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Introduction

The purpose of this document is to describe three types of errors - spurious accesses, alignment errors, and spurious interrupts - that may be encountered on devices running Cisco IOS® software.

If you have the output of a **show alignment** command from your Cisco device, you can use [Cisco CLI Analyzer](#) to display potential issues and fixes. To use [Cisco CLI Analyzer](#), you must be a [registered](#) customer, be logged in, and have JavaScript enabled.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The command is not supported on all platforms (only in reduced instruction set computing [RISC] processors).

The **show alignment** command was introduced in 12.3(7)T, and it was hidden in earlier versions.

Conventions

For more information on document conventions, see the [Cisco Technical Tips Conventions](#).

Spurious Accesses

Spurious access is an attempt by Cisco IOS software to access memory in a restricted location. An example of system log output for a spurious access is shown below:

Cause

A spurious access occurs when a process attempts to read from the lowest 16 KB region of memory. This portion of memory is reserved and should never be accessed. A read operation to this region of memory is usually caused when a nonexisting value is returned to a function in the software, or in other words, when a null pointer is passed to a function.

Cisco IOS Software Handling

Depending on the platform, Cisco IOS software handles spurious accesses differently. On platforms where this is possible, the Cisco IOS software code handles these invalid accesses by returning a value of zero and recording the event. If this is not supported on the platform, then the router will crash with a SegV error. Since any spurious access is inappropriate, spurious accesses always point to a bug.

Verifying Spurious Access Errors

Spurious accesses are counted and recorded, if possible, by Cisco IOS software. This information is available with the **show alignment** command. The traceback information is necessary to determine the cause and the fix of the spurious accesses.

Note: The **show alignment** command is hidden and undocumented. The command is also not supported on all platforms (only reduced instruction set computing [RISC] processors). A sample output from **show alignment** command is provided below:

```
Router#show alignment
Alignment data for:
GS Software (RSP-PV-M), Version 11.1(26.1)CC, EARLY DEPLOYMENT MAINTENANCE INTER
IM SOFTWARE
Compiled Thu 27-May-99 20:48 by jjgreen

No alignment data has been recorded.

Total Spurious Accesses 167110746, Recorded 2

Address   Count   Traceback
      0   10474   0x6012D488  0x6020FFB4 0x601D5CE0
      0   49008   0x6012D488  0x6020D25C 0x6020E744 0x602106B4
Router#
```

Correcting Spurious Access Errors

Spurious access errors are always caused by a Cisco IOS software bug. To correct this, upgrade to the latest version in your release train (for example, if you are running Cisco IOS Software Release 11.2(14), upgrade to the latest 11.2(x) image. If this doesn't solve the problem, or if it's not possible to upgrade the router, contact the Cisco TAC. When opening a case to report

spurious accesses, please include the following:

- output from the **show alignment** command
- output from the **show tech-support** command
- relevant system logs

Alignment Errors

The following is an example of system log output for an alignment error:

```
Router#show alignment
Alignment data for:
GS Software (RSP-PV-M), Version 11.1(26.1)CC, EARLY DEPLOYMENT MAINTENANCE INTER
IM SOFTWARE
Compiled Thu 27-May-99 20:48 by jjgreen

No alignment data has been recorded.

Total Spurious Accesses 167110746, Recorded 2

Address  Count  Traceback
     0  10474  0x6012D488  0x6020FFB4 0x601D5CE0
     0  49008  0x6012D488  0x6020D25C 0x6020E744 0x602106B4
Router#
```

Cause

Alignment errors are caused by misaligned reads and writes. For example, a two byte read where the memory address is not an even multiple of two bytes is an alignment error. Alignment errors are caused by a software bug.

Verifying Alignment Errors

Alignment errors are reported in the log and recorded by the router. Output from the **show alignment** command provides a record of these errors along with potentially useful tracebacks. The tracebacks for alignment errors can generally be decoded to reveal the function causing the alignment problems.

