



Extended NAS-Port-Type and NAS-Port Support

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RADIUS attributes are used to define specific authentication, authorization, and accounting (AAA) elements in a user profile. NAS-Port-Type (RADIUS IETF attribute 61) indicates the type of physical port the network access server (NAS) is using to authenticate the user. NAS-Port-ID (RADIUS IETF attribute 87) contains a text string that identifies the NAS port that is authenticating the user.

The Extended NAS-Port-Type and NAS-Port Support feature allows you to better identify what service type is taking place on specific ports with non-RADIUS RFC supported types. Identifying traffic based on service type gives you flexibility to use your own coding mechanism to track users or to track shared resources, such as Ethernet or ATM interfaces.

Feature History for Extended NAS-Port-Type and NAS-Port Support

Release	Modification
12.3(7)XI1	This feature was introduced to support the Cisco 10000 series router.
12.2(28)SB	This feature was integrated into Cisco IOS Release 12.2(28)SB.

Finding Support Information for Platforms and Cisco IOS Software Images

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Corporate Headquarters:

Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

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Prerequisites for Extended NAS-Port-Type and NAS-Port Support

- You must be running a Cisco IOS image that contains the AAA component.
- AAA must be enabled and set up to use RADIUS.

Information About Extended NAS-Port-Type and NAS-Port Support

To use the Extended NAS-Port-Type and NAS-Port Support feature, you should understand:

- [Extended NAS-Port-Type \(RADIUS Attribute 61\), page 2](#)
- [NAS-Port \(RADIUS Attribute 5\), page 3](#)
- [NAS-Port-ID \(RADIUS Attribute 87\), page 4](#)

Extended NAS-Port-Type (RADIUS Attribute 61)

Prior to the attribute 61 extension, attribute 61 allowed you to identify virtual or Ethernet resources only. Now, by enabling the extended attribute 61 you can also do the following:

- Track specific service port information for broadband environments.
- Identify service port type sessions PPP over ATM (PPPoA), PPP over Ethernet (PPPoE) over Ethernet (PPPoEoE), PPPoE over ATM (PPPoEoA), PPPoE over VLAN (PPPoEoVLAN), and PPPoE over Q-in-Q (PPPoEoQinQ) with a corresponding RADIUS value, which allows you to identify physical NAS port types based on service types.

Benefits of Using the Extended NAS-Port-Type Attribute

The benefits of using the extended attribute 61 include:

- Establishing your own coding scheme to track users on specific physical ports. For example, service providers may want to track customers using shared resources such as Ethernet or ATM interfaces that have virtual LANs (VLANs), stacked VLAN (Q-in-Q), or virtual circuits (VCs) connected to certain customers.
- Allowing additional granularity for subinterfaces such as VLAN, Q-in-Q, VC, or VC ranges by overriding the attribute 61 value to be sent on any session that resides on the port. For example, this capability provides an extra level of detail for service providers in managing their end users and allows for further detail of different customer usage.

The value for the extended 61 attribute can be any number you choose. In particular, customizing your own value is useful when you need to distinguish among NAS port types based on the type of end client using a port. For example, if you want to track mobile clients behind a specific private virtual connection (PVC), you can define your own attribute 61 value for mobile clients.

The non-RFC compliant broadband service port types with their corresponding values that can be set with the extended attribute 61 are shown in [Table 1](#).

Table 1 Service Port Types and Corresponding RADIUS Values

Service Port Type	RADIUS Value
PPPoA	30
PPPoEoA	31
PPPoEoE	32
PPPoEoVLAN	33
PPPoEoQinQ	34

NAS-Port (RADIUS Attribute 5)

NAS-Port (RADIUS attribute 5) indicates the physical NAS port number that is authenticating the user. A logical port can be represented by the virtual path identifier (VPI) and virtual channel identifier (VCI) for an ATM interface, or by the VLAN ID or Q-in-Q ID for an Ethernet interface.

Each platform and service may have different port information, which is relevant to its environment; therefore there is no unique way to populate this attribute. There are four service-specific non-configurable formats (a, b, c, and d) and one configurable format (e) that can be tailored to customer and platform needs.

