VMS Software

How to Configure failSAFE IP for an OpenVMS Cluster

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1. How to Configure failSAFE IP for an OpenVMS Cluster

> **Important**
>
> These steps modify cluster-wide network configuration. Perform them during a maintenance window and ensure you have a backup of existing configurations.

The failSAFE IP service provides IP address redundancy by allowing the same IP address to be configured on multiple interfaces across cluster nodes.

Follow the steps in this article to configure failSAFE IP in an OpenVMS cluster environment.

2. Procedure

2.1 Example Environment

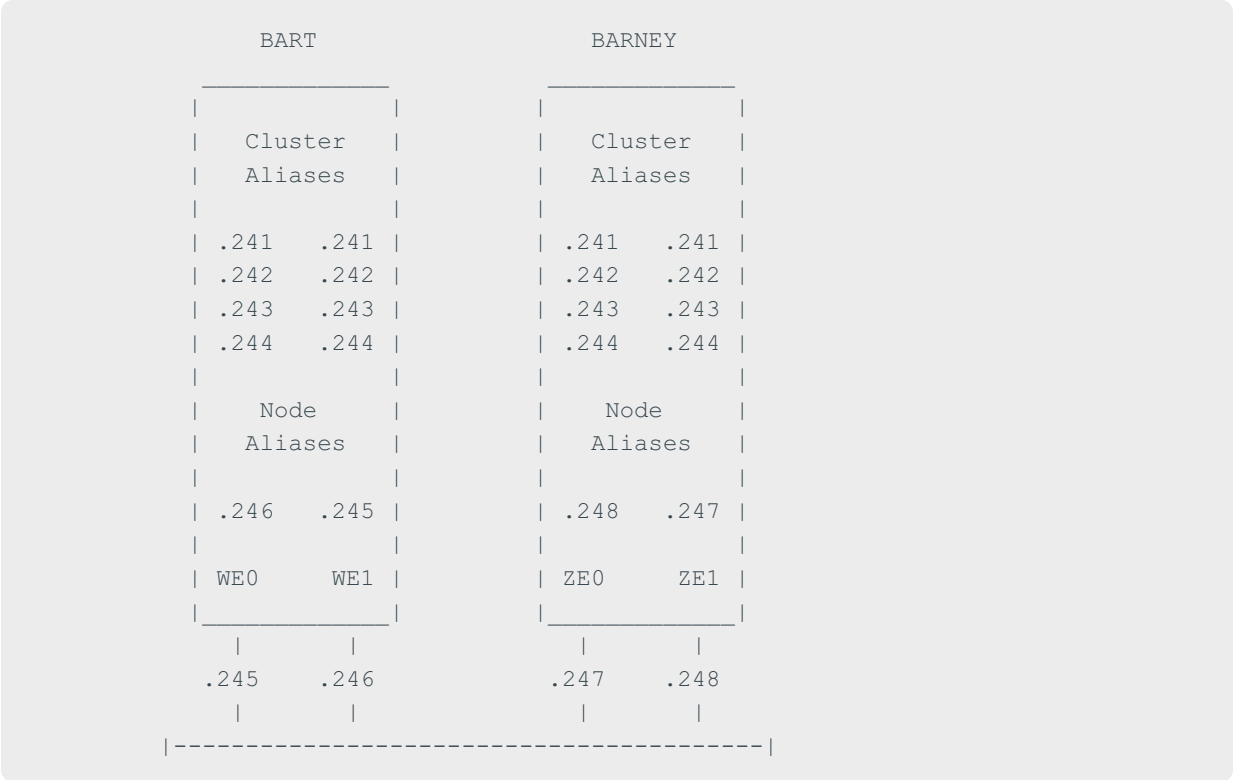
The sample OpenVMS Cluster environment consists of two systems, BART and BARNEY.

Each node contains two network interfaces and six IP addresses.

Cluster-wide failover aliases: 16.112.249.241–16.112.249.244.

Node-specific IPs: BART (16.112.249.245, .246); BARNEY (16.112.249.247, .248). These addresses are also used as hardcoded interface IPs.

Cluster Layout:



Interface mappings: WE0 (.245), WE1 (.246), ZE0 (.247), ZE1 (.248).

