LAN Interfaces Configuration Guide, 17.2.0

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Supporting AT&T Vyatta Network Operating System

Contents

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About This Guide

This guide describes how to configure LAN interfaces on AT&T products that run on the AT&T Vyatta Network Operating System (referred to as a virtual router, vRouter, or router in the guide).

Loopback Interface

Loopback interface overview

A loopback interface is a special software-only interface that emulates a physical interface and allows the router to “connect” to itself. Packets routed to the loopback interface are rerouted back to the router and processed locally. Packets routed out the loopback interface but not destined for the loopback interface are dropped.

The AT&T Vyatta vRouter supports multiple loopback interfaces. These interfaces, with unique IP addressing, can be used as preferred source addresses for routing protocols such as BGP. These interfaces can also be configured as null or blackhole interfaces.

The AT&T Vyatta vRouter supports multiple IPv4 and IPv6 addresses on each loopback interface. These interfaces (lo and lo1 through lo*N*) have unique IP addressing, can be used as preferred source addresses for routing protocols such as BGP, and can be configured as null or blackhole interfaces.

The loopback interface provides a number of advantages.

- As long as the router is functioning, the loopback interface is always up, and so is very reliable. When even only one link to the router is functioning, the loopback interface can be accessed. The loopback interface thus eliminates the need to try each IP address of the router until it finds one that is still up.
- Because the loopback interface is always up, a routing session (such as a BGP session) can continue even if the outbound interface fails.
- You can simplify collection of management information by specifying the loopback interface as the interface for sending and receiving management information such as logs and SNMP traps.
- The loopback interface can be used to increase security by filtering incoming traffic with access control rules that specify the local interface as the only acceptable destination.
- In OSPF, you can advertise a loopback interface as an interface route into the network, regardless of whether physical links are up or down. This increases reliability by allowing traffic to take alternate paths if one or more physical links go down.
- In BGP, parallel paths can be configured to the loopback interface on a peer device. These parallel paths provide improved load sharing and redundancy.

The router automatically creates the loopback interface on startup with an interface name of lo. It also automatically configures the loopback address with standard IP addressing.

- According to RFC 5735, the 127.0.0.1/8 IPv4 address is assigned to the loopback address. This address is hidden from the `show` command output. Typically, the IPv4 address that is assigned to the loopback device is 127.0.0.1 for IPv4, although any address in the range from 127.0.0.0 through 127.255.255.255 is mapped to it.
- According to RFC 3513, the ::1/128 IPv6 address is assigned to the loopback interface.
- According to RFC 2606, the localhost domain name is mapped to the loopback addresses.

When configuring the router, it is good practice to take advantage of the reliability of the loopback interface with these practices:

- The host name of the router should be mapped to the loopback interface address, rather than to a physical interface.
- In OSPF and BGP, the router ID should be set to the loopback address. This prevents a possible dynamic recalculation and reassignment of the loopback address when physical interfaces are added or removed from the system. This action is disruptive to active BGP and OSPF sessions.

The AT&T Vyatta vRouter has extensive support for IPv6, including IPv6 interface addressing. The commands for configuring IPv6 on the loopback interface are given in this chapter. A full description of IPv6 support is provided in the AT&T Vyatta Network Operating System IPv6 Support Configuration Guide.

Examples of loopback interface configuration

This section presents the following topics:

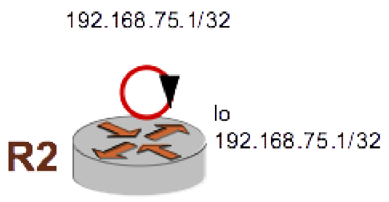
- Configuring network addresses *(page 14)*
- IPv6 on the loopback interface *(page 14)*

Configuring network addresses

The system automatically creates and addresses the loopback interface, so you do not need to configure any additional addressing. If you delete the loopback node, the system re-creates and readdresses the loopback address again the next time the system starts.

You may at times want to configure a smaller network prefix than /8 to the loopback interface. The example in this section shows how to assign the 192.168.75.1/32 address to the loopback interface. When you finish the example, the interface is configured as in the following figure.

Figure 1: Configuring the loopback interface



To configure the loopback interface, perform the following steps in configuration mode.

Table 1: Configuring the loopback interface

Step	Command
Assign the IP address to the loopback interface.	`vyatta@R1# set interfaces loopback lo address 192.168.75.1/32`
Commit the configuration.	`vyatta@R1# commit`

View the configuration.	`vyatta@R1# show interfaces loopback`
	` loopback lo {`
	`    address 192.168.75.1/32`
	` }`

IPv6 on the loopback interface

AT&T Vyatta Network Operating System IPv6 Support Configuration Guide provides examples of configuring IPv6 on interfaces.

Related commands in other guides

Commands for using other system features with loopback interfaces are located in the following guides.

Related Commands Documented Elsewhere	
OSPF	OSPF is supported on the loopback interface. Commands for configuring OSPF are described in AT&T Vyatta Network Operating System OSPF Configuration Guide.
QoS	QoS traffic policies are supported on the loopback interface. Commands for configuring quality of service on the loopback interface are described in AT&T Vyatta Network Operating System QoS Configuration Guide.
RIP	RIP is supported on the loopback interface. Commands for configuring RIP are described in AT&T Vyatta Network Operating System RIP Configuration Guide.
RIPng	RIPng is supported on the loopback interface. Commands for configuring RIPng are described in AT&T Vyatta Network Operating System RIPng Configuration Guide.

Loopback Interface Commands

clear interfaces loopback counters

Clears statistics counters for loopback interfaces.

Syntax:
`clear interfaces loopback [` *interface-name* `]` **`counters`**

The statistics counters for all loopback interfaces are cleared.

interface-name
Clears statistics counters for a loopback interface, **`lo`** *or* **`lo`***n*, where *n* ranges from 1 through 99999. If an interface is not specified, this command clears the counters of all loopback interfaces.

Operational mode

Use this command to clear statistics counters for loopback interfaces.

interfaces loopback <interface-name>

Defines a loopback interface.

Syntax:
`set interfaces loopback` *interface-name*

Syntax:
`delete interfaces loopback [` *interface-name* `]`

Syntax:
`show interfaces loopback`

A configuration node is automatically created for the lo loopback interface on startup.

interface-name
The name of a loopback interface, **`lo`** or **`lo`***n*, where *n* ranges from 1 through 99999.

Configuration mode

```
interfaces {
    loopback interface-name
}
```

Use this command to configure a loopback interface.

Use the `set` form of this command to create a loopback interface. However, the system automatically creates a configuration node for the lo loopback interface on startup, so you should not need to use the `set` form of this command to create the lo loopback interface unless you have deleted it.

Use the `delete` form of this command to remove all loopback interfaces or just one. The system creates an empty configuration node for the lo interface the next time the system starts.

Use the `show` form of this command to display the configured loopback interfaces.

interfaces loopback <interface-name> address

Specifies the IP address and network prefix for a loopback interface.

Syntax:

`set interfaces loopback` *interface-name* **`address`** { *ipv4* | *ipv6* }

Syntax:
`delete interfaces loopback` *interface-name* **`address`** { *ipv4* | *ipv6* }

Syntax:
`show interfaces loopback` *interface-name* **`address`**

interface-name
The name of a loopback interface, **`lo`** or **`lo`***n*, where *n* ranges from 1 through 99999.

ipv4
The IPv4 address and network prefix of the loopback interface. The format is *ip-address* / *prefix* (for example, 127.0.0.1/8).

You can define multiple IP addresses for the loopback interface by creating multiple **`address`** configuration nodes.

ipv6
The IPv6 address and network prefix of the loopback interface. The format is *ipv6-address* / *prefix* (for example, ::1/128).

You can define multiple IPv6 addresses for the loopback interface, by creating multiple **`address`** configuration nodes.

Configuration mode

```
interfaces {
   loopback interface-name {
      address ipv4
      address ipv6
   }
}
```

Use the `set` form of this command to specify the IP address and network prefix for a loopback interface. You can specify more than one IP address and network prefix for a loopback interface by creating multiple **`address`** configuration nodes.

Use the `delete` form of this command to delete an address and network prefix for a loopback interface.

Use the `show` form of this command to display the address configuration of a loopback interface.

interfaces loopback <interface-name> description <description>

Describes a loopback interface.

Syntax:
`set interfaces loopback` *interface-name* **`description`** *description*

Syntax:
`delete interfaces loopback` *interface-name* **`description`**

Syntax:
`show interfaces loopback` *interface-name* **`description`**

interface-name
The name of a loopback interface, **`lo`** or **`lo`***n*, where *n* ranges from 1 through 99999.

description
A description for the loopback interface.

Configuration mode

```
interfaces {
   loopback interface-name {
      description description
   }
}
```

Use this command to describe a loopback interface.

Use the `set` form of this command to describe a loopback interface.

Use the `delete` form of this command to delete the description of a loopback interface.

Use the `show` form of this command to display the description of a loopback interface.

interfaces loopback <interface-name> ipv6 address

Assigns an IPv6 address to a loopback interface.

Syntax:
`set interfaces loopback` *interface-name* **`ipv6 address`** [**`autoconf`** | **`eui64`** *ipv6prefix* | **`link-local`** *ipv6-address*]

Syntax:
`delete interfaces loopback` *interface-name* **`ipv6 address`** [**`autoconf`** | **`eui64`** *ipv6prefix* | **`link-local`** *ipv6-address*]

Syntax:
`show interfaces loopback` *interface-name* **`ipv6 address`** [**`autoconf`** | **`eui64`**]

interface-name
The name of a loopback interface, **`lo`** or **`lo`***n*, where *n* ranges from 1 through 99999.

`autoconf`
Generates an IPv6 address by using the SLAAC protocol. Use this keyword if the interface is performing a “host” function rather than a “router” function. You can specify this keyword in addition to static IPv6, static IPv4, and IPv4 DHCP addresses on the interface.

`eui64` ***ipv6prefix***
Specifies the 64-bit IPv6 address prefix that is used to configure an IPv6 address in EUI-64 format. The system concatenates this prefix with a 64-bit EUI-64 value that is derived from the 48-bit MAC address of the interface.

`link-local` ***ipv6-address***
Specifies the 128-bit IPv6 address.

Configuration mode

```
interfaces {
 loopback interface-name {
  ipv6 {
   address {
    autoconf
    eui64 ipv6prefix
    link-local ipv6-address
   }
  }
 }
}
```

Use this command to specify a method for assigning an IPv6 address to a loopback interface.

Use the **`autoconf`** keyword to direct the system to automatically configure (autoconfigure) the address by using the Stateless Address Autoconfiguration (SLAAC) protocol that is defined in RFC 4862. Alternatively, you can provide an EUI-64 IPv6 address prefix so that the system constructs the IPv6 address.

If you want the system to use SLAAC to acquire an address on the interface, then in addition to setting this parameter, you must also disable IPv6 forwarding, either globally (by using the `system ipv6 disable-forwarding` command) or specifically on the interface (by using the interfaces loopback <interface-name> ipv6 disable-forwarding *(page 19)* command).

Use the `set` form of this command to specify a method for assigning an IPv6 address to a loopback interface.

Use the `delete` form of this command to delete an IPv6 address from a loopback interface.

Use the `show` form of this command to display IPv6 address configuration settings for a loopback interface.

interfaces loopback <interface-name> ipv6 disable

Disables IPv6 on a loopback interface.

Syntax:
`set interfaces loopback` *interface-name* **`ipv6 disable`**

Syntax:
`delete interfaces loopback` *interface-name* **`ipv6 disable`**

Syntax:
`show interfaces loopback` *interface-name* **`ipv6 disable`**

interface-name
The name of a loopback interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Configuration mode.

Configuration Statement

```
interfaces {
  loopback interface-name {
    ipv6 {
      disable
    }
  }
}
```

By default, IPv6 is enabled on all interfaces. A global command exists which can disable IPv6, namely `set system ipv6 disable`, and this will take precedence over any of the existing per-interface based, IPv6 commands.

IPv6 Forwarding can be disabled via the `set interface loopback interface-name ipv6 disable-forwarding` command, but note that IPv6 traffic can still be terminated on this interface.

IPv6 configuration can be totally disabled via the `set interface loopback interface-name ipv6 disable` command.

Use the `set` form of this command to disable IPv6 on this interface.

Use the `delete` form of this command to enable IPv6 on this interface.

Use the `show` form of this command to display the current IPv6 configuration on this interface.

interfaces loopback <interface-name> ipv6 disable-forwarding

Disables IPv6 packet forwarding on the loopback interface.

Syntax:
`set interfaces loopback` *interface-name* **`ipv6 disable-forwarding`**

Syntax:

`delete interfaces loopback` *`interface-name`* **`ipv6 disable-forwarding`**

Syntax:
`show interfaces loopback` *`interface-name`* **`ipv6 disable-forwarding`**

IPv6 packets are forwarded.

interface-name
: The name of a loopback interface, **`lo`** or **`lo`***n*, where *n* ranges from 1 through 99999.

Configuration mode

```
interfaces {
    loopback interface-name {
       ipv6 {
          disable-forwarding
       }
    }
}
```

Use this command to disable IPv6 packet forwarding on a loopback interface.

You can also disable IPv6 forwarding globally (that is, for all interfaces) by using the `system ipv6 disable-forwarding` command.

Use the `set` form of this command to disable IPv6 packet forwarding on a loopback interface.

Use the `delete` form of this command to enable IPv6 packet forwarding on a loopback interface.

Use the `show` form of this command to display the configuration of IPv6 packet forwarding on a loopback interface.

interfaces loopback <interface-name> ipv6 dup-addr-detect-transmits

Specifies the number of NS packets to transmit as part of the DAD process.

Syntax:
`set interfaces loopback` *`interface-name`* **`ipv6 dup-addr-detect-transmits`** [**`0`** | *number*]

Syntax:
`delete interfaces loopback` *`interface-name`* **`ipv6 dup-addr-detect-transmits`**

Syntax:
`show interfaces loopback` *`interface-name`* **`ipv6 dup-addr-detect-transmits`**

One NS packet is transmitted as part of the DAD process.

interface-name
: The name of a loopback interface, **`lo`** or **`lo`***n*, where *n* ranges from 1 through 99999.

`0`
: Disables DAD on the loopback interface.

number
: The number of NS packets to transmit as part of the DAD process. The number ranges from 1 through n. The default number is 1.

Configuration mode

```
interfaces {
   loopback interface-name {
      ipv6 {
         dup-addr-detect-transmits 0
         dup-addr-detect-transmits number
      }
   }
}
```

Use this command to specify the number of Neighbor Solicitation (NS) packets to transmit as part of the Duplicate Address Detection (DAD) process.

Use the `set` form of this command to specify the number of NS packets to transmit.

Use the `delete` form of this command to delete the transmission number from a loopback interface and transmit the default number of one NS packet.

Use the `show` form of this command to display the number of NS packets that are transmitted.

show interfaces loopback

Displays statistics and configuration information about configured loopback interfaces.

Syntax:
`show interfaces loopback` [*interface-name* [**`brief`**] | **`detail`**]

When used with no option, this command displays a brief status of the loopback interface.

interface-name
The name of a loopback interface, **`lo`** or **`lo`***n*, where *n* ranges from 1 through 99999.

`brief`
Displays a brief status of a loopback interface.

`detail`
Displays detailed information and statistics about all loopback interfaces.

Operational mode

Use this command to display information about loopback interfaces.

The following example shows how to display a brief status of a loopback interface.

```
 vyatta@R1:~$ show interfaces loopback lo2 brief
Codes: S - State, L - Link, u - Up, D - Down, A - Admin Down
Interface        IP Address                        S/L  Description
---------        ----------                        ---  -----------
lo2              192.2.0.1/24                      u/u
```

The following example shows how to display detailed information about a loopback interface.

```
 vyatta@R1:~$ show interfaces loopback lo2
lo2: <BROADCAST,NOARP,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN group default
    link/ether 62:32:92:61:c4:69 brd ff:ff:ff:ff:ff:ff
    inet 192.2.0.1/24 brd 192.2.0.255 scope global lo2
       valid_lft forever preferred_lft forever
    inet6 fe80::6032:92ff:fe61:c469/64 scope link
       valid_lft forever preferred_lft forever

    RX:  bytes    packets     errors    ignored    overrun      mcast
             0          0          0          0          0          0
    TX:  bytes    packets     errors    dropped    carrier collisions
             0          0          0          0          0          0
```

The following example shows how to display detailed information about all loopback interfaces.

```
  vyatta@R1:~$ show interfaces loopback lo
lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet 192.0.0.1/24 brd 192.0.0.255 scope global lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever

    RX:  bytes    packets     errors    ignored    overrun      mcast
       1058949       6632          0          0          0          0
    TX:  bytes    packets     errors    dropped    carrier collisions
       1058949       6632          0          0          0          0
lo2: <BROADCAST,NOARP,UP,LOWER_UP> mtu 1500 qdisc noqueue state UNKNOWN group default
    link/ether 62:32:92:61:c4:69 brd ff:ff:ff:ff:ff:ff
    inet 192.2.0.1/24 brd 192.2.0.255 scope global lo2
       valid_lft forever preferred_lft forever
    inet6 fe80::6032:92ff:fe61:c469/64 scope link
       valid_lft forever preferred_lft forever
...
```

Data Plane Interfaces

Data plane interfaces overview

A system receives packets from neighboring systems through its network interfaces. On the LAN, an interface is typically an Ethernet interface. In the AT&T Vyatta vRouter, a data plane interface is an abstraction that represents the underlying physical or virtual Ethernet interface of the system.

Note: The terms Ethernet interface and data plane interface are synonymous in this guide.

Ethernet interfaces are viewed and configured in the interfaces ethernet node of the configuration tree. The system automatically discovers the physical interfaces on the system and creates entries for them in the configuration tree on startup. For example, on a system with two Ethernet interfaces, the router automatically creates configuration nodes for dp0p1p1 and dp0p1p2.

After the interface is enabled and provided with an address, you can configure it with various system features, such as firewall, routing protocols, quality of service, and so on.

The AT&T Vyatta vRouter has extensive support for IPv6, including IPv6 interface addressing. The commands for configuring IPv6 on Ethernet interfaces are given in this chapter. AT&T Vyatta Network Operating System IPv6 Support Configuration Guide fully describes AT&T Vyatta vRouter IPv6 support.

Examples of data plane interface configuration

This section presents the following topics:

- Viewing system interfaces *(page 23)*
- Basic configuration of a data plane interface *(page 24)*
- Ethernet multinetting *(page 25)*
- IPv6 on data plane interfaces *(page 26)*
- Hardware binding for data plane interfaces *(page 26)*

Viewing system interfaces

You can configure only interfaces that are physically available to the operating system on the hardware you are using. To view all the interfaces known to the operating system, use the `show interfaces system` command in operational mode, as shown in the following example. In this example, the system has two physical Ethernet interfaces, dp0p1p1 and dp0p1p2, plus a VLAN interface (vif) configured for VLAN 40 that is under dp0p1p2.

Viewing available system interfaces

```
vyatta@vyatta:~$ show interfaces system

1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group default
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00 promiscuity 0
    RX: bytes  packets  errors  dropped overrun mcast
    20843877   133515   0       0       0       0
    TX: bytes  packets  errors  dropped carrier collsns
    20843877   133515   0       0       0       0
6: dp0p160p1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP mode DORMANT
 group default qlen 500
    link/ether 00:0c:29:19:5c:20 brd ff:ff:ff:ff:ff:ff promiscuity 0
    tun
    RX: bytes  packets  errors  dropped overrun mcast
    7620971    125056   0       11638   0       117337
    TX: bytes  packets  errors  dropped carrier collsns
    152687     1589     0       0       0       0
```

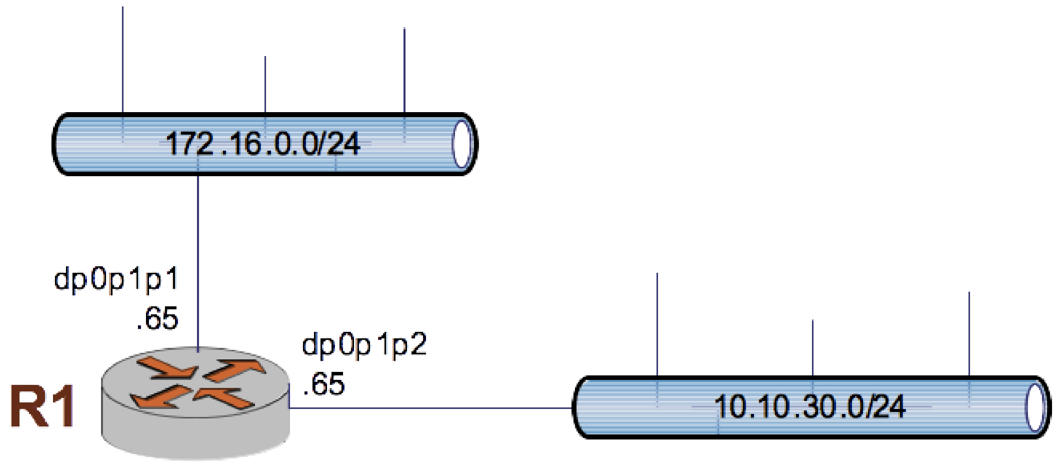
```
7: dp0p192p1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP mode DORMANT
 group default qlen 500
    link/ether 00:0c:29:19:5c:2a brd ff:ff:ff:ff:ff:ff promiscuity 0
    tun
    RX: bytes  packets  errors  dropped overrun mcast
    2052       24       0       58794   0       12
    TX: bytes  packets  errors  dropped carrier collsns
    2278       37       0       0       0       0
8: dp0p224p1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP mode DORMANT
 group default qlen 500
    link/ether 00:0c:29:19:5c:34 brd ff:ff:ff:ff:ff:ff promiscuity 0
    tun
    RX: bytes  packets  errors  dropped overrun mcast
    876        14       0       10      0       2
    TX: bytes  packets  errors  dropped carrier collsns
    408        4        0       0       0       0
9: dp0p256p1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP mode DORMANT
 group default qlen 500
    link/ether 00:0c:29:19:5c:3e brd ff:ff:ff:ff:ff:ff promiscuity 0
    tun
    RX: bytes  packets  errors  dropped overrun mcast
    57684      218      0       0       0       0
    TX: bytes  packets  errors  dropped carrier collsns
    636        6        0       0       0       0
10: .spathintf: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UNKNOWN mode
 DEFAULT group default qlen 500
    link/ether 6a:9f:e0:5a:b4:de brd ff:ff:ff:ff:ff:ff promiscuity 0
    tun
    RX: bytes  packets  errors  dropped overrun mcast
    0          0        0       0       0       0
    TX: bytes  packets  errors  dropped carrier collsns
    0          0        0       0       0       0
```

Basic configuration of a data plane interface

This section presents a sample configuration for a data plane, or Ethernet, interface that is connected to an Ethernet LAN.

When you finish the sample configuration, the system is configured as shown in the following figure.

Figure 2: Basic configuration of a data plane



The following example shows how to apply IP addresses directly to the two data plane interfaces already discovered for the system—dp0p1p1 and dp0p1p2. These interfaces were automatically created by the system on startup, when the system detected the physical interfaces.

Each IP address is applied directly to the interface. The system automatically discovers the MAC address (hardware ID) of the network interface card (NIC) that houses the data plane interface and applies default values for a number of other options.

To configure these interfaces, perform the following steps in configuration mode.

Table 2: Configuring data plane interfaces

Step	Command
Assign an IP address to the dp0p1p1 interface.	`vyatta@R1# set interfaces dataplane dp0p1p1 address 176.16.0.65/24`

Assign an IP address to the dp0p1p2 interface.	`vyatta@R1# set interfaces dataplane dp0p1p2 address 10.10.30.65/24`
	`[edit]`

Commit and view the configuration.	`vyatta@R1# commit`
	`OK`
	`[edit]`
	`vyatta@R1# show interfaces dataplane`
	`dataplane dp0p1p1 {`
	`     address 10.1.32.73/24`
	`     mtu 1500`
	` }`

Ethernet multinetting

Each physical interface can have multiple IP addresses assigned to it. If you want to have multiple networks on the same physical interface (called multinetting) but do not want to use 802.1Q VLANs, simply create multiple address configuration nodes directly under the primary interface.

To configure Ethernet multinetting, perform the following steps in configuration mode.

Table 3: Configuring Ethernet multinetting

Step	Command
Assign the first IP address to the dp0p1p1 interface.	`vyatta@R2# set interfaces dataplane dp0p1p1 address 172.16.0.65/24`
Assign the second IP address to the dp0p1p1 interface.	`vyatta@R1# set interfaces dataplane dp0p1p1 address 192.168.1.17/24`

Commit and view the configuration.	`vyatta@R1# commit`
	`OK`
	`[edit]`
	
	`vyatta@R1# show interfaces dataplane dp0p1p1`
	` address 192.168.1.81/24`
	` address`
	`192.168.1.17/24`

IPv6 on data plane interfaces

AT&T Vyatta Network Operating System IPv6 Support Configuration Guide provides examples of configuring IPv6 on interfaces.

Hardware binding for data plane interfaces

The vRouter provides you with the option to override the names of vRouter data plane interfaces to ensure that these names remain bound to network interface cards (NICs), which is useful in the following scenarios.