Note: The **show alignment** command is hidden and undocumented. The command is also not supported on all platforms (only high-end routers support it). A sample output from the **show alignment** command is provided below:

```
Router#show alignment
Alignment data for:
RSP Software (RSP-ISV-M), Version 11.3(3a), RELEASE SOFTWARE (fc1)
Compiled Fri 01-May-98 18:28 by phanguye

Total Corrections 6, Recorded 2, Reads 6, Writes 0

Initial Initial
Address    Count  Access  Type  Traceback
60EF3765   3      32bit   read  0x60262474 0x601AC594 0x601AC580
60EF3761   3      32bit   read  0x60262478 0x601AC594 0x601AC580

No spurious memory references have been recorded.
```

```
Router#
```

Correcting Alignment Errors

Alignment errors can generally be corrected by software and, if so, will not cause a crash. Correcting alignment errors does, however, consume processor resources and can result in a performance penalty. If there are continuous alignment errors, the router can spend most of its time fixing them, increasing the CPU utilization. These errors are corrected at interrupt.

Spurious Interrupts

Spurious interrupts are not the same as spurious memory accesses.

A spurious interrupt occurs when an unnecessary interrupt is raised for an already processed packet, possibly due to an internal race condition, or improper initialization of interrupt handling routines. There is no discernable impact on the behavior of the router due to spurious interrupts. They may safely be ignored as long as there isn't a high and increasing number of spurious interrupts, along with some dropped packets or degraded performance. Otherwise, the root cause must be investigated.

The **show align** command provides information on spurious memory accesses, but not spurious interrupts. The only information on spurious interrupts that can be obtained from the system is in the **show stacks** output, where there is a counter that counts how many have occurred.

```
Router#show stacks
Minimum process stacks:
 Free/Size   Name
 3692/4000    DHCPD Receive
 4796/6000    Router Init
 1904/4000    Init
 3408/4000    RADIUS INITCONFIG
 4228/5000    DHCP Client
 2468/4000    Exec

Interrupt level stacks:
Level     Called Unused/Size  Name
   3          0   3000/3000   Serial interface state change interrupt
   4   54351439   1760/3000   Network interfaces
   5      64181   2872/3000   Console Uart

Spurious interrupts: 29
```
Spurious interrupts may be caused either by defective hardware or by software. Most of the time, this has no side-effect on the expected behavior of the router or switch. They are only counted for monitoring purposes.

A couple of spurious interrupts do not cause much CPU utilization. If this is the only symptom occurring on a router or switch, and everything else is working as expected (no packet drops and so on), then the spurious interrupts may be ignored.

Cisco routers based on the 68k processor (that is, the Cisco 1000, 1600, 2500, 4000, and 7000 (RP)) can be configured to generate a coredump if a certain threshold of spurious interrupts is reached.

```
Router(config)#exception ?
core-file           Set name of core dump file
crashinfo           Crashinfo collection
```

```
dump                 Set name of host to dump to
flash                Set the device and erase permission
memory               Memory leak debugging
protocol             Set protocol for sending core file
region-size          Size of region for exception-time memory pool
spurious-interrupt   Crash after a given number of spurious interrupts

Router(config)#exception spurious-interrupt ?
  <1-4294967295>  Spurious interrupt threshold
```

For more information on coredump generation, see [Creating Core Dumps](#). This information might be requested by our Technical Assistant Center in the case of performance degradation due to spurious interrupts. If that is the case, there should be a high and increasing number of spurious interrupts, along with some packet drops or degraded performance.

Information to Collect if You Create a TAC Service Request

If you still need assistance after following the troubleshooting steps above and want to [create a service request](#) ([registered](#) customers only) with the Cisco TAC, be sure to attach the following information to your case for troubleshooting spurious accesses, alignment errors, and spurious interrupts:

- Troubleshooting performed before creating the service request
- **show technical-support** output (in enable mode, if possible)
- **show alignment** output (if not already included in the **show technical-support** output)
- **show log** output or console captures, if available

Please attach the collected data to your service request in non-zipped, plain text format (.txt). You can att information to your service request by uploading it using the [TAC Service Request Tool](#) ([registered](#) custo only) . If you cannot access the Service Request Tool, you can attach the relevant information to your ser request by sending it to attach@cisco.com with your service request number in the subject line of your message.

Note: Please do not manually reload or power-cycle the router before collecting the above information, ur required to troubleshoot spurious accesses, alignment errors, and spurious interrupts, as this can cause important information to be lost that is needed for determining the root cause of the problem.

Related Information

- **[Troubleshooting High CPU Utilization on Cisco Routers](#)**
- **[Technical Support - Cisco Systems](#)**