Embedded Resource Manager (ERM)-MIB

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The Embedded Resource Manager (ERM)-MIB feature introduces MIB support for the Embedded Resource Manager (ERM) feature. The ERM feature tracks resource usage information for every registered resource owner and resource user. ERM ensures efficient usage of available resources. The ERM-MIB feature allows you to monitor the usage of resources by gathering resource usage information using MIB objects. The network manager can use the information collected by the ERM-MIB objects to ensure the optimal use of the resources.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the "Feature Information for ERM-MIB" section on page 16.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

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

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Prerequisites for ERM-MIB

Simple Network Management Protocol (SNMP) must be enabled on the router before notifications (traps) can be configured or before SNMP GET operations can be performed.

Information About ERM-MIB

The ERM-MIB feature introduces network management support for ERM through the use of ERM-MIB table entries, MIB objects, and MIB trap notification objects that are defined in CISCO-ERM-MIB.my.

To use the ERM-MIB feature, you should understand the following concepts:

- ERM Show MIB Objects, page 2
- ERM Configuration MIB Objects, page 7
- ERM Notification MIB Objects, page 9

ERM Show MIB Objects

The ERM Show MIB objects are read-only objects. You can use these MIB objects to obtain information about resource owners, resource user type, resource users or groups, resource owner and resource user relationships, and resource monitors in the system.

Table 1 describes the ERM Show MIB objects.

Table 1 ERM Show MIB objects

ERM Show MIB Objects	Purpose
cermResOwnerTable	Obtains the details of all resource owners in the system.
cermResOwnerSubTypeTable	Obtains the details of the resource owner sub-types in the system.
cermResOwnerSubTypeThresholdTable	Obtains the details of the threshold value defined for each resource owner sub-type in the system.
cermResUserTypeTable	Obtains the details of the resource user types in the system.
cermResUserTable	Obtains the details of each resource user in the system.
cermResGroupTable	Obtains the details of each resource group in the system.
cermResGroupResUserTable	Obtains the details of resource users available in a specific resource group.
cermResOwnerResUserOrGroupTable	Obtains the details of all the resource owners, resource users, and group relationships defined in the system.
cermResOwnerResUserOrGroupThresholdTable	Obtains the details of the threshold value defined for each resource owner sub-type, resource user or resource group relationship in the system.

Table 1 ERM Show MIB objects

ERM Show MIB Objects	Purpose
cermResUserTypeResOwnerTable	Obtains the details of resource owners present in a specific resource user type.
cermResMonitorTable	Obtains the details of resource monitors in the system.
cermResMonitorResOwnerResUserTable	Obtains the details of resource owners, resource users, and resource owner and resource user relationships that are monitored by a resource monitor.
cermResMonitorPolicyTable	Obtains the details of resource policies that are monitored by a resource monitor.

Obtaining Information About Resource Owners

You can use cermResOwnerTable to obtain information about all resource owners in the system. The index for cermResOwnerTable is entPhysicalIndex, cermResOwnerSubEntityId, cermResOwnerId.

The cermResOwnerTable defines the following MIB objects:

- cermResOwnerSubEntityId
- cermResOwnerId
- cermResOwnerName
- cermResOwnerMeasurementUnit
- cermResOwnerThresholdIsConfigurable
- cermResOwnerResUserCount
- cermResOwnerResGroupCount

Obtaining Sub-type Specific Information

You can use cermResOwnerSubTypeTable to obtain sub-type specific information. The cermResOwnerSubTypeTable is an extension of the cermResOwnerTable. The index for this table is entPhysicalIndex, cermResOwnerSubEntityId, cermResOwnerId, cermResOwnerSubTypeId.

Each resource owner will have one or more entries in this table. For example, the CPU resource owner has three sub-types: process, interrupt, and total.

Some resource owners may not have any sub-types, such as the IPC resource owner. In such cases this table will contain a single entry with cermResOwnerSubTypeId as 0 and cermResOwnerSubTypeName as an empty string.

You can obtain all sub-type related information specified in this table by querying the corresponding resource owner.

The cermResOwnerSubTypeTable defines the following objects:

- cermResOwnerSubTypeId
- cermResOwnerSubTypeName
- cermResOwnerSubTypeUsagePct
- cermResOwnerSubTypeUsage

- cermResOwnerSubTypeMaxUsage
- cermResOwnerSubTypeGlobNotifSeverity

Obtaining Applied System Global Threshold Details

You can use cermResOwnerSubTypeThresholdTable to obtain applied threshold details for each resource owner sub-type. This object is an extension of the cermResOwnerSubTypeTable.

