



# Troubleshooting ISG with Session Monitoring and Distributed Conditional Debugging

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Intelligent Services Gateway (ISG) is a Cisco IOS and Cisco IOS XE software feature set that provides a structured framework in which edge devices can deliver flexible and scalable services to subscribers. This document describes ISG session monitoring and distributed conditional debugging. ISG session monitoring uses the **show interface monitor** and **show processes cpu monitor** commands, which display statistics that are updated at specified intervals. Conditional debugging facilitates debug filtering for ISG and is available as distributed conditional debugging.

## Finding Feature Information

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 for Distributed Conditional Debugging” section on page 171](#).

Use Cisco Feature Navigator to find information about platform support and Cisco IOS XE 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 ISG Session Monitoring and Distributed Conditional Debugging

For information about release and platform support, see the “[Feature Information for Distributed Conditional Debugging](#)” section on page 171.

Before using the information in this module, it is recommended that you be familiar with the use of Cisco IOS **debug** commands and conditional debugging. See the “[Additional References](#)” section on page 171 to find information about these topics.

## Restrictions for Distributed Conditional Debugging

Conditions that are set for an active session take effect only when the session is terminated and reestablished.



### Caution

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Because debugging output is assigned high priority in the CPU process, it can render the system unusable. For this reason, use the Cisco IOS **debug** commands only to troubleshoot specific problems or during troubleshooting sessions with Cisco technical support staff. Moreover, it is best to use **debug** commands during periods of lower network traffic and fewer users, or on a debug chassis with a single active session. Debugging during these periods decreases the likelihood that increased **debug** command processing overhead will affect system use.

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## Information About ISG Session Monitoring and Distributed Conditional Debugging

Before you enable session monitoring or distributed conditional debugging, you should understand the following concepts:

- [ISG Session and Flow Monitoring, page 162](#)
- [ISG Distributed Conditional Debugging, page 163](#)

## ISG Session and Flow Monitoring

ISG introduces a mechanism that allows an administrator to monitor ISG sessions and flows continuously. The **show interface monitor** command, which displays interface statistics, and the **show process cpu monitor** command, which displays information about CPU usage, both update the information in their displays at specified intervals. These commands also provide the ability to freeze or clear the information in the display.

## ISG Distributed Conditional Debugging

This section contains the following concepts:

- [Benefits of Enhanced Conditional Debugging for the ISG Platforms, page 163](#)
- [Cisco IOS XE Software Components Supported by Distributed Conditional Debugging, page 163](#)

### Benefits of Enhanced Conditional Debugging for the ISG Platforms

Because thousands of user sessions run on the ISG platforms, it is not practical to troubleshoot a problem with a session by enabling the various component **debug** commands that are available and trace through the messages for a single session or user. Instead, it is more practical to filter debugging messages for a single session or call across the various Cisco IOS XE components that a session traverses. For this reason, the conditional debugging previously offered in the Cisco IOS XE software has been enhanced to facilitate debug filtering for ISG and is available as distributed conditional debugging.

### Cisco IOS XE Software Components Supported by Distributed Conditional Debugging

The following components are supported for ISG distributed conditional debugging:

- Authentication, authorization, and accounting (AAA) and RADIUS
- Feature Manager
- Policy Manager
- PPP
- PPP over Ethernet (PPPoE)
- Session Manager
- Virtual Private Dialup Network (VPDN)

See [Table 1](#) and [Table 2](#) for specific commands that are supported for distributed conditional debugging.

## How to Enable ISG Session Monitoring and Distributed Conditional Debugging

This section contains the following tasks:

- [Monitoring ISG Sessions and Flows, page 163](#)
- [Configuring Distributed Conditional Debugging, page 164](#)

### Monitoring ISG Sessions and Flows

Perform this task to monitor interface and CPU statistics. The **show** commands are not required and may be entered in any order.