Previously, format e allowed customization of only one global format for all call types on a device, which had limitations for devices that contained multiple services. With the extended attribute 5 support, you can now configure a custom format e string for any service type based on the value of attribute 61. When building the RADIUS access or accounting request, the encoding routine will apply the specific format e string defined for the session of the value of attribute 61.

**Note**

Setting a specific format e string for the value of attribute 61 overrides the default global format e string.

Relationship Between NAS-Port-Type (RADIUS Attribute 61) and NAS-Port (RADIUS Attribute 5)

The **radius-server attribute nas-port format** command has been enhanced to support the custom format e string with the **type nas-port-type** keyword and option. The **type** keyword allows you to specify format strings to represent physical port types for any of the extended NAS-Port-Type values.

The relationship between the extended attribute 61 and extended attribute 5 support is that the format e string chosen by the encoding routine will depend on the value of attribute 61 for the session. If you use the extended attribute 61 values (values 30–34) and want to further customize the NAS port type, configure a different format string.

For example, you can specify the string "SSSSAAAAPPPPIIIIIICCCCCCCCCCCC" for type 30 (all PPPoA ports), and you can also specify string "SSSSAPPPVVVVVVVVVVVVVVVVVVVVVVVVVVVVVV" for type 33 (all PPPoAoVLAN ports). In this case, you can track VPI/VCI-specific information for a PPPoA user and VLAN-specific information for a PPPoEoVLAN user.

**Note**

If you enable the extended attribute 61, format e with either type 5 (Virtual) or type 15 (Ethernet) will not function, as these types require an additional value to be set (the extended attribute 61 values 30–34).

NAS-Port-ID (RADIUS Attribute 87)

The NAS-Port-ID (RADIUS attribute 87) contains the character text string identifier of the NAS port that is authenticating the user. This text string typically matches the interface description found under the CLI configuration. This attribute was previously available under Cisco Vendor Specific Attribute (VSA) Cisco-NAS-Port and is now sent by default under IETF attribute 87.

How to Configure Extended NAS-Port-Type and NAS-Port Support

This section contains the following procedures that allow you to configure extended NAS-Port-Type attribute and NAS-Port attribute:

- [Enabling Extended NAS-Port-Type Attribute and NAS-Port Attribute Support, page 4](#)
- [Overriding Global NAS-Port-Type Configuration, page 6](#)

Enabling Extended NAS-Port-Type Attribute and NAS-Port Attribute Support

Use the following task to configure extended NAS-Port-Type attribute and NAS-Port attribute support.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **radius-server attribute 61 extended**
4. **radius-server attribute nas-port format** *format* [*string*]
5. **radius-server attribute nas-port format** *format* [*string*] [**type** *nas-port-type*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	radius-server attribute 61 extended Example: Router(config)# radius-server attribute 61 extended	Enables extended, non-RFC compliant attribute 61 values. • Identifies the broadband service port types such as, PPPoA, PPPoEoA, PPPoEoE, PPPoEoVLAN, and PPPoEoQinQ. • Sends the appropriate value to the AAA record.


```
radius-server attribute nas-port format e SSSSAPPPVVVVVVVVVVVVVVVVVVVV type 33
radius-server attribute nas-port format e SSSSAPPPQQQQQQQQQQVVVVVVVVVV type 34
radius-server host 10.76.86.91 auth-port 1645 acct-port 1646
radius-server key rad123
.
.
.
```

The following example displays the current configuration of RADIUS command output, where you have globally specified the format e string for all PPPoA ports (type 30).

```
Router# show running-config | include radius
```

```
aaa authentication ppp default group radius
aaa authorization network default group radius
aaa accounting network default start-stop group radius
radius-server attribute nas-port format e SSSSSSSSAAAAAAPPPIIIIIII
radius-server attribute nas-port format e SSSSAAAAAPPPIIIIIIIICCCCCCCCCC type 30
radius-server host 10.76.86.91 auth-port 1645 acct-port 1646
radius-server key rad123
.
.
.
```

Overriding Global NAS-Port-Type Configuration

You can override attribute 61 configured globally on the router at an interface or subinterface level.