The index for cermResOwnerSubTypeThresholdTable is entPhysicalIndex, cermResOwnerSubEntityId, cermResOwnerId, cermResOwnerSubTypeId, cermResOwnerSubTypeThreshSeverity. You can obtain all threshold details corresponding to a resource owner sub-type by querying the corresponding resource owner.

The cermResOwnerSubTypeThresholdTable defines the following objects:

- cermResOwnerSubTypeThreshSeverity
- cermResOwnerSubTypeRisingThresh
- cermResOwnerSubTypeRisingInterval
- cermResOwnerSubTypeFallingThresh
- cermResOwnerSubTypeFallingInterval

Obtaining Information About a Resource User Type

You can use cermResUserTypeTable to obtain information about a resource user type. Each resource user type in the system has an entry in cermResUserTypeTable. The index for this object is entPhysicalIndex, cermResUserTypeSubEntityId, cermResUserTypeId.

The cermResUserTypeTable defines the following objects:

- cermResUserTypeSubEntityId
- cermResUserTypeId
- cermResUserTypeName
- cermResUserTypeResOwnerCount
- cermResUserTypeResUserCount
- cermResUserTypeResGroupCount

Obtaining Resource User-Specific Information

You can use cermResUserTable to obtain information about each resource user in the system. This object is an extension of cermResUserTypeTable. The index for cermResUserTable is entPhysicalIndex, cermResUserTypeSubEntityId, cermResUserTypeId, ermResUserId.

The cermResUserTable defines the following objects:

- cermResUserId
- cermResUserName
- cermResUserPriority
- cermResUserResGroupId

Obtaining Information About Resource Groups

You can use cermResGroupTable to obtain information about every resource group available in the system. This object is an extension of cermResUserTypeTable. The index for cermResGroupTable is entPhysicalIndex, cermResUserTypeSubEntityId, cermResUserTypeId, cermResGroupId.

The cermResGroupTable defines the following objects:

- cermResGroupId
- cermResGroupName
- cermResGroupUserInstanceCount

Obtaining Information About Resource Users in a Particular Resource Group

You can use cermResGroupResUserTable to obtain the list of resource users available in a particular resource group. This object is an extension of cermResGroupTable. The index for cermResGroupResUserTable is entPhysicalIndex, cermResUserTypeSubEntityId, cermResUserTypeId, cermResGroupId, cermResGroupResUserId.

The cermResGroupResUserTable defines the following object:

- cermResGroupResUserId

Obtaining Information About Resource Owner and User Relationships

You can use cermResOwnerResUserOrGroupTable to obtain information about each resource owner-user relationship or resource owner-group relationship in the system. This object is an extension of cermResOwnerSubTypeTable.

The index for cermResOwnerResUserOrGroupTable is entPhysicalIndex, cermResOwnerSubEntityId, cermResOwnerId, cermResOwnerSubTypeId, cermResOwnerResUserTypeId, cermResOwnerResUserOrGroupId.

This table can be used for the following tasks:

- To obtain the list of resource users registered for a specific resource owner.
- To obtain usage, max-usage, user local and per user global current notification levels for a given resource owner sub-type and resource user relation.

The cermResOwnerResUserOrGroupTable defines the following objects:

- cermResOwnerResUserTypeId
- cermResOwnerResUserOrGroupId
- cermResUserOrGroupFlag
- cermResUserOrGroupUsagePct
- cermResUserOrGroupUsage
- cermResUserOrGroupMaxUsage
- cermResUserOrGroupNotifSeverity
- cermResUserOrGroupGlobNotifSeverity

Obtaining Threshold Information About Each Resource Owner Sub-type and Resource User Relationship

You can use cermResOwnerResUserOrGroupThresholdTable to obtain threshold information about each resource owner sub-type and resource user relationship. This object is an extension of the cermResOwnerResUserOrGroupTable.

The index for cermResOwnerResUserOrGroupThresholdTable is entPhysicalIndex, cermResOwnerSubEntityId, cermResOwnerId, cermResOwnerSubTypeId, cermResOwnerResUserTypeId, cermResOwnerResUserOrGroupId, cermResUserOrGroupThreshIsUserGlob, cermResUserOrGroupThreshSeverity.

