the line identifier into RADIUS packets destined for the RADIUS server.

The DSLAM intercepts PPPoE discovery frames from the client or initiates a discovery frame if the PPPoE Active Discovery (PAD) client is a legacy PPP over ATM (PPPoA) device. The DSLAM inserts a unique Remote-ID tag and DSL sync rate tag using the PPPoE vendor-specific tag (0x0105) to PPPoE Active Discovery Initiation (PADI) and PPPoE Active Discovery Request (PADR) packets; see the figure below. The DSLAM forwards these packets upstream to the BRAS after the insertion. The tag contains the identification of the DSL line on which the PADI or PADR packet was received, in the access node where the intermediate agent resides.

**Figure 2: PPPoE Remote-ID Tag Processing Solution**



When the **vendor-tag remote-id service** command is configured in broadband access (BBA) group configuration mode, the BRAS processes the received PPPoE vendor-specific tag in the PADR frame and extracts the Remote-ID tag, which is sent to the remote AAA server as a VSA in all AAA access and accounting requests. When the **radius-server attribute 31 remote-id** global configuration command is also configured on the BRAS, the Remote-ID value is inserted into attribute 31.

Outgoing PAD Offer (PADO) and PAD Session-Confirmation (PADS) packets from the BRAS have the DSLAM-inserted Remote-ID tag. The DSLAM should strip the tag out of PADO and PADS frames. If the DSLAM cannot strip off the tag, the BRAS must remove the tag before sending the frames out. This is accomplished using the **vendor-tag strip** BBA group configuration mode command. If this command is configured under the BBA group, the BRAS strips the incoming Remote-ID tag (and any other vendor tag) off of the outgoing PADO and PADS frames. This action complies with DSL Forum Technical Report 101 .

## Benefits of the PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement

The shift toward Fast or Gigabit Ethernet-based DSLAMs offers the following benefits:

- Ability to use simpler and lower-cost provisioning options for DSL subscribers over a Fast or Gigabit Ethernet-based backhaul network rather than on an ATM-based network.
- Ability to use higher bandwidth connectivity options available from Fast or Gigabit Ethernet that are not possible on ATM.
- Ability to upgrade to next-generation DSLAMs with quality of service (QoS), and support for higher bandwidth, asymmetric dual latency modems such as the ADSL2.

Ability to inject high-bandwidth content such as video in a Fast or Gigabit Ethernet network.

## How to Configure the PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement

### Configuring the PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement Feature

This task describes how to configure the PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement feature. When this feature is configured, BRAS will process the incoming PADR frames and send the Remote-ID field of the incoming tag to the RADIUS server as a VSA.

For DSL-Sync-Rate tags, you must enter the **vendor-tag dsl-sync-rate service** command under a BBA group. When this command is entered, the BRAS will process incoming PADR frames and send the DSL-Sync-Rate tags to the RADIUS server as VSAs.

An Access-Accept message is sent by the RADIUS server and vendor-tag attributes sent in the Access-Request message will be present in the Access-Accept message if the RADIUS server echoes it back.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **aaa new-model**
4. **radius-server attribute 31 remote-id**
5. **bba-group pppoe *group-name***
6. **vendor-tag remote-id service**
7. **vendor-tag dsl-sync-rate service**
8. **nas-port-id format c**
9. **end**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<p><b>enable</b></p> <p><b>Example:</b></p> <pre>Router&gt; enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<p><b>configure terminal</b></p> <p><b>Example:</b></p> <pre>Router# configure terminal</pre>	<p>Enters global configuration mode.</p>
<b>Step 3</b>	<p><b>aaa new-model</b></p> <p><b>Example:</b></p> <pre>Router(config)# aaa new-model</pre>	<p>(Optional) Enables the AAA access control model.</p>
<b>Step 4</b>	<p><b>radius-server attribute 31 remote-id</b></p> <p><b>Example:</b></p> <pre>Router(config)# radius-server attribute 31 remote-id</pre>	<p>(Optional) Sends the Remote-ID tag to the RADIUS server via a new VSA (AAA_AT_REMOTE_ID) and in attribute 31--Calling Station ID.</p>
<b>Step 5</b>	<p><b>bba-group pppoe <i>group-name</i></b></p> <p><b>Example:</b></p> <pre>Router(config)# bba-group pppoe pppoe-group</pre>	<p>Defines a PPPoE profile and enters BBA group configuration mode.</p>