- Moving a NIC from a damaged slot to a different slot (slot-number- or PCI-address-based binding)
- Moving a NIC from one slot to another (MAC-address based binding)
- Naming data plane interfaces the same across different chassis, hypervisors, and cloud environments

The hardware-binding commands have the following syntax:

`interfaces dataplane` *interface-name* **`hardware`** *binding-keyword-and-value*

For information about hardware-binding commands, refer to Data Plane Interfaces Commands *(page 29)*.

Command dependencies

Some of the hardware-binding commands must be run with other hardware-binding commands; otherwise, commit fails.

The following examples show the commands that you can run individually and those that you must run with other commands.

- The following command binds dp0s5 to the NIC at the 0:00:05.0 PCI address.
  ```
  set interfaces dataplane dp0s5 hardware pci-address 0:00:05.0
  ```
- The following command binds dp0s7 to port 0 on a system that has a single NIC.
  ```
  set interfaces dataplane dp0s7 hardware port 0
  ```
- The following command binds dp0s9 to the NIC whose MAC address is b0:03:f4:02:02:05.
  ```
  set interfaces dataplane dp0s9 hardware mac b0:03:f4:02:02:05
  ```
- The following command binds dp0s10 to the onboard NIC whose firmware index is 39.
  ```
  set interfaces dataplane dp0s10 hardware firmware-index 39
  ```
- The following commands bind dp0s6 to function 0 of the NIC in PCI slot 6.
  ```
  set interfaces dataplane dp0s6 hardware pci-slot 6

  set interfaces dataplane dp0s6 hardware pci-function 0
  ```
- The following commands bind dp0s8 to port 0 of the NIC in PCI slot 8.
  ```
  set interfaces dataplane dp0s8 hardware pci-slot 8

  set interfaces dataplane dp0s8 hardware dev-port 0
  ```

Overriding interface names based on hardware bindings

Consider a scenario in which interfaces map to PCI slots as shown in the following table.

Table 4: Mapping of interface names to PCI slots

Interface name	PCI slot
dp0s4	4
dp0s5	5
dp0s6	6

To override the interface names, you must configure hardware binding by using the **`set interfaces dataplane`** *interface-name* **`hardware pci-slot`** *slot-number* command, as shown in the following example.

Table 5: Overriding interface names

Step	Command

Create new placeholder interface names.
 	
Note: Do not move your management interface if you are on a Telnet or SSH console.
	`vyatta@R1# set interfaces dataplane dp0s1`
	` hardware pci-slot 4`
	`[edit]`
	`vyatta@R1# set interfaces dataplane dp0s2`
	` hardware pci-slot 5`
	`[edit]`
	`vyatta@R1# set interfaces dataplane dp0s3`
	` hardware pci-slot 6`
	`[edit]`

Commit your changes.	`vyatta@R1# commit`
	`[edit]`

Save your changes.	`vyatta@R1# save`
	`[edit]`

Exit the configuration mode.	`vyatta@R1# exit`
	`logout`

Reboot your vRouter.	`vyatta@R1:~$ reboot`
Verify that you have correctly configured the override of the interface names.	`vyatta@R1:~$ show interfaces dataplane`

Apply the configuration of dp0s4, dp0s5 and dp0s6 to dp0s1, dp0s2 and dp0s3, respectively.	`vyatta@R1:~$ configure`
	`...`

Delete the configuration for the dp0s4, dp0s5, and dp0s6 interfaces.	`vyatta@R1# delete interface dataplane dp0s4`
	`[edit]`
	`vyatta@R1# delete interface dataplane dp0s5`
	`[edit]`
	`vyatta@R1# delete interface dataplane dp0s6`
	`[edit]`

Commit your changes.	`vyatta@R1# commit`
	`[edit]`

Save your changes.	`vyatta@R1# save`
	`[edit]`

Exit the configuration mode.	`vyatta@R1# exit`
	`logout`

Binding data plane interfaces to MAC addresses

Consider a scenario in which you are running a vRouter in a virtual machine (VM) and the virtual interfaces might not consistently appear at the same locations on each instantiation of the VM.

On the first boot of the VM, the interface assignments might be as follows:

Table 6: Data plane interface assignments and MAC addresses

Data plane interface	MAC address
dp0s3 (physically in slot 3 on the VM)	00:01:02:03:05:06
dp0s4 (physically in slot 4 on the VM)	00:01:02:03:05:07

To keep the NICs in slots 3 and 4 assigned to dp0s3 and dp0s4, respectively, for every subsequent instantiation of your VM, enter the following commands:

```
vyatta@R1# set interfaces dataplane dp0s3 hardware mac 00:01:02:03:05:06
vyatta@R1# set interfaces dataplane dp0s4 hardware mac 00:01:02:03:05:07
vyatta@R1# commit
vyatta@R1# save
```

You do not have to reboot the vRouter.

Data Plane Interfaces Commands

clear interfaces dataplane counters

Clears statistics counters for a single data plane interface or all data plane interfaces.

Syntax:
`clear interfaces dataplane` [*interface-name*] **`counters`**

Statistics counters for all data plane interfaces are cleared.

interface-name
The identifier of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Operational mode

Use this command to clear statistics counters for a single data plane interface or all data plane interfaces.

Note:

Counters in the controller (slow path) are not cleared by this command.

interfaces dataplane <interface-name>

Defines a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name*

Syntax:
`delete interfaces dataplane` *interface-name*

Syntax:
`show interfaces dataplane` *interface-name*

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Configuration mode

```
interfaces {
    dataplane interface-name
}
```

Use this command to create a data plane interface.

Use the `set` form of this command to create a data plane interface.

Use the `delete` form of this command to delete a data plane interface. The system creates an empty configuration node for the interface the next time the system starts.

Use the `show` form of this command to display data plane interface configuration.

interfaces dataplane <interface-name> address

Specifies the IP address and network prefix for a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`address`** { *ipv4* | *ipv6* | **`dhcp`** | **`dhcpv6`** }

Syntax:
`delete interfaces dataplane` *interface-name* **`address`** [*ipv4* | *ipv6* | **`dhcp`** | **`dhcpv6`**]

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

ipv4
The IPv4 address of a data plane interface. The format is *ip-address/prefix* (for example, 192.168.1.77/24).

ipv6
The IPv6 address of a data plane interface. The format is *ipv6-address/prefix* (for example, 2001:db8:1234::/48).

`dhcp`
Defines the interface as a DHCP client, which obtains its address and prefix from a DHCP server.

`dhcpv6`
Defines the interface as a DHCPv6 client, which obtains its address and prefix from a DHCPv6 server.

Configuration mode

```
interfaces {
    dataplane interface-name {
        address {
            ipv4
            ipv6
            dhcp
            dhcpv6
        }
    }
}
```

Use this command to specify the IP address and network prefix for a data plane interface.

Use the `set` form of this command to set an IP address and a network prefix. You can set only one IP address for the interface.

Use the `delete` form of this command to delete an IP address and a network prefix.

interfaces dataplane <interface-name> bond-group <bondx>

Adds a data plane interface to a bonding group.

Syntax:
`set interfaces dataplane` *interface-name* **`bond-group`** *bondx*

Syntax:
`delete interfaces dataplane` *interface-name* **`bond-group`** *bondx*

Syntax:
`show interfaces dataplane` *interface-name* **`bond-group`** *bondx*

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

bondx
The identifier for the bond group. Supported values are **`bond0`** through **`bond99`**.

Configuration mode

```
interfaces {
    dataplane interface-name {
        bond-group bondx
    }
}
```

Use this command to add a data plane interface to a data plane link bond group.

A data plane interface can only be a member of one data plane link bond group and the bond group must first be defined using interfaces bonding <dpFbondx> *(page 30)*. The maximum number of data plane interfaces that can be added to a bonding group depends on available system resources. For most implementations this is essentially unlimited.

Note: The data plane interface will not be added to the bond group if it is disabled.

You must not configure any IP address for the data plane interface if it is to become part of a bonding group. Instead, the IP address for the group is configured on the bonding interface using interfaces dataplane <interface-name> address *(page 29)*.

Use the `set` form of this command to add a data plane interface to a data plane link bond group.

Use the `delete` form of this command to remove a data plane interface from a data plane link bond group.

Use the `show` form of this command to view bond group configuration.

interfaces dataplane <interface-name> description <description>

Describes a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`description`** *description*

Syntax:
`delete interfaces dataplane` *interface-name* **`description`**

Syntax:
`show interfaces dataplane` *interface-name* **`description`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

description
A mnemonic name or description for the data plane interface.

Configuration mode

```
interfaces {
    dataplane interface-name {
        description description
    }
}
```

Use this command to describe a data plane interface.

Use the `set` form of this command to describe a data plane interface.

Use the `delete` form of this command to delete the description of a data plane interface.

Use the `show` form of this command to display the description of a data plane interface.

interfaces dataplane <interface-name> dhcp-options no-rfc3442

Disables support for the classless static route option for DHCP on a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`dhcp-options no-rfc3442`**

Syntax:
`delete interfaces dataplane` *interface-name* **`dhcp-options no-rfc3442`**

Syntax:
`show interfaces dataplane` *interface-name* **`dhcp-options`**

The classless static route option for DHCP is enabled.

interface-name

The AT&T Vyatta vRouter can only use interfaces that are available to the operating system kernel (that is, interfaces that physically exist on the system) and have been created in the configuration tree and configured with an IP address.

The AT&T Vyatta vRouter automatically creates configuration nodes for all available physical interfaces on startup.

If you want to use an interface with a specific function (say, BGP) the interface must be enabled within the configuration node for that function (for example, within the BGP configuration node).

`no-rfc3442`

Removes the classless static route option (121) from the parameter request list that a DHCP client sends to the DHCP server. For further information, refer to RFC 3442 at https://tools/ietf.org/html/refc3442.

Configuration mode

```
interfaces {
    dataplane interface-name {
        dhcp-options {
            no-rfc3442
        }
    }
}
```

Note: This command is relevant only if the **`dhcp`** option has been set by using interfaces dataplane <interface-name> address *(page 29)*.

Note: Normally, this command is not required. It would be used only if the remote DHCP server is configured to provide classless static routes, but these routes are not required on the router that is configured to use the DHCP address.

Use the `set` form of this command to disable support for the DHCP classless static route option on a data plane interface.

Use the `delete` form of this command to re-enable support for the DHCP classless static route option on a data plane interface.

Use the `show` form of this command to display the status of the DHCP classless static route option on a data plane interface.

interfaces dataplane <interface-name> dhcpv6-options

Specifies the way in which a DHCPv6 client is to acquire an address, parameters, or both from the DHCPv6 server.

Syntax:
`set interfaces dataplane` *interface-name* **`dhcpv6-options`** [**`parameters-only`** | **`temporary`**]

Syntax:
`delete interfaces dataplane` *interface-name* **`dhcpv6-options`** [**`parameters-only`** | **`temporary`**]

Syntax:
`show interfaces dataplane` *interface-name* **`dhcpv6-options`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

`parameters-only`
Acquires only configuration parameters (and not an IPv6 address) from the DHCPv6 server.

`temporary`
Acquires a temporary IPv6 address from the DHCPv6 server.

Configuration mode

```
interfaces {
    dataplane interface-name {
        dhcpv6-options {
            parameters-only
            temporary
        }
    }
}
```

Use this command to specify in what way the DHCPv6 client is to acquire an IPv6 address, parameters, or both from the DHCPv6 server.

Note that the parameters are relevant only if the **`dhcpv6`** option has been set for interfaces dataplane <interface-name> address *(page 29)*.

The **`parameters-only`** parameter is typically used with Stateless Address Autoconfiguration (SLAAC) or static address configuration. The **`parameters-only`** and **`temporary`** parameters are mutually exclusive.

Use the `set` form of this command to specify the DHCPv6 options.

Use the `delete` form of this command to delete the DHCPv6 options.

Use the `show` form of this command to display DHCPv6 option configuration.

interfaces dataplane <interface-name> disable

Disables a data plane interface without discarding its configuration.

Syntax:
`set interfaces dataplane` *interface-name* **`disable`**

Syntax:
`delete interfaces dataplane` *interface-name* **`disable`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Configuration mode

```
interfaces {
    dataplane interface-name {
            disable
    }
}
```

Use this command to disable a data plane interface without discarding its configuration.

Use the `set` form of this command to disable an interface.

Use the `delete` form of this command to enable an interface.

interfaces dataplane <interface-name> disable-link-detect

Directs a data plane interface not to detect physical link-state changes.

Syntax:
`set interfaces dataplane` *interface-name* **`disable-link-detect`**

Syntax:
`delete interfaces dataplane` *interface-name* **`disable-link-detect`**

An interface detects physical link-state changes.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Configuration mode

```
interfaces {
    dataplane interface-name {
        disable-link-detect
    }
}
```

Use this command to direct a data plane interface not to detect physical state changes to the Ethernet link (for example, when a cable is unplugged).

Use the `set` form of this command to disable detection of physical link-state changes.

Use the `delete` form of this command to enable detection of physical link-state changes.

interfaces dataplane <interface-name> hardware dev-port <port-number>

Binds a data plane interface to a port on a PCI NIC that has multiple ports.

Syntax:
`set interfaces dataplane` *interface-name* **`hardware dev-port`** *port-number*

Syntax:
`delete interfaces dataplane` *interface-name* **`hardware dev-port`** *port-number*

Syntax:
`show interfaces dataplane` *interface-name* **`hardware dev-port`**

interface-name
The name of a data plane interface. For more information about formats for the names of supported data plane interfaces, refer to Data Plane Interface *(page 155)*.

port-number
: The number of a port. The number ranges from 0 through 4294967295.

Configuration mode

```
dataplane interface-name {
        hardware {
                dev-port port-number
        }
}
```

This command is useful when a NIC has multiple ports but occupies a single PCI slot. To uniquely identify a port on the NIC, you must also use the `interfaces dataplane` *interface-name* `hardware pci-address` *pci-address* or `interfaces dataplane` *interface-name* `hardware pci-slot` *pci-slot* command. For example, you can instruct the vRouter to bind dp0s5 to port 1 of the NIC whose address is 00:19.0 or bind dp0s3 to port 2 of the NIC in slot 3.

Use the `set` form of this command to bind a data plane interface to a port on a PCI NIC.

Use the `delete` form of this command to unbind a data plane interface from a port on a PCI NIC.

Use the `show` form of this command to display the port hardware-binding information for a data plane interface.

interfaces dataplane <interface-name> hardware firmware-index <firmware-index>

Binds a data plane interface to the firmware index of an onboard NIC.

Syntax:
`set interfaces dataplane` *interface-name* **`hardware firmware-index`** *firmware-index*

Syntax:
`delete interfaces dataplane` *interface-name* **`hardware firmware-index`** *firmware-index*

Syntax:
`show interfaces dataplane` *interface-name* **`hardware firmware-index`**

interface-name
: The name of a data plane interface. For more information about formats for the names of supported data plane interfaces, refer to Data Plane Interface *(page 155)*.

firmware-index
: The ACPI firmware index of an onboard NIC. The index is a number that ranges from 0 through 4294967295. The BIOS assigns the index to the onboard NIC, which is built into the motherboard of a system. Only an OEM can change firmware index assignments.

Configuration mode

```
dataplane interface-name {
        hardware {
                firmware-index firmware-index
        }
}
```

Use the `set` form of this command to bind a data plane interface to the firmware index of an onboard NIC.

Use the `delete` form of this command to unbind a data plane interface from the firmware index of an onboard NIC.

Use the `show` form of this command to display the firmware index of an onboard NIC that is bound to a data plane interface.

interfaces dataplane <interface-name> hardware mac <mac-address>

Binds a data plane interface to the vendor-assigned MAC address of a NIC.

Syntax:
`set interfaces dataplane` *interface-name* **`hardware mac`** *mac-address*

Syntax:
`delete interfaces dataplane` *interface-name* **`hardware mac`** *mac-address*

Syntax:
`show interfaces dataplane` *interface-name* **`hardware mac`**

interface-name
The name of a data plane interface. For more information about formats for the names of supported data plane interfaces, refer to Data Plane Interface *(page 155)*.

mac-address
The MAC address of a NIC. The MAC address has the following format: *h*:*h*:*h*:*h*:*h*:*h*, where *h* is one or two hexadecimal digits.

Configuration mode

```
dataplane interface-name {
        hardware {
                mac mac-address
        }
}
```

Use the `set` form of this command to bind a data plane interface to the MAC address of a NIC.

Use the `delete` form of this command to unbind the data plane interface from the MAC address of a NIC.

Use the `show` form of this command to display the MAC address hardware-binding information for a data plane interface.

interfaces dataplane <interface-name> hardware pci-address <pci-address>

Binds a data plane interface to the PCI address of a NIC.

Syntax:
`set interfaces dataplane` *interface-name* **`hardware pci-address`** *pci-address*

Syntax:
`delete interfaces dataplane` *interface-name* **`hardware pci-address`** *pci-address*

Syntax:
`show interfaces dataplane` *interface-name* **`hardware pci-address`**

interface-name
The name of a data plane interface. For more information about formats for the names of supported data plane interfaces, refer to Data Plane Interface *(page 155)*.

pci-address
The PCI address of a NIC. The format of the address is as follows:
[*domain* :] *bus* : *slot* . *function*

- *domain*: The domain is a hexadecimal value that ranges from 0 through ffff.

- *bus*: The bus address is a hexadecimal value that ranges from 0 through ff.
- *slot*: The slot number is a hexadecimal value that ranges from 0 through 1f.
- *function*: The function number ranges from 0 through 7.

Configuration mode

```
dataplane interface-name {
        hardware {
                pci-address pci-address
        }
}
```

You can obtain the PCI address of a NIC by running the **lpsci** Linux command. In the following example, the bus address of the first card is 0, slot number is 19, and function number is 0. The bus address of the second card is 2, slot number is 0, and function number is 0. If you have a single PCI domain, as most systems do, then the domain value is 0.

```
$ lspci
...
00:19.0 Ethernet controller: Intel Corporation Ethernet Connection I218-LM (rev 04)
...
02:00.0 Network controller: Intel Corporation Wireless 7260 (rev 73)
...
```

Use the `set` form of this command to bind a data plane interface to the PCI address of a NIC.

Use the `delete` form of this command to unbind a data plane interface from a PCI address.

Use the `show` form of this command to display the PCI address that is bound to a data plane interface.

interfaces dataplane <interface-name> hardware pci-function <function-number>

Binds a data plane interface to a function number for a PCI NIC.

Syntax:
`set interfaces dataplane` *interface-name* **`hardware pci-function`** *function-number*

Syntax:
`delete interfaces dataplane` *interface-name* **`hardware pci-function`** *function-number*

Syntax:
`show interfaces dataplane` *interface-name* **`hardware pci-function`**

interface-name
The name of a data plane interface. For more information about formats for the names of supported data plane interfaces, refer to Data Plane Interface *(page 155)*.

function-number
The number of a PCI function (a logical PCI card). The number ranges from 0 through 7.

Configuration mode

```
dataplane interface-name {
        hardware {
                pci-function function-number
        }
}
```

If a PCI card hosts several functions, use this command to associate a data plane interface with one of those functions. You must use this command with the **`interfaces dataplane`** *interface-name* **`hardware pci-slot`** *slot-number* command.

Use the `set` form of this command to bind a data plane interface to a function number for a PCI NIC.

Use the `delete` form of this command to unbind a data plane interface from a PCI function number.

Use the `show` form of this command to display the hardware PCI function that is bound to a data plane interface.

interfaces dataplane <interface-name> hardware pci-slot <slot-number>

Binds a data plane interface to a PCI slot into which a NIC is plugged.

Syntax:
`set interfaces dataplane` *interface-name* **`hardware pci-slot`** *pci-slot-number*

Syntax:
`delete interfaces dataplane` *interface-name* **`hardware pci-slot`** *pci-slot-number*

Syntax:
`show interfaces dataplane` *interface-name* **`hardware pci-slot`**

interface-name
The name of a data plane interface. For more information about formats for the names of supported data plane interfaces, refer to Data Plane Interface *(page 155)*.

pci-slot-number
The number of a PCI slot. The number ranges from 0 through 4294967295.

Configuration mode

```
dataplane interface-name {
        hardware {
                pci-slot pci-slot-number
        }
}
```

Use the `set` form of this command to bind a data plane interface to a PCI slot.

Use the `delete` form of this command to unbind a data plane interface from a PCI slot.

Use the `show` form of this command to display the PCI slot hardware-binding information for a data plane interface.

interfaces dataplane <interface-name> hardware port <port-number>

Binds a data plane interface to a port on a PCI NIC, based on the discovery order by DPDK.

Syntax:
`set interfaces dataplane` *interface-name* **`hardware port`** *port-number*

Syntax:
`delete interfaces dataplane` *interface-name* **`hardware port`** *port-number*

Syntax:
`show interfaces dataplane` *interface-name* **`hardware port`**

interface-name

The name of a data plane interface. For more information about formats for the names of supported data plane interfaces, refer to Data Plane Interface *(page 155)*.

port-number
The discovery order by DPDK. The discovery order is a number that ranges from 0 through 31.

Configuration mode

```
dataplane interface-name {
        hardware {
                port port-number
        }
}
```

Data Plane Development Kit (DPDK) discovers interfaces on a system in some particular, nonrandom order. For example, if a system has one NIC, you can use this command to bind dp0s0 to port 0, the first port that DPDK finds. By using this command, you can always be certain that no matter where the NIC is added to a system, the NIC always comes up as dp0s0.

Use the `set` form of this command to bind a data plane interface to a port on a PCI NIC.

Use the `delete` form of this command to unbind a data plane interface from a PCI NIC port.

Use the `show` form of this command to display the port hardware-binding information for a data plane interface.

interfaces dataplane <interface-name> ip disable-forwarding

Disables forwarding on a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`ip disable-forwarding`**

Syntax:
`delete interfaces dataplane` *interface-name* **`ip disable-forwarding`**

IPv6 packets are forwarded.

interface-name
The identifier of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Configuration mode

```
interfaces {
    dataplane interface-name {
        ip {
            disable-forwarding
        }
    }
}
```

Use this command to disable packet forwarding on a data plane interface.

You can also disable forwarding globally (that is, for all interfaces) by using the `system ipv6 disable-forwarding` command.

Use the `set` form of this command to disable IPv6 packet forwarding on an interface.

Use the `delete` form of this command to enable IPv6 packet forwarding on an interface.

interfaces dataplane <interface-name> ip enable-proxy-arp

Enables proxy ARP on a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`ip enable-proxy-arp`**

Syntax:
`delete interfaces dataplane` *interface-name* **`ip enable-proxy-arp`**

Proxy ARP is not enabled on a data plane interface.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Configuration mode

```
interfaces {
    dataplane interface-name {
        ip {
            enable-proxy-arp
        }
    }
}
```

Use this command to enable proxy Address Resolution Protocol (ARP) on a data plane interface.

Proxy ARP allows a data plane interface to respond with its own media access control (MAC) address to ARP requests for destination IP addresses on subnets that are attached to other interfaces on the system. Subsequent packets sent to those destination IP addresses are forwarded appropriately by the system.

Use the `set` form of this command to enable proxy ARP on an interface.

Use the `delete` form of this command to return the system to its default behavior, that is, proxy ARP is not enabled on a data plane interface.

interfaces dataplane <interface-name> ip pim mode <mode>

Specifies the PIM on a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`ip pim mode`** *mode*

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

mode
The PIM mode for an interface. The mode is as follows:

`dense`: Enable PIM dense mode.

`dense-passive`: Enable passive operation for PIM dense mode.

`sparse`: Enable PIM sparse mode.

`sparse-passive`: Enable passive operation for PIM sparse mode.

Configuration mode

```
interfaces {
    dataplane interface-name {
        ip {
            pim {
                mode sparse
            }
        }
    }
}
```

Use the `set` form of this command to specify the PIM mode on a data plane interface.

interfaces dataplane <interface-name> ip rpf-check

Enables the policy for reverse-path filter.

Syntax:
`set interfaces dataplane` *interface-name* **`ip rpf-check`** { **`strict`** | **`loose`** | **`disable`** }

Syntax:
`delete interfaces dataplane` *interface_name* **`ip rpf-check`** [**`strict`** | **`loose`** | **`disable`**]

Syntax:
`show interfaces dataplane` *interface_name* **`ip rpf-check`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

`strict`
An ingress filter using a dynamic access list. According to RFC 3704.

`loose`
An ingress filter that checks for the presence of a source route. According to RFC 3704.

`disable`
No source validation.

Configuration mode

```
interfaces {
    dataplane interface-name {
        ip {
            rpf-check
                strict
                loose
                disable
        }
    }
}
```

Use this command to enable the policy for reverse-path filter.

Use the `set` form of this command to enable the policy for reverse-path filter.

Use the `delete` form of this command to delete the policy for reverse-path filter.

Use the `show` form of this command to display the policy for reverse-path filter.

interfaces dataplane <interface-name> ipv6 address

Assigns an IPv6 address to a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`ipv6 address`** [**`autoconf`** | **`eui64`** *ipv6prefix* | **`link-local`** *ipv6address*]

Syntax:
`delete interfaces dataplane` *interface-name* **`ipv6 address`** [**`autoconf`** | **`eui64`** *ipv6prefix* | **`link-local`** *ipv6address*]

Syntax:

`show interfaces dataplane` *interface-name* **`ipv6 address`** `[` **`autoconf`** `|` **`eui64`** `]`

interface-name
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

`autoconf`
: Generates an IPv6 address using the SLAAC protocol. Use this keyword if the interface is performing a "host" function rather than a "router" function. You can specify this keyword in addition to static IPv6, static IPv4, or IPv4 DHCP addresses on the interface.