Use the following task to override all global options on how the extended attribute 61 is sent to any subinterface such as Ethernet, VLAN, Q-in-Q, VC, or VC ranges.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface atm** *interface-number* [*subinterface-number* {**mpls** | **multipoint** | **point-to-point**}]
4. **pvc** [*name*] *vpi/vci* [**ces** | **ilmi** | **qsaal** | **smds** | **l2transport**]
5. **radius attribute nas-port-type** *value*

DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>enable</pre> Example: Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	<pre>configure terminal</pre> Example: Router# configure terminal	Enters global configuration mode.
Step 3	<pre>interface atm interface-number [subinterface-number {mpls multipoint point-to-point}]</pre> Example: Router(config)# interface atm 5/0/0.1	Enters ATM subinterface mode.
Step 4	<pre>pvc [name] vpi/vci [ces ilmi qsaal smds l2transport]</pre> Example: Router(config-subif)# pvc 1/33	Enters PVC subinterface mode.
Step 5	<pre>radius attribute nas-port-type value</pre> Example: Router(config-if-atm-vc)# radius attribute nas-port-type 7	To set a specific extended attribute 61 value for an interface or subinterface, select a value for a port type to override the NAS-Port type configured globally. - The range for <i>value</i> is 0–2147483647. - The <i>value</i> argument must be assigned a number 1–40 to set a customized extended NAS port type and configure a specific service port type. Choosing a number outside of this range will force the default global NAS port format e string to be used to configure the NAS port value that is sent for that session. - You can set a specific service port type with the radius-server attribute nas-port format command. Note This setting will override a global NAS port type session format.

Configuration Examples for Extended NAS-Port-Type and NAS-Port Support

This section provides the following extended NAS-Port-Type and NAS-Port Support configuration examples:

- [Configuring Global Support for Extended NAS-Port-Type Attribute: Example, page 8](#)
- [Configuring a Customized Format String and Port Type: Example, page 8](#)

Configuring Global Support for Extended NAS-Port-Type Attribute: Example

The following example shows how to configure global support for extended NAS port type ports and how to specify two separate format e strings globally for two different types of ports:

- type 30 (which is PPPoA)
- type 33 (which is PPPoEoVLAN)

```
Router# configure terminal
Router(config)#
Router(config)# radius-server attribute 61 extended
Router(config)# radius-server attribute nas-port format e SSSSAPPPUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
Router(config)# radius-server attribute nas-port format e SSSSAPPPIIIIIIIIICCCCCCCCCCCCCCCC
type 30
Router(config)#
Router(config)# radius-server attribute nas-port format e SSSSAPPPVVVVVVVVVVVVVVVVVVVVVVVVVVVVVV
type 33
Router(config)#
```

Configuring a Customized Format String and Port Type: Example

The following example shows you first how to customize a format e string and port type for an ATM interface and then how to override the global value set for extended attribute 61 by applying the customer customized NAS port type value of 36 on the ATM interface:

```
Router# configure terminal
Router(config)# radius-server attribute nas-port format e SSSSAPPPIIIIIIIIICCCCCCCCCCCCCCCC
type 36
Router(config)# interface atm 5/0/0.1
Router(config-subif)# pvc 1/33
Router(config-if-atm-vc)#
Router(config-if-atm-vc)# radius attribute nas-port-type 36
```

Additional References

The following sections provide references related to extended NAS-Port-Type and NAS-Port support.

Related Documents

Related Topic	Document Title
Cisco 10000 Series Router	<i>Cisco 10000 Series Broadband Aggregation and Leased-Line Configuration Guide</i> , Release 12.3XI, Chapter 17, “Extended NAS-Port-Type and NAS-Port Support”
RADIUS Attributes	RADIUS Attributes

Standards

Standards	Title
None	—

MIBs

MIBs	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
None	—

Technical Assistance

Description	Link
The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Command Reference

This section documents new and modified commands only.

