



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

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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:

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- [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

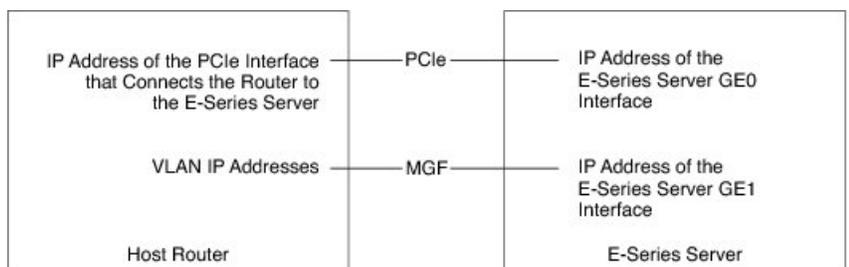
Use this configuration if you want the traffic to your application or operating system to flow through the Cisco ISR G2. To configure an internal connection between the Cisco ISR G2 and the E-Series Server, you must configure these IP addresses:

- 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
<b>Step 1</b>	Router> <b>enable</b>	Enters privileged EXEC mode on the host router. Enter your password if prompted.
<b>Step 2</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 3</b>	Router (config)# <b>interface ucse slot/0</b>	Enters interface configuration mode for the router's PCIe <i>slot/0</i> interface.
<b>Step 4</b>	Enter one of the following commands: <ul style="list-style-type: none"> <li>• Router (config-if)# <b>ip address</b> <i>router-to-e-series-server-interface-ip-address subnet-mask</i></li> <li>• Router (config-if)# <b>ip unnumbered</b> <i>type number</i></li> </ul>	<p>The <b>ip address</b> 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.</p> <p>or</p> <p>The <b>ip unnumbered</b> command enables IP processing on an interface without assigning an explicit IP address to that interface.</p> <ul style="list-style-type: none"> <li>• <i>type</i>—Type of interface on which the router has an assigned IP address.</li> <li>• <i>number</i>—Number of the interface on which the router has an assigned IP address.</li> </ul> <p><b>Note</b> The unnumbered interface must be unique. It cannot be another unnumbered interface.</p>

	Command or Action	Purpose
		<b>Caution</b> The <b>ip unnumbered</b> command creates a point-to-point interface between devices. Broadcasting is not supported.
<b>Step 5</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.
<b>Step 6</b>	Router (config-if)# <b>end</b>	Exits interface configuration mode.
<b>Step 7</b>	Use the server's operating system to configure the E-Series Server's <b>GE0</b> interface. See the figure above.	—
<b>Step 8</b>	Router (config)# <b>interface ucse slot/1</b>	Enters interface configuration mode for the router's MGF <i>slot/1</i> VLAN interface. See the figure above.
<b>Step 9</b>	Router (config-if)# <b>switchport mode trunk</b>	Puts the port into permanent trunking mode. The default configuration is access mode.
<b>Step 10</b>	Router (config-if)# [ <b>switchport trunk allowed vlan <i>vlan-numbers</i></b> ]	(Optional) Allows trunking on the specified VLANs. <ul style="list-style-type: none"> <li>• <i>vlan-numbers</i>—VLAN numbers on which to allow trunking.</li> </ul>
<b>Step 11</b>	Router (config-if)# <b>exit</b>	Exits interface configuration mode.
<b>Step 12</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 13</b>	Router (config)# <b>interface vlan <i>vlan-number</i></b>	Enters interface configuration mode for the specified VLAN number.
<b>Step 14</b>	Router (config-if)# <b>ip address <i>vlan-ip-address subnet-mask</i></b>	Specifies the IP address for the VLAN. See the figure above. <ul style="list-style-type: none"> <li>• <i>vlan-ip-address</i>—IP address of the VLAN.</li> <li>• <i>subnet-mask</i>—Subnet mask to append to the IP address.</li> </ul>
<b>Step 15</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.
<b>Step 16</b>	Router (config-if)# <b>end</b>	Exits interface configuration mode.
<b>Step 17</b>	Use the server's operating system to configure the E-Series Server's <b>GE1</b> 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.

