Configuring a Connection Between the Router and the E-Series Server or NCE

Depending on whether you want the traffic to flow through the router or not, do one of the following:

- If you *do not want* the traffic to your application or operating system to flow through the router, use the server's host operating system to configure the E-Series Server's or NCE's external interface.
- If you *want* the traffic to your application or operating system to flow through the router, use the procedures provided in this chapter to configure an internal connection between the router and the E-Series Server or NCE.

This chapter includes the following sections:

- Configuring an Internal Connection Between the Cisco ISR G2 and the E-Series Server, on page 1
- Configuring an Internal Connection Between the Cisco ISR 4000 Series and the E-Series Server, on page 4
- Configuring an Internal Connection Between the Cisco ISR G2 and the EHWIC E-Series NCE, on page 10
- Configuring an Internal Connection Between the Cisco ISR 4000 Series and the NIM E-Series NCE, on page 13
- Understanding Network Interface Mapping, on page 20
- Determining the MAC Address in Microsoft Windows, Linux, and VMware vSphere Hypervisor , on page 22

Configuring an Internal Connection Between the Cisco ISR G2 and the E-Series Server

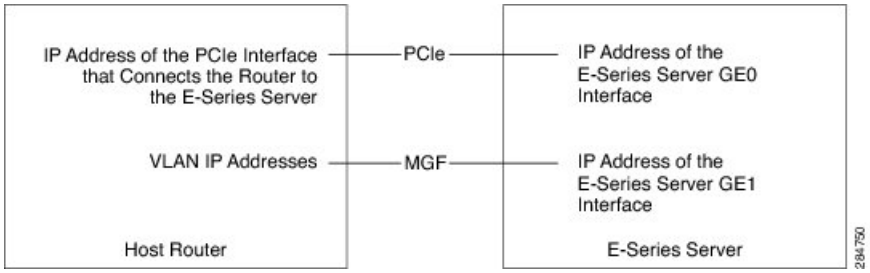
Use this configuration if you want the traffic to your application or operating system to flow through the Cisco ISR G2. To configure an internal connection between the Cisco ISR G2 and the E-Series Server, you must configure these IP addresses:

- For traffic to flow through the PCIe connection (see next figure), configure the following:
  - IP address of the router's internal PCIe interface that connects the router to the E-Series Server's GE0 interface.
  - IP address of the E-Series Server's GE0 interface.

- For traffic to flow through the MGF connection (see next figure), configure the following:
  - IP address of the router's internal MGF VLAN interface.
  - IP address of the E-Series Server's GE1 interface.

The following figure shows the internal connection between the router and the E-Series Server.

Figure 1: Internal Connection Between the Cisco ISR G2 and the E-Series Server



Procedure

	Command or Action	Purpose
Step 1	Router> **enable**	Enters privileged EXEC mode on the host router. Enter your password if prompted.
Step 2	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 3	Router (config)# **interface ucse** *slot*/**0**	Enters interface configuration mode for the router's PCIe *slot*/**0** interface.
Step 4	Enter one of the following commands: • Router (config-if)# **ip address** *router-to-e-series-server-interface-ip-address subnet-mask* • Router (config-if)# **ip unnumbered** *type number*	The **ip address** command specifies the IP address of the router's internal PCIe interface that connects the router to the E-Series Server's GE0 interface. See the figure above. or The **ip unnumbered** command enables IP processing on an interface without assigning an explicit IP address to that interface. • *type*—Type of interface on which the router has an assigned IP address. • *number*—Number of the interface on which the router has an assigned IP address. **Note** The unnumbered interface must be unique. It cannot be another unnumbered interface.

	Command or Action	Purpose
		Caution The **ip unnumbered** command creates a point-to-point interface between devices. Broadcasting is not supported.
Step 5	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 6	Router (config-if)# **end**	Exits interface configuration mode.
Step 7	Use the server's operating system to configure the E-Series Server's **GE0** interface. See the figure above.	—
Step 8	Router (config)# **interface ucse** *slot*/**1**	Enters interface configuration mode for the router's MGF *slot*/**1** VLAN interface. See the figure above.
Step 9	Router (config-if)# **switchport mode trunk**	Puts the port into permanent trunking mode. The default configuration is access mode.
Step 10	Router (config-if)# **[switchport trunk allowed vlan** *vlan-numbers***]**	(Optional) Allows trunking on the specified VLANs. • *vlan-numbers*—VLAN numbers on which to allow trunking.
Step 11	Router (config-if)# **exit**	Exits interface configuration mode.
Step 12	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 13	Router (config)# **interface vlan** *vlan-number*	Enters interface configuration mode for the specified VLAN number.
Step 14	Router (config-if)# **ip address** *vlan-ip-address subnet-mask*	Specifies the IP address for the VLAN. See the figure above. • *vlan-ip-address*—IP address of the VLAN. • *subnet-mask*—Subnet mask to append to the IP address.
Step 15	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 16	Router (config-if)# **end**	Exits interface configuration mode.
Step 17	Use the server's operating system to configure the E-Series Server's **GE1** interface. See figure above.	—

Example

This example shows how to configure an internal connection between the router and the E-Series Server.