`eui64` ***ipv6prefix***
: Specifies the 64-bit IPv6 address prefix that is used to configure an IPv6 address in EUI-64 format. The system concatenates this prefix with a 64-bit EUI-64 value that is derived from the 48-bit MAC address of the interface.

`link-local` ***ipv6address***
: Specifies the IPv6 address that is valid only for communication within the local broadcast domain.

Configuration mode

```
interfaces {
    dataplane interface-name {
        ipv6 {
            address {
                autoconf
                eui64 ipv6prefix
                link-local ipv6address
            }
        }
    }
}
```

Use this command to assign an IPv6 address to a data plane interface.

Use the **`autoconf`** keyword to direct the system to automatically configure (autoconfigure) the address, using the Stateless Address Autoconfiguration (SLAAC) protocol defined in RFC 4862. Alternatively, you can use the **`eui64`** keyword with an IPv6 address prefix so that the system constructs the IPv6 address.

If you want the system to use SLAAC to acquire an address on the interface, then in addition to setting this parameter, you must also disable IPv6 forwarding, either globally (by using the `system ipv6 disable-forwarding` command) or specifically on the interface (by using interfaces dataplane <interface-name> ipv6 disable-forwarding *(page 43)*).

Use the **`link-local`** keyword to explicitly configure a specific link-local address, which then replaces any system generated link-local address.

Use the `set` form of this command to assign an IPv6 address to a data plane interface.

Use the `delete` form of this command to delete an IPv6 address from a data plane interface.

Use the `show` form of this command to display IPv6 address configuration settings.

interfaces dataplane <interface-name> ipv6 disable

Disables IPv6 on a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`ipv6 disable`**

Syntax:
`delete interfaces dataplane` *interface-name* **`ipv6 disable`**

Syntax:
`show interfaces dataplane` *interface-name* **`ipv6 disable`**

interface-name

The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Configuration mode.

Configuration Statement

```
interfaces {
  dataplane interface-name {
    ipv6 {
      disable
    }
  }
}
```

By default, IPv6 is enabled on all interfaces. A global command exists which can disable IPv6, namely `set system ipv6 disable`, and this will take precedence over any of the existing per-interface based, IPv6 commands.

IPv6 Forwarding can be disabled via the `set interface dataplane interface-name ipv6 disable-forwarding` command, but note that IPv6 traffic can still be terminated on this interface.

IPv6 configuration can be totally disabled via the `set interface dataplane interface-name ipv6 disable` command.

Use the `set` form of this command to disable IPv6 on this interface.

Use the `delete` form of this command to enable IPv6 on this interface.

Use the `show` form of this command to display the current IPv6 configuration on this interface.

interfaces dataplane <interface-name> ipv6 disable-forwarding

Disables IPv6 forwarding on a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`ipv6 disable-forwarding`**

Syntax:
`delete interfaces dataplane` *interface-name* **`ipv6 disable-forwarding`**

IPv6 packets are forwarded.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Configuration mode

```
interfaces {
    dataplane interface-name {
        ipv6 {
            disable-forwarding
        }
    }
}
```

Use this command to disable IPv6 packet forwarding on a data plane interface.

You can also disable IPv6 forwarding globally (that is, for all interfaces) by using the `system ipv6 disable-forwarding` command.

Use the `set` form of this command to disable IPv6 packet forwarding on an interface.

Use the `delete` form of this command to enable IPv6 packet forwarding on an interface.

interfaces dataplane <interface-name> ipv6 dup-addr-detect-transmits <num>

Specifies the number of NS packets to transmit as part of the DAD process.

Syntax:
`set interfaces dataplane` *interface-name* **`ipv6 dup-addr-detect-transmits`** *num*

Syntax:
`delete interfaces dataplane` *interface-name* **`ipv6 dup-addr-detect-transmits`**

One NS packet is transmitted as part of the DAD process.

interface-name
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

num
: The number of NS packets to transmit as part of the DAD process. The number ranges from 1 through *n*. The default number is 1.

Configuration mode

```
interfaces {
    dataplane interface-name {
        ipv6 {
            dup-addr-detect-transmits num
        }
    }
}
```

Use this command to specify the number of Neighbor Solicitation (NS) packets to transmit as part of the Duplicate Address Detection (DAD) process.

Use the `set` form of this command to specify the number of NS packets to transmit on an interface.

Use the `delete` form of this command to delete the transmission number from an interface and transmit the default number of one NS packet.

interfaces dataplane <interface-name> ipv6 router-advert

Specifies the router advertisements to be sent from a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`ipv6 router-advert`** [**`cur-hop-limit`** *limit*] [**`default-lifetime`** *lifetime*] [**`default-preference`** *preference*] [**`link-mtu`** *mtu*] [**`managed-flag`** *state*] [**`max-interval`** *interval*] [**`min-interval`** *interval*] [**`other-config-flag`** *state*] [**`prefix`** *ipv6net* [**`autonomous-flag`** *state* | **`on-link-flag`** *state* | **`preferred-lifetime`** *lifetime* | **`valid-lifetime`** *lifetime*]] [**`reachable-time`** *time*] [**`retrans-timer`** *time*] [**`send-advert`** *state*]

Syntax:
`delete interfaces dataplane` *interface-name* **`ipv6 router-advert`** [**`cur-hop-limit`**] [**`default-lifetime`**] [**`default-preference`**] [**`link-mtu`**] [**`managed-flag`**] [**`max-interval`**] [**`min-interval`**] [**`other-config-flag`**] [**`prefix`** *ipv6net* [**`autonomous-flag`** | **`on-link-flag`** | **`preferred-lifetime`** | **`valid-lifetime`**]] [**`reachable-time`**] [**`retrans-timer`**] [**`send-advert`**]

Router advertisements are not sent on an interface.

interface-name
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

`cur-hop-limit` ***limit***
: Specifies the hop-count field of the IP header for outgoing (unicast) IP packets. This value is placed in the Hop Count field of the IP header for outgoing (unicast) IP packets. The range is 0 to 255. The default is 64. A limit of 0 means unspecified by the router.

`default-lifetime` ***lifetime***
: Specifies the lifetime, in seconds, that is associated with the default router. A lifetime of 0 indicates that the router is not a default router. The lifetime ranges from the value that is configured for the **`max-interval`** option to 9000 (18.2 hours). If the lifetime is not configured, the value for this timer is three times **`max-interval`**.

`default-preference` ***preference***
: Specifies the preference that is associated with the default router. The preference is **`low`**, **`medium`**, or **`high`**. The default preference is **`medium`**.

`link-mtu` ***mtu***
: Specifies the MTU to be advertised for the link. The MTU is 0 or ranges from 1280 through the maximum MTU for the type of link, as defined in RFC 2464. The default MTU is 0, which means the MTU is not specified in the router advertisement message. That is because it is expected that the MTU is configured directly on the interface itself and not for routing advertisements. You can configure this option when the link MTU is not well known.

If the MTU that is set here does not match the MTU that is configured on the interface, the system issues a warning but does not fail.

`managed-flag` ***state***
: Whether to use the administered protocol for address autoconfiguration. The state is either of the following:

`true`: Hosts use the administered (stateful) protocol for address autoconfiguration in addition to any addresses autoconfigured using stateless address autoconfiguration.

`false`: Hosts use only stateless address autoconfiguration.

The default state is **`false`**.

`max-interval` ***interval***
: Specifies the maximum time, in seconds, that is allowed between sending unsolicited multicast router advertisements from the interface. The interval ranges from 4 through 1800. The default is 600 (10 minutes).

`min-interval` ***interval***
: Specifies the minimum time, in seconds, that is allowed between sending unsolicited multicast router advertisements from the interface. The interval ranges from 3 through 0.75 times the **`max-interval`** option. The default interval is 0.33 times **`max-interval`**.

`other-config-flag` ***state***
: Specifies that the interface use the administered (stateful) protocol for autoconfiguration of nonaddress information, as defined in RFC 4862. The state is either of the following:

`true`: Hosts use the administered protocol for autoconfiguration of nonaddress information.

`false`: Hosts use stateless autoconfiguration of nonaddress information.

The default state is **`false`**.

`prefix` ***ipv6net***
: Multinode. Specifies the IPv6 prefix to be advertised on the IPv6 interface, in the format *ipv6-address/prefix*.

You can define more than one IPv6 prefix by configuring multiple prefix configuration nodes.

`autonomous-flag` ***state***
: Specifies whether the prefix can be used for autonomous address configuration as defined in RFC 4862. The state is either of the following:

`true`: The prefix can be used for autonomous address configuration.

`false`: The prefix cannot be used for autonomous address configuration.

The default state is **`true`**.

`on-link-flag` ***state***

Specifies whether the prefix can be used for onlink determination, as defined in RFC 4862. The state is either of the following:

true: The prefix can be used for onlink determination.

false: The advertisement makes no statement about onlink or off-link properties of the prefix. For instance, the prefix might be used for address configuration with some addresses belonging to the prefix being onlink and others being off-link.

The default state is **true**.

preferred-lifetime ***lifetime***
Specifies the length of time, in seconds, that the addresses generated from the prefix by Stateless Address Autoconfiguration (SLAAC) is to remain preferred, as defined in RFC 4862. The interval is with respect to the time the packet is sent. The lifetime ranges from 1 through 4294967296 plus the **infinity** keyword, which represents forever. (The actual value of **infinity** is a byte in which all bits are set to 1s: 0XFFFFFFFF.) The default lifetime is 604800 (7 days).

valid-lifetime ***lifetime***
Specifies the length of time, in seconds, that the prefix is valid for onlink determination, as defined in RFC 4862. The interval is with respect to the time the packet is sent. The lifetime ranges from 1 through 4294967296 plus the **infinity** keyword, which represents forever. (The actual value of **infinity** is a byte in which all bits are set to 1s: 0XFFFFFFFF.) The default lifetime is 2592000 (30 days).

reachable-time ***time***
Specifies the length of time, in milliseconds, for which the system assumes a neighbor is reachable after having received a reachability confirmation. This time is used by address resolution and the Neighbor Unreachability Detection algorithm (see Section 7.3 of RFC 2461). The time ranges from 0 through 3600000, where a value of 0 means the reachable time is not specified in the router advertisement message. The default time is 0.

retrans-timer ***time***
Specifies the length of time, in milliseconds, between retransmitted NS messages. This time is used by address resolution and the Neighbor Unreachability Detection algorithm (see Sections 7.2 and 7.3 of RFC 2461). The time ranges from 0 through 4294967295, where a value of 0 means the retransmit time is not specified in the router advertisement message. The default time is 0.

send-advert ***state***
Specifies whether router advertisements are to be sent from this interface. The state is either of the following:

true: Sends router advertisements from this interface.

false: Does not send router advertisements from this interface. If a state is in effect, parameters in this configuration subtree are still used to configure the local implementation parameters.

The default state is **true**.

Configuration mode

```
interfaces {
    dataplane interface-name {
        ipv6 {
            router-advert {
                cur-hop-limit limit
                default-lifetime lifetime
                default-preference preference
                link-mtu mtu
                managed-flag state
                max-interval interval
                min-interval interval
                other-config-flag state
                prefix ipv6net {
                    autonomous-flag state
                    on-link-flag state
                    preferred-lifetime lifetime
                    valid-lifetime lifetime
                }
                reachable-time time
                retrans-timer time
                send-advert state
            }
        }
    }
}
```

Use this command to specify the router advertisements to be sent from a data plane interface.

Router advertisements are sent by IPv6 routers to advertise their existence to hosts on the network. IPv6 hosts do not send router advertisements.

If the **`router-advert`** node of the configuration tree is missing, router advertisements are not sent. In addition, if IPv6 forwarding is disabled either globally (by using the `system ipv6 disable-forwarding` command) or on the interface (by using interfaces dataplane <interface-name> ipv6 disable-forwarding *(page 43)*), router advertisements are not sent.

Most router advertisement parameters are required by either the Neighbor Discovery (ND) protocol or the Stateless Address Autoconfiguration (SLAAC) protocol. These parameters are used both locally for the IPv6 implementation and become part of the RA messages sent to hosts on the network so that they can be configured appropriately.

Use the `set` form of this command to create the router-advert configuration node and begin to send router advertisements.

Use the `delete` form of this command to delete the router-advert configuration node and stop sending router advertisements.

Use the `show` form of this command to display router advertisement configuration.

interfaces dataplane <interface-name> mac <mac-addr>

Sets the MAC address of a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`mac`** *mac-addr*

Syntax:
`delete interfaces dataplane` *interface-name* **`mac`**

The default MAC address for an interface is the factory-set MAC address.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

mac-addr
A MAC address. The format of the address is six 8-bit numbers, separated by colons, in hexadecimal; for example, 00:0a:59:9a:f2:ba.

Configuration mode

```
interfaces {
    dataplane interface-name {
        mac mac-addr
    }
}
```

Use this command to set the media access control (MAC) address of a data plane interface.

Some data plane interfaces provide the ability to change their MAC addresses. This command allows you to change the MAC addresses of these interfaces.

Use the `set` form of this command to set the MAC address of an interface.

Use the `delete` form of this command to delete the MAC address of an interface, restoring the factory-assigned MAC address.

interfaces dataplane <interface-name> mtu <mtu>

Sets the size of the MTU for a data plane interface.

Syntax:
`set interfaces dataplane` *interface-name* **`mtu`** *mtu*

Syntax:
`delete interfaces dataplane` *interface-name* **`mtu`**

Syntax:
`show interfaces dataplane` *interface-name* **`mtu`**

The default size of the MTU is 1500.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

mtu
The size of the MTU, in octets, for the interface as a whole, including any logical interfaces configured for it. The size of the MTU ranges from 68 through 9000.

Configuration mode

```
interfaces {
    dataplane interface-name {
        mtu mtu
    }
}
```

Use this command to set the size of the maximum transmission unit (MTU) for a data plane interface.

During forwarding, IPv4 packets larger than the MTU are fragmented unless the “Don't Fragment” (DF) bit is set in the IP header. In that case, the packets are dropped and an ICMP “fragmentation needed” message is returned to the sender.

Note that MTU sizes larger than 1500 cause the system to generate “jumbo frames,” which are not compatible with some data plane interface cards and devices.

If the data plane interface is part of an Ethernet link bond, MTU settings for the bonded link override MTU settings for the physical interface.

Use the `set` form of this command to specify the size of the MTU.

Use the `delete` form of this command to delete the size of the MTU and restore the default size of 1500.

Use the `show` form of this command to display the current size of the MTU.

interfaces dataplane <interface-name> sflow

Enables sflow on the specified interface.

Syntax:
`set interfaces dataplane` *interface-name* **`sflow`**

Syntax:
`delete interfaces dataplane` *interface-name* **`sflow`**

Syntax:
`show interfaces dataplane` *interface-name* **`sflow`**

interface-name

The AT&T Vyatta vRouter can only use interfaces that are available to the operating system kernel (that is, interfaces that physically exist on the system) and have been created in the configuration tree.

The AT&T Vyatta vRouter automatically creates configuration nodes for all available physical interfaces on startup.

Configuration mode

```
interfaces {
   dataplane interface-name {
      sflow
   }
}
```

Use the `set` form of this command to enable sflow on the specified interface.

Use the `delete` form of this command to disable sflow on the specified interface.

Use the `show` form of this command to show whether sflow is enabled on the specified interface.

interfaces dataplane <interface-name> vif <vif-id> dhcp-options no-rfc3442

Disables support for the classless static route option for DHCP on a virtual interface.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`dhcp-options no-rfc3442`**

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`dhcp-options no-rfc3442`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`dhcp-options`**

The classless static route option for DHCP is enabled.

interface-name

The AT&T Vyatta vRouter can only use interfaces that are available to the operating system kernel (that is, interfaces that physically exist on the system) and have been created in the configuration tree and configured with an IP address.

The AT&T Vyatta vRouter automatically creates configuration nodes for all available physical interfaces on startup.

If you want to use an interface with a specific function (say, BGP) the interface must be enabled within the configuration node for that function (for example, within the BGP configuration node).

vif-id

Multinode. The ID of a virtual interface. The ID ranges from 1 through 4094.

`no-rfc3442`

Removes the classless static route option (121) from the parameter request list that a DHCP client sends to the DHCP server. For further information, refer to RFC 3442 at https://tools/ietf.org/html/refc3442.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         dhcp-options {
            no-rfc3442
         }
      }
   }
}
```

Note: This command is relevant only if the **dhcp** option has been set by using interfaces dataplane <interface-name> vif <vif-id> address *(page 79)*.

Note: Normally, this command is not required. It would be used only if the remote DHCP server is configured to provide classless static routes, but these routes are not required on the router that is configured to use the DHCP address.

Use the `set` form of this command to disable support for the DHCP classless static route option on a virtual interface.

Use the `delete` form of this command to re-enable support for the DHCP classless static route option on a virtual interface.

Use the `show` form of this command to display the status of the DHCP classless static route option on a virtual interface.

interfaces dataplane <interface-name> vif <vif-id> policy qos <name>

Configures a QoS policy for a VLAN on a virtual interface.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`policy qos`** *name*

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`policy qos`**

interface-name

The AT&T Vyatta vRouter can only use interfaces that are available to the operating system kernel (that is, interfaces that physically exist on the system) and have been created in the configuration tree.

The AT&T Vyatta vRouter automatically creates configuration nodes for all available physical interfaces on startup.

vif-id

Multinode. The ID of a virtual interface. The ID ranges from 1 through 4094.

name

Specifies a QoS policy name.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         policy {
            qos name
         }
      }
   }
}
```

Use the `set` form of this command to configure a QoS policy for a VLAN on a virtual interface. Before using this command, use the `set interfaces dataplane interface-name policy qos policy-name` command to set a port level QoS policy. The command is described in AT&T Vyatta Network Operating System QoS Configuration Guide

Use the `delete` form of this command to remove the QoS policy on the virtual interface.

interfaces dataplane <interface-name> vrrp vrrp-group <vrrp-group-id> notify bgp

Sets the BGP update notification when the path taken by the outgoing traffic changes.

Syntax:
`set interfaces dataplane` *interface-name* **`vrrp vrrp-group`** *vrrp-group-id* **`notify bgp`**

Syntax:
`delete interfaces dataplane` *interface-name* **`vrrp`**

Syntax:
`show interfaces dataplane` *interface-name* **`vrrp`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vrrp-group-id
The ID of a vrrp downlink group instance.

Configuration mode

```
interfaces {
    dataplane interface-name {
        vrrp {
            vrrp-group vrrp-group-id {
                notify {
                    bgp
                }
            }
        }
    }
}
```

In certain topologies that involve VRRP in downlink LANs and eBGP to ISP in uplink LANs, symmetric routing can be achieved by influencing or changing the path taken by incoming traffic according to the path taken by outgoing traffic.

The edge topology described here can have two vRouters that act as VRRP Master and Backup pair for the downlink LAN of the end hosts. Both VRRP Master and Backup pair routers are connected to an ISP gateway router, each through eBGP. This configuration provides two possible outgoing and incoming paths for the traffic.

When VRRP state changes in downlink, that is, when the path taken by the outgoing traffic changes, vRouters send BGP updates to respective eBGP ISP gateway peers. The update notification contains Multi-Exit Discriminator (MED) or prepend-as-path changes according to the configuration to influence the change in BGP best paths for incoming traffic.

The as-path-string that is used on the active path or the path that includes the VRRP elected master is NONE, that is, no AS-path prepended.

This configuration is required to enable the symmetric routing on vRouters in association with either of the following commands:

- `set protocols bgp` *asn* **`neighbor`** *id* **`vrrp-failover vrrp-group`** *vrrp-group-id* **`med`** *med-value*
- `set protocols bgp` *asn* **`neighbor`** *id* **`vrrp-failover vrrp-group`** *vrrp-group-id* **`prepend-as`** *as-path-string*

monitor interfaces dataplane <interface-name> traffic

Displays captured traffic on a data plane interface.

Syntax:
`monitor interfaces dataplane` *interface-name* **`traffic`** [**`detail`** [**`filter filter-name`** | **`unlimited`** [**`filter filter-name`**]] | **`filter filter-name`** | **`save`** *filename* | **`unlimited`** [**`filter filter-name`**]]

Captured traffic for all ports on the specified interface is shown.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

`detail`
Provides detailed information about the monitored data plane traffic.

`unlimited`
Monitors an unlimited amount of traffic.

`save` ***filename***
Saves the monitored traffic to the specified file.

`filter` ***filter-name***
Applies the specific PCAP (packet capture) filter to traffic.

Operational mode

Use this command to display captured traffic on the first 1,000 packets through a data plane interface. Type Ctrl +c to stop the output.

The following example shows how to display captured traffic on the dp0p1p1 interface.

```
vyatta@vyatta:~$ monitor interfaces dataplane dp0p1p1 traffic
Capturing traffic on dp0p1p1 ...
  0.000000 fe80::ad08:8661:4d:b925 -> ff02::c      SSDP M-SEARCH * HTTP/1.1
  0.000067 fe80::69ca:5c11:bcf6:29da -> ff02::c      SSDP M-SEARCH * HTTP/1.1
  2.608804 fe80::8941:71ef:b55d:e348 -> ff02::1:2    DHCPv6 Solicit
  3.010862 fe80::ad08:8661:4d:b925 -> ff02::c      SSDP M-SEARCH * HTTP/1.1
  3.010901 fe80::69ca:5c11:bcf6:29da -> ff02::c      SSDP M-SEARCH * HTTP/1.1
  4.568357 192.168.1.254 -> 238.255.255.251 SSDP NOTIFY * HTTP/1.1
  4.568372 192.168.1.254 -> 238.255.255.251 SSDP NOTIFY * HTTP/1.1
...
```

show interfaces dataplane

Displays the operational status of a data plane interface or all data plane interfaces.

Syntax:
`show interfaces dataplane` [*interface-name*]

The operational status of all data plane interfaces is displayed.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Operational mode

Use this command to display the operational status of a data plane interface or all data plane interfaces.

Note:

This command only displays the counters for a specific interface. Counters in the controller (slow path) are not displayed by this command.

The following example shows how to display the operational status of all data plane interfaces.

```
vyatta@vyatta:~$ show interfaces dataplane
```

```
Codes: S - State, L - Link, u - Up, D - Down, A - Admin Down
Interface        IP Address                        S/L  Description
---------        ----------                        ---  -----------
dp0p2p1          192.168.122.191/24                u/u
dp0p3p1          192.168.102.101/24                u/u
```

show interfaces dataplane detail

Displays detailed statistics and configuration information about all data plane interfaces.

Syntax:
`show interfaces dataplane detail`

Operational mode

Use this command to display detailed statistics and configuration information about all data plane interfaces.

The following example shows how to display detailed statistics and configuration information about all data plane interfaces.

```
vyatta@vyatta:~$ show interfaces dataplane detail

dp0p160p1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default
 qlen 500
    link/ether 00:0c:29:19:5c:20 brd ff:ff:ff:ff:ff:ff
    inet 10.1.32.73/24 brd 10.1.32.255 scope global dp0p160p1
       valid_lft forever preferred_lft forever
    inet6 fe80::20c:29ff:fe19:5c20/64 scope link
       valid_lft forever preferred_lft forever

    RX:  bytes    packets     errors    dropped    overrun      mcast
       1260712      20717          0       6926          0      18727
    TX:  bytes    packets     errors    dropped    carrier collisions
         71856        816          0          0          0          0
dp0p192p1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default
 qlen 500
    link/ether 00:0c:29:19:5c:2a brd ff:ff:ff:ff:ff:ff
    inet 10.10.10.3/24 brd 10.10.10.255 scope global dp0p192p1
       valid_lft forever preferred_lft forever
    inet6 fe80::20c:29ff:fe19:5c2a/64 scope link
       valid_lft forever preferred_lft forever

    RX:  bytes    packets     errors    dropped    overrun      mcast
          2052         24          0         10          0         12
    TX:  bytes    packets     errors    dropped    carrier collisions
           408          4          0          0          0          0
dp0p224p1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default
 qlen 500
    link/ether 00:0c:29:19:5c:34 brd ff:ff:ff:ff:ff:ff
    inet 10.50.50.3/24 brd 10.50.50.255 scope global dp0p224p1
       valid_lft forever preferred_lft forever
    inet6 fe80::20c:29ff:fe19:5c34/64 scope link
       valid_lft forever preferred_lft forever

    RX:  bytes    packets     errors    dropped    overrun      mcast
           876         14          0         10          0          2
    TX:  bytes    packets     errors    dropped    carrier collisions
           408          4          0          0          0          0
dp0p256p1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default
 qlen 500
    link/ether 00:0c:29:19:5c:3e brd ff:ff:ff:ff:ff:ff
    inet 20.20.20.3/24 brd 20.20.20.255 scope global dp0p256p1
       valid_lft forever preferred_lft forever
    inet6 2020:20::3/64 scope global
       valid_lft forever preferred_lft forever
    inet6 fe80::20c:29ff:fe19:5c3e/64 scope link
       valid_lft forever preferred_lft forever

    RX:  bytes    packets     errors    dropped    overrun      mcast
          9181         36          0          0          0          0
    TX:  bytes    packets     errors    dropped    carrier collisions
           636          6          0          0          0          0
```

show interfaces dataplane <interface-name> brief

Displays a brief status of a data plane interface.

Syntax:
`show interfaces dataplane` *interface-name* **`brief`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Operational mode

Use this command to display a brief status of a data plane interface.