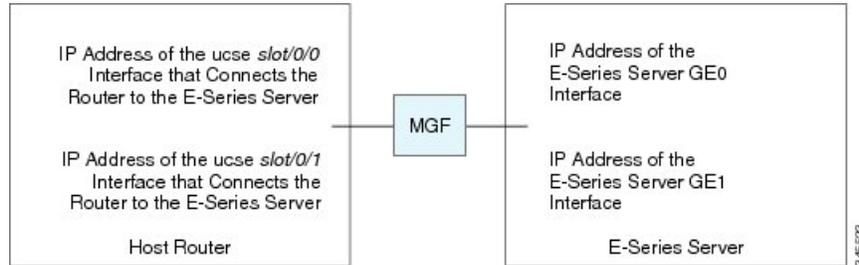
## Configuring an Internal Connection Between the Cisco ISR 4000 Series and the E-Series Server

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**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	Router> <b>enable</b>	Enters privileged EXEC mode on the host router. Enter your password if prompted.
<b>Step 2</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 3</b>	Router (config)# <b>interface ucse slot/0/0</b>	Enters interface configuration mode for the router's ucse slot/0/0 interface.
<b>Step 4</b>	Enter one of the following commands: <ul style="list-style-type: none"> <li>• Router (config-if)# <b>ip address</b> <i>router-to-e-series-server-interface-ip-address subnet-mask</i></li> <li>• Router (config-if)# <b>ip unnumbered</b> <i>type number</i></li> </ul>	Specify the IP address of the router's <b>ucse slot 0/0</b> interface that connects the router to the E-Series Server's GE0 interface. See the figure above. or The <b>ip unnumbered</b> command enables IP processing on an interface without assigning an explicit IP address to that interface. <ul style="list-style-type: none"> <li>• <i>type</i>—Type of interface on which the router has an assigned IP address.</li> <li>• <i>number</i>—Number of the interface on which the router has an assigned IP address.</li> </ul> <p><b>Note</b> The unnumbered interface must be unique. It cannot be another unnumbered interface.</p> <p><b>Caution</b> The <b>ip unnumbered</b> command creates a point-to-point interface between devices. Broadcasting is not supported.</p>
<b>Step 5</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.

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

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	Router> <b>enable</b>	Enters privileged EXEC mode on the host router. Enter your password if prompted.
<b>Step 2</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 3</b>	Router (config)# <b>interface ucse slot/0/0</b>	Enters interface configuration mode for the router's ucse <i>slot/0/0</i> interface.
<b>Step 4</b>	Router (config-if)# <b>service instance id ethernet</b>	Configures an Ethernet service instance on an interface and enters Ethernet service configuration mode.
<b>Step 5</b>	Router (config-if-srv)# <b>encapsulation encapsulation-type vlan-id</b>	Defines the encapsulation type.
<b>Step 6</b>	Router (config-if-srv)# <b>bridge-domain bridge-id</b>	Configures the bridge domain.
<b>Step 7</b>	Router (config-if-srv)# <b>exit</b>	Exits Ethernet service configuration mode.
<b>Step 8</b>	Router (config-if)# <b>interface BDI bridge-id</b>	Enters the bridge domain interface.
<b>Step 9</b>	Router (config-if)# <b>ip address bdi-interface-ip-address</b>	Specifies the IP address of the BDI interface.
<b>Step 10</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.
<b>Step 11</b>	Router (config-if)# <b>end</b>	Returns to global configuration mode on the host router.
<b>Step 12</b>	Use the server's operating system to configure the E-Series Server's <b>GE0</b> 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
<b>Step 1</b>	Router> <b>enable</b>	Enters privileged EXEC mode on the host router. Enter your password if prompted.
<b>Step 2</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 3</b>	Router (config)# <b>interface ucse slot/0/0</b>	Enters interface configuration mode for the router's <b>ucse slot/0/0</b> interface.
<b>Step 4</b>	Router (config-if)# <b>no ip address</b>	Removes an IP address or disables IP processing.
<b>Step 5</b>	Router (config-if)# <b>no negotiation auto</b>	Disables automatic negotiation on the interface.
<b>Step 6</b>	Router (config-if)# <b>switchport mode trunk</b>	Puts the port into permanent trunking mode.
<b>Step 7</b>	Router (config-if)# <b>service instance id ethernet</b>	Configures an Ethernet service instance on an interface and enters Ethernet service configuration mode.
<b>Step 8</b>	Router (config-if-srv)# <b>encapsulation dot1q encapsulation-type vlan-id</b>	Defines the encapsulation type.
<b>Step 9</b>	Enter one of the following commands:	<ul style="list-style-type: none"> <li>The <b>rewrite egress tag push dot1q</b> command specifies the encapsulation</li> </ul>