New Commands

- [radius attribute nas-port-type](#)
- [radius-server attribute 61 extended](#)

Modified Commands

- [radius-server attribute nas-port format](#)

radius attribute nas-port-type

To configure subinterfaces such as Ethernet, virtual LANs (VLAN), stacked VLAN (Q-in-Q), virtual circuit (VC), and VC ranges, use the **radius attribute nas-port-type** command subinterface configuration mode. To disable the interface or subinterface configuration, use the **no** form of this command.

radius attribute nas-port-type *value*

no radius attribute nas-port-type *value*

Syntax Description	<i>value</i>	Number assigned for a port type.
		<i>value</i> must be assigned a number 1–40 to set a customized extended NAS-Port Type and configure a specific service port type. Choosing a number outside of this range will force the default NAS port format e string to be used to configure the value for attribute 5 that is sent for that session. - You can set a specific service port type with the radius-server attribute nas-port format command. Note This setting will override a global NAS-port-type session format.

Defaults	NAS-port-type is not configured.
----------	----------------------------------

Command Modes	Subinterface configuration
---------------	----------------------------

Command History	Release	Modification
	12.3(7)XI	This command was introduced.
	12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

Usage Guidelines	You can override the attribute 61 configured globally at a subinterface level. To set a different extended attribute 61 value for an interface or subinterface, such as for Ethernet, VLAN, Q-in-Q, VC, or VC ranges, select a value for that port type. An extended attribute 61 setting at an interface or subinterface level will override the global extended attribute 61 value.
------------------	---

Examples	The following example shows how to override the global value set for an extended attribute 61 by setting a separate value of type 30 (PPP over ATM [PPPoA]) on a specific ATM subinterface:
----------	--

```
Router# configure terminal
Router(config)#
Router(config)# interface atm 5/0/0.1
Router(config-subif)# pvc 1/33
```

■ radius attribute nas-port-type

```
Router(config-if-atm-vc)#  
Router(config-if-atm-vc)# radius attribute nas-port-type 30
```

Related Commands

Command	Description
radius-server attribute 61 extended	Enables extended, non-RFC compliant RADIUS attribute 61 in global configuration mode.
radius-server attribute nas-port format	Enables selection of the NAS-Port format used for RADIUS accounting features and to restore the default NAS-Port format in global configuration mode.

radius-server attribute 61 extended

To enable extended, non-RFC compliant NAS-Port-Type attribute (RADIUS attribute 61), use the **radius-server attribute 61 extended** command in global configuration mode.

radius-server attribute 61 extended

no radius-server attribute 61 extended

Syntax Description	This command has no arguments or keywords.						
Defaults	Extended attribute 61 is disabled by default.						
Command Modes	Global configuration						
Command History	<table border="1"> <thead> <tr> <th>Release</th><th>Modification</th></tr> </thead> <tbody> <tr> <td>12.3(7)XI1</td><td>This command was introduced.</td></tr> <tr> <td>12.2(28)SB</td><td>This command was integrated into Cisco IOS Release 12.2(28)SB.</td></tr> </tbody> </table>	Release	Modification	12.3(7)XI1	This command was introduced.	12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
Release	Modification						
12.3(7)XI1	This command was introduced.						
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.						
Usage Guidelines	If extended attribute 61 is not enabled the following occurs: - All PPP over ATM (PPPoA), PPP over Ethernet (PPPoE) over Ethernet (PPPoEoE), PPPoE over ATM (PPPoEoA) sessions are identified as Virtual. - All PPPoE over VLAN (PPPoEoVLAN) and PPPoE over Q-in-Q (PPPoEoQinQ) sessions are identified as VLAN. - RFC-compliant values, such as Virtual (value 5) and Ethernet (value 15) are sent to the authentication, authorization, and accounting (AAA) records.						
Examples	The following example shows how to configure global support for extended attribute 61 ports and how to specify different format e strings globally for two different types of ports: - Type 30 (which is PPPoA) - Type 33 (which is PPPoEoVLAN) <pre>Router# configure terminal Router(config)# Router(config)# radius-server attribute 61 extended Router(config)# radius-server attribute nas-port format e SSSSAPPPUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU Router(config)# radius-server attribute nas-port format e SSSSAPPPIIIIIIIICCCCCCCCCCCCCCCC type 30 Router(config)# Router(config)# radius-server attribute nas-port format e SSSSAPPPVVVVVVVVVVVVVVVVVVVVVVVVVVVV type 33 Router(config)# </pre>						

