



Configuring Embedded Resource Manager-MIB

The Embedded Resource Manager (ERM)-MIB feature introduces MIB support for the ERM feature. The ERM feature tracks resource usage information for every registered resource owner and resource user. 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.

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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 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

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.

The table below 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.
cermResUserTypeResOwnerTable	Obtains the details of resource owners present in a specific resource user type.

ERM Show MIB Objects	Purpose
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 entries for `cermResOwnerTable` are `entPhysicalIndex`, `cermResOwnerSubEntityId`, and `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 entries for `cermResOwnerSubTypeTable` are `entPhysicalIndex`, `cermResOwnerSubEntityId`, `cermResOwnerId`, and `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 entries for `cermResOwnerSubTypeThresholdTable` are `entPhysicalIndex`, `cermResOwnerSubEntityId`, `cermResOwnerId`, `cermResOwnerSubTypeId`, and `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 entries for this object are `entPhysicalIndex`, `cermResUserTypeSubEntityId`, and `cermResUserId`.

The `cermResUserTypeTable` defines the following objects:

- `cermResUserTypeSubEntityId`
- `cermResUserId`
- `cermResUserName`
- `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 entries for `cermResUserTable` are `entPhysicalIndex`, `cermResUserTypeSubEntityId`, `cermResUserId`, and `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 entries for `cermResGroupTable` are `entPhysicalIndex`, `cermResUserTypeSubEntityId`, `cermResUserTypeId`, and `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 entries for `cermResGroupResUserTable` are `entPhysicalIndex`, `cermResUserTypeSubEntityId`, `cermResUserTypeId`, `cermResGroupId`, and `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 entries for `cermResOwnerResUserOrGroupTable` are `entPhysicalIndex`, `cermResOwnerSubEntityId`, `cermResOwnerId`, `cermResOwnerSubTypeId`, `cermResOwnerResUserTypeId`, and `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 entries for `cermResOwnerResUserOrGroupThresholdTable` are `entPhysicalIndex`, `cermResOwnerSubEntityId`, `cermResOwnerId`, `cermResOwnerSubTypeId`, `cermResOwnerResUserId`, `cermResOwnerResUserOrGroupId`, `cermResUserOrGroupThreshIsUserGlob`, and `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 entries for `cermResUserTypeResOwnerTable` are `entPhysicalIndex`, `cermResUserTypeSubEntityId`, `cermResUserId`, and `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 entries for this object are `entPhysicalIndex`, `cermResMonitorSubEntityId`, and `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 entries for `cermResMonitorResOwnerResUserTable` are `entPhysicalIndex`, `cermResMonitorSubEntityId`, `cermResMonitorId`, `cermResMonitorResOwnerId`, `cermResMonitorResUserId`, and `cermResMonitorResUserType`.

The `cermResMonitorResOwnerResUserTable` defines the following objects:

- `cermResMonitorResOwnerId`
- `cermResMonitorResUserType`
- `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 entries for `cermResMonitorPolicyTable` are `entPhysicalIndex`, `cermResMonitorSubEntityId`, `cermResMonitorId`, and `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:

The table below describes the ERM Configuration MIB objects.

Table 2: ERM Configuration MIB Objects

ERM Configuration MIB Objects	Purpose
<code>cermScalarsGlobalPolicyName</code> (scalar object)	Identifies and indicates the global resource policy applied in the system.
<code>cermConfigPolicyTable</code>	Creates, modifies, or deletes a resource policy.

ERM Configuration MIB Objects	Purpose
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 identify and indicate if a global resource policy is applied in the system. If no global resource policy is applied in the system, this object will contain an 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 entry for this object is `cermPolicyName`.

The `cermConfigPolicyTable` defines the following objects:

- `cermPolicyName`
- `cermPolicyIsGlobal`
- `cermPolicyUserName`
- `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 entries for `cermConfigPolicyResOwnerThreshTable` are `cermPolicyName`, `cermPolicyPhysicalIndex`, `cermConfigPolicyResOwnerSubEntityId`, `cermConfigPolicyResOwnerId`, `cermConfigPolicyResOwnerSubTypeId`, `ermConfigPolicyIsUserGlobal`, and `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 entry for this object is `cermConfigResGroupName`.

The `cermConfigResGroupTable` defines the following objects:

- `cermConfigResGroupName`
- `cermConfigResGroupUserName`
- `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 entries for `cermConfigResGroupUserTable` are `cermConfigResGroupName` and `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 entries for this object are `cermPolicyApplyUserOrGroupName` and `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 three types of ERM Notification MIB objects.

The table below describes the ERM Notification MIB objects.

Table 3: ERM Notification MIB Objects

ERM Notification MIB Objects	Purpose
<code>cermNotifsEnabled</code>	Enables ERM notifications.
<code>ciscoErmGlobalPolicyViolation</code>	Specifies the type of notification received on global policy violation.
<code>ciscoErmLocalPolicyViolation</code>	Specifies the type of user-specific notification received on local 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

Enabling ERM-MIB Notification Traps

You can enable ERM-MIB notification traps, which are generated when resource usage exceeds the threshold value. 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. <ul style="list-style-type: none"> • 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.

Before You Begin

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

SUMMARY STEPS

1. **enable**
2. **show running-config** [*options*]
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. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	show running-config [<i>options</i>] Example: Router# show running-config	Displays the running configuration to determine if an SNMP agent is already running. <ul style="list-style-type: none"> • 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 { <i>hostname</i> <i>ip-address</i> } [vrf <i>vrf-name</i>] [traps informs] [version { 1 2c 3 [auth noauth priv]}] <i>community-string</i> [udp-port <i>port</i>] [<i>notification-type</i>] Example: Router(config)# snmp-server host 209.165.201.30 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

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
Router(config)# snmp-server community public rw
```

```
Router(config)# snmp-server enable traps resource-policy
Router(config)# snmp-server host 209.165.201.30 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
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
Embedded Resource Manager	<i>Embedded Resource Manager</i>
Network Management commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	<i>Cisco IOS Network Management Command Reference</i>

Standards

Standard	Title
None	--

MIBs

MIB	MIBs Link
<ul style="list-style-type: none"> • 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
<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>http://www.cisco.com/cisco/web/support/index.html</p>

Feature Information for ERM-MIB

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 4: Feature Information for ERM-MIB

Feature Name	Releases	Feature Information
<p>Embedded Resource Manager (ERM)-MIB</p>	<p>12.2(33)SB 12.2(33)SRB 12.4(15)T Cisco IOS XE Release 3.9S</p>	<p>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.</p> <p>The following commands were introduced or modified by this feature: snmp-server enable traps resource-policy</p>

