AES and 3-DES Encryption Support for SNMP Version 3

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The AES and 3-DES Encryption Support for SNMP Version 3AES and 3-DES Encryption Support for SNMP Version 3 feature enhances the encryption capabilities of SNMP version 3. Data Encryption Standard (DES) support was introduced in Cisco IOS Release 12.0 and expanded in Cisco IOS Release 12.1. This support for Simple Network Management Protocol (SNMP) version 3 User-Based Security Model (USM) is complaint with RFC 3414, which defines DES as the only required method of message encryption for SNMP version 3 authPriv mode.

The AES and 3-DES Encryption Support for SNMP Version 3 feature adds Advanced Encryption Standard (AES) 128-bit encryption in compliance with RFC 3826. RFC 3826 extensions have been included in the SNMP-USM-AES-MIB. In addition, Cisco-specific extensions to support Triple-Data Encryption Algorithm (3-DES) and AES 192-bit and 256-bit encryption have been added to the CISCO-SNMP-USM-MIB. Additional information can be found in the Internet-Draft titled *Extension to the User-Based Security Model (USM) to Support Triple-DES EDE in "Outside" CBC Mode*, which can be found at the following URL: http://www.snmp.com/eso/draft-reeder-snmpv3-usm-3desede-00.txt.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see 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 at the end of this document.

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.

Prerequisites for AES and 3-DES Encryption Support for SNMP Version 3

- The network management station (NMS) must support SNMP version 3 to use this feature of the SNMP agent.
- This feature is available in only Cisco IOS software images where encryption algorithms are supported.

Information About AES and 3-DES Encryption Support for SNMP Version 3

SNMP Architecture

The architecture for describing Internet Management Frameworks contained in RFC 3411 describes the SNMP engine as composed of the following components:

- Dispatcher
- Message Processing Subsystem
- Security Subsystem
- Access Control Subsystem

Applications make use of the services of these subsystems. It is important to understand the SNMP architecture and the terminology of the architecture to understand where the Security Model fits into the architecture and interacts with the other subsystems within the architecture. The information is contained in RFC 3411 and your are encouraged to review this RFC to obtain an understanding of the SNMP architecture and subsystem interactions.

Encryption Key Support

In the AES and 3-DES Encryption Support for SNMP Version 3 feature the Cipher Block Chaining/Data Encryption Standard (CBC-DES) is the privacy protocol. Originally only DES was supported (as per RFC 3414). This feature adds support for AES-128 (as per RFC 3826) and AES-192, AES-256 and 3-DES (as per CISCO-SNMP-USM-OIDS-MIB).

- AES encryption uses the Cipher Feedback (CFB) mode with encryption key sizes of 128, 192, or 256 bits.
- 3DES encryption uses the 168-bit key size for encryption.

The AES Cipher Algorithm in the SNMP User-based Security Model draft describes the use of AES with 128-bit key size. However, the other options are also implemented with the extension to use the USM.

There is currently no standard for generating localized keys for 192- or 256-bit size keys for AES or for 168-bit size key for 3-DES. There is no authentication protocol available with longer keys.

Management Information Base Support

The AES and 3-DES Encryption Support for SNMP Version 3 feature supports the selection of privacy protocols through the CLI and the Management Information Base (MIB). A new standard MIB, SNMP-USM-AES-MIB, provides support for the 128-bit key in AES. The extended options of AES with 192- or 256-bit keys and 3-DES are supported as extensions to the SNMP-USM-MIB, in the Cisco-specific MIB, CISCO-SNMP-USM-EXT-MIB.