The cermResOwnerResUserOrGroupThresholdTable defines the following objects:

- cermResUserOrGroupThreshIsUserGlob
- cermResUserOrGroupThreshSeverity
- cermResUserOrGroupThreshFlag
- cermResUserOrGroupRisingThresh
- cermResUserOrGroupRisingInterval
- cermResUserOrGroupFallingThresh
- cermResUserOrGroupFallingInterval

Obtaining Information About Resource Owners Present in a Resource User Type

You can use cermResUserTypeResOwnerTable to obtain the list of resource owners present in a resource user type. This object is an extension of the cermResUserTypeTable.

The index for cermResUserTypeResOwnerTable is entPhysicalIndex, cermResUserTypeSubEntityId, cermResUserTypeId, cermResUserTypeResOwnerId.

The cermResUserTypeResOwnerTable defines the following objects:

- cermResUserTypeResOwnerId

Obtaining Information About Resource Monitors

You can use cermResMonitorTable to obtain the list of resource monitors in the system. The index for this object is entPhysicalIndex, cermResMonitorSubEntityId, cermResMonitorId.

The cermResMonitorTable defines the following objects:

- cermResMonitorSubEntityId
- cermResMonitorId
- cermResMonitorName

Obtaining Resource Information About Resource Owner and User Relationships That Are Monitored

You can use cermResMonitorResOwnerResUserTable to obtain resource-related information that is tracked by a resource monitor. This object is an extension of cermResMonitorTable.

The index for cermResMonitorResOwnerResUserTable is entPhysicalIndex, cermResMonitorSubEntityId, cermResMonitorId, cermResMonitorResOwnerId, cermResMonitorResUserTypeId, cermResMonitorResUserId.

The cermResMonitorResOwnerResUserTable defines the following objects:

- cermResMonitorResOwnerId
- cermResMonitorResUserTypeId
- cermResMonitorResUserId
- cermResMonitorResPolicyName

Obtaining Information About Resource Policies That Are Monitored by a Resource Monitor

You can use cermResMonitorPolicyTable to obtain the list of resource policies that are tracked by a resource monitor. This object is an extension of the cermResMonitorTable. The index for cermResMonitorPolicyTable is entPhysicalIndex, cermResMonitorSubEntityId, cermResMonitorId, cermResMonitorPolicyName.

The cermResMonitorPolicyTable defines the following object:

- cermResMonitorPolicyName

ERM Configuration MIB Objects

You can use the ERM Configuration MIB objects to perform the following tasks:

- Creating, modifying, or removing a resource policy.
- Creating, modifying, or removing a threshold configuration for a particular resource policy.
- Creating or removing a resource group.
- Adding or removing a resource user instance to or from a particular resource group.
- Applying system global resource policy.
- Applying user local or per user global resource policy for a resource user or resource group.

Table 2 describes the ERM Configuration MIB objects.

Table 2 ERM Configuration MIB Objects

ERM Configuration MIB Objects	Purpose
cermScalarsGlobalPolicyName (scalar object)	Identifies and indicates the global resource policy applied in the system.
cermConfigPolicyTable	Creates, modifies, or deletes a resource policy.
cermConfigPolicyResOwnerThreshTable	Configures threshold values and intervals for resource owner sub-types.
cermConfigResGroupTable	Creates or deletes a resource group.
cermConfigResGroupUserTable	Creates or deletes a user instance in a resource group.
cermConfigPolicyApplyTable	Applies an existing resource policy to a resource user or group.

Verifying Whether a Global Resource Policy Is Applied in the System

You can use the scalar object cermScalarsGlobalPolicyName to impose and indicate if a global resource policy is applied in the system. If no global resource policy is applied in the system, then this object will contain empty string. This object has read-write access permission. Setting this scalar object to an existing global resource policy name, will result in applying the global resource policy to the system.

Creating, Modifying, or Deleting a Resource Policy

You can use cermConfigPolicyTable to create, modify, or delete a resource policy. The index for this object is cermPolicyName.

The cermConfigPolicyTable defines the following objects:

- cermPolicyName
- cermPolicyIsGlobal
- cermPolicyUserTypeName
- cermPolicyLoggingEnabled
- cermPolicySnmpNotifEnabled
- cermPolicyStorageType
- cermPolicyRowStatus

Configuring Threshold Values and Intervals for Resource Owner Sub-types in a Resource Policy

You can use cermConfigPolicyResOwnerThreshTable to configure rising or falling threshold values and rising or falling intervals for resource owner sub-types in a resource policy. This object is an extension of the cermConfigPolicyTable.

