



## Crypto Conditional Debug Support

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The Crypto Conditional Debug Support feature introduces new debug commands that allow users to debug an IP Security (IPsec) tunnel on the basis of predefined crypto conditions such as the peer IP address, connection-ID of a crypto engine, and security parameter index (SPI). By limiting debug messages to specific IPsec operations and reducing the amount of debug output, users can better troubleshoot a router with a large number of tunnels.

- [Finding Feature Information, page 1](#)
- [Prerequisites for Crypto Conditional Debug Support, page 1](#)
- [Restrictions for Crypto Conditional Debug Support, page 2](#)
- [Information About Crypto Conditional Debug Support, page 2](#)
- [How to Enable Crypto Conditional Debug Support, page 4](#)
- [Configuration Examples for the Crypto Conditional Debug CLIs, page 6](#)
- [Additional References, page 7](#)
- [Feature Information for Crypto Conditional Debug Support, page 9](#)

## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and 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.

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](http://www.cisco.com/go/cfn). An account on Cisco.com is not required.

## Prerequisites for Crypto Conditional Debug Support

To use the new crypto CLIs, you must be using the k9 subsystem crypto image in Cisco IOS XE releases.

# Restrictions for Crypto Conditional Debug Support

- Although conditional debugging is useful for troubleshooting peer-specific or functionality related Internet Key Exchange (IKE) and IPSec problems, conditional debugging may not be able to define and check large numbers of debug conditions. Because extra space is needed to store the debug condition values, additional processing overhead is added to the CPU and memory usage is increased. Thus, enabling crypto conditional debugging on a router with heavy traffic should be used with caution.

## Information About Crypto Conditional Debug Support

### Supported Condition Types

The new crypto conditional debug CLIs--**debug crypto condition**, **debug crypto condition unmatched**, and **show crypto debug-condition**--allow you to specify conditions (filter values) in which to generate and display debug messages related only to the specified conditions. The table below lists the supported condition types.



#### Note

The **debug crypto condition peer** command with the **ipv4** or **ipv6** keyword can provide the hardware platform specific debugging output. The rest of the condition filters do not provide platform specific debugging output.

**Table 1: Supported Condition Types for Crypto Debug CLI**

Condition Type (Keyword)	Description
connid <sup>1</sup>	An integer between 1-32766. Relevant debug messages will be shown if the current IPSec operation uses this value as the connection ID to interface with the crypto engine.
FVRF	The name string of a virtual private network (VPN) routing and forwarding (VRF) instance. Relevant debug messages will be shown if the current IPSec operation uses this VRF instance as its front-door VRF (FVRF).
ikev2	The name string for an IKEv2 profile. Relevant debug messages will be shown if the IKEv2 profile name is specified.
isakmp	The name string for an ISAKMP profile. Relevant debug messages will be shown if the ISAKMP profile name is specified.

Condition Type (Keyword)	Description
IVRF	The name string of a VRF instance. Relevant debug messages will be shown if the current IPsec operation uses this VRF instance as its inside VRF (IVRF).
local	The name string of an IPv4 or IPv6 local address.
peer group	A Unity group-name string. Relevant debug messages will be shown if the peer is using this group name as its identity.
peer hostname	A fully qualified domain name (FQDN) string. Relevant debug messages will be shown if the peer is using this string as its identity; for example, if the peer is enabling IKE Xauth with this FQDN string.
peer ipv4 or peer ipv6	A single IP address. Relevant debug messages will be shown if the current IPsec operation is related to the IP address of this peer.
peer subnet	A subnet and a subnet mask that specify a range of peer IP addresses. Relevant debug messages will be shown if the IP address of the current IPsec peer falls into the specified subnet range.
peer username	A username string. Relevant debug messages will be shown if the peer is using this username as its identity; for example, if the peer is enabling IKE Extended Authentication (Xauth) with this username.
session	Provides information about crypto sessions.
SPI	A 32-bit unsigned integer. Relevant debug messages will be shown if the current IPsec operation uses this value as the SPI.
unmatched	Provides debug messages when context information is unavailable.

