Troubleshooting ISG with Session Monitoring and Distributed Conditional Debugging

Intelligent Services Gateway (ISG) is a 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. Conditional debugging facilitates debug filtering for ISG and is available as distributed conditional debugging.

Prerequisites for ISG Session Monitoring and Distributed Conditional Debugging

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 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 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.

Information About ISG Session Monitoring and Distributed Conditional Debugging

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

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

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	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show interface** *type number* **monitor** [**interval** *seconds*] **Example:** `Router# show interface gigabitethernet 3/0/0 monitor interval 10`	Displays interface statistics that are updated at specified intervals.
Step 3	**show processes cpu monitor** [**interval** *seconds*] **Example:** `Router# show processes cpu monitor`	Displays detailed CPU utilization statistics that are updated at specified intervals.

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

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

Debug Commands That Are Supported by ISG Conditional Debug

The table below 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 the below table.

Table 2: Debug Commands Supported by ISG Distributed Conditional Debugging

AAA Debug Commands
debug aaa accounting
debug aaa authentication
debug aaa authorization
debug aaa id
PPP Debug Commands
debug ppp authentication
debug ppp bap error
debug ppp bap events
debug ppp bap negotiation
debug ppp cbcp
debug ppp error
debug ppp mppe detailed

AAA Debug Commands
debug ppp mppe events
debug ppp mppe pack
debug ppp multi data
debug ppp multi events
debug ppp multi frag
debug ppp negotiation
debug ppp pack
debug ppp subscriber
PPPoE Debug Commands
debug pppoe data
debug pppoe error
debug pppoe event
debug pppoe packet
Session Manager Debug Commands
debug subscriber aaa authorization event
debug subscriber aaa authorization fsm
debug subscriber error
debug subscriber event
Feature Manager Debug Commands
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

AAA Debug Commands
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
Policy Manager Debug Commands
debug subscriber fsm
debug subscriber policy condition
debug subscriber policy detail
debug subscriber policy error
debug subscriber policy event
debug subscriber policy fsm
debug subscriber policy rule
debug subscriber session error
debug subscriber session event
VPDN Debug Commands
debug vpdn call event
debug vpdn call fsm
debug vpdn error

AAA Debug Commands
debug vpdn event
debug vpdn event disconnect

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	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**debug condition** *command* **Example:** `Router# debug condition username user@cisco.com`	Enter one or more of the **debug condition** commands to enable distributed conditional debugging.
Step 3	**debug** *command* **Example:** `Router# debug subscriber aaa authorization fsm`	Enter one or more of the supported **debug** commands.

Displaying Debugging Conditions

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

SUMMARY STEPS

1. **enable**
2. **show debug condition**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show debug condition** **Example:** `Router# show debug condition`	Displays conditions that have been set for debugging.

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

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)
```

Additional References

Related Documents

Related Topic	Document Title
ISG commands	Cisco IOS Intelligent Services Gateway Command Reference
Debug commands	*Cisco IOS Debug Command Reference*
Conditional debugging	"Conditionally Triggered Debugging" chapter in the *Cisco IOS Debug Command Reference*

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. 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. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Distributed Conditional Debugging

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 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	ISG provides a mechanism for continuously monitoring interface and CPU statistics. This feature introduces the **show interface monitor** and **show processes cpu monitor**commands, which display statistics that are updated at specified intervals.
ISG: Instrumentation: Advanced Conditional Debugging	Cisco IOS XE Release 2.2	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.