Note The IP addresses in this configuration example are for reference only and might not be valid.

```
Router> enable
Router# configure terminal

Router(config)# interface ucse 1/0
Router(config-if)# ip address 10.0.0.1 255.0.0.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the E-Series Server's GE0 interface

Router(config)# interface ucse 1/1
Router(config-if)# switchport mode trunk
Router(config-if)# exit

Router# configure terminal
Router(config)# interface vlan 1
Router(config-if)# ip address 20.0.0.1 255.255.255.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the E-Series Server's GE1 interface.
```

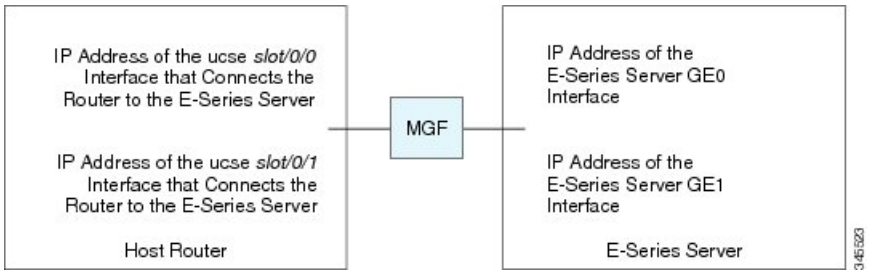
Configuring an Internal Connection Between the Cisco ISR 4000 Series and the E-Series Server

Use this configuration if you want the traffic to your application or operating system to flow through the Cisco ISR 4000 series. To configure an internal connection between the Cisco ISR 4000 series and the E-Series Server, you must configure these IP addresses:

- For traffic to flow through the router's **ucse** *slot*/**0/0** and the E-Series Server's internal GE0 interface (see next figure), configure the following:
  - IP address of the router's **ucse** *slot*/**0/0** interface that connects the router to the E-Series Server's GE0 interface.
  - IP address of the E-Series Server's GE0 interface.
- For traffic to flow through the router's **ucse** *slot*/**0/1** and the E-Series Server's internal GE1 interface (see next figure), configure the following:
  - IP address of the router's **ucse** *slot*/**0/1** interface.
  - IP address of the E-Series Server's GE1 interface.

The following figure shows the internal connection between the router and the E-Series Server.

Figure 2: Internal Connection Between the Cisco ISR 4000 Series and the E-Series Server



Procedure

	Command or Action	Purpose
Step 1	Router> **enable**	Enters privileged EXEC mode on the host router. Enter your password if prompted.
Step 2	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 3	Router (config)# **interface ucse** *slot*/**0/0**	Enters interface configuration mode for the router's ucse *slot*/**0/0** interface.
Step 4	Enter one of the following commands: • Router (config-if)# **ip address** *router-to-e-series-server-interface-ip-address subnet-mask* • Router (config-if)# **ip unnumbered** *type number*	Specify the IP address of the router's **ucse** *slot* **0/0** interface that connects the router to the E-Series Server's GE0 interface. See the figure above. or The **ip unnumbered** command enables IP processing on an interface without assigning an explicit IP address to that interface. • *type*—Type of interface on which the router has an assigned IP address. • *number*—Number of the interface on which the router has an assigned IP address. **Note** The unnumbered interface must be unique. It cannot be another unnumbered interface. **Caution** The **ip unnumbered** command creates a point-to-point interface between devices. Broadcasting is not supported.
Step 5	Router (config-if)# **no shut**	Causes the interface to be administratively up.

	Command or Action	Purpose
Step 6	Router (config-if)# **end**	Exits interface configuration mode.
Step 7	Use the server's operating system to configure the E-Series Server's **GE0** interface. See the figure above.	—
Step 8	Router (config)# **interface ucse** *slot*/**0/1**	Enters interface configuration mode for the router's ucse *slot*/**0/1** interface. See the figure above.
Step 9	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 10	Router (config-if)# **end**	Exits interface configuration mode.
Step 11	Use the server's operating system to configure the E-Series Server's **GE1** interface. See the figure above.	—

Example

This example shows how to configure an internal connection between the router and the E-Series Server.

Note The IP addresses in this configuration example are for reference only and might not be valid.

```
Router> enable
Router# configure terminal

Router(config)# interface ucse 1/0/0
Router(config-if)# ip address 10.0.0.1 255.0.0.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the E-Series Server's GE0 interface.

Router(config)# interface ucse 1/0/1
Router(config-if)# ip address 11.0.0.1 255.255.255.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the E-Series Server's GE1 interface.
```

Creating an Ethernet Virtual Circuit Between the E-Series Server and the Cisco ISR 4000 Series Using the Native VLAN

Use this procedure if you have added the native VLAN to encapsulate and transport selected data either to the operating system installed on the E-Series Server, or to the virtual machines created on the installed hypervisor.

Before you begin

Configure an internal connection between the Cisco ISR 4000 series and the E-Series Server.

Procedure

	Command or Action	Purpose
Step 1	Router> **enable**	Enters privileged EXEC mode on the host router. Enter your password if prompted.
Step 2	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 3	Router (config)# **interface ucse** *slot*/**0/0**	Enters interface configuration mode for the router's ucse *slot*/**0/0** interface.
Step 4	Router (config-if)# **service instance** *id* **ethernet**	Configures an Ethernet service instance on an interface and enters Ethernet service configuration mode.
Step 5	Router (config-if-srv)# **encapsulation** *encapsulation-type vlan-id*	Defines the encapsulation type.
Step 6	Router (config-if-srv)# **bridge-domain** *bridge-id*	Configures the bridge domain.
Step 7	Router (config-if-srv)# **exit**	Exits Ethernet service configuration mode.
Step 8	Router (config-if)# **interface BDI** *bridge-id*	Enters the bridge domain interface.
Step 9	Router (config-if)# **ip address** *bdi-interface-ip-address*	Specifies the IP address of the BDI interface.
Step 10	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 11	Router (config-if)# **end**	Returns to global configuration mode on the host router.
Step 12	Use the server's operating system to configure the E-Series Server's **GE0** interface.	—

Example

This example shows how to create an Ethernet Virtual Circuit using the native VLAN between the E-Series Server and the Cisco ISR 4000 series.