The index for cermConfigPolicyResOwnerThreshTable is cermPolicyName, cermPolicyPhysicalIndex, cermConfigPolicyResOwnerSubEntityId, cermConfigPolicyResOwnerId, cermConfigPolicyResOwnerSubTypeId, ermConfigPolicyIsUserGlobal, cermConfigPolicyThresholdLevel.

The cermConfigPolicyResOwnerThreshTable defines the following objects:

- cermPolicyPhysicalIndex
- cermConfigPolicyResOwnerSubEntityId
- cermPolicyResOwnerId
- cermPolicyResOwnerSubTypeId
- cermPolicyIsUserGlobal
- cermPolicyThresholdLevel
- cermPolicyRisingThreshold
- cermPolicyRisingInterval
- cermPolicyFallingThreshold
- cermPolicyFallingInterval
- cermPolicyResOwnerThreshStorageType
- cermPolicyResOwnerRowStatus

Creating or Deleting a Resource Group

You can use cermConfigResGroupTable to create or delete a resource group in the system. The index for this object is cermConfigResGroupName.

The cermConfigResGroupTable defines the following objects:

- cermConfigResGroupName
- cermConfigResGroupUserTypeName
- cermConfigResGroupStorageType
- cermConfigResGroupRowStatus

Creating or Deleting a User Instance in a Resource Group

You can use cermConfigResGroupUserTable to create or delete a user instance in a given resource group. This object is an extension of the cermConfigResGroupTable.

The index for cermConfigResGroupUserTable is cermConfigResGroupName, cermConfigResGroupUserName.

The cermConfigResGroupUserTable defines the following objects:

- cermConfigResGroupUserName
- cermConfigResGroupUserStorageType
- cermConfigResGroupUserRowStatus

Applying an Existing Resource Policy to a Resource User or Group

You can use cermConfigPolicyApplyTable to apply an existing resource policy to a resource user or resource group. The index for this object is cermPolicyApplyUserOrGroupName, cermPolicyApplyUserOrGroupFlag.

The cermConfigPolicyApplyTable defines the following objects:

- cermPolicyApplyUserOrGroupName
- cermPolicyApplyUserOrGroupFlag
- cermPolicyApplyPolicyName
- cermPolicyApplyStorageType
- cermPolicyApplyRowStatus

ERM Notification MIB Objects

You can configure ERM Notification MIB objects to receive global or user-specific notification on policy violation. There are two types of ERM Notification MIB objects.

Table 3 describes the ERM Notification MIB objects.

Table 3 ERM Notification MIB Objects

ERM Notification MIB Objects	Purpose
cermNotifsEnabled	Enables ERM notifications.
ciscoErmGlobalPolicyViolation	Enables a global notification on policy violation.
ciscoErmLocalPolicyViolation	Enables a user-specific notification on policy violation.

Controlling the Generation of Traps for ERM Policy Violation Notifications

You can use cermNotifsEnabled to determine if the generation of traps for ERM policy violation notifications is allowed.

When this object is set to true, it allows generation of traps for the ERM policy violation related notifications ciscoErmGlobalPolicyViolation and ciscoErmLocalPolicyViolation.

Receiving a Global Notification on Policy Violation

You can use ciscoErmGlobPolicyViolation to receive global notification on policy violation.

The notification object ciscoErmGlobPolicyViolation defines the following objects:

- cermResOwnerName
- cermResOwnerSubTypeName
- cermNotifsThresholdSeverity
- cermNotifsThresholdValue
- cermNotifsDirection
- cermNotifsPolicyName

Receiving a User-Specific Notification on Policy Violation

You can use ciscoErmUserPolicyViolation to receive a user-specific notification on policy violation.

The notification object ciscoErmUserPolicyViolation contains the following objects:

- cermResOwnerName
- cermResOwnerSubTypeName
- cermResUserTypeName
- cermResUserName
- cermResUserOrGroupThreshFlag
- cermNotifsThresholdIsUserGlob
- cermNotifsThresholdSeverity
- cermNotifsThresholdValue
- cermNotifsDirection
- cermNotifsPolicyName

How to Configure ERM-MIB

This section contains the following procedures:

Enabling ERM-MIB Notification Traps

You can enable ERM-MIB notification traps, which are generated when resource usage exceeds the threshold value that is configured through the CLI. The ERM-MIB notification traps will be sent to the host that is configured to receive traps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **snmp-server enable traps resource-policy**
4. **end**

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	**snmp-server enable traps resource-policy** **Example:** `Router(config)# snmp-server enable traps resource-policy`	Enables CISCO-ERM-MIB notifications.
Step 4	**end** **Example:** `Router(config)# end`	Returns the router to privileged EXEC mode.