<sup>1</sup> If an IPsec connid, flowid, or SPI is used as a debug condition, the debug messages for a related IPsec flow are generated. An IPsec flow has two connids, flowids, and SPIs—one inbound and one outbound. Both two connids, flowids, and SPIs can be used as the debug condition that triggers debug messages for the IPsec flow.

# How to Enable Crypto Conditional Debug Support

## Enabling Crypto Conditional Debug Messages

### Performance Considerations

- Before enabling crypto conditional debugging, you must decide what debug condition types (also known as debug filters) and values will be used. The volume of debug messages is dependent on the number of conditions you define.



#### Note

Specifying numerous debug conditions may consume CPU cycles and negatively affect router performance.

- Your router will perform conditional debugging only after at least one of the global crypto debug commands--**debug crypto isakmp**, **debug crypto ipsec**, and **debug crypto engine**--has been enabled. This requirement helps to ensure that the performance of the router will not be impacted when conditional debugging is not being used.

### Disable Crypto Debug Conditions

If you choose to disable crypto conditional debugging, you must first disable any crypto global debug CLIs you have issued ; thereafter, you can disable conditional debugging.



#### Note

The **reset** keyword can be used to disable all configured conditions at one time.

### SUMMARY STEPS

1. **enable**
2. **debug crypto condition** [**connid** *integer* **engine-id** *integer*] [**flowid** *integer* **engine-id** *integer*] [**fvr** *string*] [**ivr** *string*] [**peer** [**group** *string*] [**hostname** *string*] [**ipv4** *ipaddress*] [**subnet** *subnet mask*] [**username** *string*]] [**spi** *integer*] [**reset**]
3. **show crypto debug-condition** {[**peer**] [**connid**] [**spi**] [**fvr**] [**ivr**] [**unmatched**]}
4. **debug crypto isakmp**
5. **debug crypto ipsec**
6. **debug crypto engine**
7. **debug crypto condition unmatched** [**isakmp** | **ipsec** | **engine**]

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<p><b>enable</b></p> <p><b>Example:</b></p> <pre>Router&gt; enable</pre>	<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 crypto condition</b> [<b>connid</b> <i>integer</i> <b>engine-id</b> <i>integer</i>] [<b>flowid</b> <i>integer</i> <b>engine-id</b> <i>integer</i>] [<b>fvrif</b> <i>string</i>] [<b>ivrf</b> <i>string</i>] [<b>peer</b> [<b>group</b> <i>string</i>] [<b>hostname</b> <i>string</i>] [<b>ipv4</b> <i>ipaddress</i>] [<b>subnet</b> <i>subnet mask</i>] [<b>username</b> <i>string</i>]] [<b>spi</b> <i>integer</i>] [<b>reset</b>]</p> <p><b>Example:</b></p> <pre>Router# debug crypto condition connid 2000 engine-id 1</pre>	<p>Defines conditional debug filters.</p>
Step 3	<p><b>show crypto debug-condition</b> {[<b>peer</b>] [<b>connid</b>] [<b>spi</b>] [<b>fvrif</b>] [<b>ivrf</b>] [<b>unmatched</b>]}</p> <p><b>Example:</b></p> <pre>Router# show crypto debug-condition spi</pre>	<p>Displays crypto debug conditions that have already been enabled in the router.</p>
Step 4	<p><b>debug crypto isakmp</b></p> <p><b>Example:</b></p> <pre>Router# debug crypto isakmp</pre>	<p>Enables global IKE debugging.</p>
Step 5	<p><b>debug crypto ipsec</b></p> <p><b>Example:</b></p> <pre>Router# debug crypto ipsec</pre>	<p>Enables global IPsec debugging.</p>
Step 6	<p><b>debug crypto engine</b></p> <p><b>Example:</b></p> <pre>Router# debug crypto engine</pre>	<p>Enables global crypto engine debugging.</p>
Step 7	<p><b>debug crypto condition unmatched</b> [<b>isakmp</b>   <b>ipsec</b>   <b>engine</b>]</p> <p><b>Example:</b></p> <pre>Router# debug crypto condition unmatched ipsec</pre>	<p>(Optional) Displays debug conditional crypto messages when no context information is available to check against debug conditions.</p> <p>If none of the optional keywords are specified, all crypto-related information will be shown.</p>

## Enabling Crypto Error Debug Messages

To enable crypto error debug messages, you must perform the following tasks.

