

# Oracle® Enterprise Manager Ops Center

Creating IPMP Groups in Oracle Solaris 11 Non-Global Zone on Oracle SuperCluster

12c Release 3 (12.3.0.0.0)

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This guide provides an end-to-end example for how to use Oracle Enterprise Manager Ops Center.

## Introduction

Oracle Enterprise Manager Ops Center provides comprehensive lifecycle management for Oracle Solaris and Linux operating systems in your data center.

IP Multipath (IPMP) provides physical interface failure detection, transparent network access failover, and packet load spreading for systems with multiple interfaces. Oracle Enterprise Manager Ops Center provides an option to create IPMP groups. You can configure one or more interfaces into an IPMP group. The group functions like an IP interface with data addresses to send and receive network traffic. When an underlying interface in the group fails, the data addresses are redistributed among the remaining underlying active interfaces in the group. Thus, the group maintains network connectivity despite an interface failure. With IPMP, network connectivity is always available, provided a minimum of one interface is usable for the group.

IPMP groups can be created in a zone, server pool, and also as a standalone outside of Oracle SuperCluster.

In this document, you learn how to create IPMP groups on Ethernet and InfiniBand interfaces for Oracle Solaris 11 non-global zone on Oracle SuperCluster.

See [Related Resources](#) for links to related information and articles about discovering and managing other assets.

The following sections are described in detail:

- [Setup the Network](#)
- [Create an IPMP Group for Ethernet Interface](#)
- [Create an IPMP Group for InfiniBand Interface](#)
- [Verify the IPMP Group](#)

## Pre-requisites

The following are the prerequisites before you start the procedure:

- Oracle SuperCluster discovered and managed by Oracle Enterprise Manager Ops Center.
- Agent-managed Oracle Solaris 11 global zone.
- Server pool for Oracle Solaris 11 non-global zones.

- **Zone without a network interface** created in the server pool for Oracle Solaris 11 non-global zones.
- Oracle Solaris version S11.1 SRU 10.0.5.0. or higher.
- Logical Domains Manager version 3.1.0.0.24 or higher.

## Setup the Network

Perform the following steps to setup the network for creating an IPMP group.

1. Log in to Oracle Enterprise Manager Ops Center.
2. In the Navigation pane, under Assets, select **Server Pools**.
3. In the server pool, select the non-global zone (without a network interface) where you want to create an IPMP group.

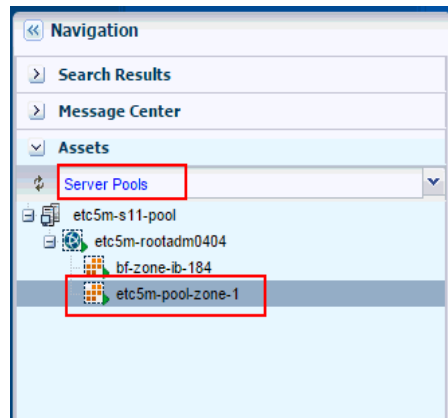
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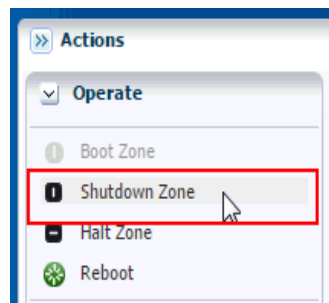
**Note:** Oracle Enterprise Manager Ops Center can assign only one interface to Oracle SuperCluster non-global zones.

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4. Shut down the non-global zone server pool. In the Actions pane, click **Shutdown Zone**. Click **Shutdown Zone** again to confirm.



After the zone is shutdown, it is displayed in the navigation pane as shown in the following figure.

5. Connect two network interfaces to the non-global zone. Perform the following steps to connect the network interfaces.
  - a. In the Navigation pane, select the non-global zone.
  - b. In the Actions pane, click **Connect Network**. The Connect Networks to Zone window opens.

Oracle Enterprise Manager Ops Center - Connect Networks to Zone

**Connect Networks to Zone** ORACLE

Oracle Enterprise Manager Ops Center - Connect Networks to Zone

**Connect Networks to Zone**

Zone Name:

Select the network that you want to connect to the zone and enter the required network interface information.  
Click the Add (+) icon to add more than one network to the zone.  
Click Connect Networks to connect the selected networks to the zone.