Note The IP addresses in this configuration example are for reference only.

```
Router> enable
Router# configure terminal
```

```
Router(config)# interface ucse 1/0/0
Router(config-if)# service instance 1 ethernet
Router(config-if-srv)# encapsulation untagged
Router(config-if-srv)# bridge-domain 1
Router(config-if-srv)# exit
Router(config-if)# exit

Router(config-if)# interface BDI 1
Router(config-if)# ip address 10.0.0.1 255.0.0.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the E-Series Server's GE0 interface.
```

Creating an Ethernet Virtual Circuit Between the E-Series Server and the Cisco ISR 4000 Series Using a Non-Native VLAN

Use this procedure if you have added a non-native VLAN to encapsulate and transport selected data either to the operating system installed on the E-Series Server, or to the virtual machines created on the installed hypervisor.

Before you begin

Configure an internal connection between the E-Series Server and the Cisco ISR 4000 series.

Procedure

	Command or Action	Purpose
Step 1	Router> **enable**	Enters privileged EXEC mode on the host router. Enter your password if prompted.
Step 2	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 3	Router (config)# **interface ucse** *slot*/**0/0**	Enters interface configuration mode for the router's ucse *slot*/**0/0** interface.
Step 4	Router (config-if)# **no ip address**	Removes an IP address or disables IP processing.
Step 5	Router (config-if)# **no negotiation auto**	Disables automatic negotiation on the interface.
Step 6	Router (config-if)# **switchport mode trunk**	Puts the port into permanent trunking mode.
Step 7	Router (config-if)# **service instance** *id* **ethernet**	Configures an Ethernet service instance on an interface and enters Ethernet service configuration mode.
Step 8	Router (config-if-srv)# **encapsulation dot1q** *encapsulation-type vlan-id*	Defines the encapsulation type.
Step 9	Enter one of the following commands:	• The **rewrite egress tag push dot1q** command specifies the encapsulation

	Command or Action	Purpose
	• Router (config-if-srv)# **rewrite egress tag push dot1q** *encapsulation-type vlan-id* • Router (config-if-srv)# **rewrite ingress tag pop 1 symmetric** *encapsulation-type vlan-id*	adjustment to be performed on a frame that is egressing a service instance. • The **rewrite ingress tag pop 1 symmetric** command specifies the encapsulation adjustment to be performed on a frame that is ingressing a service instance.
Step 10	Router (config-if-srv)# **bridge-domain** *bridge-id*	Configures the bridge domain.
Step 11	Router (config-if-srv)# **exit**	Exits Ethernet service configuration mode.
Step 12	Router (config-if)# **exit**	Exits interface configuration mode.
Step 13	Router (config)# **interface BDI** *bridge-id*	Enters the bridge domain interface.
Step 14	Router (config-if)# **ip address** *bdi-interface-ip-address*	Specifies the IP address of the BDI interface.
Step 15	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 16	Router (config-if)# **end**	Returns to global configuration mode on the host router.
Step 17	Use the server's operating system to configure the E-Series Server's **NIC** interface.	—
Step 18	Router# **ping** *server's-NIC-interface*	Shows if connection is established with the E-Series Server's **NIC** interface.
Step 19	Router# **show arp**	Displays the Access Resolution Protocol (ARP) cache.
Step 20	Router# **show bridge-domain** *bridge-id*	Displays bridge domain information.

Example

This example shows how to create an Ethernet virtual circuit using a non-native VLAN between the E-Series Server and the Cisco ISR 4000 series.

Note The IP addresses in this configuration example are for reference only.

```
Router> enable
Router# configure terminal
Router(config)# interface ucse 2/0/0
Router(config-if)# no ip address
Router(config-if)# no negotiation auto
Router(config-if)# switchport mode trunk
```

```
Router(config-if)# service instance 10 ethernet
Router(config-if-srv)# encapsulation dot1q 10
Router(config-if-srv)# rewrite egress tag push dot1q 10
Router(config-if-srv)# bridge-domain 10
Router(config-if-srv)# exit
Router(config-if)# exit

Router(config)# interface BDI10
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the E-Series Server's NIC interface.

Router# ping 192.168.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2 ms

Router# show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.1.1            -   0022.bdfb.2783  ARPA   BDI10
Internet  192.168.1.2            1   0022.bde6.07b4  ARPA   BDI10

Router# show bridge-domain 10
Bridge-domain 10 (2 ports in all)
State: UP                    Mac learning: Enabled
Aging-Timer: 300 second(s)
    BDI10  (up)
    ucse2/0/0 service instance 10
   MAC address    Policy  Tag       Age  Pseudoport
   0022.BDE6.07B4 forward dynamic   246  ucse2/0/0.EFP10
   0022.BDFB.2783 to_bdi  static    0    BDI10
```

Note For additional details about the **rewrite** commands, see http://www.cisco.com/en/US/docs/ios-xml/ios/cether/command/ce-cr-book.html.

