Security Configuration Guide: Unified Threat Defense, Cisco IOS Release 15M&T

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

CONTENTS

CHAPTER 1

Cisco Firepower Threat Defense for ISR

Cisco Firepower Threat Defense is Cisco's premier network security option. It provides a comprehensive suite of security features such as firewall capabilities, monitoring, alerts, Intrusion Detection System (IDS) and Intrusion Prevention System (IPS).

This module describes how to configure and deploy IDS on Cisco Integrated Services Routers (ISRs).

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. An account on Cisco.com is not required.

Restrictions for Cisco Firepower Threat Defense for ISR

- Multicast traffic is not inspected.
- IPv6 traffic cannot be exported.

Information About Cisco Firepower Threat Defense for ISR

Cisco Firepower Threat Defense for ISR Overview

Cisco Firepower Threat Defense is a premier security solution that provides enhanced inspection for packet flows.

The Cisco Firepower Threat Defense solution consists of the following two entities:

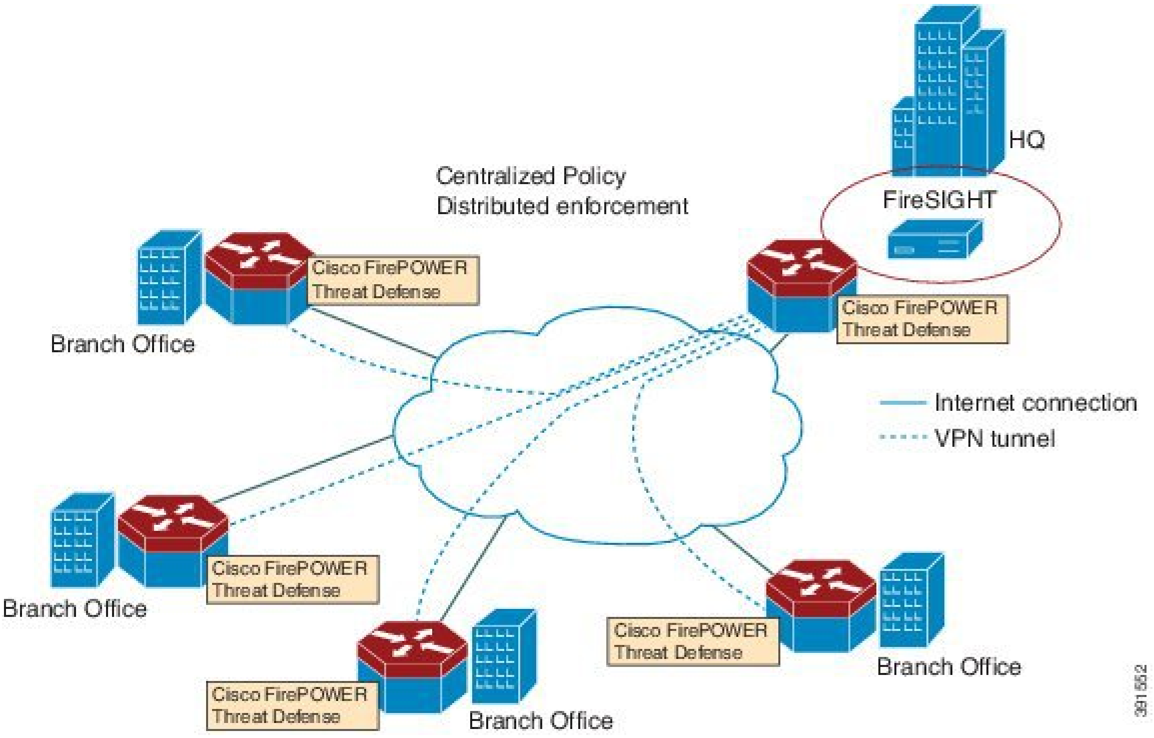
- Cisco FireSIGHT—A centralized policy and reporting entity that can run anywhere in the network. This can be the Cisco FireSIGHT appliance or a virtual installation on a server class machine.
- Virtual Firepower sensor—Security entities that implement policies, and send events and statistics back to the defense center. The Firepower sensor is hosted on Cisco Unified Computing System (UCS) E-Series Blade. Both the FireSIGHT and sensor are distributed as virtual packages.