Networks to be connected			
Network	NIC	Address Allocation Method	Zone IP
<input type="text"/>	<input type="text"/>	Use static IP	<input type="text"/>

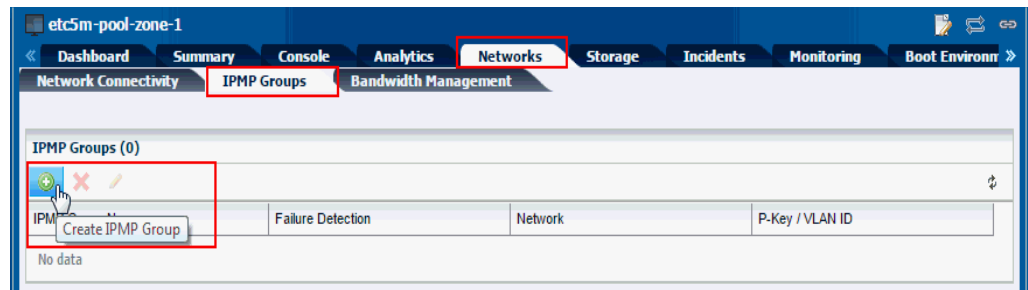
- c. Click the Add icon to create an empty network field.
- d. In the Network field, select a network to connect to the zone.
- e. In the NIC field, select a network interface card.
- f. Click the Add icon to create an empty network field to add a standby network.

- g. In the Network field, select the same network that you selected in **step 5d** to connect to the zone.
  - h. In the NIC field, select another network interface card.  
The network interface card must be different from the one you selected before.
  - i. Click **Connect Networks**.
  - j. In the selected non-global zone, navigate to **Network > Network Connectivity** and verify if the networks connected are present in the Network Interface Connectivity table.
6. In the Actions pane, click **Boot Zone** to boot the non-global zone. Click **Boot Zone** again to confirm.

## Create an IPMP Group for Ethernet Interface

Perform the following steps to create an IPMP group for an Ethernet interface. Use the Ops Center Administrator role to perform the following steps.

1. Select the non-global zone.
2. In the center pane, click **Networks**, then select the **IPMP Groups** tab.



3. Click the Add icon to create an IPMP group. The Create IPMP Group wizard opens.
4. In the Specify IPMP Group screen, enter the required values.

- a. In the IPMP Group Name field, enter a name for the IPMP group.

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**Note:** The IPMP name must consist of a string followed by a numeric value. For example, ipmp1. If you want to create more groups, increase the numeric value. For example, ipmp2, ipmp3, ipmp4, and so on.

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- b. In the Network field, select a network from the drop-down list.
  - c. In the Gateway field, select the check box **Add Default Route to Gateway**.
  - d. In the Media Type field, select **Ethernet**.
  - e. In the IPMP Group Members field, select the networks from the Available Networks column and move them to the IPMP Group Members column.
  - f. Click **Next**.
5. In the Specify NIC Settings screen, select the first network interface to serve as standby. Select the check box against the network in the Standby Interface field, then click **Next**. Leave the check box against the second network interface unchecked.

6. In the Specify Data Addresses screen, click the Add icon and enter an unused IP address of the IPMP group, then click **Next**.

**Specify Data Addresses**

Specify one or more data addresses for the IPMP group.  
You must specify more than one interface to allow failover.

Data Address
00.000.000.000

7. Review the Summary, then click **Finish**.

## Create an IPMP Group for InfiniBand Interface

Perform the following steps to create an IPMP group for an InfiniBand interface. Use the Ops Center Administrator role to perform the following steps.

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**Note:** Creation of IPMP on Oracle Solaris 10 non-global zone is not supported.

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1. Select the non-global zone.
2. In the center pane, click **Networks**, then select the **IPMP Groups** tab.

3. Click the Add icon to create an IPMP group. The Create IPMP Group wizard opens.
4. In the Specify IPMP Group screen, enter the required values.