	Command or Action	Purpose
	<ul style="list-style-type: none"> <li>• Router (config-if-srv)# <b>rewrite egress tag push dot1q encapsulation-type vlan-id</b></li> <li>• Router (config-if-srv)# <b>rewrite ingress tag pop 1 symmetric encapsulation-type vlan-id</b></li> </ul>	<p>adjustment to be performed on a frame that is egressing a service instance.</p> <ul style="list-style-type: none"> <li>• The <b>rewrite ingress tag pop 1 symmetric</b> command specifies the encapsulation adjustment to be performed on a frame that is ingressing a service instance.</li> </ul>
<b>Step 10</b>	Router (config-if-srv)# <b>bridge-domain bridge-id</b>	Configures the bridge domain.
<b>Step 11</b>	Router (config-if-srv)# <b>exit</b>	Exits Ethernet service configuration mode.
<b>Step 12</b>	Router (config-if)# <b>exit</b>	Exits interface configuration mode.
<b>Step 13</b>	Router (config)# <b>interface BDI bridge-id</b>	Enters the bridge domain interface.
<b>Step 14</b>	Router (config-if)# <b>ip address bdi-interface-ip-address</b>	Specifies the IP address of the BDI interface.
<b>Step 15</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.
<b>Step 16</b>	Router (config-if)# <b>end</b>	Returns to global configuration mode on the host router.
<b>Step 17</b>	Use the server's operating system to configure the E-Series Server's <b>NIC</b> interface.	—
<b>Step 18</b>	Router# <b>ping server's-NIC-interface</b>	Shows if connection is established with the E-Series Server's <b>NIC</b> interface.
<b>Step 19</b>	Router# <b>show arp</b>	Displays the Access Resolution Protocol (ARP) cache.
<b>Step 20</b>	Router# <b>show bridge-domain bridge-id</b>	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:

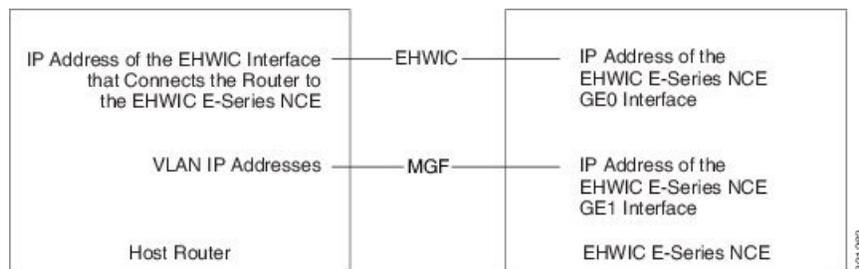


**Important** The MGF connection option is not applicable to the Cisco 1921 ISR G2.

- 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**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	Router> <b>enable</b>	Enters privileged EXEC mode on the host router. Enter your password if prompted.
<b>Step 2</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 3</b>	Router (config)# <b>interface ucse 0/subslot/0</b>	Enters interface configuration mode for the router's EHWIC 0/subslot/0 interface.
<b>Step 4</b>	Enter one of the following commands: <ul style="list-style-type: none"> <li>• Router (config-if)# <b>ip address</b> <i>router-to-e-series-server-interface-ip-address</i> <i>subnet-mask</i></li> <li>• Router (config-if)# <b>ip unnumbered</b> <i>type</i> <i>number</i></li> </ul>	The <b>ip address</b> 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 <b>ip unnumbered</b> command enables IP processing on an interface without assigning an explicit IP address to that interface. <ul style="list-style-type: none"> <li>• <i>type</i>—Type of interface on which the router has an assigned IP address.</li> <li>• <i>number</i>—Number of the interface on which the router has an assigned IP address.</li> </ul>