## SUMMARY STEPS

1. `enable`
2. `show interface type number monitor [interval seconds]`
3. `show processes cpu monitor [interval seconds]`

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<p><code>enable</code></p> <p><b>Example:</b> Router&gt; enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<p><code>show interface <i>type number</i> monitor [interval <i>seconds</i>]</code></p> <p><b>Example:</b> Router# show interface gigabitethernet 3/0/0 monitor interval 10</p>	<p>Displays interface statistics that are updated at specified intervals.</p>
Step 3	<p><code>show processes cpu monitor [interval <i>seconds</i>]</code></p> <p><b>Example:</b> Router# show processes cpu monitor</p>	<p>Displays detailed CPU utilization statistics that are updated at specified intervals.</p>

## Configuring Distributed Conditional Debugging

Two main tasks are required for configuring distributed conditional debugging: enabling conditional debugging, and issuing one or more supported **debug** commands. These required tasks are described in the following sections:

- [ISG Debug Condition Commands, page 164](#)
- [Debug Commands That Are Supported by ISG Conditional Debug, page 165](#)
- [Enabling Distributed Conditional Debugging, page 167](#)
- [Restrictions, page 167](#)
- [Enabling Distributed Conditional Debugging, page 167](#)
- [Displaying Debugging Conditions, page 168](#)
- [Troubleshooting Tips, page 168](#)

## ISG Debug Condition Commands

[Table 1](#) lists the **debug condition** commands that you can issue at the EXEC prompt to enable distributed conditional debugging. You can set more than one condition.

**Table 1 Supported Conditional Debug Commands**

Command	Purpose
<b>debug condition domain</b> <i>domain-name</i>	Filters messages on the specified domain name.
<b>debug condition interface</b> {Fast Ethernet   Gigabit Ethernet   TenGigabit Ethernet} <b>vlan-id</b> <i>ID</i>	Filters messages on the specified VLAN identifier.
<b>debug condition mac-address</b> <i>hexadecimal-MAC-address</i>	Filters messages on the specified MAC address.
<b>debug condition portbundle ip</b> <i>IP-address</i> <b>bundle</b> <i>bundle-number</i>	Filters messages on the specified Port-Bundle Host Key (PBHK).
<b>debug condition session-id</b> <i>session-ID</i>	Filters messages on the specified session identifier. <b>Note</b> The session identifier can be obtained by entering the <b>show subscriber session</b> command.
<b>debug condition username</b> <i>email-address</i>	Filters messages on the specified Internet username.

## Debug Commands That Are Supported by ISG Conditional Debug

Table 2 lists the Cisco IOS debugging commands that are supported for distributed conditional debugging. The commands are listed by component. One or more of these commands can be issued after enabling one of the **debug condition** commands listed in Table 1.

**Table 2 Debug Commands Supported by ISG Distributed Conditional Debugging**

AAA Debug Commands
<b>debug aaa accounting</b>
<b>debug aaa authentication</b>
<b>debug aaa authorization</b>
<b>debug aaa id</b>
PPP Debug Commands
<b>debug ppp authentication</b>
<b>debug ppp bap error</b>
<b>debug ppp bap events</b>
<b>debug ppp bap negotiation</b>
<b>debug ppp cbcp</b>
<b>debug ppp error</b>
<b>debug ppp mppe detailed</b>
<b>debug ppp mppe events</b>
<b>debug ppp mppe pack</b>
<b>debug ppp multi data</b>
<b>debug ppp multi events</b>
<b>debug ppp multi frag</b>
<b>debug ppp negotiation</b>
<b>debug ppp pack</b>

**Table 2** *Debug Commands Supported by ISG Distributed Conditional Debugging (continued)*

debug ppp subscriber
<b>PPPoE Debug Commands</b>
debug pppoe data
debug pppoe error
debug pppoe event
debug pppoe packet
<b>Session Manager Debug Commands</b>
debug subscriber aaa authorization event
debug subscriber aaa authorization fsm
debug subscriber error
debug subscriber event
<b>Feature Manager Debug Commands</b>
debug subscriber feature access-list error
debug subscriber feature access-list event
debug subscriber feature compression detail
debug subscriber feature compression error
debug subscriber feature compression event
debug subscriber feature detail
debug subscriber feature error
debug subscriber feature event
debug subscriber feature interface-config error
debug subscriber feature interface-config event
debug subscriber feature modem-on-hold detail
debug subscriber feature modem-on-hold error
debug subscriber feature modem-on-hold event
debug subscriber feature portbundle error
debug subscriber feature portbundle event
debug subscriber feature portbundle packet
debug subscriber feature qos-policy error
debug subscriber feature qos-policy event
debug subscriber feature static-routes error
debug subscriber feature static-routes event
debug subscriber feature traffic-classification detail
debug subscriber feature traffic-classification error
debug subscriber feature traffic-classification event
<b>Policy Manager Debug Commands</b>
debug subscriber fsm

