Network Architectures

OpenStack-Ansible supports a number of different network architectures, and can be deployed using a single network interface for non-production workloads or using multiple network interfaces or bonded interfaces for production workloads.

Our OpenStack-Ansible production environment reference architectures in this guide segments traffic using VLANs across multiple network interfaces or bonds.

The default networks used in an OpenStack-Ansible in this deployment can be observed in the following table:

Network	CIDR	VLAN
Management Network	`172.29.236.0/22`	`10`
Overlay Network	`172.29.240.0/22`	`30`
Storage Network	`172.29.244.0/22`	`20`

Note

Unless, if we specifically do mention about a new network architecture we will be referring to the same network architecture above through out this document.

Management Network

The `Management Network`, also referred to as the `Container network`, provides management of and communication between the infrastructure and OpenStack services running in containers or on metal. The management network uses a dedicated `VLAN` typically connected to the `br-mgmt` bridge, and may also be used as the primary interface used to interact with the server via `SSH`.

Overlay Network

The `Overlay Network`, also referred to as the `Tunnel Network`, provides connectivity between hosts for the purpose of `tunneling` encapsulated traffic using `VXLAN`, `GRE`, or other protocols. The `Overlay Network` uses a dedicated `VLAN` typically connected to the `br-vxlan` bridge.

Storage Network

The `Storage Network` provides segregated access to Block Storage from OpenStack services such as `Cinder, Glance, Ceph`, etc.. The `Storage Network` uses a dedicated `VLAN` typically connected to the `br-storage` bridge.

> **Note**
>
> The `CIDRs` and `VLANs` listed for each network are examples and may be different in your environment.

Additional `VLANs` may be required for the following purposes:

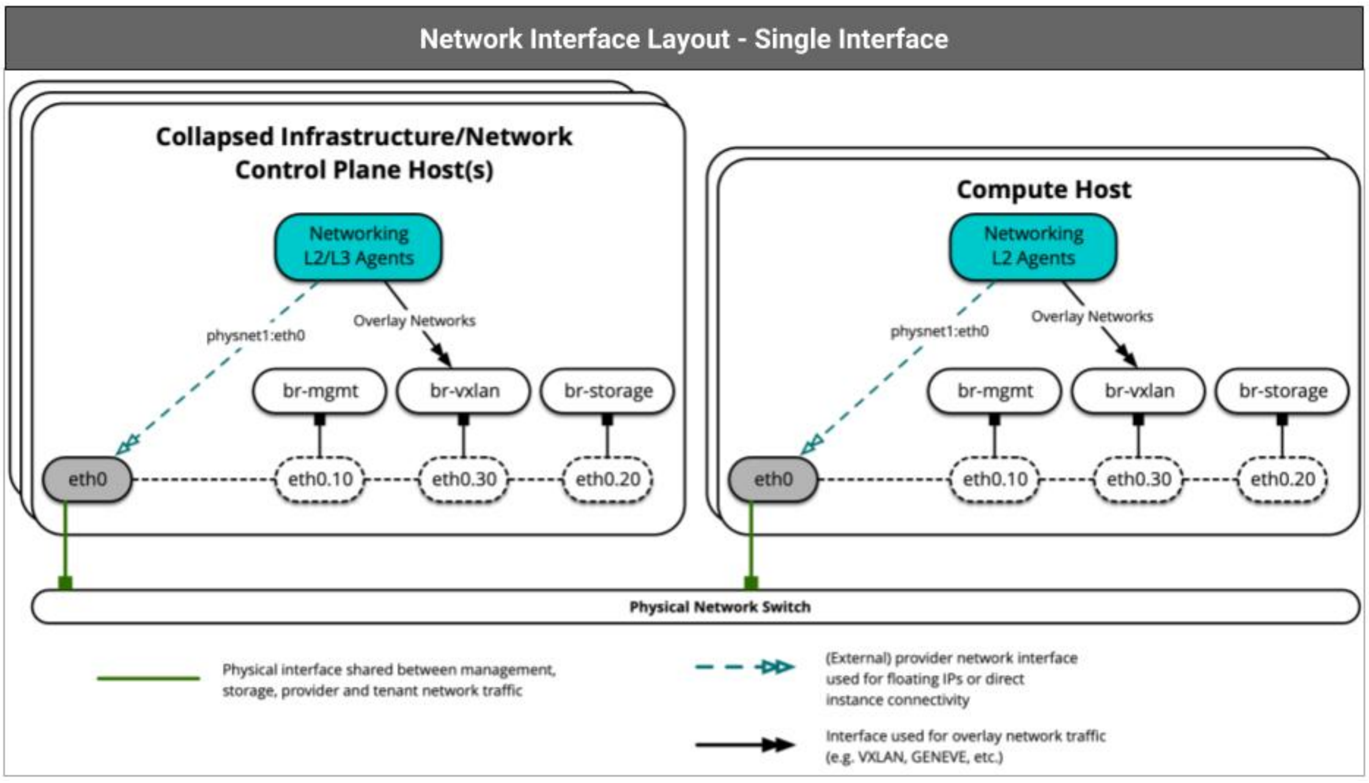
- External provider networks for `Floating IPs` and instances
- Self-service `Project/Tenant` networks for instances
- Other OpenStack services