How to Configure AES and 3-DES Encryption Support for SNMP Version 3

Adding a New User to an SNMP Group

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **snmp-server user** *username group-name* [**remote** *host* [**udp-port** *port*][**vrf** *vrf-name*]] {**v1** | **v2c** | **v3** [**encrypted**] [**auth** {**md5** | **sha**} *auth-password*]} [**access** [**ipv6** *nacl*] [**priv** {**des** | **3des** | **aes {128 | 192 | 256}**} *privpassword*] {*acl-number* | *acl-name*}]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enters privileged EXEC mode. • Enter your password when prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

Command or Action	Purpose
Step 3 **snmp-server user** *username group-name* [**remote** *host* [**udp-port** *port*][**vrf** *vrf-name*]] {**v1** | **v2c** | **v3** [**encrypted**] [**auth** {**md5** | **sha**} *auth-password*]} [**access** [**ipv6** *nacl*] [**priv** {**des** | **3des** | **aes {128 | 192 |256}**} *privpassword*] {*acl-number* | *acl-name*}] **Example:** `Router(config)# snmp-server user new-user new-group v3 auth md5 secureone priv aes 128 privatetwo 2`	Adds an SNMP user, specifies a group to which the user belongs, specifies the authorization algorithm to be used (MD5 or SHA), specifies the privacy algorithm to be used (DES, 3-DES, AES, AES-192, or AES-256), and specifies the password to be associated with this privacy protocol.

Verifying SNMP User Configuration

To display information about the configured characteristics of Simple Network Management Protocol (SNMP) users, use the **show snmp user** command in privileged EXEC mode.

Note The **show snmp user** command displays all the users configured on the router. However, unlike other SNMP configurations, the **snmp-server user** command will not appear on the "show running" output.

SUMMARY STEPS

1. **enable**
2. **show snmp user** [*username*

DETAILED STEPS

Step 1 **enable**
Enters privileged EXEC mode. Enter your password when prompted.

Step 2 **show snmp user** [*username*
The following example specifies the username as abcd, the engine ID string as 00000090200000000C025808, and the storage type as nonvolatile:

Example:

```
Router# show snmp user
 abcd
User name: abcd
Engine ID: 00000090200000000C025808
storage-type: nonvolatile       active access-list: 10
Rowstatus: active
Authentication Protocol: MD5
Privacy protocol: 3DES
Group name: VacmGroupName
Group name: VacmGroupName
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
SNMP commands	*Cisco IOS Network Management Command Reference*
SNMP configuration tasks	*Cisco IOS Network Management Configuration Guide*

Standards

Standard	Title
draft-reeder-snmpv3-usm-3desede-00.txt	Extension to the User-Based Security Model (USM) to Support Triple-DES EDE in "Outside" CBC Mode

MIBs

MIB	MIBs Link
• CISCO-SNMP-USM-OIDS-MIB • SNMP-USM-AES-MIB	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

RFC	Title
RFC 2574	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)
RFC 3411	Architecture for Describing Internet Management Frameworks
RFC 3414	*User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)*
RFC 3826	The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for AES and 3-DES Encryption Support for SNMP Version 3

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 AES and 3-DES Encryption Support for SNMP Version 3

Feature Name	Releases	Feature Information
AES and 3-DES Encryption Support for SNMP Version 3	12.2(33)SRB 12.2(33)SB 12.2(33)SXI 12.4(2)T 15.0(1)S Cisco IOS XE 3.1.0SG	The AES and 3-DES Encryption Support for SNMP Version 3 feature enhances the encryption capabilities of SNMP version 3. DES support was introduced in Cisco IOS Release 12.0 and expanded in Cisco IOS Release 12.1. This support for SNMP version 3 USM is complaint with RFC 3414, which defines DES as the only required method of message encryption for SNMP version 3 authPriv mode. The AES and 3-DES Encryption Support for SNMP Version 3 feature adds AES 128-bit encryption in compliance with RFC 3826. AES and 3-DES Encryption Support for SNMP Version 3 was introduced in Cisco IOS Release 12.4(2)T. AES and 3-DES Encryption Support for SNMP Version 3 was integrated into Cisco IOS Release 12.2(33)SRB. AES and 3-DES Encryption Support for SNMP Version 3 was integrated into Cisco IOS Release 12.2(33)SB. This feature was integrated into Cisco IOS Release 15.0(1)S.