# Memory Scan

This feature module describes the Memory Scan feature. This document contains the following sections:



## Feature Overview

The Memory Scan feature adds a low-priority background process that searches all installed dynamic random-access memory (DRAM) for possible parity errors. If errors are found in memory areas that are not in use, this feature attempts to scrub (remove) the errors. The time to complete one memory scan and scrub cycle can range from 10 minutes to several hours, depending on the amount of installed memory. The impact of the Memory Scan feature on the central processing unit (CPU) is minimal. The feature can be controlled and monitored with the new **memory scan** and **show memory scan** command-line interface (CLI) commands.

### Benefits

The Memory Scan feature does not discriminate against different information types in DRAM; that is, it perceives text, data, and heap information in the same way. The feature continues to work when a memory cell is busy, although it might respond differently to errors found in different areas. The feature responds to errors in one or more of the following ways:

- A message is logged for all errors found. Each message contains an explanation of the error and suggests corrective action if applicable.

- For errors in heap storage control blocks, attempts are made to scrub errors in the free blocks. If an error is scrubbed, no further action occurs, but there is an entry in the error log. If it is not scrubbed, the block that contains the error is linked to a bad-memory list which will not be allocated to users. If the memory block is large, the block is split and only a small portion containing the error is linked to a bad-memory list.
- For errors in a busy block, or in other areas such as text or data, an error message is produced but no further action is taken, preventing damage to living data.

## Restrictions

The Memory Scan feature is only supported on the Route Switch Processor (RSP) module in Cisco 7500 series routers.

# Supported Platforms

This feature is supported on Cisco 7500 series routers.

# Prerequisites

Before you configure the Memory Scan feature, you must have a software image that supports the Memory Scan feature on your router. For more information on downloading a software image, refer to the "Loading and Maintaining System Images and Microcode" chapter of the *Configuration Fundamentals Configuration Guide*, and the "System Image and Microcode Commands" chapter of the *Configuration Fundamentals Command Reference* publication.

# Supported MIBs and RFC

None

# List of Terms and Acronyms

**dynamic random-access memory (DRAM)**— RAM that stores information in capacitors that must be periodically refreshed.

**heap**—Area of memory used for dynamic memory allocation where blocks of memory are allocated and freed in an arbitrary order.

**parity**—Extra bit added to a byte or a word to reveal errors in storage (in RAM or disk) or transmission. Even parity means that the parity bit is set so that there are an even number of one bits in the word, including the parity bit. A single parity bit can only reveal single bit errors.

**parity errors**—Parity errors indicate that internal hardware error checks have failed.

**Route Processor (RP)**—Processor module in Cisco 7000 series routers that contains the CPU, system software, and most of the memory components that are used in the router. Sometimes called a supervisory processor.

**Route/Switch Processor (RSP)**—Processor module in Cisco 7500 series routers that integrates the functions of the RP and the SP.

**scrub**—Function that removes transient parity errors from system memory.

**Switch Processor (SP)**—Cisco 7000 series processor module that acts as the administrator for all CxBus activities. Sometimes called CiscoBus controller.

# Configuration Tasks

Perform these tasks to configure memory scan and verify its operation:

- Configuring Memory Scan
- Verifying Memory Scan

## Configuring Memory Scan

The following table describes the CLI commands used to configure this feature:

| Command | Purpose |
|---|---|
| `Router(config)# memory scan` | Enables the Memory Scan feature on Cisco 7500 series routers |

## Verifying Memory Scan

Use the **show running-configuration** command in privileged EXEC mode to verify that memory scan appears in the running configuration.

Use the **show memory scan** command to monitor the number and type of parity errors on your system. Use the **show memory scan** command in privileged EXEC mode. In the following example, no parity errors are found:

```
Router# show memory scan
Memory scan is on.
No parity error has been detected.
```

If **memory scan** has not been configured or has been turned off, the **show memory scan** command generates a report. In the following example, memory scan is turned off:

```
Router# show memory scan
Memory scan is off
No parity error has been detected.
```

If errors are detected in the system, the **show memory scan** command generates an error report containing the following fields:

| Field | Meaning |
|---|---|
| Address | The byte address where the error occurred |
| BlockPtr | The pointer to the block that contains the error |
| BlockSize | The size of the memory block |

| Field | Meaning |
|---|---|
| Disposit | The action taken in response to the error |
| • BlockInUse | — An error was detected in a busy block |
| • InFieldPrev | — An error was detected in the previous field of a block header |
| • InHeader | — An error was detected in a block header |
| • Linked | — A block was linked to a bad list |
| • MScrubed | — The same address was scrubbed more than once, and the block was linked to a bad list |
| • MultiError | — Multiple errors have been found in one block |
| • NoBlkHdr | — No block header was found |
| • NotYet | — An error was found, no action has been taken at this time |
| • Scrubed | — An error was scrubbed |
| • SplitLinked | — A block was split, and only a small portion was linked to a bad list |
| Region | The memory region in which the error was found |
| • IBSS | — image BSS |
| • IData | — imagedata |
| • IText | — imagetext |
| • local | — heap |
| Timestamp | The time the error occurred |

In the following example, memory scan detected a parity error:

```
Router# show memory scan
Memory scan is on.
Total Parity Errors 1.
Address BlockPtr BlckSize Disposit   Region Timestamp
6115ABCD 60D5D090   9517A4  Scrubed    Local 16:57:09 UTC Thu Mar 18
```

# Monitoring and Maintaining Memory Scan

| Command | Purpose |
|---|---|
| `Router# show memory scan` | Monitors the number and type of parity errors on your system. |

# Configuration Examples

Use the **memory scan** command to configure the Memory Scan feature on a Cisco 7500 series router. Use the following command in global configuration mode:

```
Router(config)# memory scan
```

# Command Reference

This section documents new or modified commands.

- **memory scan**
- **show memory scan**

# memory scan

To enable the Memory Scan feature on a Cisco 7500 series router, use the **memory scan** command. Use the **no** form of this command to restore the router configuration to the default.

**memory scan**

**no memory scan**

## Defaults

This command is disabled by default.

## Command Modes

Global configuration

## Command History

| Release | Modification |
|---|---|
| 12.0(4)XE | This command was introduced. |
| 12.0(7)T | This command was added to Cisco IOS Release 12.0 T. |

## Example

The following example configures the Memory Scan feature on a Cisco 7500 series router:

```
Router(config)# memory scan
```

# show memory scan

To monitor the number and type of memory errors on your system, use the **show memory scan** EXEC command.

**show memory scan**

## Defaults

No default behavior or values

## Command Modes

EXEC

## Command History

| Release | Modification |
|---|---|
| 12.0(4)XE | This command was introduced. |
| 12.0(7)T | This command was added to Cisco IOS Release 12.0 T. |

## Example

The following example monitors the number and type of parity errors on your system:

```
Router# show memory scan
Memory scan is on.
No parity error has been detected.
```