Configuring an Internal Connection Between the Cisco ISR G2 and the EHWIC E-Series NCE

Use this configuration if you want the traffic to your application or operating system to flow through the Cisco ISR G2. To configure an internal connection between the Cisco ISR G2 and the EHWIC E-Series NCE, you must configure these IP addresses:

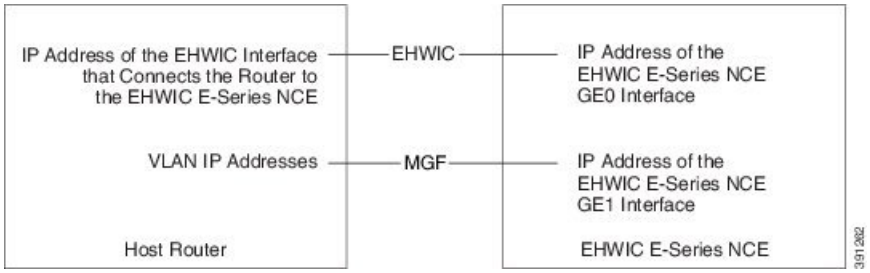
- For traffic to flow through the EHWIC connection (see next figure), configure the following:
  - IP address of the router's internal EHWIC interface that connects the router to the EHWIC E-Series NCE's GE0 interface.
  - IP address of the EHWIC E-Series NCE's GE0 interface.
- For traffic to flow through the MGF connection (see next figure), configure the following:

Important The MGF connection option is not applicable to the Cisco 1921 ISR G2.

- IP address of the router's internal MGF VLAN interface.
- IP address of the EHWIC E-Series NCE's GE1 interface.

The following figure shows the internal connection between the router and the EHWIC E-Series NCE.

Figure 3: Internal Connection Between the Cisco ISR G2 and the EHWIC E-Series NCE



Procedure

	Command or Action	Purpose
Step 1	Router> **enable**	Enters privileged EXEC mode on the host router. Enter your password if prompted.
Step 2	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 3	Router (config)# **interface ucse 0**/*subslot*/**0**	Enters interface configuration mode for the router's EHWIC **0**/*subslot*/**0** interface.
Step 4	Enter one of the following commands: • Router (config-if)# **ip address** *router-to-e-series-server-interface-ip-address subnet-mask* • Router (config-if)# **ip unnumbered** *type number*	The **ip address** command specifies the IP address of the router's internal PCIe interface that connects the router to the EHWIC E-Series NCE's GE0 interface. See the figure above. or The **ip unnumbered** command enables IP processing on an interface without assigning an explicit IP address to that interface. • *type*—Type of interface on which the router has an assigned IP address. • *number*—Number of the interface on which the router has an assigned IP address.

	Command or Action	Purpose
		Note The unnumbered interface must be unique. It cannot be another unnumbered interface. **Caution** The **ip unnumbered** command creates a point-to-point interface between devices. Broadcasting is not supported.
Step 5	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 6	Router (config-if)# **end**	Exits interface configuration mode.
Step 7	Use the server's operating system to configure the EHWIC E-Series NCE's **GE0** interface. See the figure above.	—
Step 8	Router (config)# **interface ucse 0/***subslot***/1**	Enters interface configuration mode for the router's MGF **0/***subslot***/1** VLAN interface. See the figure above. **Important** This step is not applicable to the Cisco ISR 1921.
Step 9	Router (config-if)# **switchport mode trunk**	Puts the port into permanent trunking mode. The default configuration is access mode.
Step 10	Router (config-if)# **[switchport trunk allowed vlan** *vlan-numbers***]**	(Optional) Allows trunking on the specified VLANs. • *vlan-numbers*—VLAN numbers on which to allow trunking.
Step 11	Router (config-if)# **end**	Exits interface configuration mode.
Step 12	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 13	Router (config)# **interface vlan** *vlan-number*	Enters interface configuration mode for the specified VLAN number.
Step 14	Router (config-if)# **ip address** *vlan-ip-address subnet-mask*	Specifies the IP address for the VLAN. See the figure above. • *vlan-ip-address*—IP address of the VLAN. • *subnet-mask*—Subnet mask to append to the IP address.
Step 15	Router (config-if)# **no shut**	Causes the interface to be administratively up.

	Command or Action	Purpose
Step 16	Router (config-if)# **end**	Exits interface configuration mode.
Step 17	Use the server's operating system to configure the EHWIC E-Series NCE's **GE1** interface. See the figure above.	**Important** This step is not applicable to the Cisco 1921 ISR G2.

Example

This example shows how to configure an internal connection between the router and the EHWIC E-Series NCE.

Note The IP addresses in this configuration example are for reference only and might not be valid.

```
Router> enable
Router# configure terminal

Router(config)# interface ucse 0/1/0
Router(config-if)# ip address 10.0.0.1 255.0.0.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the E-Series Server's GE0 interface

Router(config)# interface ucse 0/1/1
Router(config-if)# switchport mode trunk
Router(config-if)# end

Router# configure terminal
Router(config)# interface vlan 1
Router(config-if)# ip address 20.0.0.1 255.255.255.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the E-Series Server's GE1 interface.
```

Configuring an Internal Connection Between the Cisco ISR 4000 Series and the NIM E-Series NCE

Use this configuration if you want the traffic to your application or operating system to flow through the Cisco ISR 4000 series. To configure an internal connection between the Cisco ISR 4000 series and the NIM E-Series NCE, you must configure these IP addresses:

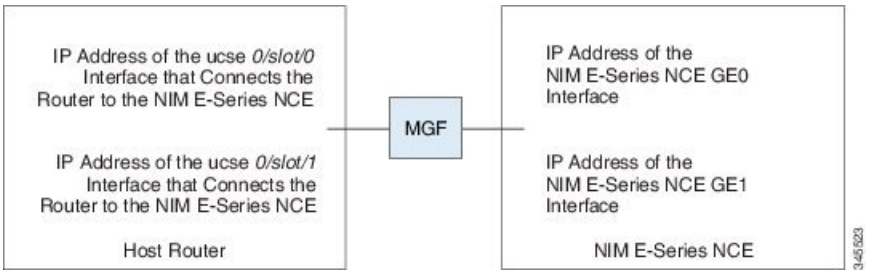
- For traffic to flow through the router's **ucse 0**/*subslot*/**0** and the server's internal GE0 interface (see next figure), configure the following:
  - IP address of the router's **ucse 0**/*subslot*/**0** interface that connects the router to the server's GE0 interface.