UCS E-Series Blades are general purpose blade servers that are housed within Cisco Integrated Services Routers (ISR) Generation 2 (G2) and Cisco ISR 4000 Series Integrated Services Routers. These blades can be deployed either as bare-metal on operating systems or as virtual machines on hypervisors. There are two internal interfaces that connect a router to an UCS E-Series Blade. On ISR G2, Slot0 is a Peripheral Component Interconnet Express (PCIe) internal interface, and UCS E-Series Slot1 is a switched interface connected to the backplane Multi Gigabit Fabric (MGF). In Cisco ISR 4000 Series Routers, both internal interfaces are connected to the MGF.

A hypervisor is installed on the UCS E-Series Blade, and Cisco Firepower Threat Defense runs as a virtual machine on it. The Cisco Firepower Threat Defense OVA file is directly installed on the UCS E-Series Blade using the hypervisor operating system. Cisco Firepower Threat Defense runs as an anonymous inline device with no additional communication with the router. Traffic is diverted from the ingress physical interface to the Cisco Firepower Threat Defense that runs on the UCS E-Series Blade.

The following figure shows a Cisco Firepower Threat Defense deployment scenario. In this figure, the traffic lines between sensors and FireSIGHT are control connections. Packets are routed through these connections using router forwarding rules.

Figure 1: Cisco Firepower Threat Defense Deployment Scenario


HQ
Centralized Policy
Distributed enforcement
FireSIGHT
Cisco FirePOWER Threat Defense
Branch Office
Cisco FirePOWER Threat Defense
Internet connection
VPN tunnel
Cisco FirePOWER Threat Defense
Branch Office
Cisco FirePOWER Threat Defense
Cisco FirePOWER Threat Defense
Branch Office
Branch Office
391552

By default, the virtualized Cisco Firepower sensor comes with three interfaces, one for management, and two others for traffic analysis. These interfaces must be mapped to the UCS E-Series interfaces.

Hardware and Software Requirements for Cisco Firepower Threat Defense

The following hardware is required to run the Cisco Firepower Threat Defense solution:

- Cisco Firepower Sensor version 5.4
- Cisco Integrated Services Routers (ISR) 4000 Series Routers
- Cisco Unified Computing System (UCS) E-Series Blade
- Cisco FireSIGHT

The following software is required to run the Cisco Firepower Threat Defense solution:

- UCS-E hypervisor
- ESXi 5.0.0, 5.1.0, or 5.5.0
- Cisco Firepower Sensor version Cisco IOS XE Release 3.14S and later releases

- Cisco FireSIGHT version 5.2, 5.3 or 5.4. FireSIGHT only supports the current version and is backward compatible with only the previous version. In case, your Cisco Firepower Sensor version is 5.4, then you have to use FireSIGHT version 5.4 or 5.3.

IDS Packet Flow on ISR G2 Routers

IDS monitors the traffic that passes through devices, and generates alerts when intrusions are detected. In IDS mode, traffic is copied to the sensor and is analyzed for threats. IDS mode cannot enforce policies; it can detect and report violations. In IDS mode, traffic is replicated from interfaces and redirected to Cisco FirePOWER Threat Defense that runs on the Cisco UCS E-Series Blade.

In Cisco Integrated Services Routers (ISR) Generation 2 (G2), Cisco FirePOWER Threat Defense uses Router IP Traffic Export (RITE) to copy packets and redirect traffic over a Layer-2 link. RITE allows you to configure routers to export IP packets received on multiple, simultaneous WAN or LAN interfaces. The unaltered IP packets are exported on a single LAN or VLAN interface, thereby, easing the deployment of protocol analyzers and monitoring devices.

Following are the limitations of RITE:

- When IP traffic export is enabled, and packets are captured and transmitted across an interface, a delay occurs on the outbound interface. Performance delays increase with the number of interfaces that are monitored, and the number of destination hosts.
- The MAC address of the device (device is Cisco FirePOWER Threat Defense interface in passive mode) that receives the exported traffic must be on the same VLAN or directly connected to one of the router interfaces.
- The outgoing interface for exported traffic must be an Ethernet interface. Incoming (or monitored) traffic can traverse any interface.