Network Interfaces

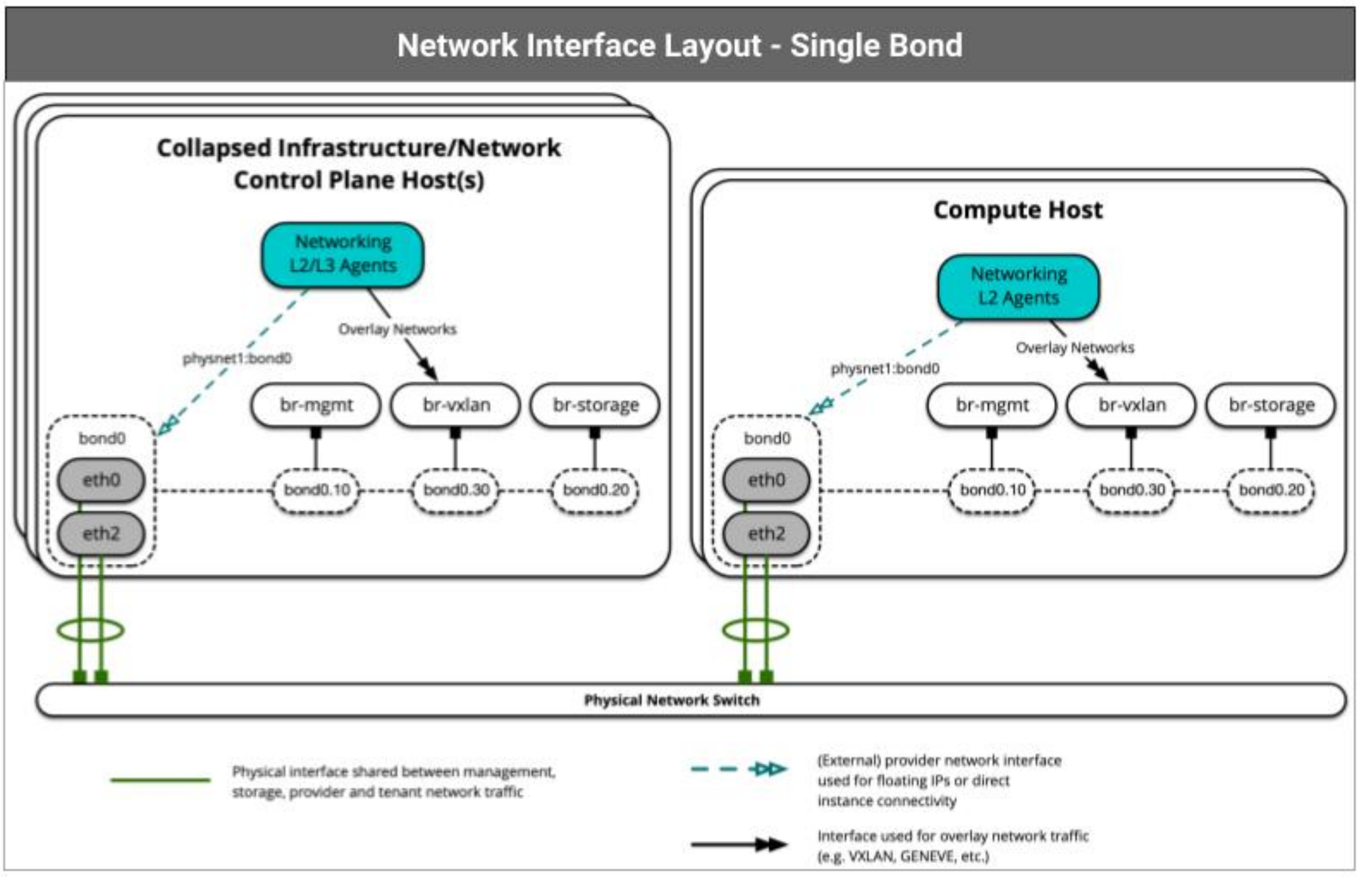
Single Interface or Bond

OpenStack-Ansible supports the use of a `single` interface or set of `bonded` interfaces that carry `traffic` for OpenStack services as well as instances.

The following diagram demonstrates hosts using a single interface:


Network Interface Layout - Single Interface
Collapsed Infrastructure/Network Control Plane Host(s)
Networking L2/L3 Agents
physnet1:eth0
Overlay Networks
br-mgmt
br-vxlan
br-storage
eth0
eth0.10
eth0.30
eth0.20
Compute Host
Networking L2 Agents
physnet1:eth0
Overlay Networks
br-mgmt
br-vxlan
br-storage
eth0
eth0.10
eth0.30
eth0.20
Physical Network Switch
Physical interface shared between management, storage, provider and tenant network traffic
(External) provider network interface used for floating IPs or direct instance connectivity
Interface used for overlay network traffic (e.g. VXLAN, GENEVE, etc.)

The following diagram demonstrates hosts using a single bond:


Network Interface Layout - Single Bond
Collapsed Infrastructure/Network Control Plane Host(s)
Networking L2/L3 Agents
Overlay Networks
physnet1:bond0
br-mgmt
br-vxlan
br-storage
bond0
eth0
eth2
bond0.10
bond0.30
bond0.20
Compute Host
Networking L2 Agents
Overlay Networks
physnet1:bond0
br-mgmt
br-vxlan
br-storage
bond0
eth0
eth2
bond0.10
bond0.30
bond0.20
Physical Network Switch
Physical interface shared between management, storage, provider and tenant network traffic
(External) provider network interface used for floating IPs or direct instance connectivity
Interface used for overlay network traffic (e.g. VXLAN, GENEVE, etc.)

Single Bond Sample Network Configuration

Each host will require the correct network bridges to be implemented.

The following is the `/etc/network/interfaces` file for `infra1` control plane host using a single bond in a Ubuntu host.

Note

If your environment does not have eth0, but instead has p1p1 or some other interface name, ensure that all references to eth0 in all configuration files are replaced with the appropriate name. The same applies to additional network interfaces.

Please refer to Configuring Network Interfaces for more details.

Important

This is a multi-NIC bonded configuration to implement the required bridges for OpenStack-Ansible. This illustrates the configuration of the first Infrastructure host `infra1` and the IP addresses assigned should be adapted for implementation on the other hosts. After implementing this configuration, the host will need to be rebooted.