Configuring the Router to Send SNMP Notification Traps for ERM to a Host

Perform this task to enable the router to send SNMP notifications traps defined in ERM-MIB to a host.

Prerequisites

- SNMP must be enabled on your network.
- Create an a SNMP server community to receive information on MIB objects and traps using the command **snmp-server community**.

SUMMARY STEPS

1. **enable**
2. **show running-config**
3. **configure terminal**
4. **snmp-server host** {*hostname* | *ip-address*} [**vrf** *vrf-name*] [**traps** | **informs**] [**version** {**1** | **2c** | **3** [**auth** | **noauth** | **priv**]}] *community-string* [**udp-port** *port*] [*notification-type*]
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show running-config** [*options*] **Example:** `Router# show running-config`	Displays the running configuration to determine if an SNMP agent is already running. • If no SNMP information is displayed, continue with the next step. If any SNMP information is displayed, you can modify the information or change it as needed.
Step 3	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 4	**snmp-server host** {*hostname* | *ip-address*} [**vrf** *vrf-name*] [**traps** | **informs**] [**version** {**1** | **2c** | **3** [**auth** | **noauth** | **priv**]}] *community-string* [**udp-port** *port*] [*notification-type*] **Example:** `Router(config)# snmp-server host 172.16.1.1 traps version 2c priv mycommunitystring isis`	Specifies the recipient (target host) for ERM SNMP notification operations.
Step 5	**end** **Example:** `Router(config)# end`	Returns the router to privileged EXEC mode.

Configuration Examples for ERM-MIB

This section provides the following configuration example:

- Configuring the Router to Send SNMP Notifications for ERM to a Host: Example, page 13

Configuring the Router to Send SNMP Notifications for ERM to a Host: Example

The following example shows how to configure the router to send SNMP notifications for ERM to a host:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# snmp-server community public rw
Router(config)# snmp-server enable traps resource-policy
Router(config)# snmp-server host 10.2.86.100 version 2c public
Router(config)# end
```

Additional References

The following sections provide references related to the ERM-MIB feature.

Related Documents

Related Topic	Document Title
Embedded Resource Manager	"Embedded Resource Manager" chapter in the *Cisco IOS Network Management Configuration Guide*
Embedded Resource Manager commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS Network Management Command Reference*

Standards

Standard	Title
None	—

MIBs

MIB	MIBs Link
• CISCO-ERM-MIB.my	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 1902	Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2).

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. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register on Cisco.com.	http://www.cisco.com/techsupport

Command Reference

This section documents the following new command only.

- **snmp-server enable traps resource-policy**

snmp-server enable traps resource-policy

To enable ERM-MIB notification traps, use the **snmp-server enable traps resource-policy** command in global configuration mode. To disable the ERM-MIB notification traps, use the **no** form of this command.

snmp-server enable traps resource-policy

no snmp-server enable traps resource-policy

Syntax Description

This command has no arguments or keywords.

Command Default

Disabled (notification traps will be sent only to the host that is configured to receive traps).

Command Modes

Global configuration

Command History

Release	Modification
12.2(33)SRB	This command was introduced.

Examples

The following example shows how to configure the router to enable ERM-MIB notification traps:

```
Router(config)# snmp-server enable traps resource-policy
```

Related Commands

Command	Description
snmp-server community	Permits access to SNMP by setting up the community access string.
snmp-server host	Specifies the recipient of an SNMP notification message.

Feature Information for ERM-MIB

Table 4 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 4 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 4 Feature Information for ERM-MIB

Feature Name	Releases	Feature Information
Embedded Resource Manager (ERM)-MIB	12.2(33)SRB	The ERM-MIB feature introduces MIB support for the Embedded Resource Manager (ERM) feature. The ERM-MIB feature allows you to monitor the usage of resources by gathering resource usage information using MIB objects. The network manager can use the information collected by the ERM-MIB objects to ensure the optimal use of the resources.