	Command or Action	Purpose
<b>Step 6</b>	<b>vendor-tag remote-id service</b>  <b>Example:</b> <pre>Router(config-bba-group)# vendor-tag remote-id service</pre>	Enables the BRAS to process incoming PADR frames and send the Remote-ID field of the incoming tag to the RADIUS server as a VSA.
<b>Step 7</b>	<b>vendor-tag dsl-sync-rate service</b>  <b>Example:</b> <pre>Router(config-bba-group)# vendor-tag dsl-sync-rate service</pre>	Enables the BRAS to process the incoming PADR frames and send the DSL-Sync-Rate tags to the RADIUS server as VSAs.
<b>Step 8</b>	<b>nas-port-id format c</b>  <b>Example:</b> <pre>Router(config-bba-group)# nas-port-id format c</pre>	<p>Specifies a format for broadband subscriber access line identification coding.</p> <ul style="list-style-type: none"> <li>The designation of <b>format c</b> is specifically designed for a particular coding format. A sample of this format is as follows:  NAS_PORT_ID=atm 31/31/7:255.65535 example001/0/31/63/31/127</li> <li>This means the subscriber interface type of the BRAS equipment is an ATM interface. The BRAS slot number is 31, and the BRAS subslot number is 31. The BRAS port number is 7. The virtual path identifier (VPI) is 255, and the virtual circuit identifier (VCI) is 65535.</li> </ul> <p>The Circuit-ID/Remote-ID tag is example001/0/31/63/31/127.</p>
<b>Step 9</b>	<b>end</b>  <b>Example:</b> <pre>Router(config-bba-group)# end</pre>	(Optional) Exits the current configuration mode and enters the privileged EXEC mode.

## Stripping Vendor-Specific Tags

Outgoing PADO and PADS packets will have the DSLAM-inserted Remote-ID and DSL-Sync-Rate tags, and the DSLAM must strip these tags from the packets. If the DSLAM cannot strip the tag, the BRAS must remove it before sending out the packets. This task is accomplished through configuration of the **vendor-tag strip** command in BBA group configuration mode. Note that the **vendor-tag strip** command also removes the Circuit-ID tag.

**SUMMARY STEPS**

1. **enable**
2. **configure terminal**
3. **bba-group pppoe *group-name***
4. **vendor-tag strip**
5. **end**

**DETAILED STEPS**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
<b>Step 3</b>	<b>bba-group pppoe <i>group-name</i></b>  <b>Example:</b> Router(config)# bba-group pppoe pppoe-group	Defines a PPPoE profile and enters BBA group configuration mode.
<b>Step 4</b>	<b>vendor-tag strip</b>  <b>Example:</b> Router(config-bba-group)# vendor-tag strip	Enables the BRAS to strip off incoming vendor-specific tags (including Remote-ID, DSL-Sync-Rate tags, and Circuit-ID) from outgoing PADO and PADS frames.
<b>Step 5</b>	<b>end</b>  <b>Example:</b> Router(config-bba-group)# end	(Optional) Exits the current configuration mode and enters the privileged EXEC mode.

**Troubleshooting Tips**

When you enter the **radius-server attribute 31 remote-id** global configuration command in the PPPoE Agent Remote-ID Tag and DSL Line Characteristics Enhancement feature configuration on the BRAS, you can use the **debug radius** privileged EXEC command to generate a report.