Assuming that `eth0/1` and `eth2/3` are dual port NIC's we pair `eth0` with `eth2` for increased resiliency in the case of one interface card failing.

```
auto eth0

iface eth0 inet manual
    bond-master bond0
    bond-primary eth0

auto eth1
iface eth1 inet manual

auto eth2
iface eth2 inet manual
    bond-master bond0

auto eth3
iface eth3 inet manual

# Create a bonded interface. Note that the "bond-slaves" is set to none. This
# is because the bond-master has already been set in the raw interfaces for
# the new bond0.

auto bond0
iface bond0 inet manual
    bond-slaves none
    bond-mode active-backup
    bond-miimon 100
    bond-downdelay 200
    bond-updelay 200

# Container/Host management VLAN interface

auto bond0.10
iface bond0.10 inet manual
    vlan-raw-device bond0

# OpenStack Networking VXLAN (tunnel/overlay) VLAN interface

auto bond0.30
iface bond0.30 inet manual
    vlan-raw-device bond0

# Storage network VLAN interface (optional)

auto bond0.20
iface bond0.20 inet manual

# Container/Host management bridge

auto br-mgmt
iface br-mgmt inet static
    bridge_stp off
    bridge_waitport 0
    bridge_fd 0
    bridge_ports bond0.10
    address 172.29.236.11
    netmask 255.255.252.0
    gateway 172.29.236.1
    dns-nameservers 8.8.8.8 8.8.4.4

# OpenStack Networking VXLAN (tunnel/overlay) bridge
#
# Nodes hosting Neutron agents must have an IP address on this interface,
# including COMPUTE, NETWORK, and collapsed INFRA/NETWORK nodes.
#

auto br-vxlan
iface br-vxlan inet static
    bridge_stp off
    bridge_waitport 0
    bridge_fd 0
    bridge_ports bond0.30
    address 172.29.240.16
    netmask 255.255.252.0

# OpenStack Networking VLAN bridge
#
# The "br-vlan" bridge is no longer necessary for deployments unless Neutron
# agents are deployed in a container. Instead, a direct interface such as
# bond0 can be specified via the "host_bind_override" override when defining
# provider networks.
#
#auto br-vlan
#iface br-vlan inet manual
#    bridge_stp off
#    bridge_waitport 0
#    bridge_fd 0
#    bridge_ports bond0
# compute1 Network VLAN bridge
#auto br-vlan
#iface br-vlan inet manual
#    bridge_stp off
#    bridge_waitport 0
#    bridge_fd 0
#
# Storage bridge (optional)
#
# Only the COMPUTE and STORAGE nodes must have an IP address
# on this bridge. When used by infrastructure nodes, the
# IP addresses are assigned to containers which use this
# bridge.
#
auto br-storage
iface br-storage inet manual
    bridge_stp off
    bridge_waitport 0
    bridge_fd 0
    bridge_ports bond0.20
```