Related Commands	Command	Description
	radius attribute nas-port-type	Configures interfaces and subinterfaces such as Ethernet, VLAN, Q-in-Q, VC and VC ranges in global configuration mode.
	radius-server attribute nas-port format	Enables selection of the NAS-Port format used for RADIUS accounting features and to restore the default NAS-Port format in global configuration mode.

radius-server attribute nas-port format

To select the NAS-Port format used for RADIUS accounting features and restore the default NAS-port format, or to set the global attribute 61 session format e string or configure a specific service port type for attribute 61 support, use the **radius-server attribute nas-port format** command in global configuration mode. To stop sending attribute 5 to the RADIUS server, use the **no** form of this command.

NAS-Port for RADIUS Accounting Features and Restoring Default NAS-Port Format

radius-server attribute nas-port format *format*

no radius-server attribute nas-port format *format*

Extended NAS-Port Support

radius-server attribute nas-port format *format* [*string*] [**type** *nas-port-type*]

no radius-server attribute nas-port format *format* [*string*] [**type** *nas-port-type*]

Syntax Description		
<i>format</i>		NAS-Port format. Possible values for the format argument are as follows: • a – Standard NAS-Port format • b – Extended NAS-Port format • c – Carrier-based format • d – PPPoX (PPP over Ethernet or PPP over ATM) extended NAS-Port format • e – Configurable NAS-Port format
<i>string</i>		(Optional) Represents all of a specific port type for format e.
type <i>nas-port-type</i>		(Optional) Allows you to globally specify different format strings to represent specific physical port types. You may set one of the extended NAS-Port-Type attribute values: • Value 30 – PPP over ATM (PPPoA) • Value 31 – PPP over Ethernet (PPPoE) over ATM (PPPoEoA) • Value 32 – PPPoE over Ethernet (PPPoEoE) • Value 33 – PPPoE over VLAN (PPPoEoVLAN) • Value 34 – PPPoE over Q-in-Q (PPPoEoQinQ)

Defaults

NAS-Port for RADIUS Accounting Features and Restoring Default NAS-Port Format

Standard NAS-Port format

Extended NAS-Port Support

Standard NAS-Port format

Command Modes

Global configuration

Command History

Release	Modification
11.3(7)T	This command was introduced.
11.3(9)DB	The PPP extended NAS-Port format was added.
12.1(5)T	The PPP extended NAS-Port format was expanded to support PPPoE over ATM and PPPoE over IEEE 802.1Q VLANs.
12.2(4)T	Format e was introduced.
12.2(11)T	Format e was extended to support PPPoX information.
12.3(3)	Format e was extended to support Session ID U.
12.3(7)XI1	Format e was extended to allow the format string to be NAS-Port-Type attribute specific. The following keyword and arguments were added: <i>string</i> , type nas-port-type .
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

Usage Guidelines

The **radius-server attribute nas-port format** command configures RADIUS to change the size and format of the NAS-Port attribute field (RADIUS IETF attribute 5).

The following NAS-Port formats are supported:

- Standard NAS-Port format—This 16-bit NAS-Port format indicates the type, port, and channel of the controlling interface. This is the default format used by Cisco IOS software.
- Extended NAS-Port format—The standard NAS-Port attribute field is expanded to 32 bits. The upper 16 bits of the NAS-Port attribute display the type and number of the controlling interface; the lower 16 bits indicate the interface that is undergoing authentication.
- Shelf-slot NAS-Port format—This 16-bit NAS-Port format supports expanded hardware models requiring shelf and slot entries.
- PPP extended NAS-Port format—This NAS-Port format uses 32 bits to indicate the interface, virtual path identifier (VPI), and virtual channel indicator (VCI) for PPPoA and PPPoEoA, and the interface and VLAN ID for PPPoE over Institute of IEEE standard 802.1Q VLANs.