2.2 Configure Network Interfaces

Configure the network interface on each node as shown in the following examples:

BART Interfaces

```
$ TCPIP SET CONFIGURATION INTERFACE WE0/HOST=16.112.249.245 -
_$/NETWORK=255.255.255.0/BROADCAST=16.112.249.255

$ TCPIP SET CONFIGURATION INTERFACE WE1/HOST=16.112.249.246 -
_$/NETWORK=255.255.255.0/BROADCAST=16.112.249.255
```

Verify the configuration:

```
$ TCPIP SHOW CONFIGURATION INTERFACE

Interface: WE1
   IP_Addr: 16.112.249.246  NETWRK: 255.255.255.0  BRDCST: 16.112.249.255
Interface: WE0
   IP_Addr: 16.112.249.245  NETWRK: 255.255.255.0  BRDCST: 16.112.249.255
```

BARNEY Interfaces

```
$ TCPIP SET CONFIGURATION INTERFACE ZE0/HOST=16.112.249.247 -
_$/NETWORK=255.255.255.0/BROADCAST=16.112.249.255

$ TCPIP SET CONFIGURATION INTERFACE ZE1/HOST=16.112.249.248 -
_$/NETWORK=255.255.255.0/BROADCAST=16.112.249.255
```

Verify the configuration:

```
$ TCPIP SHOW CONFIGURATION INTERFACE

Interface: ZE0
   IP_Addr: 16.112.249.247  NETWRK: 255.255.255.0  BRDCST: 16.112.249.255
Interface: ZE1
   IP_Addr: 16.112.249.248  NETWRK: 255.255.255.0  BRDCST: 16.112.249.255
```

2.3 Configure TCPIP$SYSTARTUP.COM

To configure the failSAFE aliases, modify SYS$MANAGER:TCPIP$SYSTARTUP.COM on each node as shown in the following examples.

Node BART

Define foreign commands:

```
$ @SYS$MANAGER:TCPIP$DEFINE_COMMANDS.COM
```

Enable global symbols:

```
$ SET SYMBOL /SCOPE=(NOLOCAL,GLOBAL)
```

Configure the WE home alias interfaces. This example presumes that addresses .245 and .246 were previously created using TCPIP$CONFIG:

```
$ IFCONFIG WE0 HOME ALIAS 16.112.249.241/24
$ IFCONFIG WE1 HOME ALIAS 16.112.249.242/24
```

Configure the WE aliases:

```
$ IFCONFIG WE0 ALIAS ALIASLIST 16.112.249.242,243,244,246/24
$ IFCONFIG WE1 ALIAS ALIASLIST 16.112.249.241,243,244,245/24
```

Node BARNEY

Define foreign commands:

```
$ @SYS$MANAGER:TCPIP$DEFINE_COMMANDS.COM
```

Enable global symbols:

```
$ SET SYMBOL /SCOPE=(NOLOCAL,GLOBAL)
```

Configure the ZE home alias interfaces. This example presumes that addresses .247 and .248 were previously created using TCPIP$CONFIG:

```
$ IFCONFIG ZE0 HOME ALIAS 16.112.249.243/24
$ IFCONFIG ZE1 HOME ALIAS 16.112.249.244/24
```

Configure the ZE aliases:

```
$ IFCONFIG ZE0 ALIAS ALIASLIST 16.112.249.241,242,244,248/24
$ IFCONFIG ZE1 ALIAS ALIASLIST 16.112.249.241,242,243,247/24
```

2.4 Enable the failSAFE Service

1. Run the TCP/IP configuration utility:

```
$ @SYS$STARTUP:TCPIP$CONFIG.COM
```

   Select the following configuration options:

```
Enter configuration option: 4  Optional components
Enter configuration option: 5  Configure failSAFE IP
Enter configuration option: 3  Enable & Start service on this node
```

   Example output:

```
%TCPIP-I-INFO, TCPIP$AUX identifier (UIC=[3655,*]) already exists
        Creating FAILSAFE Service Entry
        Creating SYS$SYSDEVICE:[TCPIP$FSAFE]TCPIP$FAILSAFE.CONF

%TCPIP-I-INFO, image SYS$SYSTEM:TCPIP$FAILSAFE.EXE installed
%TCPIP-I-INFO, logical names created
%TCPIP-I-INFO, service enabled
%TCPIP-S-STARTDONE, TCPIP$FAILSAFE startup completed
```

2. Verify that the service is enabled:

```
$ TCPIP SHOW SERVICE FAILSAFE
```

   Example output:

```
Service        Port  Proto    Process          Address      State
FAILSAFE          1  TCP      TCPIP$FAILSAFE   0.0.0.0      Enabled
```

3. Restart TCP/IP Services to apply the changes:

```
$ @SYS$STARTUP:TCPIP$SHUTDOWN.COM
$ @SYS$STARTUP:TCPIP$STARTUP.COM
```