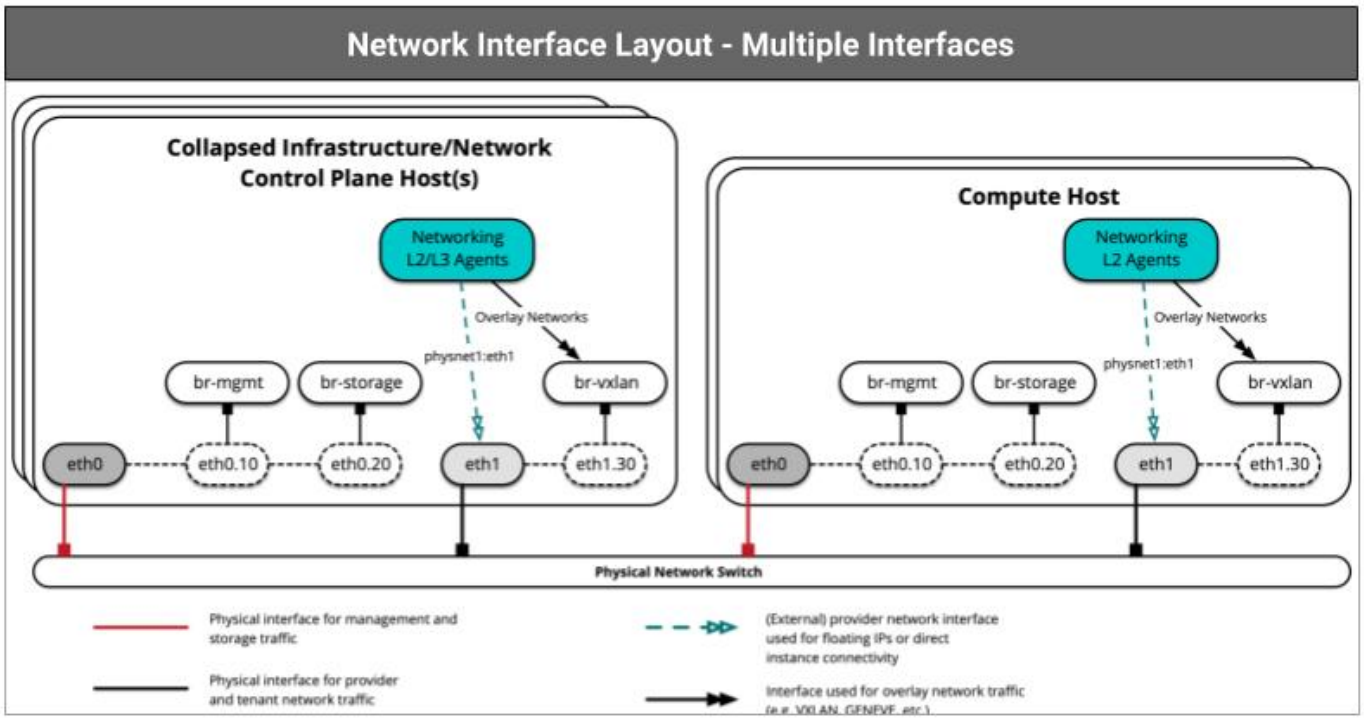
```
# compute1 Storage bridge

#auto br-storage
#iface br-storage inet static
#    bridge_stp off#auto br-storage
#    bridge_waitport 0
#    bridge_fd 0
#    bridge_ports bond0.20
#    address 172.29.244.16
#    netmask 255.255.252.0
```