- IP address of the server's GE0 interface.

- For traffic to flow through the router's **ucse 0**/*subslot*/**1** and the server's internal GE1 interface (see next figure), configure the following:
  - IP address of the router's **ucse 0**/*subslot*/**1** interface.
  - IP address of the server's GE1 interface.

The following figure shows the internal connection between the router and the server.

Figure 4: Internal Connection Between the Cisco ISR 4000 Series and the NIM E-Series NCE



Procedure

	Command or Action	Purpose
Step 1	Router> **enable**	Enters privileged EXEC mode on the host router. Enter your password if prompted.
Step 2	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 3	Router (config)# **interface ucse 0**/*subslot*/**0**	Enters interface configuration mode for the router's ucse **0**/*subslot*/**0** interface.
Step 4	Enter one of the following commands: • Router (config-if)# **ip address** *router-to-e-series-server-interface-ip-address subnet-mask* • Router (config-if)# **ip unnumbered** *type number*	Specify the IP address of the router's **ucse 0**/*subslot*/**0** interface that connects the router to the server's GE0 interface. See the figure above. or The **ip unnumbered** command enables IP processing on an interface without assigning an explicit IP address to that interface. • *type*—Type of interface on which the router has an assigned IP address. • *number*—Number of the interface on which the router has an assigned IP address.

	Command or Action	Purpose
		Note The unnumbered interface must be unique. It cannot be another unnumbered interface. **Caution** The **ip unnumbered** command creates a point-to-point interface between devices. Broadcasting is not supported.
Step 5	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 6	Router (config-if)# **end**	Exits interface configuration mode.
Step 7	Use the server's operating system to configure the server's **GE0** interface. See the figure above.	—
Step 8	Router (config)# **interface ucse 0/***subslot***/1**	Enters interface configuration mode for the router's ucse **0/***subslot***/1** interface.
Step 9	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 10	Router (config-if)# **end**	Exits interface configuration mode.
Step 11	Use the server's operating system to configure the server's **GE1** interface. See the figure above.	—

Example

This example shows how to configure an internal connection between the router and the NIM E-Series NCE.

Note The IP addresses in this configuration example are for reference only and might not be valid.

```
Router> enable
Router# configure terminal

Router(config)# interface ucse 0/1/0
Router(config-if)# ip address 10.0.0.1 255.0.0.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the NIM E-Series NCE's GE0 interface.

Router(config)# interface ucse 0/1/1
Router(config-if)# ip address 11.0.0.1 255.255.255.0
Router(config-if)# no shut
Router(config-if)# end
```

```
Use the server's operating system to configure the NIM E-Series NCE's GE1 interface.
```

Creating an Ethernet Virtual Circuit Between the NIM E-Series NCE and the Cisco ISR 4000 Series Using the Native VLAN

Use this procedure if you have added the native VLAN to encapsulate and transport selected data either to the operating system installed on the E-Series Server, or to the virtual machines created on the installed hypervisor.

Before you begin

Configure an internal connection between the Cisco ISR 4000 series and the NIM E-Series NCE.

Procedure

	Command or Action	Purpose
Step 1	Router> **enable**	Enters privileged EXEC mode on the host router. Enter your password if prompted.
Step 2	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 3	Router (config)# **interface ucse 0/***subslot***/0**	Enters interface configuration mode for the router's **0/***subslot***/0** interface.
Step 4	Router (config-if)# **service instance** *id* **ethernet**	Configures an Ethernet service instance on an interface and enters Ethernet service configuration mode.
Step 5	Router (config-if-srv)# **encapsulation** *encapsulation-type vlan-id*	Defines the encapsulation type.
Step 6	Router (config-if-srv)# **bridge-domain** *bridge-id*	Configures the bridge domain.
Step 7	Router (config-if-srv)# **exit**	Exits Ethernet service configuration mode.
Step 8	Router (config-if)# **interface BDI** *bridge-id*	Enters the bridge domain interface.
Step 9	Router (config-if)# **ip address** *bdi-interface-ip-address*	Specifies the IP address of the BDI interface.
Step 10	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 11	Router (config-if)# **end**	Returns to global configuration mode on the host router.
Step 12	Use the server's operating system to configure the NIM E-Series NCE's **GE0** interface.	—

Example

This example shows how to create an Ethernet Virtual Circuit using the native VLAN between the NIM E-Series NCE and the Cisco ISR 4000 series.