The following example shows how to display a brief status of the dp0p1p3 interface.

```
vyatta@vyatta:~$ show interfaces dataplane dp0p1p3 brief
Codes: S - State, L - Link, u - Up, D - Down, A - Admin Down
Interface     IP Address                        S/L  Description
---------     ----------                        ---  -----------
dp0p1p3       192.18.1.1/27                     u/u  10G Fibre
```

show interfaces dataplane <interface-name> physical

Displays information about the physical layer of a data plane interface.

Syntax:
`show interfaces dataplane` *interface-name* **`physical`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

Operational mode

Use this command to display information about the physical layer of a data plane interface.

The following example shows how to display information about the physical layer of a data plane interface.

```
vyatta@vyatta:~$ show interfaces dataplane dp0p1p1 physical
Settings for dp0p1p1:
        Supported ports: [ ]
        Supported link modes:   Not reported
        Supported pause frame use: No
        Supports auto-negotiation: No
        Advertised link modes:  Not reported
        Advertised pause frame use: No
        Advertised auto-negotiation: No
        Speed: 10000Mb/s
        Duplex: Full
        Port: Twisted Pair
        PHYAD: 0
        Transceiver: internal
        Auto-negotiation: on
        MDI-X: Unknown
        Current message level: 0xffffffa1 (-95)
                               drv ifup tx_err tx_queued intr tx_done
rx_status pktdata hw wol 0xffff8000
        Link detected: yes
driver: rte_vmxnet3_pmd
version: 1.6
firmware-version:
bus-info: 0000:0b:00.0
supports-statistics: no
supports-test: no
supports-eeprom-access: no
supports-register-dump: no
supports-priv-flags: no
vyatta@vyatta:~$
```

Note: The Speed field always displays 10000Mb/s irrespective of the speed of the interface. The speed of virtual devices is dependent on the packet processing capability of the CPU and available memory instead of the hardware.

Related commands documented elsewhere

Commands for using other system features with data plane interfaces are located in the following guides or chapters in this guide.

Related Commands Documented Elsewhere	
Bridging	Layer 2 bridging is supported on data plane interfaces. Commands for configuring bridge groups are described in AT&T Vyatta Network Operating System Bridging Configuration Guide.
DHCP	DHCP is supported on data plane interfaces. Commands for configuring DHCP are described in AT&T Vyatta Network Operating System Services Configuration Guide.
Firewall	Firewall is supported on data plane interfaces. Commands for configuring firewall are described in AT&T Vyatta Network Operating System Firewall Configuration Guide.
Multicast	Multicast is supported on data plane interfaces. Commands for configuring multicast are described in AT&T Vyatta Network Operating System Multicast Routing Configuration Guide .
OSPF	OSPF is supported on data plane interfaces. Commands for configuring OSPF are described in AT&T Vyatta Network Operating System OSPF Configuration Guide.

Related Commands Documented Elsewhere	
PIM	PIM is supported on data plane interfaces. Commands for configuring PIM are described in AT&T Vyatta Network Operating System PIM Configuration Guide.
Policy Based Routing	Policy Based Routing is supported on data plane interfaces. Commands for configuring Policy Based Routing are described in AT&T Vyatta Network Operating System Policy-based Routing Configuration Guide.
QoS	Quality of service traffic policies are supported on data plane interfaces. Commands for configuring QoS are described in AT&T Vyatta Network Operating System QoS Configuration Guide.
RIP	RIP is supported on data plane interfaces. Commands for configuring RIP are described in AT&T Vyatta Network Operating System RIP Configuration Guide.
RIPng	RIPng is supported on data plane interfaces. Commands for configuring RIPng are described in AT&T Vyatta Network Operating System RIPng Configuration Guide.
System interfaces	Commands for showing the physical interfaces available on your system are described in AT&T Vyatta Network Operating System Basic System Configuration Guide.
VLAN interfaces	802.1Q VLAN operation is supported on data plane interfaces. Commands for configuring VLAN interfaces (vifs) are described in Data Plane Interfaces *(page 23)*.
VRRP	VRRP is supported on data plane interfaces and on VLAN interfaces configured under data plane interfaces. Commands for configuring VRRP are described in AT&T Vyatta Network Operating System High Availability Configuration Guide.

Ethernet Link Bonding Interface

Ethernet link bonding overview

In some operational scenarios, it makes sense to group multiple physical links together to create a larger virtual link. Grouping offers a way to increase performance between two devices without having to pay for a higher-speed physical link, and to provide redundancy so that connectivity still exists if a link fails. In a WAN, multilink Point-to-Point Protocol (MLPPP) is used to bundle multiple PPP links; in a LAN, Ethernet link bonding is used to bundle multiple Ethernet links.

Many implementations of Ethernet link bonding are nonstandard. The IEEE 802.3ad specification (now called IEEE 802.1ax) attempts to increase standardization. The IEEE 802.3ad standard has been adopted to varying degrees by all manufacturers. This standard specifies the general properties of the link, and defines the Link Aggregation Control Protocol (LACP).

802.3ad LACP is an active protocol that runs on Ethernet links that are configured for bonding. LACP allows peers to negotiate the automatic bonding of multiple links and helps detect situations in which one side is not configured correctly for link bonding. LACP also actively tests all physical connections between configured devices. Link failures can be detected even if other physical devices are attached to either end (for example, physical media converters) and would otherwise not show a link as down if a fault occurs in the middle of the physical link. If a link fails, traffic is redistributed dynamically to the remaining links.

Note: To migrate from the AT&T 5400 vRouter to the AT&T Vyatta vRouter, you must configure LACP before SL can deploy the vRouter on a network.

The 802.3ad standard specifies that all physical links composing the bonded virtual link are full-duplex and point-to-point. Violation of either assumption can cause unexpected behavior in the bonded link.

The 802.3ad standard specifies that all packets belonging to a “conversation” must travel across the same physical link and that no packets may be duplicated. However, the abstraction of a conversation and the algorithm for assigning conversations to each link are incompletely specified. As a result, specific implementations vary, even between the ends of the bonded virtual link. This variance can lead to asymmetric traffic flow.

The number of links that can be bonded is limited by system capacity, especially memory. The Ethernet links in a bonded link need not be all the same speed.

Physical links that are added to a bonded link do not have to be operational when they are added. In the configuration for the bonded link, only the maximum transmission unit (MTU) is inherited from the bundle. That is, if you change the MTU of the bonded link, the MTU of the underlying Ethernet links is overridden. The remaining configuration is always taken from the configuration that is specified for the individual Ethernet link. The exception is that a physical link cannot be assigned an IP address if it is to be added to a bond group.

You can include VLANs within a bonded link; however, bundling multiple VLANs together as a bonded trunk is not supported. Because the purpose of bonding is to improve availability and performance, the bonded link requires actual physical links as a base.

Note: The performance of a bonding interface is limited by the performance of a single member interface, not the line rate of the aggregated interfaces.

The following actions can cause unexpected behavior and are not supported:

- Deleting a member link from a bonding interface and adding it to a different bonding interface.
- Deleting a member link from a bonding interface and adding it to the same bonding interface.
- Deleting a member link from a bonding interface and using it as an unbonded dataplane interface.
- Deleting all member links from a bonding interface and deleting the bonding interface itself.

Ethernet bonding configuration examples

This section presents the following topics:

- Basic Ethernet bonding *(page 58)*
- Ethernet bonding with VLAN *(page 59)*

Basic Ethernet bonding

To configure an Ethernet bonded link, create a bonding interface and configure it as any other Ethernet interface. Then, for each Ethernet interface that is to belong to the bonded link, specify the bond group (point to the bonding interface that you created).

The following figure shows a simple Ethernet link bonding scenario, with an Ethernet bonded link consisting of two physical Ethernet links.

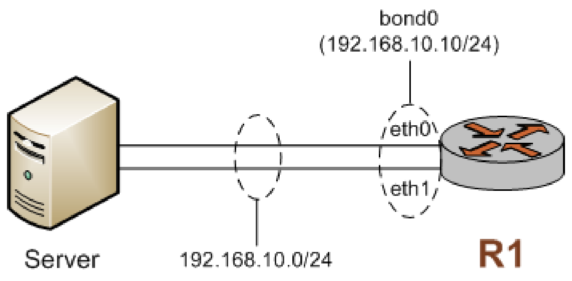
The figure has the following characteristics:

- The dp0bond0 bond group is created by using the default bonding mode (lacp).
- The dp0p1p1 and dp0p1p2 data plane interfaces represent the underlying physical links. Both are added as member links to the bonded interface dp0bond0.

No IP addresses are assigned to the individual physical Ethernet links. The bonding does not work if any of the component Ethernet links has an IP address assigned to it.

Use the `show interfaces` and `show interfaces bonding` commands to determine the status of the bonding interface and its constituent Ethernet interfaces.

Figure 3: Creating a bond group with two Ethernet interfaces



To configure this scenario, perform the following steps in configuration mode.

Table 7: Creating a bond group with two Ethernet interfaces

Step	Command
Create the dp0bond0 bonding group.	`vyatta@R1# set interfaces bonding dp0bond0`
Set the IP address for the bonding group to 192.168.10.10/24.	`vyatta@R1# set interfaces bonding dp0bond0 address 192.168.10.10/24`
Add dp0p1p1 to the dp0bond0 bonding group.	`vyatta@R1# set interfaces dataplane dp0p1p1 bond-group dp0bond0`
Add dp0p1p2 to the dp0bond0 bonding group.	`vyatta@R1# set interfaces dataplane dp0p1p2 bond-group dp0bond0`

Step	Command
Commit the change.	`vyatta@R1# commit`

Show the bonding group configuration.	`vyatta@R1# show interfaces bonding dp0bond0`
	`address 192.168.10.10/24`

Show the dp0p1p1 configuration.	`vyatta@R1# show interfaces bonding dp0p1p1`
	`bond-group dp0bond0`

Show the dp0p1p2 configuration.	`vyatta@R1# show interfaces bonding dp0p1p2`
	`bond-group dp0bond0`

Ethernet bonding with VLAN

After a bonding interface is created, it is possible to create a VLAN within it. The following example is an extension of the previous example with the addition of a VLAN. The resulting bonding interface contains both VLAN and nonVLAN traffic.

To configure this scenario, perform the following steps in configuration mode.

Table 8: Adding a VLAN to an existing bonding interface.

Step	Command

Add the vif configuration to the bonding group.	`vyatta@R1# set interfaces bonding dp0bond0`
	` vif 192 address 10.192.248.225/24`

Commit the change.	`vyatta@R1# commit`

Show the new bonding group configuration.	`vyatta@R1# show interfaces bonding dp0bond0`
	` address 192.168.10.10/24`
	` mode lacp`
	` vif 192 {`
	`    address 10.192.248.225/24`
	` }`

Ethernet Link Bonding Interface Commands

interfaces bonding <dpFbondx>

Defines an Ethernet link bonding interface, also known as a bond group.

Syntax:
`set interfaces bonding` *dpFbondx*

Syntax:
`delete interfaces bonding` *dpFbondx*

Syntax:
`show interfaces bonding [` *dpFbondx* `]`

dpFbondx

The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

You can define more than one bond group by specifying multiple **`bonding`** configuration nodes.

Configuration mode

```
interfaces {
    bonding dpFbondx {

    }
}
```

Use this command to define an Ethernet link bonding interface, also known as a bond group. An Ethernet link bond group allows the bandwidth of individual links to be combined into a single virtual link.

You must create the bond group (using this command or one of its variants) before you can assign Ethernet interfaces to it.

Use the `set` form of this command to create a bond group.

Use the `delete` form of this command to remove an Ethernet link bond group.

Use the `show` form of this command to view the Ethernet link bond group configuration.

interfaces bonding <dpFbondx> address

Assigns a network address to an Ethernet link bond group.

Syntax:
`set interfaces bonding` *dpFbondx* **`address`** { *address* | **`dhcp`** | **`dhcpv6`** }

Syntax:
`delete interfaces bonding` *dpFbondx* **`address`**

Syntax:
`show interfaces bonding` *dpFbondx* **`address`**

dpFbondx

The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

address

An IPv4 network address on this interface. The format of the address is *ip-address* / **prefix** (for example, 192.168.1.77/24).

You can define multiple IPv4 network addresses for a single interface, by creating multiple **`address`** configuration nodes.

`dhcp`

Specifies that the address and prefix are obtained from a DHCP server.

`dhcpv6`

Specifies that the address and prefix are obtained from a DHCPv6 server.

Configuration mode

```
interfaces {
    bonding dpFbondx {
       address {
            address
            dhcp
            dhcpv6
       ]
    }
}
```

Use this command to assign a network address to an Ethernet link bond group.

You can direct the interface to obtain its address and prefix from a Dynamic Host Configuration Protocol (DHCP) or DHCPv6 server by using the **`dhcp`** or **`dhcpv6`** option.

Use the `set` form of this command to set the IP address and network prefix. You can set more than one IP address for the interface by creating multiple **`address`** configuration nodes.

Use the `delete` form of this command to remove the address from an Ethernet link bond group.

Use the `show` form of this command to view the address of an Ethernet link bond group.

interfaces bonding <dpFbondx> description <desc>

Provides a description of an Ethernet link bond group.

Syntax:
`set interfaces bonding` *dpFbondx* **`description`** *desc*

Syntax:
`delete interfaces bonding` *dpFbondx* **`description`**

Syntax:
`show interfaces bonding` *dpFbondx* **`description`**

dpFbondx

The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

desc

A brief description of the bond group.

Configuration mode

```
interfaces {
    bonding dpFbondx {
       description desc

    }
}
```

Use this command to provide a description of a bond group.

Use the `set` form of this command to provide a description of the bond group.

Use the `delete` form of this command to remove the description of a bond group.

Use the `show` form of this command to view the description of a bond group.

interfaces bonding <dpFbondx> dhcp-options no-rfc3442

Disables support for the classless static route option for DHCP on an Ethernet bonding interface.

Syntax:
`set interfaces bonding` *dpFbondx* **`dhcp-options no-rfc3442`**

Syntax:
`delete interfaces bonding` *dpFbondx* **`dhcp-options no-rfc3442`**

Syntax:
`show interfaces bonding` *dpFbondx* **`dhcp-options`**

The classless static route option for DHCP is enabled.

dpFbondx
The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99.`**

`no-rfc3442`
Removes the classless static route option (121) from the parameter request list that a DHCP client sends to the DHCP server. For further information, refer to RFC 3442 at https://tools/ietf.org/html/refc3442.

Configuration mode

```
interfaces {
    bonding dpFbondx {
        dhcp-options {
            no-rfc3442
        }
    }
}
```

Note: This command is relevant only if the **`dhcp`** option has been set by using interfaces dataplane <interface-name> address *(page 29)*.

Note: Normally, this command is not required. It would be used only if the remote DHCP server is configured to provide classless static routes, but these routes are not required on the router that is configured to use the DHCP address.

Use the `set` form of this command to disable support for the DHCP classless static route option on an Ethernet bonding interface.

Use the `delete` form of this command to re-enable support for the DHCP classless static route option on an Ethernet bonding interface.

Use the `show` form of this command to display the status of the DHCP classless static route option on an Ethernet bonding interface.

interfaces bonding <dpFbondx> dhcpv6-options

Specifies the way in which a DHCPv6 client is to acquire an address, parameters, or all of them from a DHCPv6 server.

Syntax:

`set interfaces bonding` *dpFbondx* **`dhcpv6-options`** { **`parameters-only`** | **`temporary`** }

Syntax:
`delete interfaces bonding` *dpFbondx* **`dhcpv6-options`** { **`parameters-only`** | **`temporary`** }

Syntax:
`show interfaces bonding` *dpFbondx* **`dhcpv6-options`**

dpFbondx
: The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99.`**

`parameters-only`
: Acquires only configuration parameters (and not an IPv6 address) from the DHCPv6 server.

  Only one of the **`parameters-only`** and **`temporary`** parameters can be specified.

`temporary`
: Acquires a temporary IPv6 address as described for IPv6 privacy addressing in RFC 4941.

  Only one of the **`parameters-only`** and **`temporary`** parameters can be specified.

Configuration mode

```
interfaces {
    bonding dpFbondx {
       dhcpv6-options
             parameters-only
             temporary
    }
}
```

Use this command to specify in what way the DHCPv6 client is to acquire an IPv6 address, parameters, or all of them from a DHCPv6 server.

These parameters are relevant only if the **`dhcpv6`** option has been set for the `interfaces bonding` *dpFbondx* **`address`** command.

The **`parameters-only`** option is typically used with Stateless Address Autoconfiguration (SLAAC) or static address configuration. It and the **`temporary`** parameter are mutually exclusive.

Use the `set` form of this command to specify the DHCPv6 options.

Use the `delete` form of this command to remove the DHCPv6 options.

Use the `show` form of this command to view the DHCPv6 configuration.

interfaces bonding <dpFbondx> disable

Disables an Ethernet link bond group without discarding configuration.

Syntax:
`set interfaces bonding` *dpFbondx* **`disable`**

Syntax:
`delete interfaces bonding` *dpFbondx* **`disable`**

Syntax:
`show interfaces bonding` *dpFbondx*

dpFbondx
: The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

Configuration mode

```
interfaces {
    bonding dpFbondx {
        disable
    }
}
```

Use this command to disable an Ethernet link bond group without discarding configuration.

Use the `set` form of this command to disable the bond group.

Use the `delete` form of this command to enable the interface.

Use the `show` form of this command to view the configuration.

interfaces bonding <dpFbondx> flow-monitoring

Configures flow monitoring for a bonding interface.

Syntax:
`set interfaces bonding` *dpFbondx* **`flow-monitoring`** { **`aggregator`** *agg-name* | **`exporter`** *exp-name* | **`selector`** *sel-name* }

Syntax:
`delete interfaces bonding` *dpFbondx*

Syntax:
`show interfaces bonding` *dpFbondx*

dpFbondx
The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

agg-name
Name of a flow monitoring aggregator.

exp-name
Name of a flow monitoring exporter.

sel-name
Name of a flow monitoring selector.

Configuration mode

```
interfaces {
    bonding dpFbondx flow-monitoring {
       aggregator agg-name
       exporter exp-name
       selector sel-name
    }
}
```

Use this command to configure flow monitoring for a bonding interface.

Use the `set` form of this command to provide a description of the bond group.

Use the `delete` form of this command to remove the description of a bond group.

Use the `show` form of this command to view the description of a bond group.

interfaces bonding <dpFbondx> ip enable-proxy-arp

Enables proxy ARP on an Ethernet link bonding interface.

Syntax:
`set interfaces bonding` *dpFbondx* **`ip enable-proxy-arp`**

Syntax:

`delete interfaces bonding` *dpFbondx* **`ip`**

Syntax:
`show interfaces bonding` *dpFbondx*

Proxy ARP is not enabled on the Ethernet link bonding interface.

dpFbondx
The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

Configuration mode

```
interfaces {
    bonding dpFbondx {
       ip enable-proxy-arp
    }
}
```

Use this command to enable proxy Address Resolution Protocol (ARP) on an Ethernet link bonding interface.

Proxy ARP allows an Ethernet link bonding interface to respond with its own media access control (MAC) address to ARP requests for destination IP addresses on subnets attached to other interfaces on the system. Subsequent packets that are sent to those destination IP addresses are forwarded appropriately by the system.

Use the `set` form of this command to enable proxy ARP on an interface.

Use the `delete` form of this command to disable proxy ARP on an interface.

Use the `show` form of this command to view the proxy ARP configuration.

interfaces bonding <dpFbondx> ip rip receive <version>

Limits RIP packets that are received on an Ethernet link bonding interface to the specific version.

Syntax:
`set interfaces bonding` *dpFbondx* **`ip rip receive`** [*version*]

Syntax:
`delete interfaces bonding` *dpFbondx* **`ip rip receive`**

Syntax:
`show interfaces bonding`

Both versions of RIP packets are received.

dpFbondx
The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

version
The version of RIP packets that are received (either 1 or 2 but not both)

Configuration mode

```
interfaces {
    bonding dpFbondx {
       ip {
          rip {
             receive version
          }
       }
    }
}
```

Use this command to limit the RIP packets that are received to a specific version (1 or 2).

Use the `set` form of this command to limit the receipt of RIP packets to a specific version.

Use the `delete` form of this command to receive both versions of RIP packets on an interface.

Use the `show` form of this command to view the configuration of RIP packets that are received on an interface.

interfaces bonding <dpFbondx> ip rip send <version>

Limits RIP packets that are sent on an Ethernet link bonding interface to the specific version.

Syntax:
`set interfaces bonding` *dpFbondx* **`ip rip send`** [*version*]

Syntax:
`delete interfaces bonding` *dpFbondx* **`ip rip send`**

Syntax:
`show interfaces bonding` *dpFbondx*

Both versions of RIP packets are sent.

dpFbondx
The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

version
The version of RIP packets that are sent (either 1 or 2 but not both)

Configuration mode

```
interfaces {
    bonding dpFbondx {
       ip {
            rip {
                send version
            }
       }
    }
}
```

Use this command to limit the RIP packets that are sent to a specific version (1 or 2).

Use the `set` form of this command to limit the sending of RIP packets to a specific version.

Use the `delete` form of this command to send both versions of RIP packets on an interface.

Use the `show` form of this command to view the configuration of RIP packets that are sent on an interface.

interfaces bonding <interface-name> ipv6 address

Assigns an IPv6 address to an Ethernet link bonding interface.

Syntax:
`set interfaces bonding` *interface-name* **`ipv6 address`** [**`autoconf`** | **`eui64`** *ipv6prefix*]

Syntax:
`delete interfaces bonding` *interface-name* **`ipv6 address`** [**`autoconf`** | **`eui64`** *ipv6prefix*]

Syntax:
`show interfaces bonding` *interface-name* **`ipv6 address`** [**`autoconf`** | **`eui64`**]

interface-name
: The name of a bonding interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

`autoconf`
: Generates an IPv6 address using the SLAAC protocol. Use this keyword if the interface is performing a “host” function rather than a “router” function. You can specify this keyword in addition to static IPv6, static IPv4, or IPv4 DHCP addresses on the interface.

`eui64` ***ipv6prefix***
: Specifies the 64-bit IPv6 address prefix that is used to configure an IPv6 address in EUI-64 format. The system concatenates this prefix with a 64-bit EUI-64 value that is derived from the 48-bit MAC address of the interface.

Configuration mode

```
interfaces {
    bonding interface-name {
        ipv6 {
            address {
                autoconf
                eui64 ipv6prefix
            }
        }
    }
}
```

Use this command to assign an IPv6 address to a bonding interface.

Use the **`autoconf`** keyword to direct the system to automatically configure (autoconfigure) the address, using the Stateless Address Autoconfiguration (SLAAC) protocol defined in RFC 4862. Alternatively, you can provide an EUI-64 IPv6 address prefix so that the system constructs the IPv6 address.

If you want the system to use SLAAC to acquire an address on the interface, then in addition to setting this parameter, you must also disable IPv6 forwarding, either globally (by using the `system ipv6 disable-forwarding` command) or specifically on the interface.

Use the `set` form of this command to assign an IPv6 address to a bonding interface.

Use the `delete` form of this command to delete an IPv6 address from a bonding interface.

Use the `show` form of this command to display IPv6 address configuration settings.

interfaces bonding dpFbondx ipv6 ospfv3 area

Assigns an OSPFv3 area to a IPv6 Ethernet link bonding interface.

Syntax:
`set interfaces bonding` *dpFbondx* **`ipv6 ospfv3 area`** *area-id*

Syntax:
`delete interfaces bonding` *dpFbondx* **`ipv6 ospfv3 area`**

Syntax:
`show interfaces bonding` *dpFbondx* **`ipv6 ospfv3 area`**

dpFbondx
: The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

area-id
: Specifies an OSPFv3 area as an IP address or decimal value.

Configuration mode

```
interfaces {
    bonding dp0bondx {
        ipv6 {
             ospfv3 {
                   area area-id
            }
        }
    }
}
```

Use this command to assign an OSPFv3 area to a bonding interface.

Use the `set` form of this command to assign an OSPFv3 area to a bonding interface.

Use the `delete` form of this command to delete an OSPFv3 area from a bonding interface.

Use the `show` form of this command to display OSPFv3 configuration settings.

interfaces bonding dpFbondx ipv6 ospfv3 process process-id instance-id instance-id

Defines an OSPFv3 area for an Ethernet bonding interface.

Syntax:
`set interfaces bonding` *dpFbondx* **`ipv6 ospfv3 process`** *process-id* **`instance-id`** *instance-id*

Syntax:
`delete interfaces bonding` *dpFbondx* **`ipv6 ospfv3`**

Syntax:
`show interfaces bonding` *dpFbondx* **`ipv6 ospfv3`**

area-id
The ID of an OSPFv3 area being configured, expressed as an IP address or a decimal value. The decimal value ranges from 0 to 4294967.

process-id
The OSPFv3 process ID. Enter alphanumeric characters.

Configuration mode

```
interfaces {
    bonding dp0bondx {
        ipv6 {
            ospfv3 {
                 process process-id {
                            area area-id
                 }
            }
        }
    }
}
```

Use this command to define an area within an OSPFv3 AS.

Use the **set** form of this command to create an OSPFv3 area or define the parameters for a specified OSPFv3 area.

Use the **delete** form of this command to remove an OSPFv3 area.

Use the **show** form of this command to display the OSPFv3 area configuration.

interfaces bonding <dpFbondx> lacp-options activity

Sets the LACP operational mode for an Ethernet link bond group.