How to Deploy Cisco Firepower Threat Defense for ISR

To deploy Cisco Firepower Threat Defense Intrusion Detection System (IDS), perform the following tasks:

1. Obtain the Firepower sensor package.
2. Install the Firepower sensor package through a hypervisor, such as VMWare VSphere.
3. Configure router interfaces for traffic redirection.
    - Bridge-Domain interface (BDI) configuration for Cisco ISR 4000 Series Routers.
    - VLAN configuration for Cisco ISR Generation 2 routers.
4. Bootstrap the Firepower sensor.
5. Configure a policy in Cisco FireSIGHT.
    - The policy is configured through the FireSIGHT GUI.
6. Enable inspection.

Obtaining the Firepower Sensor Package

To deploy the Firepower sensor on an Unified Computing System (UCS) E-Series Blade, download and save the OVA file. OVA is an Open Virtualization Archive that contains a compressed and installable version of a virtual machine. Download the OVA file from https://support.sourcefire.com/sections/1/sub_sections/51#5-2-virtual-appliances.

Installing the Firepower Sensor OVA File

Install the Firepower Sensor OVA on a UCS E-Series Blade, using a hypervisor, such as VMWare VSphere.

Installing Cisco FirePOWER Threat Defense on UCS E-Series Blade for Cisco ISR G2 Routers

This section describes how to install Cisco FirePOWER Threat Defense on Cisco Unified Computing System (UCS) E-Series Blade that is installed on Cisco ISR Generation 2 Routers:

1. Install the card.
2. Verify that the card is running by using the **show inventory** command.
3. Configure the Cisco Integrated Management Controller (CIMC) port.
   The CIMC GUI is a web-based management interface for E-Series Servers. You can launch the CIMC GUI to manage the server from any remote host that meets the following minimum requirements:

   - Java 1.6 or later
   - HTTP or HTTPS-enabled
   - Adobe Flash Player 10 or later

   The CMIC runs on the port that is named management. To bootstrap this port with an IP address, use the following configuration:

   ```
   interface ucse2/0
    imc access-port dedicated
    imc ip-address 10.66.152.158 255.255.255.0
   !
   ```

   Connect to the CMIC through the browser by using the default login and password, which are admin and password, respectively. Based on the configuration example, the browser here is https://10.66.152.158.

4. Install ESXi.
   Download the ESXi image for your Cisco UCS E-Series Blade from https://my.vmware.com/web/vmware/details?downloadGroup=CISCO-ESXI-5.1.0-GA-25SEP2012&productId=284.

5. Install FirePOWER Sensor by using a hypervisor, such as VMWare VSphere on the Cisco UCS E-Series Blade.
6. Configure traffic redirect. For more information, see the section “Configuring Traffic Redirect for Firepower Threat Defense on Cisco ISR G2 Routers”.
7. Configure the VMWare vSwitch. The Virtual Machine Network Interface Card (VMNIC) mapping is as follows:

   - VMNIC0—Router Peripheral Component Interconnect Express (PCIe) interface (UCS 1/0/0)
   - VMNIC1—Router Multi-Gigabit Fabric (MGF) VLAN interface (UCS 1/0/1)

- VMNIC2—Front panel GigabitEthernet port
- VMNIC3—Front panel GigabitEthernet port.

Note VMNIC3 is only available on UCS E-Series 140D, 160Dm and 180D.