**Table 2** *Debug Commands Supported by ISG Distributed Conditional Debugging (continued)*

<code>debug subscriber policy condition</code>
<code>debug subscriber policy detail</code>
<code>debug subscriber policy error</code>
<code>debug subscriber policy event</code>
<code>debug subscriber policy fsm</code>
<code>debug subscriber policy rule</code>
<code>debug subscriber session error</code>
<code>debug subscriber session event</code>
<b>VPDN Debug Commands</b>
<code>debug vpdn call event</code>
<code>debug vpdn call fsm</code>
<code>debug vpdn error</code>
<code>debug vpdn event</code>
<code>debug vpdn event disconnect</code>

## Restrictions

The `debug condition session-id` command filters a session only after the session has been established. The session identifier is a unique dynamic number generated internally by the Cisco IOS software and assigned to each session when the session is established.

In VPDN, the `debug` commands and messages associated with tunnels cannot be filtered because they are not associated with a session, but are displayed during the tunnel-establishment phase. The debugging messages will be displayed even if filtering is enabled by one of the conditions.

If multiple conditions are set, the debugging messages corresponding to all the sessions that meet any of the conditions will be displayed. Some conditions, such as domain name, will trigger debugging messages for all the sessions that belong to the particular domain.

## Enabling Distributed Conditional Debugging

Perform this task to enable distributed conditional debugging for ISG.

### SUMMARY STEPS

1. `enable`
2. `debug condition command`
3. `debug command`

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<p><b>enable</b></p> <p><b>Example:</b> Router&gt; enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<p><b>debug condition</b> <i>command</i></p> <p><b>Example:</b> Router# debug condition username user@cisco.com</p>	<p>Enter one or more of the <b>debug condition</b> commands listed in <a href="#">Table 1</a> to enable distributed conditional debugging.</p>
Step 3	<p><b>debug</b> <i>command</i></p> <p><b>Example:</b> Router# debug subscriber aaa authorization fsm</p>	<p>Enter one or more of the supported <b>debug</b> commands from <a href="#">Table 2</a>.</p>

### Displaying Debugging Conditions

To display the debugging conditions that have been set, perform the following task:

#### SUMMARY STEPS

- enable**
- show debug condition**

#### DETAILED STEPS

	Command or Action	Purpose
Step 1	<p><b>enable</b></p> <p><b>Example:</b> Router&gt; enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<p><b>show debug condition</b></p> <p><b>Example:</b> Router# show debug condition</p>	<p>Displays conditions that have been set for debugging.</p>

### Troubleshooting Tips

The Cisco IOS software displays messages as you set the conditions for filtering the debugging.

When a condition is set, it is assigned a number, as follows:

```
Condition 1 set
```

If a condition has already been set, the following message is displayed:

```
% Condition already set
```



The following messages and prompt are displayed when you attempt to disable the last condition using the **no** form of a **debug condition** command:

```
This condition is the last interface condition set.
Removing all conditions may cause a flood of debugging messages
to result, unless specific debugging flags are first removed.
```

```
Proceed with removal? [yes/no]: yes
Condition 1 has been removed
```



Tip

Use the **no** form of the commands to disable all **debug** commands before disabling all of the debugging conditions that have been set.

## Configuration Examples for ISG Distributed Conditional Debugging

This section contains the following examples:

- [Monitoring Interface Statistics: Example, page 169](#)
- [Monitoring CPU Statistics: Example, page 170](#)
- [Enabling ISG Distributed Conditional Debugging: Example, page 170](#)
- [Displaying Debugging Conditions: Example, page 170](#)
- [Filtering Debug Output: Example, page 170](#)

### Monitoring Interface Statistics: Example

The following example shows sample output for the **show interface monitor** command. The display will be updated every 10 seconds.

```
Router> show interface gigabitethernet 0/0/0 monitor interval 10

Router Name:  Scale3-Router8          Update Secs: 10
Interface Name:  GigabitEthernet 0/0/0 Interface Status: UP, line is up

Line Statistics:          Total:          Rate(/s)      Delta
Input Bytes:             123456         123           7890
Input Packets:           3456          56            560
Broadcast:               1333          6             60
OutputBytes:             75717         123           1230
Output Packets:          733           44            440

Error Statistics:        Total:          Delta:
Input Errors:            0              0
CRC Errors:              0              0
Frame Errors:            0              0
Ignored:                 0              0
Output Errors:           0              0
Collisions:              0              0

No. Interface Resets:  2
End = e                Clear = c        Freeze = f
```