	Command or Action	Purpose
		<p><b>Note</b> The unnumbered interface must be unique. It cannot be another unnumbered interface.</p> <p><b>Caution</b> The <b>ip unnumbered</b> command creates a point-to-point interface between devices. Broadcasting is not supported.</p>
<b>Step 5</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.
<b>Step 6</b>	Router (config-if)# <b>end</b>	Exits interface configuration mode.
<b>Step 7</b>	Use the server's operating system to configure the EHWIC E-Series NCE's <b>GE0</b> interface. See the figure above.	—
<b>Step 8</b>	Router (config)# <b>interface ucse 0/subslot/1</b>	<p>Enters interface configuration mode for the router's MGF <b>0/subslot/1</b> VLAN interface. See the figure above.</p> <p><b>Important</b> This step is not applicable to the Cisco ISR 1921.</p>
<b>Step 9</b>	Router (config-if)# <b>switchport mode trunk</b>	Puts the port into permanent trunking mode. The default configuration is access mode.
<b>Step 10</b>	Router (config-if)# <b>[switchport trunk allowed vlan vlan-numbers]</b>	<p>(Optional) Allows trunking on the specified VLANs.</p> <ul style="list-style-type: none"> <li>• <i>vlan-numbers</i>—VLAN numbers on which to allow trunking.</li> </ul>
<b>Step 11</b>	Router (config-if)# <b>end</b>	Exits interface configuration mode.
<b>Step 12</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 13</b>	Router (config)# <b>interface vlan vlan-number</b>	Enters interface configuration mode for the specified VLAN number.
<b>Step 14</b>	Router (config-if)# <b>ip address vlan-ip-address subnet-mask</b>	<p>Specifies the IP address for the VLAN. See the figure above.</p> <ul style="list-style-type: none"> <li>• <i>vlan-ip-address</i>—IP address of the VLAN.</li> <li>• <i>subnet-mask</i>—Subnet mask to append to the IP address.</li> </ul>
<b>Step 15</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.

	Command or Action	Purpose
<b>Step 16</b>	Router (config-if)# <b>end</b>	Exits interface configuration mode.
<b>Step 17</b>	Use the server's operating system to configure the EHWIC E-Series NCE's <b>GE1</b> interface. See the figure above.	<b>Important</b> 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

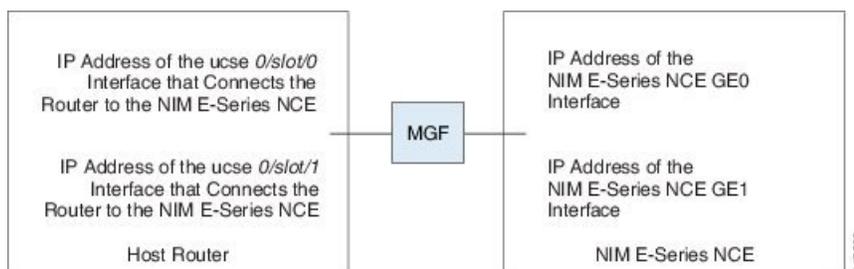
Use this configuration if you want the traffic to your application or operating system to flow through the Cisco ISR 4000 series. To configure an internal connection between the Cisco ISR 4000 series and the NIM E-Series NCE, you must configure these IP addresses:

- 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**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	Router> <b>enable</b>	Enters privileged EXEC mode on the host router. Enter your password if prompted.
<b>Step 2</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 3</b>	Router (config)# <b>interface ucse 0/subslot/0</b>	Enters interface configuration mode for the router's ucse 0/subslot/0 interface.
<b>Step 4</b>	Enter one of the following commands: <ul style="list-style-type: none"> <li>• Router (config-if)# <b>ip address</b> <i>router-to-e-series-server-interface-ip-address subnet-mask</i></li> <li>• Router (config-if)# <b>ip unnumbered type number</b></li> </ul>	Specify the IP address of the router's <b>ucse 0/subslot/0</b> interface that connects the router to the server's GE0 interface. See the figure above. or The <b>ip unnumbered</b> command enables IP processing on an interface without assigning an explicit IP address to that interface. <ul style="list-style-type: none"> <li>• <i>type</i>—Type of interface on which the router has an assigned IP address.</li> <li>• <i>number</i>—Number of the interface on which the router has an assigned IP address.</li> </ul>