Configuring Traffic Redirect for Cisco FirePOWER Threat Defense on ISR G2

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip vrf** *vrf-name*
4. **rd** *route-distinguisher*
5. **exit**
6. **interface** *type number*
7. **ip address** *ip-address mask*
8. **exit**
9. **interface** *type number*
10. **ip address** *ip-address mask*
11. **exit**
12. **interface** *type number*
13. **ip vrf forwarding** *name*
14. **ip address** *ip-address mask*
15. **exit**
16. **interface** *type number*
17. **description** *string*
18. **switchport mode** {**access** | **trunk**}
19. **no ip address**
20. **exit**
21. **interface** *type number*
22. **ip address** *ip-address mask*
23. **exit**
24. **interface** *type number*
25. **ip address** *ip-address mask*
26. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip vrf** *vrf-name* **Example:** `Router(config)# ip vrf vrf1`	Defines a VPN routing and forwarding (VRF) instance and enters VRF configuration mode.
Step 4	**rd** *route-distinguisher* **Example:** `Router(config-vrf)# rd 100:1`	Specifies a route distinguisher (RD) for a VRF instance.
Step 5	**exit** **Example:** `Router(config-vrf)# exit`	Exits VRF configuration mode and returns to global configuration mode.
Step 6	**interface** *type number* **Example:** `Router(config)# interface gigabitethernet 0/0`	Configures an interface and enters interface configuration mode. • This is the incoming interface.
Step 7	**ip address** *ip-address mask* **Example:** `Router(config-if)# ip address 10.1.1.1 255.255.255.0`	Sets a primary or secondary IP address for an interface.
Step 8	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 9	**interface** *type number* **Example:** `Router(config)# interface gigabitethernet 0/1`	Configures an interface and enters interface configuration mode. • This is the outgoing interface.
Step 10	**ip address** *ip-address mask* **Example:** `Router(config-if)# ip address 10.2.1.1 255.255.255.0`	Sets a primary or secondary IP address for an interface.

	Command or Action	Purpose
Step 11	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 12	**interface** *type number* **Example:** `Router(config)# interface ucse 2/0`	Configures an interface and enters interface configuration mode. • This is a Layer 3 interface that is associated with one of the data interfaces of Cisco FirePOWER Threat Defense.
Step 13	**ip vrf forwarding** *name* **Example:** `Router(config-if)# ip vrf forwarding vrf1`	Associates a VRF instance with an interface or subinterface.
Step 14	**ip address** *ip-address mask* **Example:** `Router(config-if)# ip address 192.0.2.2 255.255.255.0`	Sets a primary or secondary IP address for an interface.
Step 15	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 16	**interface** *type number* **Example:** `Router(config)# interface ucse 2/1`	Configures an interface and enters interface configuration mode. • This is a Layer 2 interface to which an IP address is assigned by using VLAN interfaces.
Step 17	**description** *string* **Example:** `Router(config-if)# description internal switch module connected to a Service Module`	Adds a description to an interface configuration.

Step 18	**switchport mode** {**access** | **trunk**}
	Example:
	`Router(config-if)# switchport mode trunk`
		Specifies a trunking VLAN Layer 2 interface.

Step 19	**no ip address** **Example:** `Router(config-if)# no ip address`	Removes an IP address or disables IP processing on an interface.
Step 20	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.

	Command or Action	Purpose
Step 21	**interface** *type number* **Example:** `Router(config)# interface vlan 1`	Configures an interface and enters interface configuration mode. • This interface provides management connectivity to Cisco FirePOWER Threat Defense, and is associated with the Ethernet 0 interface of Cisco FirePOWER Threat Defense.
Step 22	**ip address** *ip-address mask* **Example:** `Router(config-if)# ip address 172.16.1.1 255.255.255.0`	Sets a primary or secondary IP address for an interface.
Step 23	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 24	**interface** *type number* **Example:** `Router(config)# interface vlan 10`	Configures an interface and enters interface configuration mode. • This interface is associated to the other data interface of Cisco FirePOWER Threat Defense.
Step 25	**ip address** *ip-address mask* **Example:** `Router(config-if)# ip address 192.0.2.1 255.255.255.0`	Sets a primary or secondary IP address for an interface. • The IP address of interface VLAN 10 and the IP of interface ucse 2/0 interface must be in the same subnet.

Step 26	**end**
	Example:
	`Router(config-if)# end`
		Exits interface configuration mode and returns to privileged EXEC mode.

Bootstrapping the Firepower Sensor

You must configure the Firepower Sensor manually. Perform this task to configure a Firepower sensor to communicate with FireSIGHT. For more information, see https://support.sourcefire.com/sections/10.