Note The IP addresses in this configuration example are for reference only.

```
Router> enable
Router# configure terminal

Router(config)# interface ucse 0/1/0
Router(config-if)# service instance 1 ethernet
Router(config-if-srv)# encapsulation untagged
Router(config-if-srv)# bridge-domain 1
Router(config-if-srv)# exit
Router(config-if)# exit

Router(config-if)# interface BDI 1
Router(config-if)# ip address 10.0.0.1 255.0.0.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the NIM E-Series NCE's GE0 interface.
```

Creating an Ethernet Virtual Circuit Between the NIM E-Series NCE and the Cisco ISR 4000 Series Using a Non-Native VLAN

Use this procedure if you have added a non-native VLAN to encapsulate and transport selected data either to the operating system installed on the NIM E-Series NCE, or to the virtual machines created on the installed hypervisor.

Before you begin

Configure an internal connection between the Cisco ISR 4000 series and the NIM E-Series NCE.

Procedure

	Command or Action	Purpose
Step 1	Router> **enable**	Enters privileged EXEC mode on the host router. Enter your password if prompted.
Step 2	Router# **configure terminal**	Enters global configuration mode on the host router.
Step 3	Router (config)# **interface ucse 0/***subslot***/0**	Enters interface configuration mode for the router's ucse **0/***subslot***/0** interface.
Step 4	Router (config-if)# **no ip address**	Removes an IP address or disables IP processing.

	Command or Action	Purpose
Step 5	Router (config-if)# **no negotiation auto**	Disables automatic negotiation on the interface.
Step 6	Router (config-if)# **switchport mode trunk**	Puts the port into permanent trunking mode.
Step 7	Router (config-if)# **service instance** *id* **ethernet**	Configures an Ethernet service instance on an interface and enters Ethernet service configuration mode.
Step 8	Router (config-if-srv)# **encapsulation dot1q** *encapsulation-type vlan-id*	Defines the encapsulation type.
Step 9	Enter one of the following commands: • Router (config-if-srv)# **rewrite egress tag push dot1q** *encapsulation-type vlan-id* • Router (config-if-srv)# **rewrite ingress tag pop 1 symmetric** *encapsulation-type vlan-id*	• The **rewrite egress tag push dot1q** command specifies the encapsulation adjustment to be performed on a frame that is egressing a service instance. • The **rewrite ingress tag pop 1 symmetric** command specifies the encapsulation adjustment to be performed on a frame that is ingressing a service instance.
Step 10	Router (config-if-srv)# **bridge-domain** *bridge-id*	Configures the bridge domain.
Step 11	Router (config-if-srv)# **exit**	Exits Ethernet service configuration mode.
Step 12	Router (config-if)# **exit**	Exits interface configuration mode.
Step 13	Router (config)# **interface BDI** *bridge-id*	Enters the bridge domain interface.
Step 14	Router (config-if)# **ip address** *bdi-interface-ip-address*	Specifies the IP address of the BDI interface.
Step 15	Router (config-if)# **no shut**	Causes the interface to be administratively up.
Step 16	Router (config-if)# **end**	Returns to global configuration mode on the host router.
Step 17	Use the server's operating system to configure the NIM E-Series NCE's **NIC** interface.	—
Step 18	Router# **ping** *server's-NIC-interface*	Shows if connection is established with the NIM E-Series NCE's **NIC** interface.
Step 19	Router# **show arp**	Displays the Access Resolution Protocol (ARP) cache.
Step 20	Router# **show bridge-domain** *bridge-id*	Displays bridge domain information.

Example

This example shows how to create an Ethernet virtual circuit using a non-native VLAN between the NIM E-Series NCE and the Cisco ISR 4000 series.

Note The IP addresses in this configuration example are for reference only.

```
Router> enable
Router# configure terminal
Router(config)# interface ucse 0/1/0
Router(config-if)# no ip address
Router(config-if)# no negotiation auto
Router(config-if)# switchport mode trunk
Router(config-if)# service instance 10 ethernet
Router(config-if-srv)# encapsulation dot1q 10
Router(config-if-srv)# rewrite egress tag push dot1q 10
Router(config-if-srv)# bridge-domain 10
Router(config-if-srv)# exit
Router(config-if)# exit

Router(config)# interface BDI10
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no shut
Router(config-if)# end

Use the server's operating system to configure the NIM E-Series NCE's NIC interface.

Router# ping 192.168.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2 ms

Router# show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.1.1              -   0022.bdfb.2783  ARPA   BDI10
Internet  192.168.1.2              1   0022.bde6.07b4  ARPA   BDI10

Router# show bridge-domain 10
Bridge-domain 10 (2 ports in all)
State: UP                    Mac learning: Enabled
Aging-Timer: 300 second(s)
    BDI10  (up)
    ucse2/0/0 service instance 10
   MAC address    Policy  Tag       Age  Pseudoport
   0022.BDE6.07B4 forward dynamic   246  ucse2/0/0.EFP10
   0022.BDFB.2783 to_bdi  static    0    BDI10
```

Note For additional details about the **rewrite** commands, see http://www.cisco.com/en/US/docs/ios-xml/ios/cether/command/ce-cr-book.html.

Understanding Network Interface Mapping

This section shows you how to determine the network interface mapping for the following devices:

- E-Series Server's GE0, GE1, GE2, and GE3 interfaces—Cisco ISR G2
- E-Series Server's GE0, GE1, GE2, and GE3 interfaces—Cisco ISR 4000 series
- EHWIC E-Series NCE's GE0, GE1, and GE2 interfaces—Cisco ISR G2
- NIM E-Series NCE's GE0, GE1, and GE2 interfaces—Cisco ISR 4000 series
- NetXtreme II 1 Gigabit Server (PCIe Card)
- NetXtreme II 10 Gigabit Server (PCIe Card)

Determining Network Interface Mapping for the E-Series Server's GE0, GE1, GE2, and GE3 Interfaces—Cisco ISR G2

You can determine the port numbering of the E-Series Server by looking at the MAC addresses of the network interfaces. Note the following:

- The lowest numbered MAC address corresponds to the E-Series Server's GE0 interface.
- The second lowest MAC address corresponds to the E-Series Server's GE1 interface.
- The third lowest MAC address corresponds to the E-Series Server's GE2 interface.
- The fourth lowest MAC address corresponds to the E-Series Server's GE3 interface.