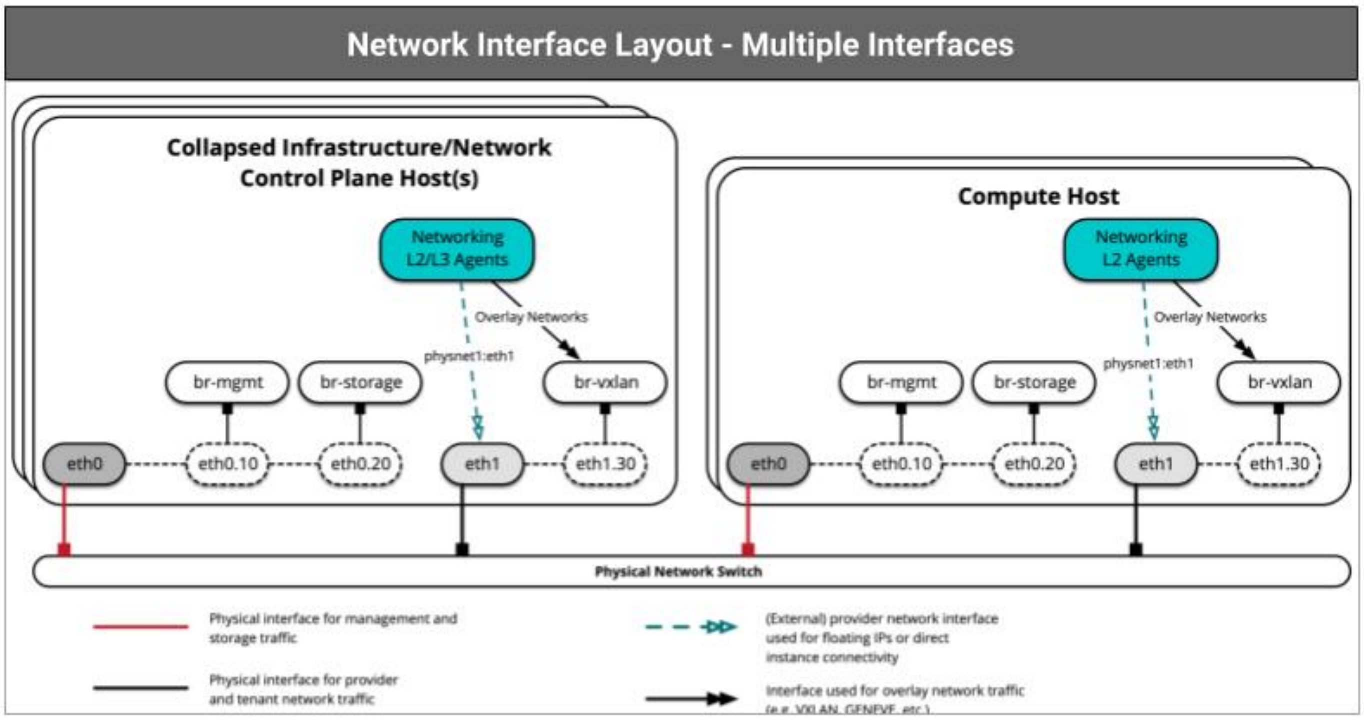
Multiple Interfaces or Bonds

OpenStack-Ansible supports the use of a multiple interfaces or sets of bonded interfaces that carry traffic for OpenStack services and instances.

The following diagram demonstrates hosts using multiple interfaces:


Network Interface Layout - Multiple Interfaces
Collapsed Infrastructure/Network Control Plane Host(s)
Networking L2/L3 Agents
Overlay Networks
physnet1:eth1
br-mgmt
br-storage
br-vxlan
eth0
eth0.10
eth0.20
eth1
eth1.30
Compute Host
Networking L2 Agents
Overlay Networks
physnet1:eth1
br-mgmt
br-storage
br-vxlan
eth0
eth0.10
eth0.20
eth1
eth1.30
Physical Network Switch
Physical interface for management and storage traffic
Physical interface for provider and tenant network traffic
(External) provider network interface used for floating IPs or direct instance connectivity
Interface used for overlay network traffic (e.g. VXLAN, GENEVE, etc.)

The following diagram demonstrates hosts using multiple bonds:


Network Interface Layout - Multiple Interfaces
Collapsed Infrastructure/Network Control Plane Host(s)
Networking L2/L3 Agents
Overlay Networks
physnet1:eth1
br-mgmt
br-storage
br-vxlan
eth0
eth0.10
eth0.20
eth1
eth1.30
Compute Host
Networking L2 Agents
Overlay Networks
physnet1:eth1
br-mgmt
br-storage
br-vxlan
eth0
eth0.10
eth0.20
eth1
eth1.30
Physical Network Switch
Physical interface for management and storage traffic
Physical interface for provider and tenant network traffic
(External) provider network interface used for floating IPs or direct instance connectivity
Interface used for overlay network traffic
(e.g. VXLAN, GENEVE, etc.)

Multiples Bond Sample Network Configuration

Note

If your environment does not have `eth0`, but instead has `p1p1` or some other interface name, ensure that all references to eth0 in all configuration files are replaced with the appropriate name. The same applies to additional network interfaces.