Syntax:
`set interfaces bonding` *dpFbondx* **`lacp-options activity`** `{` **`active`** `|` **`passive`** `}`

Syntax:
`delete interfaces bonding` *dpFbondx* **`lacp-options`**

Syntax:
`show interfaces bonding` *dpFbondx* **`lacp-options`**

active

dpFbondx
The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

`active`
Specifies active participation in the exchange of LACP Data Unit (LACPDU).

`passive`
Specifies passive (default) participation in the exchange of LACPDU.

Configuration mode

```
interfaces {
    bonding dpFbondx {
           lacp-options {
                    activity {
                          active
                          passive
                    }
           }
     }
}
```

Use this command to set the LACP operational mode for an Ethernet link bond group.

Use the `set` form of this command to set the default LACP operational mode for a bond group.

Use the `delete` form of this command to restore the default (passive) LACPDU participation for a bond group.

Use the `show` form of this command to view the configuration of LACPDU participation.

interfaces bonding <dpFbondx> lacp-options key

Sets the LACP aggregation (operational) key for an Ethernet link bond group.

Syntax:
`set interfaces bonding` *dpFbondx* **`lacp-options key`** *value*

Syntax:
`delete interfaces bonding` *dpFbondx* **`lacp-options key`**

Syntax:
`show interfaces bonding` *dpFbondx* **`lacp-options key`**

active

dpFbondx
The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

value
Specifies an LACP aggregation (operational) key.

Configuration mode

```
interfaces {
     bonding dpFbondx {
        lacp-options {
              key value
        }
     }
}
```

Use this command to set the LACP aggregation (operational) key for an Ethernet link bond group.

Use the `set` form of this command to set is used to set the LACP aggregation (operational) key.

Use the `delete` form of this command is used to restore the LACP aggregation (operational) key.

Use the `show` form of this command to view the LACP aggregation (operational) key setting.

interfaces bonding <dpFbondx> mac <mac-addr>

Sets the MAC address of an Ethernet link bond group.

Syntax:
`set interfaces bonding` *dpFbondx* **`mac`** *mac-addr*

Syntax:
`delete interfaces bonding` *dpFbondx* **`mac`**

Syntax:
`show interfaces bonding` *dpFbondx* **`mac`**

The MAC address used is the MAC address of the first interface added to the bond group.

dpFbondx
The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

mac-addr
The MAC address of an Ethernet link bond group. The format of the address must be appropriate for the interface type. For an Ethernet interface, the format is six colon-separated 8-bit numbers in hexadecimal; for example, 00:0a:59:9a:f2:ba.

Configuration mode

```

interfaces {
    bonding dpFbondx {
       mac mac-addr

    }
}
```

Use this command to set the media access control (MAC) address of an Ethernet link bond group.

Use the `set` form of this command to set the MAC address of a bond group.

Use the `delete` form of this command to remove the MAC address of an Ethernet link bond group.

Use the `show` form of this command to view MAC address of a Ethernet link bond group.

interfaces bonding <dpFbondx> mode

Sets the bonding mode for an Ethernet link bond group.

Syntax:
`set interfaces bonding` *dpFbondx* **`mode`** { **`active-backup`** | **`lacp`** | **`balanced`** }

Syntax:
`delete interfaces bonding` *dpFbondx* **`mode`**

Syntax:

`show interfaces bonding` *dpFbondx* **`mode`**

lacp is the default mode.

dpFbondx
: The identifier a bond group. The identifier ranges from **`dp0bond0`** through **`dp0bond99`**.

`active-backup`
: Uses an interfaces of a Link Aggregation Group as the active (primary) interface. A different interface becomes active if the primary Ethernet interface fails. The Link Aggregation Group interface MAC address is externally visible only on the active interface.

`lacp`
: Uses LACP to dynamically create aggregation groups that share the same link speed and duplex settings.

`balanced`
: Uses a hash to distribute the transmit load across member links. This mode exhibits the same behavior as the LACP mode, but it transmits without the control protocol.

Configuration mode

```
interfaces {
    bonding dpFbondx {
       mode {
           active-backup
           lacp
     balanced

       }
    }
}
```

Use this command to set the bonding mode for an Ethernet link bond group.

Use the `set` form of this command to set the bonding mode of a bond group.

Use the `delete` form of this command to restore the default bonding mode (lacp) for the bond group.

Use the `show` form of this command to view the current bonding mode for a bond group.

interfaces bonding <dpFbondx> mtu <mtu>

Specifies the MTU for an Ethernet link bond group.

Syntax:
`set interfaces bonding` *dpFbondx* **`mtu`** *mtu*

Syntax:
`delete interfaces bonding` *dpFbondx* **`mtu`**

Syntax:
`show interfaces bonding` *dpFbondx* **`mtu`**

The MTU of the first Ethernet link added to the group is used.

dpFbondx
: The identifier for a bond group. The identifier ranges from **`dp0bond0`** through **`dp0bond99`**.

mtu
: The MTU, in octets, for the interface as a whole, including any logical interfaces that are configured for it. The MTU ranges from 68 to 9000.

Configuration mode

```
interfaces {
    bonding dpFbondx {
        mtu mtu
    }
}
```

Use this command to set the maximum transmission unit (MTU) for an Ethernet link bond group. The MTU is also applied to any vifs that are defined for the bonding interface.

Changing the MTU changes the MTU on the Ethernet links within the bond. Also, explicitly changing the MTU of the Ethernet links within the bond (by configuring the individual links) is not allowed.

During forwarding, IPv4 packets larger than the MTU are fragmented unless the DF bit is set. In that case, the packets are dropped and an ICMP “Packet too big” message is returned to the sender.

Use the `set` form of this command to set the MTU of a bond group.

Use the `delete` form of this command to restore the default MTU, which is the MTU of the first Ethernet link added to the group, and disable fragmentation.

Use the `show` form of this command to display the MTU for a bond group.

interfaces bonding <dpFbondx> primary <ifx>

Sets the primary Ethernet interface within the Ethernet link bonding interface.

Syntax:
`set interfaces bonding` *dpFbondx* **`primary`** *ifx*

Syntax:
`delete interfaces bonding` *dpFbondx* **`primary`**

Syntax:
`show interfaces bonding` *dpFbondx* **`primary`**

No primary link is configured.

dpFbondx
The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

ifx
The identifier of the primary Ethernet interface within the bond group. The identifier ranges from **`d0p0p1`** through **`d0p2p3`**.

Configuration mode

```
interfaces {
    bonding dpFbondx {
        primary ifx
    }
}
```

Use this command to specify the primary interface within the Ethernet link bond group

This option is available only when the bonding mode is Active Backup.

When the bonding mode is Active Backup and an interface is identified as the primary, the primary interface is always the only active member of the bonding interface so long as it is available. Only when the primary is offline are alternates used.

This option is useful when one member link is to be preferred over another; for example, when one member link has higher throughput than another.

Use the `set` form of this command to designate an Ethernet interface as the primary interface for Ethernet link bonding.

Use the `delete` form of this command to remove the primary Ethernet interface as the primary interface for Ethernet link bonding.

Use the `show` form of this command to view the primary Ethernet link bonding configuration for the Ethernet link bonding.

show interfaces bonding

Shows information about Ethernet link bond groups

Syntax:
`show interfaces bonding` *dpFbondx* **`brief`**

Syntax:
`show interfaces bonding` *dpFbondx* **`slaves`**

Syntax:
`show interfaces bonding` *dpFbondx* `[` **`vif`** *value* `]`

Information is displayed for all Ethernet link bond groups.

dpFbondx
: The identifier for the bond group. Supported values are **`dp0bond0`** through **`dp0bond99`**.

`brief`
: Displays information about the bonding slaves.

`slaves`
: Displays information about the bonding slaves in brief format.

Operational mode

Use this command to show bond group information.

The following example shows the output for `show interfaces bonding` for all bonding interfaces.

```
vyatta@vyatta:~$ show interfaces bonding
    Codes: S - State, L - Link, u - Up, D - Down, A - Admin Down
    Interface        IP Address                        S/L  Description
    ---------        ----------                        ---  -----------
    dp0bond0         10.2.0.1/30                       u/u
    dp0bond0.200     10.200.0.1/24                     u/u
```

The following example shows the output for a specific bond group.

```
vyatta@vyatta:~$ show interfaces bonding dp0bond0
    <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen
 500
    link/ether 52:54:00:5a:b2:86 brd ff:ff:ff:ff:ff:ff
    inet 10.2.0.1/30 brd 10.2.0.3 scope global dp0bond0 valid_lft forever preferred_lft
 forever
    inet6 fe80::dc63:72ff:fe07:2c6/64 scope link valid_lft forever preferred_lft forever
    uptime: 45 seconds transitions: 1 last-change: 2015-04-09T18:31:45+0000
    RX: bytes packets errors ignored overrun mcast
        3126         27             0         0         0         0
    TX: bytes packets errors dropped carrier collisions
        3242         28             0         0         0
         0
```

The following example shows the output for `show interfaces bonding slaves`.

```
vyatta@vyatta:~$ show interfaces bonding slaves
    Interface            Mode          State Link Slaves
    dp0bond0             802.3ad       up     up    2
```

The following example shows the output for `show interfaces bonding` *dpFbondx* **`slaves`**.

```
vyatta@vyatta:~$ show interfaces bonding dp0bond0 slaves
Interface     RX: bytes   packets     TX: bytes   packets    slctd LACP flags
dp0bond0      15348       148         12184       129
dp0s5         3784        35          8976        98         yes   DISTRIBUTING
dp0s6         11564       113         3208        31         yes   DISTRIBUTING
```

The following example shows the output for **`show interfaces bonding`** *dpFbondx* **`vif`** *value*.

```
vyatta@vyatta:~$ show interfaces bonding dp0bond0 vif 200
dp0bond0.200@dp0bond0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP
 group default
link/ether 52:54:00:5a:b2:86 brd ff:ff:ff:ff:ff:ff
inet 10.200.0.1/24 brd 10.200.0.255 scope global dp0bond0.200 valid_lft forever preferred_lft
 forever
inet6 fe80::5054:ff:fe5a:b286/64 scope link valid_lft forever preferred_lft forever
uptime: 16 seconds transitions: 1 last-change: 2015-04-09T18:50:39+0000

RX:   bytes    packets    errors     ignored     overrun     mcast
      1018      11         0          0           0           8
TX:   bytes    packets    errors     dropped     carrier   collisions
      1018      11         0          0           0           0
```

Related commands documented elsewhere

The following documents describe other system features that can be used with bonded Ethernet link interfaces.

Related Commands Documented Elsewhere	
Bridging	Layer 2 bridging is supported on bonding interfaces. Commands for configuring bridge groups are described in AT&T Vyatta Network Operating System Bridging Configuration Guide.
Firewall	Firewall is supported on bonding interfaces. Commands for configuring firewall are described in AT&T Vyatta Network Operating System Firewall Configuration Guide.

Related Commands Documented Elsewhere	
OSPF	OSPF is supported on bonding interfaces. Commands for configuring OSPF are described in AT&T Vyatta Network Operating System OSPF Configuration Guide.
OSPF	OSPFv3 is supported on bonding interfaces. Commands for configuring OSPFv3 are described in AT&T Vyatta Network Operating System OSPFv3 Configuration Guide.
Policy Based Routing	Policy-based routing is supported on bonding interfaces. Commands for configuring Policy-based routing are described in AT&T Vyatta Network Operating System Policy-based Routing Configuration Guide.
RIP	RIP is supported on bonding interfaces. Commands for configuring RIP are described in AT&T Vyatta Network Operating System RIP Configuration Guide.
RIPng	RIPng is supported on bonding interfaces. Commands for configuring RIPng are described in AT&T Vyatta Network Operating System RIPng Configuration Guide.
Virtual interfaces	802.1Q VLAN operation is supported on bonding interfaces. Commands for configuring virtual interfaces (vifs) are described in Ethernet Link Bonding Interface *(page 57)*.
VRRP	VRRP is supported on bonding interfaces. Commands for configuring VRRP are described in AT&T Vyatta Network Operating System High Availability Configuration Guide.

VLAN Interfaces

VLAN interface overview

This section presents the following topics:

VLAN operation using virtual interfaces

Some interface types can be configured for IEEE 802.1Q VLAN operation by using a virtual interface. On the AT&T Vyatta vRouter, virtual interfaces for VLANs are called vifs. As the identifier of a vif, you specify the VLAN to which the vif is connected.

Each physical interface can be configured with multiple vifs. Then, like a physical Ethernet interface, each vif can have multiple addresses assigned to it.

Interface types that support VLAN operation

VLAN interfaces can be configured on physical Ethernet interfaces.

VLAN operation as opposed to multinetting

VLANs are identified by a four-byte tag that is inserted at the front of the Layer 2 Ethernet header. Having this additional tag means that interfaces configured for 802.1Q are not compatible with standard Ethernet packets. When considering whether or not to use a VLAN interface, keep the following in mind.

- If you are using 802.1Q VLANs, create vif configuration nodes beneath the physical interface and assign the IP address to the vif.
- If you are not using 802.1Q but want to have multiple networks on the same physical interface (that is, you want to use multinetting but not VLANs), simply create multiple address configuration nodes directly under the physical interface without using vifs.

Simultaneous Ethernet and 802.1q operation

If your other network devices support it, an Ethernet interface may be used simultaneously as a standard port and an 802.1Q VLAN port. To do this, configure an IP address directly on the physical interface and then define a vif for the interface. Assign the VLAN ID as the vif identifier and configure an IP address for the vif. (This feature may not be compatible with all Ethernet switches; some switches require a physical Ethernet interface to be exclusively either an 802.1Q interface or a standard Ethernet interface.)

Referring to VLAN interfaces in commands

To refer to a vif within an `interfaces` command, such as `show interfaces` or `set interfaces`, specify the whole path to the vif configuration node, as in the following example.

```
show interfaces dataplane dp0p1p2 vif 40
```

When referring to the same vif within other commands—for example, enabling RIP on the interface—use the format of *if-x.vlan-id*, where *if-x* is the interface type plus the interface identifier (for example, dp0p1p2) and *vlan-id* is the VLAN ID (and also the identifier of the vif). The following example refers to the vif on VLAN 40 configured under the dp0p1p2 interface.

```
set protocols rip interface dp0p1p2.40
```

IPv6 support

The AT&T Vyatta vRouter has extensive support for IPv6, including IPv6 interface addressing. This chapter describes the commands for configuring IPv6 on VLAN interfaces. AT&T Vyatta Network Operating System IPv6 Support Configuration Guide fully describes AT&T Vyatta vRouter IPv6 support.

Examples of VLAN interface configuration

This section presents the following topics:

- VLAN configuration *(page 77)*
- IPv6 on VLAN interfaces *(page 78)*

VLAN configuration

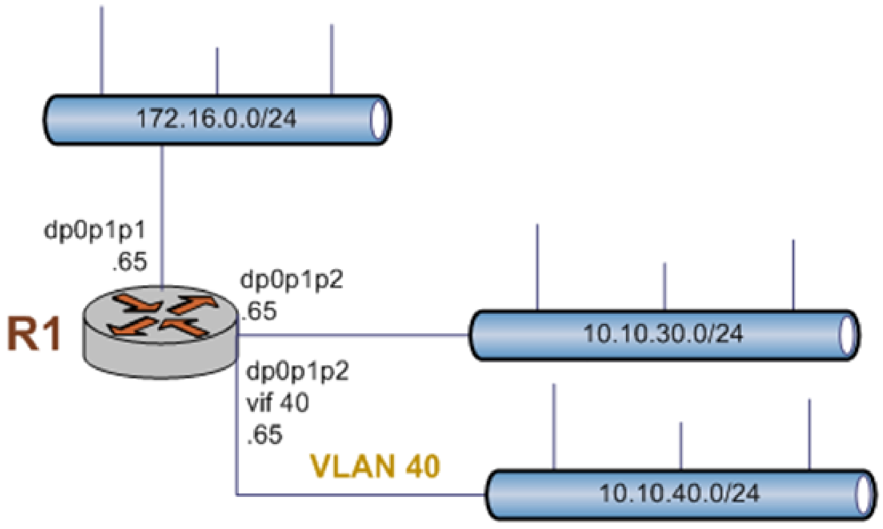
This example shows how to configure the R1 router to have a vif for VLAN 40 on the dp0p1p2 Ethernet interface. After configuring this VLAN, the R1 router has the following interfaces:

- One interface (dp0p1p1) that is configured as only a standard Ethernet interface. The IP address for this interface is 172.16.0.65.
- One interface (dp0p1p2) that is configured as both a physical Ethernet interface and a VLAN interface. The IP address for the physical Ethernet interface is 10.10.30.65. The VLAN interface connects to VLAN 40 (the identifier of the vif) and has an IP address of 10.10.40.65.

Note: By default, the VLAN tag is the same as the vif. Only if vlan-id is defined does it override the tag value.

When you finish the example, the interfaces are configured as shown in the following figure.

Figure 4: VLAN configuration



To create and configure a VLAN interface, perform the following steps in configuration mode.

Table 9: Simultaneous Ethernet and VLAN operation

Step	Command
Assign an IP address directly to the dp0p1p1 untagged Ethernet interface.	`vyatta@R1# set interfaces dataplane dp0p1p1 address 172.16.0.65/24`
Assign an IP address directly to the dp0p1p2 untagged Ethernet interface.	`vyatta@R1# set interfaces dataplane dp0p1p2 address 10.10.30.65/24`
Create the configuration node for the vif. Assign the vif VLAN ID 40. Assign the IP address for the vif.	`vyatta@R1# set interfaces dataplane dp0p1p2 vif 40 address 10.10.40.65/24`
Commit the configuration.	`vyatta@R1# commit`

Commit and view the configuration.	`vyatta@R1# show interfaces dataplane`
	` dataplane dp0p1p1 {`
	`    address 172.16.0.65/24`
	` }`
	` dataplane dp0p1p2 {`
	`    address 10.10.30.65/24`
	`    vif 40 {`
	`     address 10.10.40.65/24`
	`    }`
	` }`

IPv6 on VLAN interfaces

AT&T Vyatta Network Operating System IPv6 Support Configuration Guide provides examples of configuring IPv6 on interfaces.

VLAN Interfaces Commands

interfaces dataplane <interface-name> vif <vif-id>

Assigns a vif ID.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id*

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id*

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id*

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
Multinode. The ID of a vif. The ID ranges from 1 through 4094.

Configuration mode

```
interfaces {
    dataplane interface-name {
       vif vif-id
    }
}
```

Use the `set` form of this command to assign an IP address and a network prefix to a vif.

Use the `delete` form of this command to delete a vif ID.

Use the `show` form of this command to display vif information.

interfaces dataplane <interface-name> vif <vif-id> address

Assigns an IP address and a network prefix to a vif.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`address`** { *ipv4* | *ipv6* | **`dhcp`** | **`dhcpv6`** }

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`address`** { *ipv4* | *ipv6* | **`dhcp`** | **`dhcpv6`** }

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`address`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
Multinode. The ID of a vif. The ID ranges from 1 through 4094.

ipv4
An IPv4 address and a network prefix for this vif. The format is *ip-address/prefix* (for example, 192.168.1.77/24).

You can define multiple IP addresses for a vif by creating multiple address configuration nodes.

ipv6

An IPv6 address and a network prefix for this vif. The format is *ipv6-address/prefix* (for example, 2001:db8:1234::/48).

You can define multiple IPv6 addresses for a vif by creating multiple address configuration nodes.

`dhcp`

Defines the interface as a DHCP client, which obtains its address and prefix from a DHCP server.

`dhcpv6`

Defines the interface as a DHCP for IPv6 client, which obtains its address and prefix from a DHCPv6 server.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         address [ipv4 | ipv6 | dhcp | dhcpv6]
      }
   }
}
```

Use this command to assign an IP address and a network prefix to a vif.

Use the `set` form of this command to assign an IP address and a network prefix to a vif.

Use the `delete` form of this command to delete an IP address and a network prefix on a vif.

Use the `show` form of this command to display an IP address and a network prefix for a vif.

interfaces dataplane <interface-name> vif <vif-id> bridge-group

Adds a vif to a bridge group.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`bridge-group`** { **`bridge`** *bridge-group-name* | **`cost`** *port-cost* | **`priority`** *port-priority* | **`bpdu-guard`** | **`root-block`** }

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`bridge-group`** [**`bridge`** | **`cost`** | **`priority`**]

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`bridge-group`** [**`bridge`** | **`cost`** | **`priority`**]

interface-name

The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id

Multinode. The ID of a vif. The ID ranges from 1 through 4094.

`bpdu-guard`

Enables Spanning Tree Protocol PortFast Bridge Protocol Data Unit (BPDU) guard.

`bridge` ***bridge-group-name***

Specifies the name of the bridge group.

`cost` ***port-cost***

Specifies the numeric port cost. The range is 0 to 65535.

`priority` ***port-priority***

Specifies the bridge port cost. The range is 0 to 63.

`root-block`

Enables Spanning Tree Protocol root guard.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         bridge-group
            bpdu-guard
            bridge bridge-group-name
            cost port-cost
            priority port-priority
            root-block
      }
   }
}
```

Use this command to add a vif to a bridge group.

Use the `set` form of this command to add a vif to a bridge group.

Use the `delete` form of this command to delete a vif from a bridge group.

Use the `show` form of this command to display a vif of a bridge group.

interfaces dataplane <interface-name> vif <vif-id> description <description>

Describes a description for a vif.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`description`** *description*

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`description`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`description`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

description
A description of the vif.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         description description
      }
   }
}
```

Use this command to describe a vif.

Use the `set` form of this command to describe a vif.

Use the `delete` form of this command to delete the description of a vif.

Use the `show` form of this command to display the description of a vif.

interfaces dataplane <interface-name> vif <vif-id> dhcpv6-options

Specifies the way in which a DHCPv6 client is to acquire an address, parameters, or both from the DHCPv6 server.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`dhcpv6-options`** [**`parameters-only`** | **`temporary`**]

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`dhcpv6-options`** [**`parameters-only`** | **`temporary`**]

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`dhcpv6-options`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

`parameters-only`
Acquires only configuration parameters (and not an IPv6 address) from the DHCPv6 server.

Only one of the **`parameters-only`** and the **`temporary`** parameters can be specified.

`temporary`
Acquires a temporary IPv6 address as described for IPv6 privacy addressing in RFC 4941.

Only one of the **`parameters-only`** and the **`temporary`** parameters can be specified.

Configuration mode

```
interfaces {
    dataplane interface-name {
       vif vif-id {
          dhcpv6-options [parameters-only | temporary]
       }
    }
}
```

Use this command to specify in what way the DHCPv6 client is to acquire an IPv6 address, parameters, or both from a DHCPv6 server.

Note that the parameters are relevant only if the **`dhcpv6`** option has been set for interfaces dataplane <interface-name> vif <vif-id> *(page 79)*.

The **`parameters-only`** parameter is typically used with Stateless Address Autoconfiguration (SLAAC) or static address configuration. The **`parameters-only`** and **`temporary`** parameters are mutually exclusive.

Use the `set` form of this command to specify the DHCPv6 options for a vif.

Use the `delete` form of this command to remove the DHCPv6 options from a vif.

Use the `show` form of this command to view DHCPv6 option configuration of a vif.

interfaces dataplane <interface-name> vif <vif-id> disable

Disables a vif without discarding configuration.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`disable`**

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`disable`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id*

The vif is enabled.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

Configuration mode

```
interfaces {
    dataplane interface-name {
       vif vif-id {
          disable
       }
    }
}
```

Use this command to disable a vif without discarding configuration for a vif.

Use the `set` form of this command to disable a vif.

Use the `delete` form of this command to enable a vif.

Use the `show` form of this command to display whether a vif is disabled or enabled.

interfaces dataplane <interface-name> vif <vif-id> disable-link-detect

Directs a vif not to detect physical link-state changes.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`disable-link-detect`**

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`disable-link-detect`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id*

A vif detects physical link-state changes.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

Configuration mode

```
interfaces {
    dataplane interface-name {
       vif vif-id {
           disable-link-detect
       }
    }
}
```

Use this command to direct a vif not to detect physical state change to the underlying Data plane link (for example, when a cable is unplugged).

Use the `set` form of this command to disable detection of physical link-state changes for a vif.

Use the `delete` form of this command to enable detection of physical link-state changes for a vif.

Use the `show` form of this command to display whether detection of physical link-state changes is disabled or enabled on a vif.

interfaces dataplane <interface-name> vif <vif-id> ip disable-forwarding

Disables IPv4 forwarding on a vif.

Syntax:
`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip disable-forwarding`**

Syntax:
`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip disable-forwarding`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ip disable-forwarding`**

IPv4 packets are forwarded.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

Configuration mode

```
interfaces {
     dataplane interface-name {
        vif vif-id {
           ip {
              disable-forwarding
           }
        }
     }
}
```

Use this command to disable IPv4 packet forwarding on a vif.

You can also disable IPv4 forwarding globally (that is, for all interfaces) by using the `system ipv4 disable-forwarding` command.

Use the `set` form of this command to disable IPv4 packet forwarding on a vif.

Use the `delete` form of this command to enable IPv4 packet forwarding on a vif.

Use the `show` form of this command to display whether IPv4 packet forwarding is disabled or enabled on a vif.

interfaces dataplane <interface-name> vif <vif-id> ip enable-proxy-arp

Enables proxy ARP on a vif.

Syntax:

`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip`** **`enable-proxy-arp`**

Syntax:
`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip`** **`enable-proxy-arp`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ip`** **`enable-proxy-arp`**

Proxy ARP is not enabled on the vif.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

Configuration mode