The report includes information about the:

- Incoming access interface
- Location where discovery frames are received
- Details of the sessions being established in PPPoE extended NAS-Port format (format d)

## Configuration Examples for PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement

### Configuring PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement Example

In the following example, outgoing PADO and PADS packets will retain the incoming Vendor-Specific Circuit-ID tag:

```
Router(config)# radius-server attribute 31 remote-id
!
Router(config)# bba-group pppoe rmt-id-tag
Router(config-bba-group)# vendor-tag remote-id service
Router(config-bba-group)# vendor-tag dsl-sync-rate service
Router(config-bba-group)# nas-port-id format c
!
Router(config)# interface FastEthernet0/0/0.1
Router(config-subif)# encapsulation dot1Q 120
Router(config-subif)# pppoe enable group rmt-id-tag
```

### Stripping Vendor-Specific Tags Example

In the following example, the BRAS will strip off incoming Vendor-Specific Circuit-ID tags from outgoing PADO and PADS packets:

```
Router(config)# bba-group pppoe rmt-id-tag
Router(config-bba-group)# vendor-tag strip
Router(config)# interface FastEthernet0/0/0.1
Router(config-subif)# encapsulation dot1Q 120
Router(config-subif)# pppoe enable group rmt-id-tag
```

## Additional References

The following sections provide references related to the PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement feature.

#### Related Documents

Related Topic	Document Title
Configuring Broadband and DSL	<i>Cisco IOS XE Broadband and DSL Configuration Guide</i>



Related Topic	Document Title
RADIUS attributes	RADIUS Attributes Overview and RADIUS IETF Attributes module
DSL Line-ID tag solution	<a href="#">RFC 4679 - DSL Forum Vendor Specific RADIUS Attributes</a>
Migration to Fast or Gigabit Ethernet-based DSL aggregation	<a href="#">DSL Forum Technical Report 101</a>

**Standards**

Standard	Title
No new or modified standards are supported by this feature.	--

**MIBs**

MIB	MIBs Link
No new or modified MIBs are supported by this feature.	To locate and download MIBs for selected platforms, Cisco IOS XE software releases, and feature sets, use Cisco MIB Locator found at the following URL: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

**RFCs**

RFC	Title
RFC 2516	<a href="#">A Method for Transmitting PPP over Ethernet (PPPoE)</a>

**Technical Assistance**

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	<p><a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a></p>

## Feature Information for PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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**Table 1: Feature Information for PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement**

Feature Name	Releases	Feature Information
PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement	Cisco IOS XE Release 2.1.	<p>The PPPoE Agent Remote-ID and DSL Line Characteristics Enhancement feature provides a method by which the digital subscriber line access multiplexer (DSLAM) sends the DSL Remote-ID tag in the discovery phase as an identifier for the authentication, authorization, and accounting (AAA) access request on a Fast or Gigabit Ethernet interface, thereby simulating ATM-based broadband access, but using cost-effective Fast or Gigabit Ethernet instead. This Remote-ID tag is useful for troubleshooting, authentication, and accounting.</p> <p>The following commands were introduced or modified:  <b>radius-server attribute,</b>  <b>bba-group pppoe group-name,</b>  <b>vendor-tag remote-id service,</b>  <b>vendor-tag dsl-sync-rate service,</b>  <b>nas-port-id format c.</b></p>

## Glossary

**AAA** --authentication, authorization, and accounting.

**ATM** --Asynchronous Transfer Mode.

**BBA** --broadband access.

**BRAS** --Broadband Remote Access Server.

**DSLAM** --digital subscriber line access multiplexer. A device that connects many digital subscriber lines to a network by multiplexing the DSL traffic onto one or more network trunk lines.

**PADO** --PPPoE Active Discovery Offer.

**PADR** --PPPoE Active Discovery Request.

**PADS** --PPPoE Active Discovery Session-Confirmation.

**PPPoE** --Point-to-Point Protocol over Ethernet.

**RADIUS** --Remote Authentication Dial-In User Service. Database for authenticating modem and ISDN connections and for tracking connection time.

**VCI** --virtual circuit identifier.

**VLAN** --virtual local-area network.

**VPI** --virtual path identifier.

**VSA** --vendor specific attribute. attribute that has been implemented by a particular vendor. It uses the attribute Vendor-Specific to encapsulate the resulting AV pair: essentially, Vendor-Specific = protocol:attribute = value.