Please refer to Configuring Network Interfaces for more details.

Important

This is a multi-NIC bonded configuration to implement the required bridges for OpenStack-Ansible. This illustrates the configuration of the first Infrastructure host `infra1` and the IP addresses assigned should be adapted for implementation on the other hosts. After implementing this configuration, the host will need to be rebooted.

Assuming that `eth0/1` and `eth2/3` are dual port NIC's we pair `eth0` with `eth2` for increased resiliency in the case of one interface card failing.

```
auto eth0
iface eth0 inet manual
    bond-master bond0
    bond-primary eth0

auto eth1
iface eth1 inet manual
    bond-master bond1
    bond-primary eth1
```

```
auto eth2
iface eth2 inet manual
    bond-master bond0

auto eth3
iface eth3 inet manual
    bond-master bond1

# Create a bonded interface. Note that the "bond-slaves" is set to none. This
# is because the bond-master has already been set in the raw interfaces for
# the new bond0.
auto bond0
iface bond0 inet manual
    bond-slaves none
    bond-mode active-backup
    bond-miimon 100
    bond-downdelay 200
    bond-updelay 200

# This bond will carry VLAN and VXLAN traffic to ensure isolation from
# control plane traffic on bond0.
auto bond1
iface bond1 inet manual
    bond-slaves none
    bond-mode active-backup
    bond-miimon 100
    bond-downdelay 250
    bond-updelay 250

# Container/Host management VLAN interface
auto bond0.10
iface bond0.10 inet manual
    vlan-raw-device bond0

# OpenStack Networking VXLAN (tunnel/overlay) VLAN interface
auto bond1.30
iface bond1.30 inet manual
    vlan-raw-device bond1

# Storage network VLAN interface (optional)
auto bond0.20
iface bond0.20 inet manual
    vlan-raw-device bond0

# Container/Host management bridge
auto br-mgmt
iface br-mgmt inet static
    bridge_stp off
    bridge_waitport 0
    bridge_fd 0
    bridge_ports bond0.10
    address 172.29.236.11
    netmask 255.255.252.0
    gateway 172.29.236.1
    dns-nameservers 8.8.8.8 8.8.4.4

# OpenStack Networking VXLAN (tunnel/overlay) bridge
#
# Nodes hosting Neutron agents must have an IP address on this interface,
# including COMPUTE, NETWORK, and collapsed INFRA/NETWORK nodes.
#

auto br-vxlan
iface br-vxlan inet static
    bridge_stp off
    bridge_waitport 0
    bridge_fd 0
    bridge_ports bond1.30
    address 172.29.240.16
    netmask 255.255.252.0

# OpenStack Networking VLAN bridge
#
# The "br-vlan" bridge is no longer necessary for deployments unless Neutron
# agents are deployed in a container. Instead, a direct interface such as
# bond1 can be specified via the "host_bind_override" override when defining
# provider networks.
#
#auto br-vlan
#iface br-vlan inet manual
#    bridge_stp off
#    bridge_waitport 0
#    bridge_fd 0
#    bridge_ports bond1

# compute1 Network VLAN bridge
#auto br-vlan
#iface br-vlan inet manual
#    bridge_stp off
#    bridge_waitport 0
#    bridge_fd 0
#

# Storage bridge (optional)
#
# Only the COMPUTE and STORAGE nodes must have an IP address
# on this bridge. When used by infrastructure nodes, the
# IP addresses are assigned to containers which use this
# bridge.
#
auto br-storage
iface br-storage inet manual
    bridge_stp off
    bridge_waitport 0
    bridge_fd 0
    bridge_ports bond0.20

# compute1 Storage bridge
```

```
#auto br-storage
#iface br-storage inet static
#    bridge_stp off
#    bridge_waitport 0
#    bridge_fd 0
#    bridge_ports bond0.20
#    address 172.29.244.16
#    netmask 255.255.252.0
```