```
interfaces {
     dataplane interface-name {
        vif vif-id {
           ip {
              enable-proxy-arp
           }
        }
     }
}
```

Use this command to enable proxy Address Resolution Protocol (ARP) on a vif.

Proxy ARP allows a data plane interface to respond with its own media access control (MAC) address to ARP requests for destination IP addresses on subnets that are attached to other interfaces on the system. Subsequent packets sent to those destination IP addresses are forwarded appropriately by the system.

Use the `set` form of this command to enable proxy ARP on a vif.

Use the `delete` form of this command to return the system to its default behavior, that is, proxy ARP is not enabled on a data plane interface.

Use the `show` form of this command to display whether IPv4 packet forwarding is disabled or enabled on a vif.

interfaces dataplane <interface-name> vif <vif-id> ip rip receive

Configures receive options for RIP packets on a vif.

Syntax:
`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip`** **`rip`** **`receive`** [**`version`** *version*]

Syntax:
`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip`** **`rip`** **`receive`**

Syntax:
`show interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip`** **`rip`** **`receive`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

version
Specifies a version of RIP packets. Legal values are 1, 2, or **`both`**.

Configuration mode

```
interfaces {
     dataplane interface-name {
        vif vif-id {
           ip {
              rip {
                 receive [version version]
              }
           }
        }
     }
}
```

Use this command to configure receive options for RIP packets on a vif.

Use the `set` form of this command to configure the receive options for a vif, including an optional version.

Use the `delete` form of this command to restore the default configuration for a vif.

Use the `show` form of this command to display the configuration for a vif.

interfaces dataplane <interface-name> vif <vif-id> ip rip send

Configures send options for RIP packets on a vif.

Syntax:
`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip rip send`** [**`version`** *version*]

Syntax:
`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip rip send`**

Syntax:
`show interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip rip send`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

version
Specifies a version of RIP packets. Legal values are 1, 2, or **`both`**.

Configuration mode

```
interfaces {
     dataplane interface-name {
        vif vif-id {
           ip {
              rip {
                 send [version version]
              }
           }
        }
     }
}
```

Use this command to configure send options for RIP packets on a vif.

Use the `set` form of this command to configure the send options for a vif, including an optional version.

Use the `delete` form of this command to restore the default configuration for a vif.

Use the `show` form of this command to display the configuration for a vif.

interfaces dataplane <interface-name> vif <vif-id> ip rpf-check

Specifies reverse path filter (RPF) policy (see RFC3704).

Syntax:
`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip rip rpf-check`** { **`disable`** | **`loose`** | **`strict`** }

Syntax:
`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip rip rpf-check`**

Syntax:
`show interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ip rip rpf-check`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

`disable`
Does not validate the source.

`loose`
Enables Loose Reverse Path Forwarding as defined in RFC3704

`strict`
Enable Strict Reverse Path Forwarding as defined in RFC3704.

Configuration mode

```
interfaces {
     dataplane interface-name {
        vif vif-id {
           ip {
              rpf-check {disable | loose | strict}
           }
        }
     }
}
```

Use this command to specify reverse path filter (RPF) policy for a vif (see RFC3704).

Use the `set` form of this command to configure the policy for a vif.

Use the `delete` form of this command to restore the default configuration of a vif.

Use the `show` form of this command to display the configuration of a vif.

interfaces dataplane <interface-name> vif <vif-id> ipv6 address

Assigns an IPv6 address to a vif.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 address`** [**`autoconf`** | **`eui64`** *ipv6prefix* | **`link-local`** *ipv6-address*]

Syntax:

`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 address`** [**`autoconf`** | **`eui64`** *ipv6prefix* | **`link-local`**]

Syntax:
`show interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6 address`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

`autoconf`
Generates an IPv6 address using the SLAAC protocol. Use this keyword if the interface is performing a "host" function rather than a "router" function. You can specify this keyword in addition to static IPv6, static IPv4, or IPv4 DHCP addresses on the vif.

`eui64` ***ipv6prefix***
Specifies the 64-bit IPv6 address prefix that is used to configure an IPv6 address, in EUI-64 format. The system concatenates this prefix with a 64-bit EUI-64 value that is derived from the 48-bit MAC address of the vif.

`link-local` ***ipv6-address***
Specifies the 128-bit IPv6 address.

Configuration mode

```
interfaces {
     dataplane interface-name {
        vif vif-id {
           ipv6 {
              address [autoconf | eui64 ipv6prefix | link-local ipv6-address]
           }
        }
     }
}
```

Use this command to assign an IPv6 address to a vif.

Use the **`autoconf`** keyword to direct the system to automatically configure (autoconfigure) the address, using the Stateless Address Autoconfiguration (SLAAC) protocol defined in RFC 4862. Alternatively, you can provide an EUI-64 IPv6 address prefix so that the system constructs the IPv6 address.

If you want the system to use SLAAC to acquire addresses on the interface, then in addition to setting this parameter, you must also disable IPv6 forwarding, either globally (by using the `system ipv6 disable-forwarding` command) or specifically on the interface (by using interfaces dataplane <interface-name> vif <vif-id> ipv6 disable-forwarding *(page 89)*).

Use the `set` form of this command to assign an IPv6 address to a vif.

Use the `delete` form of this command to delete an IPv6 address from a vif.

Use the `show` form of this command to view IPv6 address configuration settings for a vif.

interfaces dataplane <interface-name> vif <vif-id> ipv6 disable

Disables IPv6 on a vif.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 disable`**

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 disable`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 disable`**

interface-name
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vfi-id
: The ID of a vif. The ID ranges from 1 through 4094.

Configuration mode.

```
interfaces {
     dataplane interface-name {
        vif vif-id {
           ipv6 {
              disable
           }
        }
     }
```

By default, IPv6 is enabled on all interfaces. A global command exists which can disable IPv6, namely `set system ipv6 disable`, and this will take precedence over any of the existing per-interface based, IPv6 commands.

IPv6 Forwarding can be disabled via the `interfaces dataplane <interface-name> vif <vif-id> ipv6 disable-forwarding` command, but note that IPv6 traffic can still be terminated on this interface.

IPv6 configuration can be totally disabled via the `interfaces dataplane <interface-name> vif <vif-id> ipv6 disable` command.

Use the `set` form of this command to disable IPv6 on this interface.

Use the `delete` form of this command to enable IPv6 on this interface.

Use the `show` form of this command to display the current IPv6 configuration on this interface.

interfaces dataplane <interface-name> vif <vif-id> ipv6 disable-forwarding

Disables IPv6 forwarding on a vif.

Syntax:
`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6 disable-forwarding`**

Syntax:
`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6 disable-forwarding`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 disable-forwarding`**

IPv6 packets are forwarded.

interface-name
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
: The ID of a vif. The ID ranges from 1 through 4094.

Configuration mode

```
interfaces {
     dataplane interface-name {
        vif vif-id {
           ipv6 {
              disable-forwarding
```

```
            }
         }
      }
}
```

Use this command to disable IPv6 packet forwarding on a vif.

You can also disable IPv6 forwarding globally (that is, for all interfaces) by using the `system ipv6 disable-forwarding` command.

Use the `set` form of this command to disable IPv6 packet forwarding on a vif.

Use the `delete` form of this command to enable IPv6 packet forwarding on a vif.

Use the `show` form of this command to display whether IPv6 packet forwarding is disabled or enabled on a vif.

interfaces dataplane <interface-name> vif <vif-id> ipv6 dup-addr-detect-transmits <num>

Specifies the number of NS packets to transmit as part of the DAD process.

Syntax:
`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6`** **`dup-addr-detect-transmits`** *num*

Syntax:
`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6`** **`dup-addr-detect-transmits`**

Syntax:
`show interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6`** **`dup-addr-detect-transmits`**

One NS packet is transmitted as part of the DAD process.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

num
The number of NS messages to transmit as part of the DAD process. The number ranges from 1 through 4294967295. The default number is 1.

Configuration mode

```
interfaces {
     dataplane interface-name {
        vif vif-id {
           ipv6 {
              dup-addr-detect-transmits num
           }
        }
     }
}
```

Use this command to specify the number of Neighbor Solicitation (NS) packets to transmit as part of the Duplicate Address Detection (DAD) process on a vif.

Use the `set` form of this command to specify the number of NS packets to transmit on a vif.

Use the `delete` form of this command to delete the transmission number from a vif and transmit the default number of one NS packet.

Use the `show` form of this command to display the number of NS packets to transmit on a vif.

interfaces dataplane <interface-name> vif <vif-id> ipv6 mld

Enables MLD on an interface.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 mld`**

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 mld`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 mld`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
          ipv6 {
             mld
          }
      }
   }
}
```

Use this command to enable Multicast Listener Discovery (MLD) on a vif.

This command enables MLD operation in stand-alone mode, and can be used to learn local membership information prior to enabling a multicast routing protocol on the vif.

This command can only be issued on VLAN interfaces.

> **Note:** Enabling IP on a vif enables the host-side functionality of MLD by default. The `set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 mld`** command enables the router-side functionality of the MLD on the given vif.

> **Note:** To use MLD for multicast routing, multicast routing must be enabled on the router. For information about multicast routing in general, see the AT&T Vyatta Network Operating System Multicast Routing Configuration Guide.

Use the `set` form of this command to enable MLD on a vif.

Use the `delete` form of this command to remove all MLD configuration and disable MLD on a vif.

Use the `show` form of this command to display MLD configuration for a vif.

interfaces dataplane <interface-name> vif <vif-id> ipv6 ospfv3

Enables OSPFv3 on a specified interface.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 ospfv3`** [**`process`** *process-id* [**`instance-id`** *instance-id*]]

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 ospfv3`** [[**`process`** *process-id* **`instance-id`** *instance-id*]]

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ipv6 ospfv3`** [**`process`** *process-id* [**`instance-id`** *instance-id*]]

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

process-id
The OSPFv3 process ID. Enter alphanumeric characters.

instance-id
The OSPFv3 instance ID. The range is from 0 to 255.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         ipv6 {
            ospfv3 [process process-id [instance-id instance-id]]
            }
        }
    }
}
```

Use this command to enable the OSPFv3 routing protocol on a vif.

Use the `set` form of this command to enable OSPFv3 on a vif.

Use the `delete` form of this command to remove all OSPFv3 configuration and disable OSPFv3 on a vif.

Use the `show` form of this command to display OSPFv3 configuration for a vif.

interfaces dataplane <interface-name> vif <vif-id> ipv6 pim

Enables Protocol Independent Multicast for a vif.

Syntax:
`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6 pim`**

Syntax:
`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6 pim`**

Syntax:
`show interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6 pim`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

Configuration mode

```
interfaces {
    dataplane interface-name {
        vif vif-id {
            ipv6 {
                pim
            }
        }
    }
}
```

Use this command to enable Protocol Independent Multicast (PIM) for a vif.

Use the `set` form of this command to restrict the flow of BSR messages through a vif.

Use the `delete` form of this command to restore the default behavior of a vif.

Use the `show` form of this command to display the current BSR border configuration for a vif.

interfaces dataplane <interface-name> vif <vif-id> ipv6 router-advert

Specifies the router advertisements to be sent from a vif.

Syntax:

`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6`** **`router-advert`** [**`cur-hop-limit`** *limit*] [**`default-lifetime`** *lifetime*] [**`default-preference`** *preference*] [**`link-mtu`** *mtu*] [**`managed-flag`** *state*] [**`max-interval`** *interval*] [**`min-interval`** *interval*] [**`other-config-flag`** *state*] [**`prefix`** *ipv6net* [**`autonomous-flag`** *state* | **`on-link-flag`** *state* | **`preferred-lifetime`** *lifetime* | **`valid-lifetime`** *lifetime*]] [**`reachable-time`** *time*] [**`retrans-timer`** *time*] [**`send-advert`** *state*]

Syntax:

`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6`** **`router-advert`** [**`cur-hop-limit`**] [**`default-lifetime`**] [**`default-preference`**] [**`link-mtu`**] [**`managed-flag`**] [**`max-interval`**] [**`min-interval`**] [**`other-config-flag`**] [**`prefix`** *ipv6net* [**`autonomous-flag`** | **`on-link-flag`** | **`preferred-lifetime`** | **`valid-lifetime`**]] [**`reachable-time`**] [**`retrans-timer`** [**`send-advert`**]

Syntax:

`show interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6`** **`router-advert`**

Router advertisements are not sent on a vif.

interface-name
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
: The ID of a vif. The ID ranges from 1 through 4094.

`cur-hop-limit` ***limit***
: Specifies the Hop Count field of the IP header for outgoing (unicast) IP packets. This value is placed in the Hop Count field of the IP header for outgoing (unicast) IP packets. The range is 0 to 255. The default is 64. A limit of 0 means unspecified by the router.

`default-lifetime` ***lifetime***
: Specifies the lifetime, in seconds, that is associated with the default router. A lifetime of 0 indicates that the router is not a default router. The lifetime ranges from the value configured for the **`max-interval`** option to 9000 (18.2 hours). If the lifetime is not configured, the value for this timer is three times **`max-interval`**.

`default-preference` ***preference***
: The preference associated with the default router. Supported values are as follows:

  `low`: The default router is low preference.

  `medium`: The default router is medium preference.

  `high`: The default router is high preference.

  The default is **`medium`**.

`link-mtu` ***mtu***

Specifies the MTU to be advertised for the link. The MTU is 0 or ranges from 1280 through the maximum MTU for the type of link, as defined in RFC 2464. The default MTU is 0, which means the MTU is not specified in the router advertisement message. That is because it is expected that the MTU is configured directly on the interface itself and not for routing advertisements. You can configure this option when the link MTU is not well known.

If the MTU that is set here does not match the MTU that is configured on the interface, the system issues a warning but does not fail.

`managed-flag` ***state***

Whether to use the administered protocol for address autoconfiguration. The state is either of the following:

`true`: Hosts use the administered (stateful) protocol for address autoconfiguration in addition to any addresses autoconfigured using stateless address autoconfiguration.

`false`: Hosts use only stateless address autoconfiguration.

The default state is **`false`**.

`max-interval` ***interval***

Specifies the maximum time, in seconds, that is allowed between sending unsolicited multicast router advertisements from the interface. The interval ranges from 4 through 1800. The default is 600 (10 minutes).

`min-interval` ***interval***

Specifies the minimum time, in seconds, that is allowed between sending unsolicited multicast router advertisements from the interface. The interval ranges from 3 through 0.75 times the **`max-interval`** option. The default interval is 0.33 times **`max-interval`**.

`other-config-flag` ***state***

Specifies that the interface use the administered (stateful) protocol for autoconfiguration of nonaddress information, as defined in RFC 4862. The state is either of the following:

`true`: Hosts use the administered protocol for autoconfiguration of nonaddress information.

`false`: Hosts use stateless autoconfiguration of nonaddress information.

The default state is **`false`**.

`prefix` ***ipv6net***

Multinode. Specifies the IPv6 prefix to be advertised on the IPv6 interface, in the format *ipv6-address/prefix*.

You can define more than one IPv6 prefix by configuring multiple prefix configuration nodes.

`autonomous-flag` ***state***

Specifies whether the prefix can be used for autonomous address configuration as defined in RFC 4862. The state is either of the following:

`true`: The prefix can be used for autonomous address configuration.

`false`: The prefix cannot be used for autonomous address configuration.

The default state is **`true`**.

`on-link-flag` ***state***

Specifies whether the prefix can be used for onlink determination, as defined in RFC 4862. The state is either of the following:

`true`: The prefix can be used for onlink determination.

`false`: The advertisement makes no statement about onlink or off-link properties of the prefix. For instance, the prefix might be used for address configuration with some addresses belonging to the prefix being onlink and others being off-link.

The default state is **`true`**.

`preferred-lifetime` ***lifetime***

Specifies the length of time, in seconds, that the addresses generated from the prefix by Stateless Address Autoconfiguration (SLAAC) is to remain preferred, as defined in RFC 4862. The interval is with respect to the time the packet is sent. The lifetime ranges from 1 through 4294967296 plus the

infinity keyword, which represents forever. (The actual value of **infinity** is a byte in which all bits are set to 1s: 0XFFFFFFFF.) The default lifetime is 604800 (7 days).

valid-lifetime ***lifetime***
: Specifies the length of time, in seconds, that the prefix is valid for onlink determination, as defined in RFC 4862. The interval is with respect to the time the packet is sent. The time ranges from 1 through 4294967296 plus the **infinity** keyword, which represents forever. (The actual value of **infinity** is a byte in which all bits are set to 1s: 0XFFFFFFFF.) The default lifetime is 2592000 (30 days).

reachable-time ***time***
: Specifies the length of time, in milliseconds, for which the system assumes a neighbor is reachable after having received a reachability confirmation. This time is used by address resolution and the Neighbor Unreachability Detection algorithm (see Section 7.3 of RFC 2461). The time ranges from 0 through 3600000, where a value of 0 means the reachable time is not specified in the router advertisement message. The default time is 0.

retrans-timer ***time***
: Specifies the length of time, in milliseconds, between retransmitted NS messages. This time is used by address resolution and the Neighbor Unreachability Detection algorithm (see Sections 7.2 and 7.3 of RFC 2461). The time ranges from 0 through 4294967295, where a value of 0 means the retransmit time is not specified in the router advertisement message. The default time is 0.

send-advert ***state***
: Specifies whether router advertisements are to be sent from this interface. The state is either of the following:

true: Sends router advertisements from this interface.

false: Does not send router advertisements from this interface. If a state is in effect, parameters in this configuration subtree are still used to configure the local implementation parameters.

The default state is **true**.

Configuration mode

```
interfaces {
     dataplane interface-name {
          vif vif-id {
               ipv6 {
                    router-advert {
                         cur-hop-limit limit
                         default-lifetime lifetime
                         default-preference preference
                         link-mtu mtu
                         managed-flag state
                         max-interval interval
                         min-interval interval
                         other-config-flag state
                         prefix ipv6net {
                              autonomous-flag state
                              on-link-flag state
                              preferred-lifetime lifetime
                              valid-lifetime lifetime
                         }
                         reachable-time time
                         retrans-timer time
                         send-advert state
                    }
               }
          }
     }
}
```

Use this command to specify the router advertisements to be sent from a vif.

Router advertisements are sent by IPv6 routers to advertise their existence to hosts on the network. IPv6 hosts do not send router advertisements.

If the **router-advert** node of the configuration tree is missing, router advertisements are not sent. In addition, if IPv6 forwarding is disabled either globally (by using the `system ipv6 disable-forwarding` command) or on the interface (by using interfaces dataplane <interface-name> vif <vif-id> ipv6 disable-forwarding *(page 89)*), router advertisements are not sent.

Most router advertisement parameters are required by either the Neighbor Discovery (ND) protocol or the Stateless Address Autoconfiguration (SLAAC) protocol. These parameters are used both locally for the IPv6 implementation and become part of the RA messages sent to hosts on the network so that they can be configured appropriately.

Use the `set` form of this command to create the router-advert configuration node and begin to send router advertisements on a vif.

Use the `delete` form of this command to delete router-advert configuration node and stop sending router advertisements on a vif.

Use the `show` form of this command to view router advertisement configuration for a vif.

interfaces dataplane <interface-name> vif <vif-id> ipv6 unnumbered donor-interface <interface> preferred-address <ipv6-address>

Configures the vif of the specified data plane interfaces as an IP unnumbered interface with the donor interface and preferred address.

Syntax:
`set interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6 unnumbered donor-interface`** *interface* **`preferred-address`** *ipv6-address*

Syntax:
`delete interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6 unnumbered`**

Syntax:
`show interfaces` **`dataplane`** *interface-name* **`vif`** *vif-id* **`ipv6 unnumbered`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

interface
Specifies the interface.

ipv6-address
Specifies the 128-bit IPv6 address of another interface.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         ipv6 {
            unnumbered donor-interface interface preferred-address
   ipv6-address
         }
      }
   }
}
```

Configures IP processing on a vif with the requirement of an assigned IP address.

Use the `set` form of this command to configure the processing.

Use the `delete` form of this command to restore the default configuration.

Use the `show` form of this command to display the configuration.

interfaces dataplane <interface-name> vif <vif-id> mtu <mtu>

Set the maximum transmission unit (MTU) for a vif.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`mtu`** *mtu*

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`mtu`**

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* **`mtu`**

The default size of the MTU is 1500.

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a vif. The ID ranges from 1 through 4094.

mtu
The size of the MTU, in octets, for the vif as a whole. The size of the MTU ranges from 68 through 9000.

Configuration mode

```
interfaces {
   dataplane interface-name {
        vif vif-id {
            mtu mtu
        }
    }
}
```

Use this command to set the size of the maximum transmission unit (MTU) for a vif.

During forwarding, IPv4 packets larger than the MTU are fragmented unless the “Don't Fragment” (DF) bit is set in the IP header. In that case, the packets are dropped and an ICMP “fragmentation needed” message is returned to the sender.

Note that MTU sizes larger than 1500 cause the system to generate “jumbo frames,” which are not compatible with some data plane interface cards and devices.

If the data plane interface is part of an Ethernet link bond, MTU settings for the bonded link override MTU settings for the physical interface.

Use the `set` form of this command to specify the size of the MTU.

Use the `delete` form of this command to delete the size of the MTU and restore the default size of 1500.

Use the `show` form of this command to display the current size of the MTU.

interfaces dataplane <interface-name> vif <vif-id> vlan <vlan-id>

Creates a vif.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* [**`vlan`** *vlan-id*]

Syntax:

`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* `[` **`vlan`** *vlan-id* `]`

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* `[` **`vlan`** *vlan-id* `]`

`dataplane` ***interface-name***
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

`vif` ***vif-id***
: Multinode. The ID of a vif. The ID ranges from 1 through 4094.

`vlan` ***vlan-id***
: Multinode. The VLAN ID of a vif, for use with 802.1Q VLAN tagging. The ID ranges from 1 through 4094. Note that only 802.1Q-tagged packets are accepted on Ethernet vifs.

  You can define more than one vif for an interface by creating multiple vif configuration nodes.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         vlan vlan-id
      }
   }
}
```

Use this command to create a vif. The vifs function as VLAN interfaces, and only 802.1Q tagged packets are accepted.

Note: The interface must be defined before a vif can be added.

Use the `set` form of this command to create a vif.

Use the `delete` form of this command to delete a vif.

Use the `show` form of this command to display a vif.

show interfaces dataplane <interface-name> vif <vif-id>

Displays the operational status of a vif.

Syntax:
`show interfaces dataplane` *interface-name* **`vif`** *vif-id* `[` **`brief`** `]`

interface-name
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
: The ID of a vif. The ID ranges from 1 through 4094.

`brief`
: Displays a brief status of the vif.

Operational mode

Use this command to display the operational status of a vif.

Related commands documented elsewhere

Commands for using other system features with VLAN interfaces are located in the following guides.

Related Commands Documented Elsewhere	
IGMP and MLD	IGMP and MLD are supported on IPv4 VLAN interfaces. Commands for configuring IGMP and MLD are described in AT&T Vyatta Network Operating System IGMP and MLD Configuration Guide.
Multicast	Multicast is supported on IPv4 VLAN interfaces. Commands for configuring multicast are described in AT&T Vyatta Network Operating System Multicast Routing Configuration Guide.
OSPF	OSPF is supported on IPv4 VLAN interfaces. Commands for configuring OSPF are described in AT&T Vyatta Network Operating System OSPF Configuration Guide.
OSPFv3	OSPFv3 is supported on IPv4 VLAN interfaces. Commands for configuring OSPFv3 are described in AT&T Vyatta Network Operating System OSPFv3 Configuration Guide.
PIM	PIM is supported on IPv4 and IPv6 VLAN interfaces. Commands for configuring PIM are described in AT&T Vyatta Network Operating System PIM Configuration Guide.
RIP	RIP is supported on IPv4 VLAN interfaces. Commands for configuring RIP are described in AT&T Vyatta Network Operating System RIP Configuration Guide.
RIPng	RIPng is supported on IPv6 VLAN interfaces. Commands for configuring RIPng are described in AT&T Vyatta Network Operating System RIPng Configuration Guide.

Q-in-Q Interface

Q-in-Q interface overview

This section presents the following topics:

- Q-in-Q interface features *(page 100)*
- Packet processing using QoS schedulers *(page 100)*

With services such as metro Ethernet, the demand for VLAN IDs can increase beyond the original space limit of 4K. Q-in-Q enables the VLAN ID space to be extended from 4K to 16M, while also reducing the number of VLANs that must be managed.

The AT&T Vyatta vRouter Q-in-Q implementation is based on IEEE 802.1ad—multiple VLAN tags in an IP packet frame. The Q-in-Q interface is able to insert two VLAN tags into the Ethernet frame of a packet.

The Q-in-Q interface is supported on the data plane interface and must be configured as a virtual interface (vif). You configure the inner VLAN and the outer VLAN by using the VIF CLI commands, modify the data plane to be able to process packets with two VLAN tags, and then display the VLAN IDs of the VIF interface.

Only the outer VLAN tag is used when scheduling QoS packets. The outer VLAN tag can use EtherTypes 0x8100, 0x9100, 0x9200, 0x9300 and 0x88A8. The inner VLAN tag uses only 0x8100.

The outer VLAN is also referred to as “service VLAN” (S-VLAN) while the inner VLAN is called “customer VLAN” (C-VLAN).

When a Q-in-Q VIF is configured, two logical interfaces are created in the Linux kernel and the data plane—one representing the outer VLAN and the other representing the inner VLAN. In the data plane, the Q-in-Q logical interfaces are created after the corresponding netlink link messages are received.

Most forwarding features are performed based on the specifications of the interface regardless of whether the packet has a VLAN.

Q-in-Q interface features

The AT&T Vyatta vRouter implementation of the Q-in-Q interface supports the same set of features as that of the single VLAN VIF:

- IPv4 and IPv6
- Bridging
- QoS
- Firewall
- Routing protocols
- PBR policy

Packet processing using QoS schedulers

To manage traffic bandwidth, use the QoS scheduler to shape traffic based on Q-in-Q packets with VLAN IDs by using the following command:

- `set policy qos name` *policy-name* **`shaper vlan`** *outer-vid*
  The VLAN ID is the outer VLAN ID of a Q-in-Q interface.

For more information on QoS, refer to *QoS Reference Guide*.

You can configure the aggregated scheduler to handle traffic that traverses the Q-in-Q interface.

- All inner VLANs share the same scheduler.
- Only the outer VLAN must be specified in the configuration.
- Use the following command to configure an aggregated scheduler:

`set policy qos name` *policy-name* **`shaper vlan`** *outer-vid*

- A subport is created for the outer VLAN and all inner VLANs under this outer VLAN share the same subport.

VLAN map

The three-bit priority of a VLAN tag in the frame can be used to map an incoming packet to a queue. For Q-in-Q packets, the priority applies only to the outer VLAN tag.

Configuring the Q-in-Q interface

To configure the VIF attributes and the QoS behavior, perform the following steps in configuration mode:

Step	Command

Create the VIF.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id vlan outer-vid`
	
	`vyatta@R1# set interfaces dataplane interface-name vif vif-id inner-vlan inner-vid`

Assign the interface address.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id address address`
Set the EtherType for VLAN packets.	`vyatta@R1# set interfaces dataplane interface-name vlan-protocol ethertype`
Add this interface to a bridge group.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id bridge-group ...`
Define the IP routing parameters.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id ip ...`
Define the IPv6 routing parameters.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id ipv6 ...`
Define the firewall rules for this interface.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id firewall ...`
Create an interface description.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id description ...`

Step	Command
Define the interface MTU.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id mtu`
Define the policy-based routing parameters.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id policy ...`
Define the l2tp cross-connect interface parameters.	`vyatta@R1# set interfaces dataplane interface-name vif vif-id xconnect ...`
Configure the QoS behavior on the interface.	`vyatta@R1# set policy qos name shaper vlan outer-vid`

Disabling the interface

To disable the interface, use the following command:

```
vyatta@R1# set interfaces dataplane interface-name vif vif-id disable ...
```

Ignoring link state changes

To configure the system to ignore link state changes, use the following command:

```
vyatta@R1# set interfaces dataplane interface-name vif vif-id disable-link-detect ...
```

Viewing interface queuing

To view the queuing of the logical interfaces, use the following command:

```
vyatta@R1# show queuing
```

Q-in-Q Interface Commands

interfaces dataplane <interface-name> vif <vif-id> inner-vlan <inner-vid>

Configures the ID of the inner VLAN for Q-in-Q.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`inner-vlan`** *inner-vid*

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id*

Syntax:
`show interfaces dataplane` *interface-name* **`vif`**

`dataplane` ***interface-name***
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
Multinode. The ID of a vif. The ID ranges from 1 through 4094.

inner-vid
Inner VLAN ID.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         inner-vlan inner-vid
      }
   }
}
```

Use this command to configure the ID of the inner VLAN for Q-in-Q.