Note To determine the MAC address of an interface, see the Determining the MAC Address in Microsoft Windows, Linux, and VMware vSphere Hypervisor , on page 22 section, or the appropriate platform documentation.

Determining Network Interface Mapping for the E-Series Server's GE0, GE1, GE2, and GE3 Interfaces—Cisco ISR 4000 series

You can determine the port numbering of the E-Series Server by looking at the MAC addresses of the network interfaces. Note the following:

- The lowest numbered MAC address corresponds to the E-Series Server's GE0 interface.
- The second lowest MAC address corresponds to the E-Series Server's GE1 interface.
- The third lowest MAC address corresponds to the E-Series Server's GE2 interface.
- The fourth lowest MAC address corresponds to the E-Series Server's GE3 interface.

Note To determine the MAC address of an interface, see the Determining the MAC Address in Microsoft Windows, Linux, and VMware vSphere Hypervisor , on page 22 section, or the appropriate platform documentation.

Determining Network Interface Mapping for the EHWIC E-Series NCE's GE0, GE1, and GE2 Interfaces—Cisco ISR G2

You can determine the port numbering of the EHWIC E-Series NCE by looking at the MAC addresses of the network interfaces. Note the following:

- The lowest numbered MAC address corresponds to the EHWIC E-Series NCE's GE0 interface.
- The second lowest MAC address corresponds to the EHWIC E-Series NCE's GE1 interface.
- The third lowest MAC address corresponds to the EHWIC E-Series NCE's GE2 interface.

Note To determine the MAC address of an interface, see the Determining the MAC Address in Microsoft Windows, Linux, and VMware vSphere Hypervisor , on page 22 section, or the appropriate platform documentation.

Determining Network Interface Mapping for the NIM E-Series NCE's GE0, GE1, and GE2 Interfaces—Cisco ISR 4000 series

You can determine the port numbering of the NIM E-Series NCE by looking at the MAC addresses of the network interfaces. Note the following:

- The lowest numbered MAC address corresponds to the NIM E-Series NCE's GE0 interface.
- The second lowest MAC address corresponds to the NIM E-Series NCE's GE1 interface.
- The third lowest MAC address corresponds to the NIM E-Series NCE's GE2 interface.

Note To determine the MAC address of an interface, see the Determining the MAC Address in Microsoft Windows, Linux, and VMware vSphere Hypervisor , on page 22 section, or the appropriate platform documentation.

Determining the Interface Name and Port Mapping for the NetXtreme II 1 Gigabit Server

To determine which interface name maps to which port number in the NetXtreme II 1 Gigabit Server (PCIe card), do the following:

1. Connect the PCIe card's port 0 to an external network device using a network cable.
2. From the host operating system, check the status of the interface to determine which interface is connected.
3. Repeat Step 2 for ports 1, 2, and 3.

Note For information about how to determine the status of the interface, see the appropriate operating system documentation.

Determining the Interface Name and Port Mapping for the NetXtreme II 10 Gigabit Server

Note Only one port is enabled in the NetXtreme II 10 Gigabit Server (PCIe card).

To determine which interface name maps to which port number in the NetXtreme II 10 Gigabit Server (PCIe card), do the following:

1. Connect the PCIe card's port 0 to an external network device using a network cable.
2. From the host operating system, check the status of the interface to determine which interface is connected.

Note For information about how to determine the status of the interface, see the appropriate operating system documentation.

Determining the MAC Address in Microsoft Windows, Linux, and VMware vSphere Hypervisor

Determining the MAC Address in the Microsoft Windows Operating System

To determine the MAC address of an interface in the Microsoft Windows operating systems, open a command window, and then enter the **ipconfig /all** command.

Determining the MAC Address in the Linux Operating System

To determine the MAC address of an interface in the Linux operating systems, open a terminal window, and then enter the **ifconfig -a** command to display the MAC address of all interfaces or **ifconfig** *interface-name* to display the MAC address of a particular interface.

Determining the MAC Address in the VMware vSphere Hypervisor

To determine the MAC address of an interface in the VMware vSphere Hypervisor, do the following:

1. In your web browser, enter the IP address that you configured to access CIMC during initial setup and then log into CIMC.

   The CIMC Home page, which is the **Server Summary** page, appears.
2. From the **Actions** area of the **Server Summary** page, click the **Launch KVM Console** icon.

   The **KVM Console** opens in a separate window.
3. From the KVM Console, click the **KVM** tab, and then do the following:
   - Press **F2** to access the VMware vSphere Hypervisor DCUI customization menu. The **DCUI** login page appears.
   - Log into the **DCUI**. The **System Customization** page appears.
   - From the **System Customization** page, click **Configure Management Network**.

The **Configure Management Network** page appears, which has several menu options, including **Network Adapter**. The **Network Adapter** menu option allows you to view the MAC address of the interfaces.