2.5 Verify the failSAFE Configuration

Verify the interface configuration using:

```
$ IFCONFIG -A
```

The IFCONFIG output for each node is as follows:

BART

```
$ IFCONFIG -A
WE0: flags=c43<UP,BROADCAST,RUNNING,MULTICAST,SIMPLEX>
failSAFE IP Addresses:
inet 16.112.249.246 netmask ffffff00 broadcast 16.112.249.255 (on BART WE1)
inet 16.112.249.244 netmask ffffff00 broadcast 16.112.249.255 (on BARNEY ZE1)
inet 16.112.249.243 netmask ffffff00 broadcast 16.112.249.255 (on BARNEY ZE0)
inet 16.112.249.242 netmask ffffff00 broadcast 16.112.249.255 (on BART WE1)
*inet 16.112.249.245 netmask ffffff00 broadcast 16.112.249.255 ipmtu 1500
*inet 16.112.249.241 netmask ffffff00 broadcast 16.112.249.255 ipmtu 1500

WE1: flags=c43<UP,BROADCAST,RUNNING,MULTICAST,SIMPLEX>
failSAFE IP Addresses:
inet 16.112.249.245 netmask ffffff00 broadcast 16.112.249.255 (on BART WE0)
inet 16.112.249.244 netmask ffffff00 broadcast 16.112.249.255 (on BARNEY ZE1)
inet 16.112.249.243 netmask ffffff00 broadcast 16.112.249.255 (on BARNEY ZE0)
inet 16.112.249.241 netmask ffffff00 broadcast 16.112.249.255 (on BART WE0)
*inet 16.112.249.246 netmask ffffff00 broadcast 16.112.249.255 ipmtu 1500
*inet 16.112.249.242 netmask ffffff00 broadcast 16.112.249.255 ipmtu 1500
```

BART failSAFE IP Configuration

Home IPs

- WE0: 16.112.249.241, 16.112.249.245
- WE1: 16.112.249.242, 16.112.249.246

Cluster Alias IPs

- 16.112.249.241 → BART / WE0
- 16.112.249.242 → BART / WE1
- 16.112.249.243 → BARNEY / ZE0
- 16.112.249.244 → BARNEY / ZE1

BART Host Alias IPs

- 16.112.249.245 → WE0
- 16.112.249.246 → WE1

BARNEY

```
$ IFCONFIG -A
ZE0: flags=c43<UP,BROADCAST,RUNNING,MULTICAST,SIMPLEX>
failSAFE IP Addresses:
inet 16.112.249.248 netmask ffffff00 broadcast 16.112.249.255 (on BARNEY ZE1)
inet 16.112.249.244 netmask ffffff00 broadcast 16.112.249.255 (on BARNEY ZE1)
inet 16.112.249.242 netmask ffffff00 broadcast 16.112.249.255 (on BART WE1)
inet 16.112.249.241 netmask ffffff00 broadcast 16.112.249.255 (on BART WE0)
*inet 16.112.249.247 netmask ffffff00 broadcast 16.112.249.255 ipmtu 1500
*inet 16.112.249.243 netmask ffffff00 broadcast 16.112.249.255 ipmtu 1500

ZE1: flags=c43<UP,BROADCAST,RUNNING,MULTICAST,SIMPLEX>
failSAFE IP Addresses:
inet 16.112.249.247 netmask ffffff00 broadcast 16.112.249.255 (on BARNEY ZE0)
inet 16.112.249.243 netmask ffffff00 broadcast 16.112.249.255 (on BARNEY ZE0)
inet 16.112.249.242 netmask ffffff00 broadcast 16.112.249.255 (on BART WE1)
inet 16.112.249.242 netmask ffffff00 broadcast 16.112.249.255 (on BART WE1)
*inet 16.112.249.248 netmask ffffff00 broadcast 16.112.249.255 ipmtu 1500
*inet 16.112.249.244 netmask ffffff00 broadcast 16.112.249.255 ipmtu 1500
```

BARNEY failSAFE IP Configuration

Home IPs

- ZE0: 16.112.249.243, 16.112.249.247
- ZE1: 16.112.249.244, 16.112.249.248

Cluster Alias IPs

- 16.112.249.241 → BART / WE0
- 16.112.249.242 → BART / WE1
- 16.112.249.243 → BARNEY / ZE0
- 16.112.249.244 → BARNEY / ZE1

BARNEY Host Alias IPs

- 16.112.249.247 → ZE0
- 16.112.249.248 → ZE1

> **Note**
>
> HOME interfaces (*) are preferred failover and recovery targets. failSAFE IP attempts to return IP addresses to their designated home interfaces whenever possible.