Use the `set` form of this command to configure the ID of the inner VLAN

Use the `delete` form of this command to delete the configuration.

Use the `show` form of this command to display the current settings.

interfaces dataplane <interface-name> vif <vif-id> vlan <outer-vid>

Configures the ID of the outer VLAN for Q-in-Q.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`vlan`** *outer-vid*

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id*

Syntax:

`show interfaces dataplane` *interface-name* **`vif`** *vif-id*

`dataplane` ***interface-name***
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
: Multinode. The ID of a vif. The ID ranges from 1 through 4094.

outer-vid
: Outer VLAN ID.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vif vif-id {
         vlan outer-vid
      }
   }
}
```

Use this command to configure the ID of the outer VLAN for Q-in-Q.

Use the `set` form of this command to configure the ID of the outer VLAN.

Use the `delete` form of this command to remove the ID settings.

Use the `show` form of this command to display the current settings.

interfaces dataplane <interface-name> vlan-protocol <ethertype>

Specifies the EtherType for VLAN frames.

Syntax:
`set interfaces dataplane` *interface-name* **`vlan-protocol`** *ethertype*

Syntax:
`delete interfaces dataplane` *interface-name*

Syntax:
`show interfaces dataplane` *interface-name*

The default EtherType is 0x8100.

`dataplane` ***interface-name***
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

ethertype
: Specifes the EtherType for the VLAN frames. The EtherType can be 0x88A8, 0x8100, 0x9100, 0x9200, or 0x9300.

Configuration mode

```
interfaces {
   dataplane interface-name {
      vlan-protocol ethertype
   }
}
```

Use this command to specify the EtherType for the VLAN frames.

Use the `set` form of this command to specify the EtherType.

Use the `delete` form of this command to restore the default EtherType.

Use the `show` form of this command to display the current EtherType.

policy qos name <policy-name> shaper vlan <outer-vid>

Specifies the outer VLAN ID for a QoS policy.

Syntax:
`set policy qos name` *policy-name* **`shaper vlan`** *outer-vid*

Syntax:
`delete policy qos name` *policy-name* **`shaper vlan`**

Syntax:
`show policy qos name` *policy-name* **`shaper vlan`**

policy-name
Specifies the QoS policy.

outer-vid
Outer VLAN ID.

Configuration mode

```
policy {
    qos {
        name policy-name {
            shaper {
                vlan outer-vid
            }
        }
    }
}
```

Use this command to specify the outer VLAN ID for a QoS policy.

Use the `set` form of this command to specify the outer VLAN ID for the QoS policy.

Use the `delete` form of this command to return to the default VLAN IDs.

Use the `show` form of this command to display the current values.

IP Unnumbered Interfaces

Overview

The IP unnumbered interfaces feature allows the use of the same IPv4 address on multiple interfaces, thus conserving IP addresses. The configuration of interfaces as unnumbered allows the enabling of IP processing on interfaces without assigning an IP address to them.

To configure an unnumbered interface, specify a donor interface from which the system can borrow an IP address. Then, configure a static-interface route to forward packets through the unnumbered interface.

Only data plane interfaces and virtual interfaces (vifs) can be configured as unnumbered interfaces. For IP packets that originate from routers, the unnumbered interfaces use IPv4 addresses from donor interfaces as preferred source addresses. The donor interfaces may be either data plane or loopback interfaces.

Note: Numbered interfaces are interfaces that have their IP addresses configured with the `set interfaces` command, for example, `set interfaces dataplane dp0s192 address 1.1.1.1/24`.

Limitations of the feature

- The IP unnumbered interfaces feature does not support IPv6 unnumbered interfaces.
- Interfaces that are configured as unnumbered can neither take other addresses nor be part of a bridge.
- Only data plane interfaces and vifs can be configured as unnumbered interfaces.
- The preferred donor interfaces are loopback interfaces.
- The feature may affect Protocol Independent Multicast (PIM) and Internet Group Management Protocol (IGMP).

How unnumbered interfaces work

Basic IP unnumbered interface configuration *(page 106)* illustrates how unnumbered interfaces work. A router called VR1 contains an interface named A that faces an interfaced named B on a router called VR2. A VLAN subinterface of A connects to a VLAN subinterface of B.The VLAN subinterface of A is configured as unnumbered.

On VR1, the administrator configures a static route through A toward the subnet in B. The static route makes the router take the manually configured unnumbered interface as the entry for routing, thereby, bypassing the need for a dynamic protocol to route traffic.

Unnumbered interface configuration example

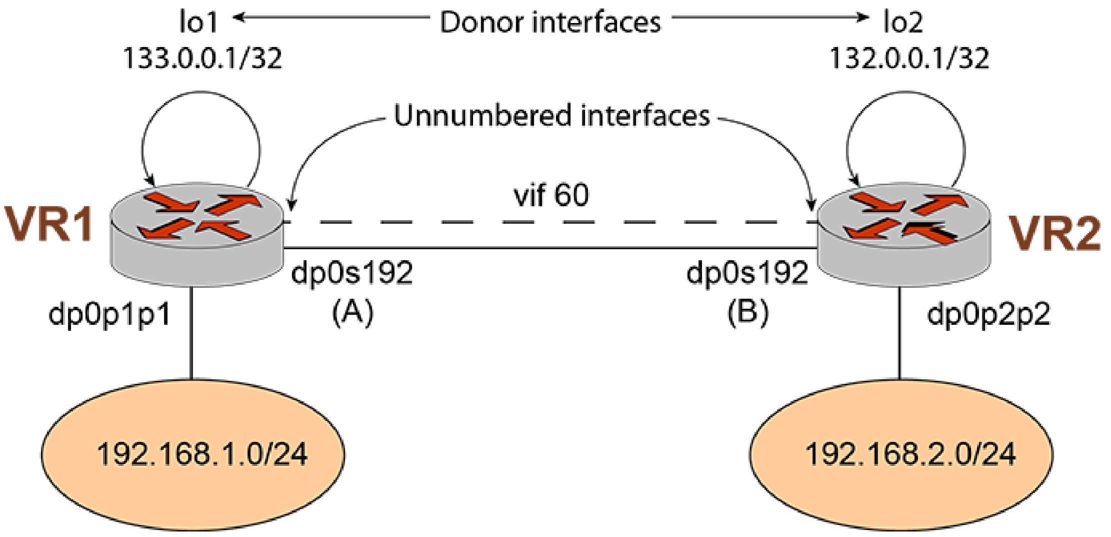
This section includes the following topics:

- Basic IP unnumbered interface configuration *(page 106)*

Basic IP unnumbered interface configuration

Figure 1 *(page 107)* presents a sample configuration of two routers with unnumbered interfaces and a static route.

Figure 5: Configuring IP unnumbered interfaces



To configure these interfaces, perform the following steps in configuration mode.

Table 10: Configuring IP unnumbered interfaces on VR1

Step	Command
Create a loopback interface, and configure the IP address.	`vyatta@Router# set interfaces loopback lo1 address 133.0.0.1/32`
Create the configuration node for the vif; assign the vif VLAN ID 60; and then assign the IP address for the vif.	`vyatta@Router# set interfaces dataplane dp0s192 vif 60 vlan '60'`
Borrow the IP address from a loopback interface.	`vyatta@Router# set interfaces dataplane dp0s192 vif 60 ip unnumbered donor-interface lo1`
Add a static-interface route to reach the other network.	`vyatta@Router# set protocols static interface-route 132.0.0.1/32 next-hop-interface 'dp0s192.60'`
Add a route to the destination network.	`vyatta@Router# set protocol static route 192.168.2.0/0 nexthop 132.0.0.1`
Commit the configuration.	`vyatta@Router# commit`

Step	Command

Verify whether the IP unnumbered support has been configured correctly.	`vyatta@Router# show interfaces dataplane dp0s192 vif 60`
	`ip {`
	`        unnumbered {`
	`                donor-interface lo1`
	`        }`
	`}`
	`vlan 60`

Table 11: Configuring IP unnumbered interfaces on VR2

Step	Command
Create a loopback interface, and configure the IP address.	`vyatta@Router# set interfaces loopback lo1 address 132.0.0.1/32`
Create the configuration node for the vif; assign the vif VLAN ID 60; and then assign the IP address for the vif.	`vyatta@Router# set interfaces dataplane dp0s192 vif 60 vlan '60'`
Borrow the IP address from a loopback interface.	`vyatta@Router# set interfaces dataplane dp0s192 vif 60 ip unnumbered donor-interface lo1`
Add the static interface route to reach the other network.	`vyatta@Router# set protocols static interface-route 133.0.0.1/32 next-hop-interface 'dp0s192.60'`
Add a route to the destination network.	`vyatta@Router# set protocol static route 192.168.1.0/0 nexthop 133.0.0.1`
Commit the configuration.	`vyatta@Router# commit`

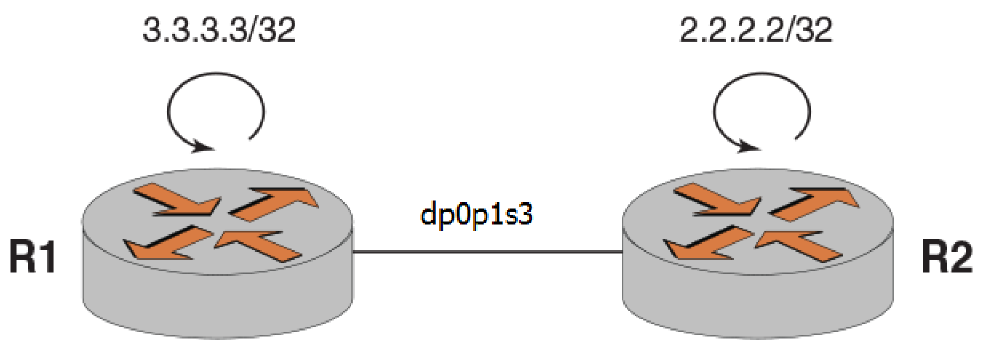
Verify whether the IP unnumbered support has been configured correctly.	`vyatta@Router# show interfaces dataplane dp0s192 vif 60`
	`ip {`
	`        unnumbered {`
	`                donor-interface lo1`
	`        }`
	`}`
	`vlan 60`

Configuring BGP on an unnumbered interface

You can configure the BGP protocol on an unnumbered interface.

This section presents an example configuration of eBGP with an unnumbered Interface. The example is based on the following figure.

Figure 6: Configuring BGP on an unnumbered interface



To configure BGP on an unnumbered interface, perform the following steps in configuration mode.

Table 12: Configuring an IP unnumbered interface on router R1

Step	Command
Add an interface address.	`vyatta@R1# set interfaces dataplane dp0p1s2 address 133.0.1.1/24`
Add an unnumbered interface address.	`vyatta@R1# set interfaces dataplane dp0p1s3 ip unnumbered donor-interface dp0p1s2`
Set the identifier of the BGP router to that of the router address.	`vyatta@R1# set protocols bgp parameters router-id 3.3.3.3`
Configure the eBGP neighbor peering.	`vyatta@R1# set protocols bgp 100 neighbor 133.0.1.2 address-family ipv4-unicast`
Set the eBGP remote AS.	`vyatta@R1# set protocols bgp 100 neighbor 133.0.1.2 remote-as 200`
Add a static interface route to reach the neighbor.	`vyatta@R1# set protocols static interface-route 133.0.1.2/32 next-hop-interface dp0p1s3 bgp network point-to-point`

Step	Command

Verify that the BGP protocol is configured with an unnumbered interface on a point-to-point interface type only.	`vyatta@R1# show interfaces`
	`interfaces {`
	`      dataplane dp0p1s2 {`
	`                   address 133.0.1.1/24`
	`       }`
	`       dataplane dp0p1s3 {`
	`                   ip {`
	`                        unnumbered {`
	`                            donor-`
	`interface dp0p1s2`
	`                        }`
	`                   }`
	`        }`
	`}`

Table 13: Configuring an IP unnumbered interface on router R2

Step	Command
Set the interface address.	`vyatta@R1# set interfaces dataplane dp0p1s2 address 133.0.1.2/24`
Set the unnumbered interface address.	`vyatta@R1# set interfaces dataplane dp0p1s3 ip unnumbered donor-interface dp0p1s2`
Set the identifier of the BGP router to that of the router address.	`vyatta@R1# set protocols bgp parameters router-id 3.3.3.3`
Set the eBGP neighbor peering.	`vyatta@R1# set protocols bgp 200 neighbor 133.0.1.1 address-family ipv4-unicast`
Set the eBGP remote AS.	`vyatta@R1# set protocols bgp 200 neighbor 133.0.1.1 remote-as 100`
Add a static interface route to reach the neighbor.	`vyatta@R1# set protocols static interface-route 133.0.1.1/32 next-hop-interface dp0p1s3`

Step	Command

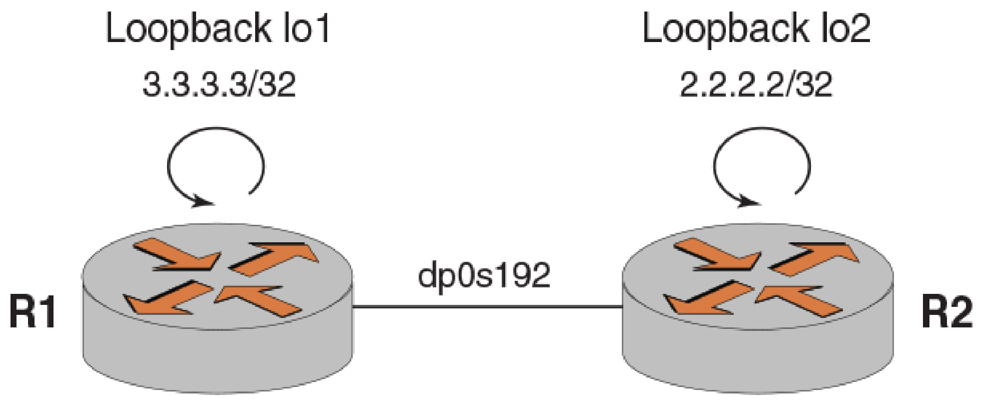
Verify that the BGP protocol is configured with an unnumbered interface on a point-to-point interface type only.	`vyatta@R1# show interfaces`
	`interfaces {`
	`      dataplane dp0p1s2 {`
	`                  address 133.0.1.2/24`
	`      }`
	`      dataplane dp0p1s3 {`
	`                  ip {`
	`                       unnumbered {`
	`                           donor-`
	`interface dp0p1s2`
	`                       }`
	`                  }`
	`      }`
	`}`

Configuring OSPF on an unnumbered interface

You can configure the OSPF protocol on an unnumbered interface.

This section presents an example configuration of OSPF with an unnumbered Interface. The example is based on the following figure.

Figure 7: Configuring OSPF on an unnumbered interface



To configure OSPF on an unnumbered interface, perform the following steps in configuration mode.

Table 14: Configuring an IP unnumbered interface on router R1

Step	Command
Create a loopback interface for router R1.	`vyatta@R1#set interfaces loopback lo1 address 3.3.3.3/32`
Add a static interface route to reach the other network.	`vyatta@R1# set protocols static interface-route 192.169.2.0/24 next-hop-interface dp0s192`

Step	Command

Add a route to the destination network.	`vyatta@R1# set protocols static route`
	`192.169.2.0/24`
	`next-hop 3.3.3.3`

Set the identifier of the OSPF router to that of the loopback address.	`vyatta@R1#set protocols ospf parameters`
	`router-id 3.3.3.3`

Configure the donor interface.	`vyatta@R1#set interfaces unnumbered`
	`donor-interface lo1`

Advertise to the 3.3.3.0/24 network.	`vyatta@R1#set protocols ospf area 0.0.0.0`
	`network 3.3.3.0/24`

Configure the point-to-point protocol on the OSPF network.	`vyatta@R1#set interfaces dataplane`
	`dp0s192 ip  ospf network point-to-point`

Verify that the OSPF protocol is configured with an unnumbered interface on a point-to-point interface type only.	`vyatta@R1## show interfaces`
	`interfaces {`
	`ospf {`
	`network`
	`point-to-point`
	`}`
	`unnumbered {`
	`donor-`
	`interface lo1`
	`}`
	`}`
	`}`
	`loopback lo1 {`
	`address 3.3.3.3/32`
	`}`
	`}`

Table 15: Configuring an IP unnumbered interface on router R2

Step	Command

Create a loopback interface for router R2.	`vyatta@R1#set interfaces loopback lo1`
	`address`
	`2.2.2.2/32`

Add a static interface route to reach the other network.	`vyatta@R1# set protocols static`
	`interface-route 192.169.2.0/24 next-hop-`
	`interface dp0s192`

Add a route to the destination network.	`vyatta@R1# set protocols static route`
	`192.169.2.0/24`
	`next-hop 2.2.2.2`

Set the identifier of the OSPF router to that of the loopback address.	`vyatta@R1#set protocols ospf parameters`
	`router-id 3.3.3.3`

Step	Command

Configure the donor interface.	`vyatta@R1#set interfaces unnumbered`
	` donor-interface lo1`

Advertise to the 2.2.2.0/24 network.	`vyatta@R1# set protocols ospf area`
	` 0.0.0.0 network 2.2.2.0/24`

Configure the point-to-point protocol on the OSPF network.	`vyatta@R1#set interfaces dataplane`
	` dp0s192 ip  ospf network point-to-point`

Verify that the OSPF protocol is configured with an unnumbered interface on a point-to-point interface type only.	`vyatta@R1## show interfaces`
	`interfaces {`
	`                 ospf {`
	`                               network`
	` point-to-point`
	`                       }`
	`                       unnumbered {`
	`                              donor-`
	`interface lo1`
	`                      }`
	`               }`
	`       }`
	`       loopback lo1 {`
	`               address 2.2.2.2/32`
	` }`
	`    }`

IP Unnumbered Interfaces Command

interfaces dataplane <interface-name> vif <vif-id> ip unnumbered donor-interface <donor-interface-name>

Configures the virtual interface of the specified data plane as an IP unnumbered interface with the donor interface and preferred address.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ip unnumbered donor-interface`** *donor_interface-name* [**`preferred-address`** *ip-address*]

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ip unnumbered`**

interface-name
The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

vif-id
The ID of a virtual interface. The ID ranges from 1 through 4094.

donor-interface-name
The name of the donor data plane or loopback interface.

`preferred-address` ***ip-address***
Specifies the borrowed preferred address to use from the donor interface.

Configuration mode