UCS E Series M3 Servers:Reordering ESXi VMNIC Interface Number to Start with Server's Lowest MAC Address

On Cisco UCS E Series M3 servers, the VMware vSphere Hypervisor DCUI VMNIC interface ordering does not map to server's lowest MAC address. After installing ESXi on M3 servers, the default DCUI VMNIC interface ordering and server's NIC interface mappings are:

```
~ Name    MAC Address        UCS-E160S-M3 NIC   Description
------  -------------      ----------------
-------------------------------------------------------
vmnic0  a8:9d:21:fc:61:12  TE2                Intel(R) Ethernet Connection X552/X557-AT
10GBASE-T
vmnic1  a8:9d:21:fc:61:13  TE3                Intel(R) Ethernet Connection X552/X557-AT
10GBASE-T
vmnic2  a8:9d:21:fc:61:10  GE0              Broadcom Corporation NetXtreme BCM5719 Gigabit
 Ethernet
vmnic3  a8:9d:21:fc:61:11  GE1              Broadcom Corporation NetXtreme BCM5719 Gigabit
 Ethernet
```

To make VMNIC interface ordering to start with the server's lowest MAC address, follow these procedures:

1. Enable SSH and Shell Access in ESXi.
2. SSH into ESXi .
3. Use **esxcli network nic list** command to display VMNIC number and its correpsonding MAC address.
4. Use **localcli --plugin-dir /usr/lib/vmware/esxcli/int/deviceInternal alias list** command to display the Bus address and VMNIC number mappings.
5. Use **localcli** command to remap VMNIC number to Bus address that has the lowest MAC address.
6. Reboot ESXi.
7. SSH into ESXi and verify changes.

The following example shows how to display VMNIC number and its MAC address:

```
~ # esxcli network nic list
Name    PCI Device     Driver  Link  Speed  Duplex  MAC Address         MTU  Description
------  -------------  ------  ----  -----  ------  -----------------  ----
-------------------------------------------------------
vmnic0  0000:004:00.0  ixgbe   Up     1000  Full    a8:9d:21:fc:61:12  1500  Intel(R)
Ethernet Connection X552/X557-AT 10GBASE-T
vmnic1  0000:004:00.1  ixgbe   Up     1000  Full    a8:9d:21:fc:61:13  1500  Intel(R)
Ethernet Connection X552/X557-AT 10GBASE-T
vmnic2  0000:008:00.0  tg3     Up     1000  Full    a8:9d:21:fc:61:10  1500  Broadcom
Corporation NetXtreme BCM5719 Gigabit Ethernet
vmnic3  0000:008:00.1  tg3     Up     1000  Full    a8:9d:21:fc:61:11  1500  Broadcom
Corporation NetXtreme BCM5719 Gigabit Ethernet
```

The following example shows how to display Bus address and VMNIC name mapping:

```
~ # localcli --plugin-dir /usr/lib/vmware/esxcli/int/ deviceInternal alias list
Bus type  Bus address          Alias
----------------------------------
```

```
pci       p0000:06:00.0        vmhba0
pci       p0000:08:00.0        vmnic2
pci       p0000:08:00.1        vmnic3
pci       p0000:04:00.1        vmnic1
pci       p0000:04:00.0        vmnic0
logical   pci#p0000:06:00.0#0  vmhba0
```

The following example shows how to remap VMNIC number to the Bus address that has the lowest MAC adddress:

```
~ # localcli --plugin-dir /usr/lib/vmware/esxcli/int/ deviceInternal alias store --alias
vmnic0 --bus-address p0000:08:00.0 --bus-type pci
~ # localcli --plugin-dir /usr/lib/vmware/esxcli/int/ deviceInternal alias store --alias
vmnic1 --bus-address p0000:08:00.1 --bus-type pci
~ # localcli --plugin-dir /usr/lib/vmware/esxcli/int/ deviceInternal alias store --alias
vmnic2 --bus-address p0000:04:00.0 --bus-type pci
~ # localcli --plugin-dir /usr/lib/vmware/esxcli/int/ deviceInternal alias store --alias
vmnic3 --bus-address p0000:04:00.1 --bus-type pci
~ # reboot
```

The following example shows how the VMNIC interface ordering looks like after the reboot. The VMNIC interface number begins with the lowest MAC address.:

```
~ # esxcli network nic list
Name    PCI Device     Driver  Link  Speed  Duplex  MAC Address         MTU  Description
------  -------------  ------  ----  -----  ------  -----------------  ----
-------------------------------------------------------
vmnic0  0000:008:00.0  tg3     Up     1000  Full    a8:9d:21:fc:61:10  1500  Broadcom
Corporation NetXtreme BCM5719 Gigabit Ethernet
vmnic1  0000:008:00.1  tg3     Up     1000  Full    a8:9d:21:fc:61:11  1500  Broadcom
Corporation NetXtreme BCM5719 Gigabit Ethernet
vmnic2  0000:004:00.0  ixgbe   Up     1000  Full    a8:9d:21:fc:61:12  1500  Intel(R)
Ethernet Connection X552/X557-AT 10GBASE-T
vmnic3  0000:004:00.1  ixgbe   Up     1000  Full    a8:9d:21:fc:61:13  1500  Intel(R)
Ethernet Connection X552/X557-AT 10GBASE-T
~ # localcli --plugin-dir /usr/lib/vmware/esxcli/int/ deviceInternal alias list
Bus type  Bus address          Alias
--------------------------------
pci       p0000:06:00.0        vmhba0
pci       p0000:08:00.0        vmnic0
pci       p0000:08:00.1        vmnic1
pci       p0000:04:00.1        vmnic3
pci       p0000:04:00.0        vmnic2
logical   pci#p0000:06:00.0#0  vmhba0
~ #
```