	Command or Action	Purpose
		<p><b>Note</b> The unnumbered interface must be unique. It cannot be another unnumbered interface.</p> <p><b>Caution</b> The <b>ip unnumbered</b> command creates a point-to-point interface between devices. Broadcasting is not supported.</p>
<b>Step 5</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.
<b>Step 6</b>	Router (config-if)# <b>end</b>	Exits interface configuration mode.
<b>Step 7</b>	Use the server's operating system to configure the server's <b>GE0</b> interface. See the figure above.	—
<b>Step 8</b>	Router (config)# <b>interface ucse 0/subslot/1</b>	Enters interface configuration mode for the router's <b>ucse 0/subslot/1</b> interface.
<b>Step 9</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.
<b>Step 10</b>	Router (config-if)# <b>end</b>	Exits interface configuration mode.
<b>Step 11</b>	Use the server's operating system to configure the server's <b>GE1</b> 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
<b>Step 1</b>	Router> <b>enable</b>	Enters privileged EXEC mode on the host router. Enter your password if prompted.
<b>Step 2</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 3</b>	Router (config)# <b>interface ucse 0/subslot0</b>	Enters interface configuration mode for the router's <b>0/subslot0</b> interface.
<b>Step 4</b>	Router (config-if)# <b>service instance id ethernet</b>	Configures an Ethernet service instance on an interface and enters Ethernet service configuration mode.
<b>Step 5</b>	Router (config-if-srv)# <b>encapsulation encapsulation-type vlan-id</b>	Defines the encapsulation type.
<b>Step 6</b>	Router (config-if-srv)# <b>bridge-domain bridge-id</b>	Configures the bridge domain.
<b>Step 7</b>	Router (config-if-srv)# <b>exit</b>	Exits Ethernet service configuration mode.
<b>Step 8</b>	Router (config-if)# <b>interface BDI bridge-id</b>	Enters the bridge domain interface.
<b>Step 9</b>	Router (config-if)# <b>ip address bdi-interface-ip-address</b>	Specifies the IP address of the BDI interface.
<b>Step 10</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.
<b>Step 11</b>	Router (config-if)# <b>end</b>	Returns to global configuration mode on the host router.
<b>Step 12</b>	Use the server's operating system to configure the NIM E-Series NCE's <b>GE0</b> 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 **GEO** 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
<b>Step 1</b>	Router> <b>enable</b>	Enters privileged EXEC mode on the host router. Enter your password if prompted.
<b>Step 2</b>	Router# <b>configure terminal</b>	Enters global configuration mode on the host router.
<b>Step 3</b>	Router (config)# <b>interface ucse 0/subslot/0</b>	Enters interface configuration mode for the router's ucse 0/subslot/0 interface.
<b>Step 4</b>	Router (config-if)# <b>no ip address</b>	Removes an IP address or disables IP processing.

	Command or Action	Purpose
<b>Step 5</b>	Router (config-if)# <b>no negotiation auto</b>	Disables automatic negotiation on the interface.
<b>Step 6</b>	Router (config-if)# <b>switchport mode trunk</b>	Puts the port into permanent trunking mode.
<b>Step 7</b>	Router (config-if)# <b>service instance id ethernet</b>	Configures an Ethernet service instance on an interface and enters Ethernet service configuration mode.
<b>Step 8</b>	Router (config-if-srv)# <b>encapsulation dot1q encapsulation-type vlan-id</b>	Defines the encapsulation type.
<b>Step 9</b>	Enter one of the following commands: <ul style="list-style-type: none"> <li>• Router (config-if-srv)# <b>rewrite egress tag push dot1q encapsulation-type vlan-id</b></li> <li>• Router (config-if-srv)# <b>rewrite ingress tag pop 1 symmetric encapsulation-type vlan-id</b></li> </ul>	<ul style="list-style-type: none"> <li>• The <b>rewrite egress tag push dot1q</b> command specifies the encapsulation adjustment to be performed on a frame that is egressing a service instance.</li> <li>• The <b>rewrite ingress tag pop 1 symmetric</b> command specifies the encapsulation adjustment to be performed on a frame that is ingressing a service instance.</li> </ul>
<b>Step 10</b>	Router (config-if-srv)# <b>bridge-domain bridge-id</b>	Configures the bridge domain.
<b>Step 11</b>	Router (config-if-srv)# <b>exit</b>	Exits Ethernet service configuration mode.
<b>Step 12</b>	Router (config-if)# <b>exit</b>	Exits interface configuration mode.
<b>Step 13</b>	Router (config)# <b>interface BDI bridge-id</b>	Enters the bridge domain interface.
<b>Step 14</b>	Router (config-if)# <b>ip address bdi-interface-ip-address</b>	Specifies the IP address of the BDI interface.
<b>Step 15</b>	Router (config-if)# <b>no shut</b>	Causes the interface to be administratively up.
<b>Step 16</b>	Router (config-if)# <b>end</b>	Returns to global configuration mode on the host router.
<b>Step 17</b>	Use the server's operating system to configure the NIM E-Series NCE's NIC interface.	—
<b>Step 18</b>	Router# <b>ping server's-NIC-interface</b>	Shows if connection is established with the NIM E-Series NCE's NIC interface.
<b>Step 19</b>	Router# <b>show arp</b>	Displays the Access Resolution Protocol (ARP) cache.
<b>Step 20</b>	Router# <b>show bridge-domain bridge-id</b>	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/ce/ether/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 corresponding 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 address:

```

~ # 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
~ #

```