Format e

The currently supported formats **a** through **c** do not work with new Cisco platforms, such as the AS5400. For this reason, a configurable format **e** was developed. Format **e** requires you to explicitly define the usage of the 32 bits of attribute 25 (NAS-Port). The usage is defined with a given parser character for each NAS-Port field of interest for a given bit field. By configuring a single character in a row, such as **x**, only one bit is assigned to store that given value. Additional characters of the same type, such as **x**, will provide a larger available range of values to be stored. Thus, the ranges may be expanded as follows:

x	0 – 1
xx	0 – 3
xxx	0 – 7
xxxx	0 – F
xxxxx	0 – 1F

and so on.

It is imperative that one know what the valid range is for a given parameter on a platform that one wishes to support. The Cisco IOS RADIUS client will bitmask the determined value to the maximum permissible value on the basis of configuration. Thus, if one has a parameter that turns out to have a value

of 8, but only 3 bits (xxx) are configured, 8 and 0x7 will give a result of 0. Therefore, one must always configure enough bits to correctly capture the value required. Care must be taken to ensure that format **e** is configured to properly work for all NAS port types within your network environment.

Currently supported parameters and their representative characters are shown below.

Zero	0 (always sets a 0 to that bit)
One	1 (always sets a 1 to that bit)
DS0 shelf	f
DS0 slot	s
DS0 adapter	a
DS0 port	p (physical port)
DS0 subinterface	i
DS0 channel	c
Async shelf	F
Async slot	S
Async port	P
Async line	L (modem line number, that is, physical terminal [TTY] number)
PPPoX slot	S
PPPoX adapter	A
PPPoX port	P
PPPoX VLAN ID	V
PPPoX VPI	I
PPPoX VCI	C
Session ID	U

All 32 bits that represent the NAS-Port must be set to one of the above characters because this format makes no assumptions for empty fields.

Access Router

The DS0 port on a T1-based card and on a T3-based card will give different results. On T1-based cards, the physical port is equal to the virtual port (as these are the same). So, p and d will give the same information for a T1 card. However, on a T3 system, the port will give you the physical port number (as there can be more than one T3 card for a given platform). As such, d will give you the virtual T1 line (as per configuration on a T3 controller). On a T3 system, p and d will be different, and one should capture both to properly identify the physical device. As a working example for the Cisco AS5400, the following configuration is recommended:

```
Router (config)# radius-server attribute nas-port format e
SSSSPPPPPPPPSSSSpppppdddddccccc
```

This will give one an asynchronous slot (0 – 16), asynchronous port (0 – 512), DS0 slot (0 – 16), DS0 physical port (0 – 32), DS0 virtual port (0 – 32), and channel (0 – 32). The parser has been implemented to explicitly require 32-bit support, or it will fail.

Finally, format **e** is supported for channel-associated signaling (CAS), Primary Rate Interface (PRI), and basic rate interface- (BRI-) based interfaces.



Extended NAS-Port-Type Attribute Support

Examples

The following example shows how to configure global support for extended NAS-Port-Type ports and how to specify two separate format e strings globally for two different types of ports:

- ```
Router# configure terminal
Router(config)#
Router(config)# radius-server attribute 61 extended
Router(config)# radius-server attribute nas-port format e SSSSAPPPUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
Router(config)# radius-server attribute nas-port format e SSSSAPPPIIIIIIIIICCCCCCCCCCCCCCCC
type 30
Router(config)#
Router(config)# radius-server attribute nas-port format e SSSSAPPPVVVVVVVVVVVVVVVVVVVVVVVVVVVVVV
type 33
Router(config)#
```

## Related Commands

| Command                                    | Description                                                                                                            |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>radius attribute nas-port-type</b>      | Configures interfaces and subinterfaces such as Ethernet, VLAN, Q-in-Q, VC and VC ranges in global configuration mode. |
| <b>radius-server attribute 61 extended</b> | Enables extended, non-RFC compliant NAS-Port-Type attribute (RADIUS attribute 61) in global configuration mode.        |
| <b>vpdn aaa attribute</b>                  | Enables the LNS to send PPP extended NAS-Port format values to the RADIUS server for accounting.                       |

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