The screenshot shows the 'Specify IPMP Group' wizard in Oracle Enterprise Manager Ops Center. The wizard is titled 'Create IPMP Group' and has four steps: 1. Specify IPMP Group, 2. Specify NIC Settings, 3. Specify Data Addresses, and 4. Summary. The current step is 'Specify IPMP Group'. The form contains the following fields and options:

- IPMP Group Name:** ipmp1
- Network:** etc-IPOB-storage
- Media Type:** Ethernet (radio button), Infiniband (radio button, selected)
- P-Key:** 0x8503
- Failure Detection:** Link-Based (always enabled) (checkbox, checked), Probe-Based (checkbox, unchecked)
- IPMP Group Members:** Available Network Interfaces (net2, net3)

At the bottom of the wizard, there are buttons for '< Previous', 'Next >', and 'Cancel'. A note at the bottom of the form states: 'Use Ctrl+Click or Shift+Click to select multiple NICs.'

- a. In the IPMP Group Name field, enter a name for the IPMP group.

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**Note:** The IPMP name must consist of a string followed by a numeric value. For example, ipmp1. If you want to create more groups, increase the numeric value. For example, ipmp2, ipmp3, ipmp4, and so on.

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- b. In the Network field, select a InfiniBand network from the drop-down list.
- c. In the Media Type field, select **InfiniBand**.
- d. In the P-Key field, the value is populated by default.
  - If the default value starts with 8 or higher, do not edit.
  - If the default value starts with 0 - 7, then edit the P-Key value and add 8 to the first digit.

The P-Key value must be similar as shown in the following example.

- e. In the IPMP Group Members field, select the networks from the Available Networks column and move them to the IPMP Group Members column.
  - f. Click **Next**.
5. In the Specify NIC Settings screen, select the first network interface to serve as standby. Select the check box against the network in the Standby Interface field, then click **Next**. Leave the check box against the second network interface unchecked.

**Specify NIC Settings**

Specify stand-by policy for each NIC of the IPMP group.

NOTE: You can optionally specify Test IP Address for any of the specified NICs, IF Probe-Based Failure Detection is specified.

Network Interfaces in the IPMP Group			
Interface	Create vnic / IB part?	Data Link Name	Standby Interface?
net2	<input type="checkbox"/>	-	<input checked="" type="checkbox"/>
net3	<input type="checkbox"/>	-	<input type="checkbox"/>

6. In the Specify Data Addresses screen, click the Add icon and enter an unused IP address of the IPMP group, then click **Next**.

**Specify Data Addresses**

Specify one or more data addresses for the IPMP group.  
You must specify more than one interface to allow failover.

Data Addresses in the IPMP Group	
Data Address	
00.000.000.000	

7. Review the Summary, then click **Finish**.

## Verify the IPMP Group

After the job completes, you can perform the following checks to verify if the IPMP group has been created.



- Verify if the IPMP group is successfully created. Perform the following steps:
  1. In the Navigation pane, select the non-global zone.
  2. In the center pane, click **Networks**, then select the **IPMP Groups** tab. The newly created IPMP group is displayed.

IPMP Group Name	Failure Detection	Network	P-Key / VLAN ID
ipmp1	Link-Based	etc-IPOB-storage	8503
ipmp3	Link-Based	etc-eth-admin	-

- Login to the non-global zone using the command line interface to check if the group is created.
- (Optional) Reboot the non-global zone to verify if the IPMP configuration is preserved after reboot.
 

```
Type init 6
```
- Use the following commands to display the IPMP configuration:
  1. Type `ipmpstat -g`
  2. Type `ipadm`
- Test the network connectivity by performing the following steps:
  1. Login to the non-global zone and type `ping -s <IP_outside_of_SSC>`.
  2. Login to the Operating System outside of Oracle SuperCluster and type `ping -s <IP_entered_in_Data_Addresses>`.

## What's Next

Now that the IPMP group is configured, the non-global zone's connectivity is always available. IPMP also provides load spreading for the outbound network traffic across the network interfaces in the group.

## Related Resources

For more information, see the Oracle Enterprise Manager Ops Center Documentation Library at [http://docs.oracle.com/cd/E59957\\_01/index.htm](http://docs.oracle.com/cd/E59957_01/index.htm).

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