### debug crypto error CLI

Enabling the **debug crypto error** command displays only error-related debug messages, thereby, allowing you to easily determine why a crypto operation, such as an IKE negotiation, has failed within your system.



**Note** When enabling this command, ensure that global crypto debug commands are not enabled; otherwise, the global commands will override any possible error-related debug messages.

### SUMMARY STEPS

1. **enable**
2. **debug crypto isakmp | ipsec | engine} error**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>debug crypto isakmp   ipsec   engine} error</b>  <b>Example:</b> Router# debug crypto ipsec error	Enables only error debugging messages for a crypto area.

## Configuration Examples for the Crypto Conditional Debug CLIs

### Enabling Crypto Conditional Debugging Example

The following example shows how to display debug messages when the peer IP address is 10.1.1.1, 10.1.1.2, or 10.1.1.3, and when the connection-ID 2000 of crypto engine 0 is used. This example also shows how to

enable global debug crypto CLIs and enable the **show crypto debug-condition** command to verify conditional settings.

```
Router#
debug crypto condition connid 2000 engine-id 1
Router#
debug crypto condition peer ipv4 10.1.1.1
Router#
debug crypto condition peer ipv4 10.1.1.2
Router#
debug crypto condition peer ipv4 10.1.1.3
Router#
debug crypto condition unmatched
! Verify crypto conditional settings.
Router#
show crypto debug-condition
Crypto conditional debug currently is turned ON
IKE debug context unmatched flag:ON
IPsec debug context unmatched flag:ON
Crypto Engine debug context unmatched flag:ON
IKE peer IP address filters:
10.1.1.1 10.1.1.2 10.1.1.3
Connection-id filters:[connid:engine_id]2000:1,
! Enable global crypto CLIs to start conditional debugging.
Router#
debug crypto isakmp
Router#
debug crypto ipsec
Router#
debug crypto engine
```

## Disabling Crypto Conditional Debugging Example

The following example shows how to disable all crypto conditional settings and verify that those settings have been disabled:

```
Router#
debug crypto condition reset
! Verify that all crypto conditional settings have been disabled.
Router#
show crypto debug-condition
Crypto conditional debug currently is turned OFF
IKE debug context unmatched flag:OFF
IPsec debug context unmatched flag:OFF
Crypto Engine debug context unmatched flag:OFF
```

## Additional References

The following sections provide references to the Crypto Conditional Debug Support feature.

### Related Documents

Related Topic	Document Title
IPSec and IKE configuration tasks	“ Internet Key Exchange for IPsec VPNs “ module in the <i>Cisco IOS XE Security Configuration Guide: Secure Connectivity</i>
IPSec and IKE commands	<i>Cisco IOS Security Command Reference</i>

**Standards**

Standards	Title
None	--

**MIBs**

MIBs	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS XE releases, and feature sets, use Cisco MIB Locator found at the following URL: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

**RFCs**

RFCs	Title
None	--

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



## Feature Information for Crypto Conditional Debug Support

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.

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**Table 2: Feature Information for Crypto Conditional Debug Support**

Feature Name	Releases	Feature Information
Crypto Conditional Debug Support	Cisco IOS XE Release 2.1	The Crypto Conditional Debug Support feature introduces three new command-line interfaces (CLIs) that allow users to debug an IP Security (IPSec) tunnel on the basis of predefined crypto conditions such as the peer IP address, connection-ID of a crypto engine, and security parameter index (SPI).