A sensor running on a Cisco Unified Computing System (UCS) E-Series Blade is bootstrapped by logging into the console of the Firepower Sensor virtual machine through VSphere.

Note Firepower Sensor must be installed and deployed before bootstrapping it.

SUMMARY STEPS

1. Provide the default username and password to login.
2. **configure network ipv4 manual** *ip-address network-mask default-gateway*
3. **configure network dns servers** *dns-server*
4. **configure network dns searchdomains** *domain-name*
5. **configure manager add** *dc-hostname registration-key*

DETAILED STEPS

	Command or Action	Purpose
Step 1	Provide the default username and password to login.	To configure the sensor, the default username and password are admin and Sourcefire, respectively. • You must change the admin password after you login to the Firepower Sensor the first time.
Step 2	**configure network ipv4 manual** *ip-address network-mask default-gateway* **Example:** `Device# configure network ipv4 manual 10.66.152.137 255.255.255.0 10.66.152.1`	Configures network connectivity.
Step 3	**configure network dns servers** *dns-server* **Example:** `Device# configure network dns servers 192.10.26.10`	Configures domain name system (DNS) servers.
Step 4	**configure network dns searchdomains** *domain-name* **Example:** `Device# configure network dns searchdomains cisco.com`	Configures DNS search domains.
Step 5	**configure manager add** *dc-hostname registration-key* **Example:** `Device# configure manager sourcefire-dc.cisco.com cisco-sf`	Associates the sensor with the FireSIGHT. • The *registration key* is a string selected by the user that is later used to register the sensor with FireSIGHT.

Example

The following is sample output from the **show network** command that displays the configured network settings of the Firepower Sensor:

```
Device# show network

---------------------------------------------------
IPv4
```

```
Configuration             : manual
Address                   : 10.66.152.137
Netmask                   : 255.255.255.0
Gateway                   : 10.66.152.1
MAC Address               : 44:03:A7:43:05:AD
Management port           : 8305
----------------------------------------------------
IPv6
Configuration             : disabled
Management port           : 8305
----------------------------------------------------
```

The following is sample output from the **show dns** command that displays the configured DNS settings:

```
Device# show dns

search cisco.com
nameserver 192.10.26.10
```

The following is sample output from the **show managers** command that displays the configured management settings:

```
Device# show managers

Host                      : sourcefire-dc.cisco.com
Registration Key          : cisco-sf
Registration              : pending
RPC Status                :
```

Enabling IDS Inspection Globally on ISR G2

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **utd**
4. **mode ids-global**
5. **ids** *mac-address*
6. **ids redirect interface** *interface -type interface-number*
7. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**utd** **Example:** `Router(config)# utd`	Enables unified threat defense (UTD) global mode and enters unified threat defense configuration mode.
Step 4	**mode ids-global** **Example:** `Router(config)# mode ids-global`	Enables the unified threat defense (UTD) functionality on all traffic through a device.
Step 5	**ids** *mac-address* **Example:** `Router(config-utd)# ids 000b.3456.234b`	Enables Intrusion Detection System (IDS) on an interface. • This is the MAC address of the data interface of Cisco FirePOWER Threat Defense that is associated with the UCSE 2/0 interface.
Step 6	**ids redirect interface** *interface -type interface-number* **Example:** `Router(config-utd)# ids redirect interface ucse 2/0`	Configures IDS traffic redirect on an interface.

Step 7	**end**
	Example:
	`Router(config-utd)# end`
		Exits unified threat defense configuration mode and returns to privileged EXEC mode.

Enabling IDS Inspection per Interface on ISR G2

Based on your requirements, you can configure unified threat defense (UTD) Intrusion Detection System (IDS) inspection at a global level or at an interface level.

