Encrypted Vendor-Specific Attributes

The Encrypted Vendor-Specific Attributes feature provides users with a way to centrally manage filters at a RADIUS server and supports the following types of string vendor-specific attributes (VSAs):

- Tagged String VSA, on page 1 (similar to Cisco VSA type 1 (Cisco:AVPair (1)) except that this new VSA is tagged)
- Encrypted String VSA, on page 2 (similar to Cisco VSA type 1 except that this new VSA is encrypted)
- Tagged and Encrypted String VSA, on page 2 (similar to Cisco VSA type 1 except that this new VSA is tagged and encrypted)

Cisco:AVPairs specify additional authentication and authorization information in the form an Attribute-Value Pair (AVPair) string. When Internet Engineering Task Force (IETF) RADIUS attribute 26 (Vendor-Specific) is transmitted with a vendor-Id number of “9” and a vendor-type value of “1” (which means that it is a Cisco AVPair), the RADIUS user profile format for a Cisco AVPair looks as follows: Cisco:AVPair = “protocol:attribute=value”.

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Prerequisites for Encrypted Vendor-Specific Attributes

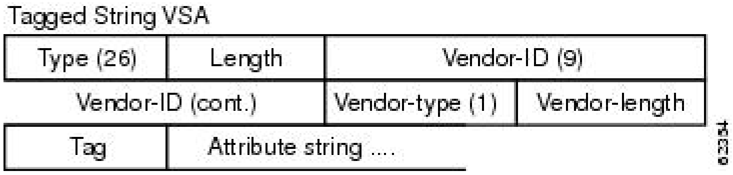
Before the RADIUS server can accept tagged and encrypted VSAs, you must configure your server for AAA authentication and authorization and to accept PPP calls.

Information About Encrypted Vendor-Specific Attributes

Tagged String VSA

The figure below displays the packet format for the Tagged String VSA:

Figure 1: Tagged String VSA Format



Tagged String VSA

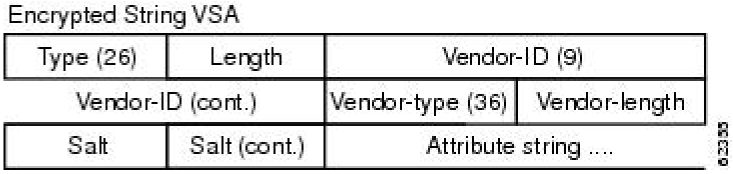
<table>
<tr><td>Type (26)</td><td>Length</td><td colspan="2">Vendor-ID (9)</td></tr>
<tr><td colspan="2">Vendor-ID (cont.)</td><td>Vendor-type (1)</td><td>Vendor-length</td></tr>
<tr><td>Tag</td><td colspan="3">Attribute string ....</td></tr>
</table>

To retrieve the correct value, the Tag field must be parsed correctly. The value for this field can range only from 0x01 through 0x1F. If the value is not within the specified range, the RADIUS server ignores the value and considers the Tag field to be a part of the Attribute String field.

Encrypted String VSA

The figure below displays the packet format for the Encrypted String VSA:

Figure 2: Encrypted String VSA Format



Encrypted String VSA

<table>
<tr><td>Type (26)</td><td>Length</td><td colspan="2">Vendor-ID (9)</td></tr>
<tr><td colspan="2">Vendor-ID (cont.)</td><td>Vendor-type (36)</td><td>Vendor-length</td></tr>
<tr><td>Salt</td><td>Salt (cont.)</td><td colspan="2">Attribute string ....</td></tr>
</table>

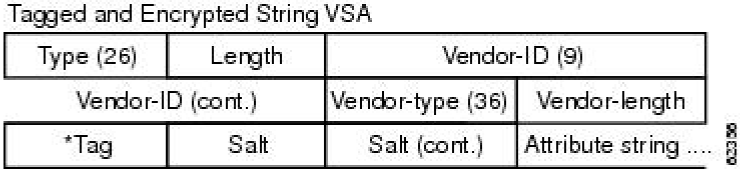
The Salt field ensures the uniqueness of the encryption key that is used to encrypt each instance of the VSA. The first and most significant bit of the Salt field must be set to 1.

Note Vendor-type (36) indicates that the attribute is an encrypted string VSA.

Tagged and Encrypted String VSA

The figure below displays the packet formats for each of the newly supported VSAs:

Figure 3: Tagged and Encrypted String VSA Format



Tagged and Encrypted String VSA

<table>
<tr><td>Type (26)</td><td>Length</td><td colspan="2">Vendor-ID (9)</td></tr>
<tr><td colspan="2">Vendor-ID (cont.)</td><td>Vendor-type (36)</td><td>Vendor-length</td></tr>
<tr><td>*Tag</td><td>Salt</td><td>Salt (cont.)</td><td>Attribute string ....</td></tr>
</table>

This VSA is similar to encrypted string VSAs except this VSA has an additional Tag field. If the Tag field is not within the valid range (0x01 through 0x1F), it is considered to be part of the Salt field.

How to Verify Encrypted Vendor-Specific Attributes

The Encrypted Vendor-Specific Attributes feature requires no configuration. To verify that RADIUS-tagged and encrypted VSAs are being sent from the RADIUS server, use the following command in privileged EXEC mode:

Command	Purpose
`Router# debug radius`	Displays information associated with RADIUS. The output of this command shows whether tagged and encrypted VSAs are being sent from the RADIUS server.

Configuration Examples for Encrypted Vendor-Specific Attributes

NAS Configuration Example

The following example shows how to configure a network access server (NAS) with a basic configuration using tagged and encrypted VSAs. (This example assumes that the configuration required to make PPP calls is already enabled.)

```
aaa new-model
aaa authentication ppp default group radius
aaa authorization network default group radius
!
radius-server host 10.2.2.2 auth-port 1645 acct-port 1646
radius-server key cisco
```

RADIUS User Profile with a Tagged and Encrypted VSA Example

The following is an example of user profile on a RADIUS server that supports tagged and encrypted string VSAs:

```
mascot   Password = "password1"
         Service-Type = NAS-Prompt,
         Framed-Protocol = PPP,
         Cisco:Cisco-Enc = "ip:route=10.0.0.0 255.0.0.0"
         Cisco.attr Cisco-Enc 36 tag-encstr(*,*)
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Commands List, All Releases*
RADIUS Attributes	*Cisco IOS XE Security Configuration Guide: Securing User Services* , Release 2
Media-Independent PPP and Multilink PPP	Configuring Media-Independent PPP and Multilink PPP feature module.
Authentication	Configuring Authentication feature module.
Authorization	Configuring Authorization feature module.

Standards

Standard	Title
None.	--

MIBs

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

RFCs

RFC	Title
RFC 2865	*Remote Authentication Dial In User Service (RADIUS)*
RFC 2868	*RADIUS Attributes for Tunnel Protocol Support*

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. 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. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Encrypted Vendor-Specific Attributes

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.

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. An account on Cisco.com is not required.

Table 1: Feature Information for Encrypted Vendor-Specific Attributes

Feature Name	Releases	Feature Information
Encrypted Vendor-Specific Attributes	Cisco IOS XE Release 2.3	The Encrypted Vendor-Specific Attributes feature provides users with a way to centrally manage filters at a RADIUS server and supports the Tagged String, Encrypted String, and Tagged and Encrypted String vendor-specific attributes (VSAs). In Cisco IOS XE Release 2.3, this feature was introduced on the Cisco ASR 1000 Series Aggregation Services Routers.