Enter Command:

## Monitoring CPU Statistics: Example

The following example shows sample output for the **show processes cpu monitor** command:

```
Router> show processes cpu monitor
```

```
CPU utilization for five seconds: 0%/0%; one minute: 0%; five minutes: 0%
PID Runtime(ms)   Invoked    uSecs   5Sec   1Min   5Min   TTY Process
   3      772         712     1084   0.08%  0.04%  0.02%   0   Exec
  67     276        4151      66   0.08%  0.03%  0.01%   0 L2TP mgmt daemon
 116    604        2263     266   0.16%  0.05%  0.01%   0 IDMGR CORE
```

```
End = e      Freeze = f
```

Enter Command:

## Enabling ISG Distributed Conditional Debugging: Example

The following example shows how to filter PPP, PPPoE, and Session Manager debugs for a PPPoE session with username “user@cisco.com”. Only debugging messages for the defined user are displayed on the console. Any other debugging messages associated with other users will not be displayed.

```
Router# debug condition username user@cisco.com
Condition 1 set
```

```
Router# debug ppp negotiation
Router# debug pppoe event
Router# debug subscriber session event
```

## Displaying Debugging Conditions: Example

The following example shows how to display debugging conditions that have been set.

```
Router# show debug condition
```

```
Condition 1: domain cisco.com (0 flags triggered)
Condition 2: username user@cisco.com (0 flags triggered)
Condition 3: ip 172.19.200.10 (0 flags triggered)
```

## Filtering Debug Output: Example

In the following example, the output of the **debug subscriber packet detail** command is filtered on the basis of the username “cpe6\_1@isp.com”:

```
Router# debug condition username cpe6_1@isp.com
```

```
Condition 1 set
```

```
Router# show debug
```

```
Condition 1: username cpe6_1@isp.com (0 flags triggered)
```

```
Router# debug subscriber packet detail
```

```
SSS packet detail debugging is on
```

```
Router# show debug

SSS:
  SSS packet detail debugging is on

Condition 1: username cpe6_1@isp.com (0 flags triggered)

Router#
```

## Additional References

The following sections provide references related to ISG session monitoring and distributed conditional debugging.

### Related Documents

Related Topic	Document Title
ISG commands	<a href="#">Cisco IOS Intelligent Services Gateway Command Reference</a>
Cisco IOS <b>debug</b> commands	<a href="#">Cisco IOS Debug Command Reference</a>
Conditional debugging	<a href="#">“Conditionally Triggered Debugging” chapter in the Cisco IOS Debug Command Reference</a>

### 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><a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a></p>

## Feature Information for Distributed Conditional Debugging

[Table 3](#) lists the features in this module and provides links to specific configuration information. For information about a feature in this technology that is not documented here, see the [“Intelligent Services Gateway Features Roadmap.”](#)

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**Note**

Table 3 list only the Cisco IOS XE 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 XE software release train also support that feature.

**Table 3** Feature Information for ISG Session Monitoring and Distributed Conditional Debugging

Feature Name	Releases	Feature Configuration Information
ISG: Instrumentation: Session and Flow Monitoring	Cisco IOS XE Release 2.2	<p>ISG provides a mechanism for continuously monitoring interface and CPU statistics. This feature introduces the <b>show interface monitor</b> and <b>show processes cpu monitor</b> commands, which display statistics that are updated at specified intervals.</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> <li>• <a href="#">ISG Session and Flow Monitoring, page 162</a></li> <li>• <a href="#">Monitoring ISG Sessions and Flows, page 163</a></li> </ul>
ISG: Instrumentation: Advanced Conditional Debugging	Cisco IOS XE Release 2.2	<p>ISG provides the ability to define various conditions for filtering debug output. Conditional debugging generates very specific and relevant information that can be used for session, flow, subscriber, and service diagnostics.</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> <li>• <a href="#">ISG Distributed Conditional Debugging, page 163</a></li> <li>• <a href="#">Configuring Distributed Conditional Debugging, page 164</a></li> </ul>

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