- You cannot enable UTD IDS inspection on dedicated management interfaces.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **utd**
4. **ids** *mac-address*
5. **ids redirect interface** *interface -type interface-number*
6. **exit**
7. **interface** *type number*
8. **utd ids**
9. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**utd** **Example:** `Router(config)# utd`	Enters unified threat defense configuration mode.
Step 4	**ids** *mac-address* **Example:** `Router(config-utd)# ids 12ab.47dd.ff89`	Enables Intrusion Detection System (IDS) on an interface. • This is the MAC address of the data interface of Cisco FirePOWER Threat Defense that is associated with the UCSE 2/0 interface.
Step 5	**ids redirect interface** *interface -type interface-number* **Example:** `Router(config-utd)# ids redirect interface ucse 2/0`	Configures IDS traffic redirect on an interface. • On ISR G2 routers, Cisco FirePOWER Threat Defense is deployed on Cisco UCS E-Series blade.
Step 6	**exit** **Example:** `Router(config-utd)# exit`	Exits unified threat defense configuration mode and returns to global configuration mode.

	Command or Action	Purpose
Step 7	**interface** *type number* **Example:** `Router(config)# interface gigabitethernet 0/0`	Configures an interface and enters interface configuration mode.
Step 8	**utd ids** **Example:** `Router(config-if)# utd ids`	Configures UTD IDS inspection for the GigabitEthernet interface.

Step 9	**end**
	Example:
	`Router(config-if)# end`
		Exits interface configuration mode and returns to privileged EXEC configuration mode.

Configuration Examples for Cisco Firepower Threat Defense on ISR

Example: Configuring Traffic Redirect for Cisco FirePOWER Threat Defense on ISR G2

```
Router# configure terminal
Router(config)# ip vrf vrf1
Router(config-vrf)# rd 100:1
Router(config-vrf)# exit
Router(config)# interface gigabitethernet 0/0
Router(config-if)# ip address 10.1.1.1 255.255.255.0
Router(config-if)# exit
Router(config)# interface gigabitethernet 0/1
Router(config-if)# ip address 10.2.1.1 255.255.255.0
Router(config-if)# exit
Router(config)# interface ucse 2/0
Router(config-if)# ip vrf forwarding vrf1
Router(config-if)# ip address 192.0.2.2 255.255.255.0
Router(config-if)# exit
Router(config)# interface ucse 2/1
Router(config-if)# description internal switch module connected to a Service Module
Router(config-if)# switchport mode trunk
Router(config-if)# no ip address
Router(config-if)# exit
Router(config)# interface vlan 1
Router(config-if)# ip address 172.16.1.1 255.255.255.0
Router(config-if)# exit
Router(config)# iinterface vlan 10
Router(config-if)# ip address 192.0.2.1 255.255.255.0
Router(config-if)# end
```

Example: Enabling IDS Inspection Globally on ISR G2

```
Router# configure terminal
Router(config)# utd
Router(config-utd)# mode ids-global
Router(config-utd)# ids 000b.3456.234b
Router(config-utd)# ids redirect ucse 2/0
Router(config-utd)# end
```

Example: Enabling IDS Inspection per Interface on ISR G2

```
Router# configure terminal
Router(config)# utd
Router(config-utd)# ids 12ab.47dd.ff89
Router(config-utd)# ids redirect ucse 2/0
Router(config-utd)# exit
Router(config)# interface gigabitethernet 0/0
Router(config-if)# utd ids
Router(config-if)# end
```

Additional References for Cisco Firepower Threat Defense for ISR

Related Documents

Related Topic	Document Title
IOS commands	Cisco IOS Master Command List, All Releases
Security commands	• Cisco IOS Security Command Reference: Commands A to C • Cisco IOS Security Command Reference: Commands D to L • Cisco IOS Security Command Reference: Commands M to R • Cisco IOS Security Command Reference: Commands S to Z
UCS E-Series Servers	http://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/e/2-0/gs/guide/b_2_0_Getting_Started_Guide.html

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/support

Feature Information for Cisco Firepower Threat Defense for ISR

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 1: Feature Information for Cisco Firepower Threat Defense for ISR

Feature Name	Releases	Feature Information
Cisco Firepower Threat Defense for ISR	Cisco IOS Release 15.5(1)T	Cisco Firepower Threat Defense is a premier network security option. It provides a comprehensive suite of Security features such as firewall capabilities, monitoring, alerts, Intrusion Detection System (IDS) and Intrusion Prevention System (IPS). The following command was introduced or modified: **ids**, **utd**.