```
interfaces {
        dataplane interface-name {
                vif vif-id {
                        ip {
                             unnumbered {
                                     donor-interface donor-interface-name {
                                             preferred-address ip-address
                                     }
                             }
                        }
                }
        }
}
```

Use this command to configure interfaces as unnumbered interfaces.

Use the `set` form of this command to configure a data plane interface as an unnumbered interface. The preferred address of the donor interface must be one of the configured addresses on the interface.

Use the `delete` form of this command to remove an unnumbered interface. To remove the preferred address of the donor interface, use the following command:

`delete interfaces dataplane` *interface-name* **`vif`** *vif-id* **`ip unnumbered donor-interface`** *donor_interface-name* **`preferred-address`**

This command has no `show` form. To display information about unnumbered data plane interfaces and donor interfaces, use show interfaces dataplane *(page 52)* and show interfaces loopback *(page 21)*.

Note: To change a donor interface, first set a new donor interface, then delete the one that you want to change.

L2TPv3 Data Plane Interfaces

This chapter describes basic configuration for Layer 2 Tunnel Protocol Version 3 (L2TPv3) tunnel interfaces.

Note: Layer 2 bridging is supported on data plane interfaces. Commands for configuring bridge groups are described in AT&T Vyatta Network Operating System Bridging Configuration Guide.

Overview

L2TPv3 is a protocol for carrying Layer 2 (L2) frames (such as Ethernet, Frame Relay, ATM, and PPP) across an IP network. The L2TPv3 RFC specifies both control-plane and data plane functions. The L2TPv3 control plane is primarily responsible for the setup, management, and maintenance of individual L2TP sessions, while the data plane function deals with encapsulation, security, and forwarding procedures.

In L2TPv3, end points are of two types: L2TP Access Concentrator (LAC) and L2TP Network Server (LNS). In L2TP LAC, a one-to-one mapping exists between a L2 attachment circuit (such as an Ethernet port or a VLAN) and an L2TP session. A LAC is simply a cross-connect device that transparently stitches the L2 frames between an Ethernet port or a VLAN and an L2TP session.

L2TP LNS, on the other hand, terminates L2 services and places the L2TP session into a forwarding domain (such as an L2 bridge domain or an L3 routing instance). LNS makes forwarding decisions based on forwarding information base (FIB) lookups.

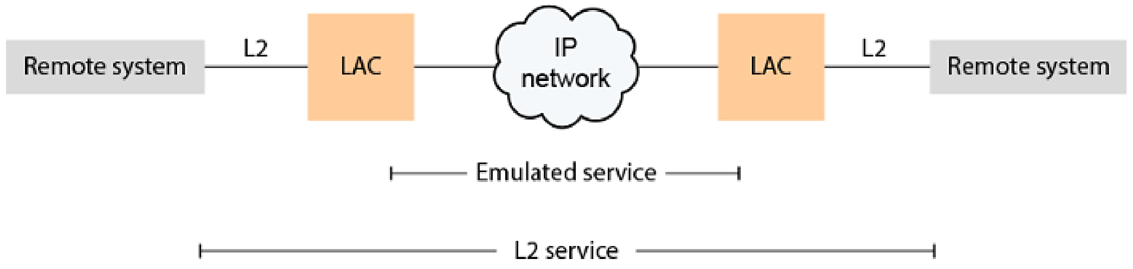
L2TP operates in three tunneling reference models:

- LAC-to-LAC
- LAC-to-LNS
- LNS-to-LNS

LAC-to-LAC tunneling reference model

In the LAC-to-LAC reference model, on both ends of the L2TP tunnel, LAC transparently stitches L2 frames between an Ethernet port or a VLAN and an L2TP session. The remote router performs the routing and bridging functions.

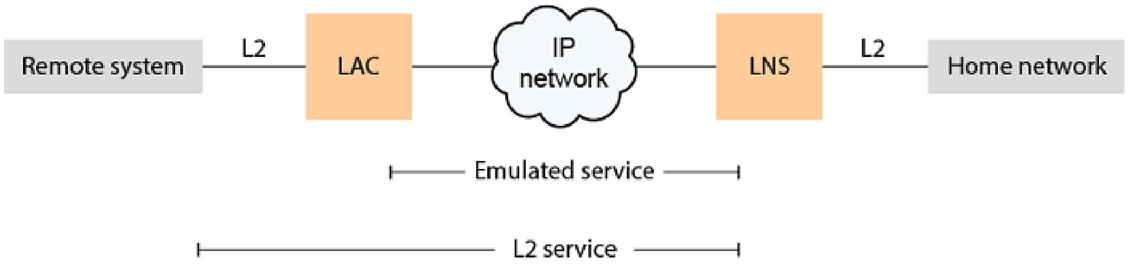
Figure 8: LAC-to-LAC tunneling reference model



LAC-to-LNS tunneling reference model

In the LAC-to-LNS reference model, on one side of the L2TP tunnel, LAC cross-connects L2 frames into an L2TP tunnel; while on the other side, LNS performs bridging or routing functions between the home network and the corresponding L2TP session.

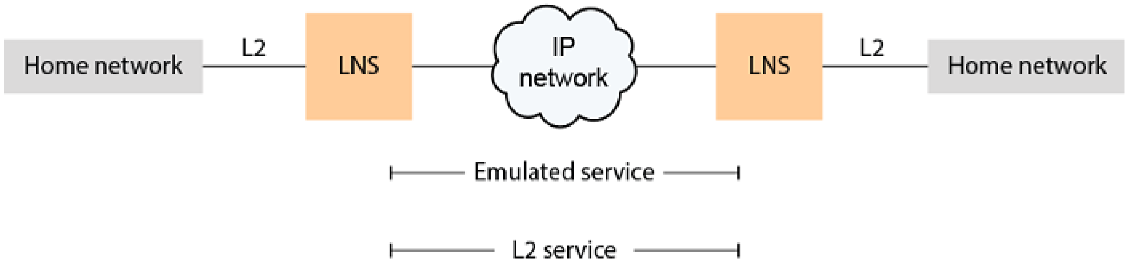
Figure 9: LAC-to-LNS tunneling reference model



LNS-to-LNS tunneling reference model

In the LNS-to-LNS reference model, on both ends of the L2TP tunnel, L2TP devices terminate the L2 service and perform routing or bridging functions between the home network and L2TP tunnel.

Figure 10: LNS-to-LNS tunneling reference model



Configuration commands

The Commands *(page 147)* section describes the L2TPv3 tunnel and LAC configuration commands. The section also describes the L2TPv3 show commands.

For LNS commands, the L2TPv3 feature supports the following command options for the `set interfaces l2tpeth` *lttpN* command. You can use these command options to configure LNS tunnels. These command options are similar to the options for the `set interfaces dataplane dp_interface` command.

Table 16: LNS command options

Command option	Description
`address`	Specifies the IPv4 or IPv6 address of a tunnel interface.
`bridge-group`	Adds and configures a bridge group for a tunnel interface.
`description`	Provides a description of a tunnel interface.
`disable`	Disables a tunnel interface.
`firewall`	Specifies firewall options.
`ip`	Specifies IPv4 parameters.
`ipv6`	Specifies IPv6 parameters.

Command option	Description
`mtu`	Specifies the maximum transmission unit (MTU).
`policy`	Specifies the policy settings for a tunnel interface.
`vif`	Specifies the identifier of a VIF interface for a tunnel.

Before configuring an L2TP tunnel

To configure an L2TP tunnel, a route to the remote peer must exist. Additionally, if the remote peer is in a different subnet, AT&T recommends adding a static route to that peer before configuring the L2TP tunnel.

L2TPv3 configuration examples

This section presents the following topics:

- Before you begin *(page 117)*
- Configuring a LAC-to-LAC IPv4 tunnel *(page 117)*
- Configuring a LAC-to-LAC IPv6 tunnel *(page 124)*
- Configuring an LNS-to-LNS IPv4 tunnel *(page 128)*
- Configuring an LNS-to-LNS tunnel with BGP routes *(page 131)*
- Configuring an LNS-to-LNS tunnel with OSPF routes *(page 137)*
- Configuring an LNS-to-LNS tunnel with RIP routes *(page 141)*

Before you begin

It is assumed for the examples in the following sections that the data plane interfaces have already been configured.

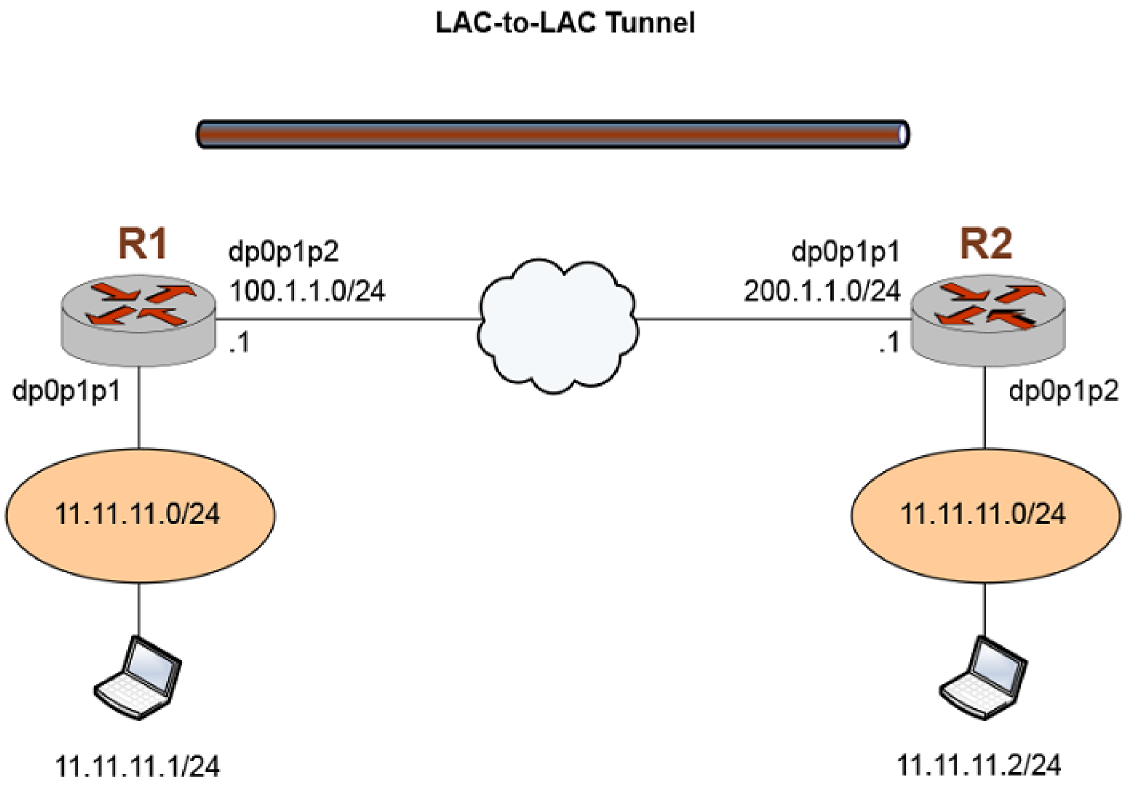
Configuring a LAC-to-LAC IPv4 tunnel

This section shows the topology of a sample L2TPv3 LAC-to-LAC IPv4 tunnel configuration. To configure this sample LAC-to-LAC tunnel, perform the following steps in configuration mode:

1. Configure the L2TPv3 tunnel and LAC cross-connect settings on the R1 router.
   a. Configure the L2TPv3 tunnel settings.
   b. Configure the LAC cross-connect settings.
2. Configure the L2TPv3 tunnel and LAC cross-connect settings on the R2 router.
   a. Configure the L2TPv3 tunnel settings.
   b. Configure the LAC cross-connect settings.

      Info:

Figure 11: Sample LAC-to-LAC IPv4 tunnel



The following procedure shows how to configure the L2TPv3 tunnel interface on R1.

Table 17: Configuring the L2TPv3 settings for a LAC-to-LAC IPv4 tunnel on R1

Step	Command
Specify IP as the encapsulation method to use for the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session encapsulation 'ip'`
Specify the cookie string used by R1 (the local router).	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-cookie '12345678'`
Specify the local IP address of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-ip '100.1.1.0/24'`
Specify the local session identifier of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-session-id '88776655'`
Specify the local UDP port of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-udp-port '65535'`

Step	Command
Specify the cookie string used by R2 (the remote router).	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-cookie '87654321'`
Specify the remote IP address of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-ip '200.1.1.0/24'`
Specify the remote session identifier of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-session-id '88776655'`
Specify the remote UDP port of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-udp-port '65534'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

Step	Command

Show the configuration.	
	```
	vyatta@vyatta:~$show interfaces
	interfaces {
	        dataplane dp0p160p1 {
	                address
	 10.18.179.216/21
	        }
	        dataplane dp0p192p1 {
	                address 100.1.1.1/24
	        }
	        dataplane dp0p1p1 {
	        }
	        l2tpeth lttp20 {
	                l2tp-session {
	                        encapsulation
	 udp
	                        local-cookie
	 abcd1234
	                        local-ip
	 100.1.1.1
	                        local-session-
	id 11223344
	                        local-udp-port
	 60000
	                        remote-cookie
	 1234abcd
	                        remote-ip
	 200.1.1.1
	                        remote-
	session-id 44332211
	                        remote-udp-
	port 60000
	                }
	        }
	        loopback lo
	}
	```

The following procedure shows how to configure the LAC cross-connect settings on R1.

Table 18: Configuring the LAC cross-connect settings on R1

Step	Command
Specify the cross-connect parameters of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces dataplane dp0p1p1 xconnect l2tpeth 'lttp20'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

Step	Command

Show the configuration.	`vyatta@vyatta:~$ show interfaces`
	`interfaces {`
	`        dataplane dp0p160p1 {`
	`                address`
	` 10.18.179.216/21`
	`        }`
	`        dataplane dp0p192p1 {`
	`                address 100.1.1.1/24`
	`        }`
	`        dataplane dp0p1p1 {`
	`                xconnect {`
	`                        l2tpeth lttp20`
	`                }`
	`        }`
	`        dataplane dp0p256p1`
	`        l2tpeth lttp20 {`
	`                l2tp-session {`
	`                        encapsulation`
	` udp`
	`                        local-cookie`
	` abcd1234`
	`                        local-ip`
	` 100.1.1.1`
	`                        local-session-`
	`id 11223344`
	`                        local-udp-port`
	` 60000`
	`                        remote-cookie`
	` 1234abcd`
	`                        remote-ip`
	` 200.1.1.1`
	`                        remote-`
	`session-id 44332211`
	`                        remote-udp-`
	`port 60000`
	`                }`
	`        }`
	`        loopback lo`
	`}`

The following procedure shows how to configure the L2TPv3 tunnel interface on R2.

Table 19: Configuring the L2TPv3 tunnel settings on R2

Step	Command
Specify IP as the encapsulation method to use for the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session encapsulation 'ip'`
Specify the cookie string used by R2 (the local router).	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-cookie '87654321'`

Step	Command
Specify the local IP address of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-ip '200.1.1.1'`
Specify the local session identifier of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-session-id '88776655'`
Specify the local UDP port of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-udp-port '65534'`
Specify the cookie string used by R1 (the remote router).	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-cookie '12345678'`
Specify the remote IP address of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-ip '100.1.1.1'`
Specify the remote session identifier of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-session-id '88776655'`
Specify the remote UDP port of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-udp-port '65535'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

Step	Command

Show the configuration.	
	```
	vyatta@vyatta:~$ show interfaces
	interfaces {
	        dataplane dp0p160p1 {
	                address
	 10.18.179.217/21
	        }
	        dataplane dp0p192p1 {
	                address 200.1.1.1/24
	        }
	        dataplane dp0p1p1 {
	        }
	        l2tpeth lttp20 {
	                l2tp-session {
	                        encapsulation
	 udp
	                        local-cookie
	 1234abcd
	                        local-ip
	 200.1.1.1
	                        local-session-
	id 44332211
	                        local-udp-port
	 60000
	                        remote-cookie
	 abcd1234
	                        remote-ip
	 100.1.1.1
	                        remote-
	session-id 11223344
	                        remote-udp-
	port 60000
	                }
	        }
	        loopback lo
	}
	```

The following procedure shows how to configure the LAC cross-connect settings on R2.

Table 20: Configuring the LAC cross-connect settings on R2

Step	Command
Specify the cross-connect parameters of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces dataplane dp0p1p1 xconnect l2tpeth 'lttp20'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

Step	Command

Show the configuration.	
	```
	vyatta@vyatta:~$ show interfaces
	interfaces {
	        dataplane dp0p160p1 {
	                address
	 10.18.179.217/21
	        }
	        dataplane dp0p192p1 {
	                address 200.1.1.1/24
	        }
	        dataplane dp0p1p1 {
	                xconnect {
	                        l2tpeth lttp20
	                }
	        }
	        l2tpeth lttp20 {
	                l2tp-session {
	                        encapsulation
	 udp
	                        local-cookie
	 1234abcd
	                        local-ip
	 200.1.1.1
	                        local-session-
	id 44332211
	                        local-udp-port
	 60000
	                        remote-cookie
	 abcd1234
	                        remote-ip
	 100.1.1.1
	                        remote-
	session-id 11223344
	                        remote-udp-
	port 60000
	                }
	        }
	        loopback lo
	}
	```

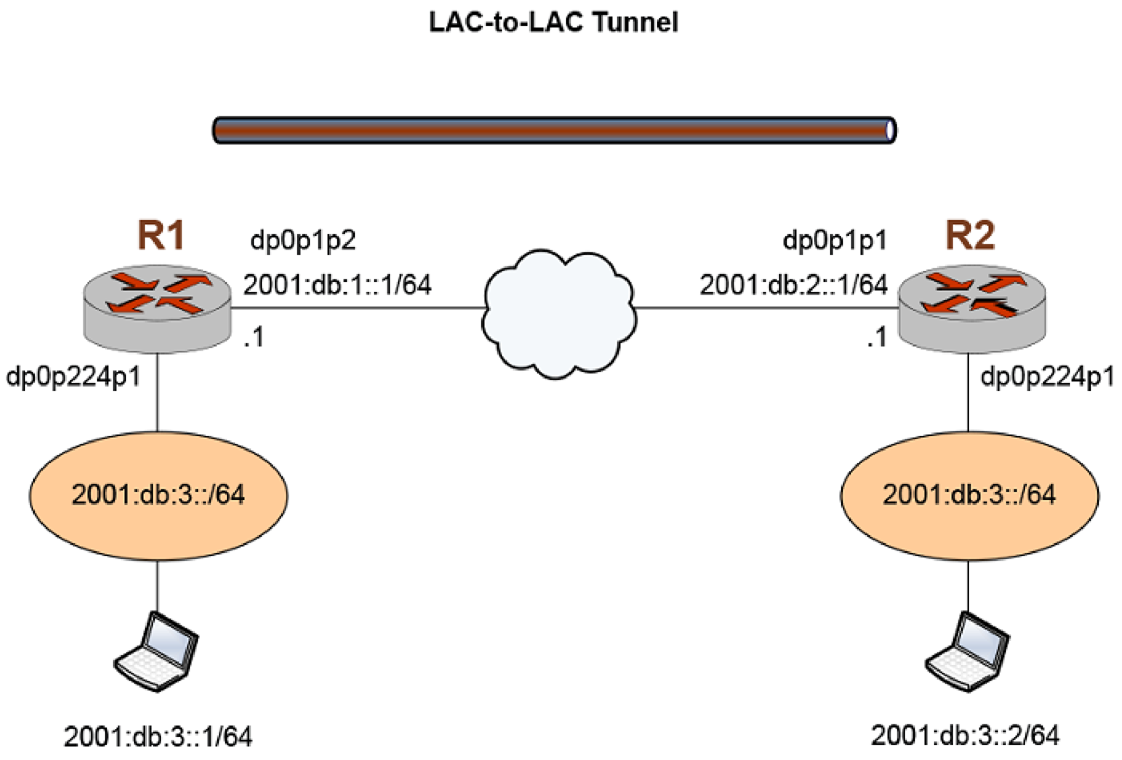
Configuring a LAC-to-LAC IPv6 tunnel

Figure 1 *(page 125)* shows the topology of a sample L2TPv3 LAC-to-LAC IPv6 tunnel configuration. To configure this sample LAC-to-LAC tunnel, perform the following steps in configuration mode:

1. Configure the L2TPv3 tunnel and LAC cross-connect settings on the R1 router.
    a. Configure the L2TPv3 tunnel settings.
    b. Configure the LAC cross-connect settings.
2. Configure the L2TPv3 tunnel and LAC cross-connect settings on the R2 router.
    a. Configure the L2TPv3 tunnel settings.
    b. Configure the LAC cross-connect settings.

Info:

Figure 12: Sample LAC-to-LAC IPv6 tunnel



The following procedure shows how to configure the L2TPv3 tunnel interface on R1.

Table 21: Configuring the L2TPv3 settings for a LAC-to-LAC IPv6 tunnel on R1

Step	Command
Specify IP as the encapsulation method to use for the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session encapsulation 'ip'`
Specify the cookie string used by R1 (the local router).	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-cookie '12345678'`
Specify the local IP address of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-ip '2001:db:1::1'`
Specify the local session identifier of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-session-id '88776655'`
Specify the local UDP port of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-udp-port '65535'`

Step	Command
Specify the cookie string used by R2 (the remote router).	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-cookie '87654321'`
Specify the remote IP address of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-ip '2001:db:2::1'`
Specify the remote session identifier of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-session-id '88776655'`
Specify the remote UDP port of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-udp-port '65534'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

The following procedure shows how to configure the LAC cross-connect settings on R1.

Table 22: Configuring the LAC cross-connect settings on R1

Step	Command
Specify the cross-connect parameters of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces dataplane dp0p224p1 xconnect l2tpeth 'lttp20'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

The following procedure shows how to configure the LAC cross-connect settings on R2.

Table 23: Configuring the L2TPv3 tunnel settings on R2

Step	Command
Specify IP as the encapsulation method to use for the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session encapsulation 'ip'`
Specify the cookie string used by R2 (the local router).	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-cookie '87654321'`

Step	Command
Specify the local IP address of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-ip '2001:db:2::1'`
Specify the local session identifier of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-session-id '88776655'`
Specify the local UDP port of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session local-udp-port '65534'`
Specify the cookie string used by R1 (the remote router).	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-cookie '12345678'`
Specify the remote IP address of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-ip '2001:db:1::1'`
Specify the remote session identifier of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-session-id '88776655'`
Specify the remote UDP port of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp20 l2tp-session remote-udp-port '65535'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

The following procedure shows how to configure the LAC cross-connect settings on R2.

Table 24: Configuring the LAC cross-connect settings on R2

Step	Command
Specify the cross-connect parameters of the lttp20 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces dataplane dp0p224p1 xconnect l2tpeth 'lttp20'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

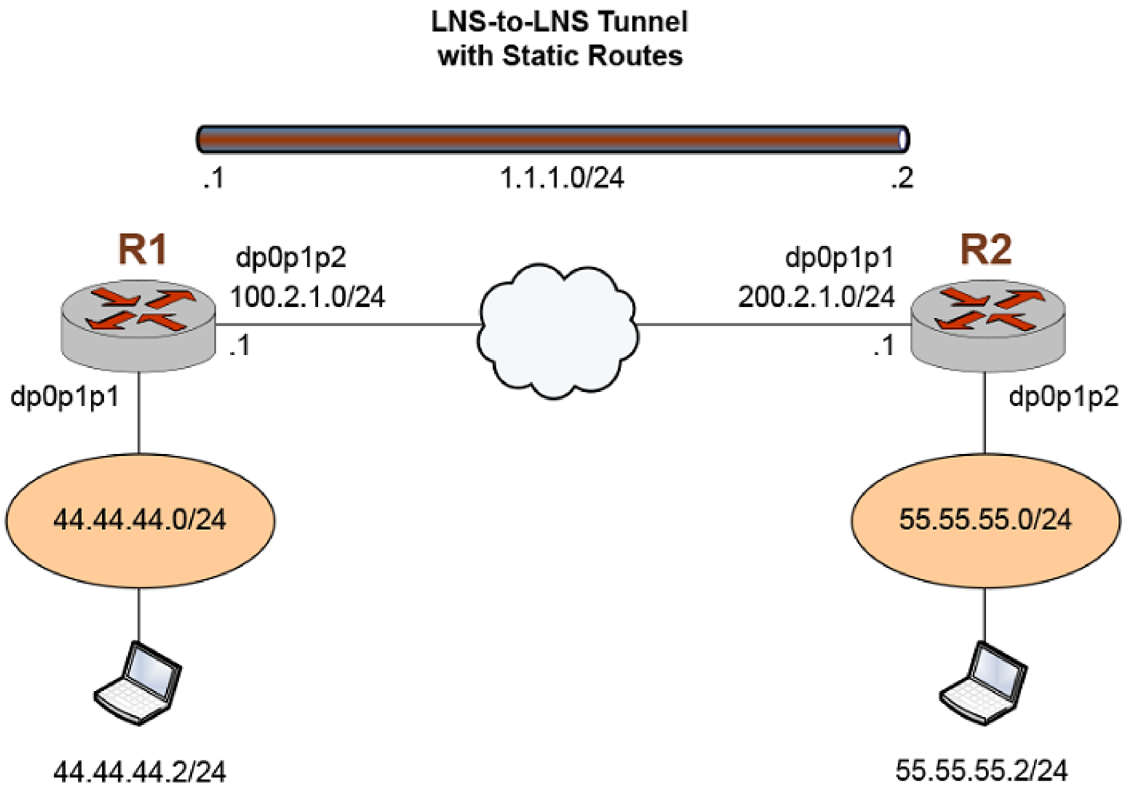
Configuring an LNS-to-LNS IPv4 tunnel

This section shows the topology of a sample L2TPv3 LNS-to-LNS IPv4 tunnel configuration. To configure this sample LNS-to-LNS tunnel, perform the following steps in configuration mode.

1. Configure the L2TPv3 tunnel settings and the LNS settings on the R1 router.
    a. Configure the L2TPv3 tunnel settings.
    b. Configure the LNS settings .
2. Configure the L2TPv3 tunnel settings and LNS settings on the R2 router.
    a. Configure the L2TPv3 tunnel settings .
    b. Configure the LNS settings .

Info:

Figure 13: Sample LNS-to-LNS IPv4 tunnel



The following procedure shows how to configure the L2TPv3 tunnel interface on R1.

Table 25: Configuring the L2TPv3 settings for an LNS-to-LNS IPv4 tunnel on R1

Step	Command
Specify IP as the encapsulation method to use for the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session encapsulation 'ip'`

Step	Command
Specify the local IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-ip '100.2.1.1'`
Specify the local session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-session-id '4294967295'`
Specify the remote IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-ip '200.2.1.1'`
Specify the remote session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-session-id '4000000000'`
Specify the IP address of the tunnel interface to which the router is connected.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 address '1.1.1.1/24'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

The following procedure shows how to configure on R1 the next hop for traffic that is destined for the 55.55.55.0/24 network.

Table 26: Configuring the next hop for 55.55.55.0/24 traffic on R1

Step	Command
Specify the IP address of the interface at the other end of the tunnel (1.1.1.2) as the next hop for traffic that is destined for the 55.55.55.0/24 network. For more information about this command, refer to *Basic Routing Configuration Guide*.	`vyatta@vyatta# set protocols static route 55.55.55.0/24 next-hop '1.1.1.2'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

Show the route.	`vyatta@vyatta# run show ip route 55.55.55.2`
	
	`Routing entry for 55.55.55.0/24`
	`  Known via "static", distance 1, metric 0, best`
	`  * 1.1.1.2, via lttp1111`

Step	Command
Exit the configuration mode.	`vyatta@vyatta# exit`

Show the configuration.	`vyatta@vyatta:~$ show interfaces l2tpeth lttp1111`
	
	`address 1.1.1.1/24`
	`l2tp-session {`
	`        encapsulation ip`
	`        local-ip 100.2.1.1`
	`        local-session-id 4294967295`
	`        remote-ip 200.2.1.1`
	`        remote-session-id 4000000000`
	`}`

The following procedure shows how to configure the L2TPv3 tunnel interface on R2.

Table 27: Configuring the L2TPv3 settings for an LNS-to-LNS IPv4 tunnel on R2

Step	Command
Specify IP as the encapsulation method to use for the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session encapsulation 'ip'`
Specify the local IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-ip '200.2.1.1'`
Specify the local session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-session-id '4294967295'`
Specify the remote IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-ip '100.2.1.1'`
Specify the remote session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-session-id '4000000000'`
Specify the IP address of the tunnel interface to which the router is connected.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 address '1.1.1.2/24'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

The following procedure shows how to configure on R2 the next hop for traffic that is destined for the 44.44.44.0/24 network.

Table 28: Configuring the next hop for 44.44.44.0/24 traffic on R2

Step	Command
Specify the IP address of the interface at the other end of the tunnel (1.1.1.1) as the next hop for traffic that is destined for the 44.44.44.0/24 network. For more information about this command, refer to *Basic Routing Configuration Guide*.	`vyatta@vyatta# set protocols static route 44.44.44.0/24 next-hop '1.1.1.1'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

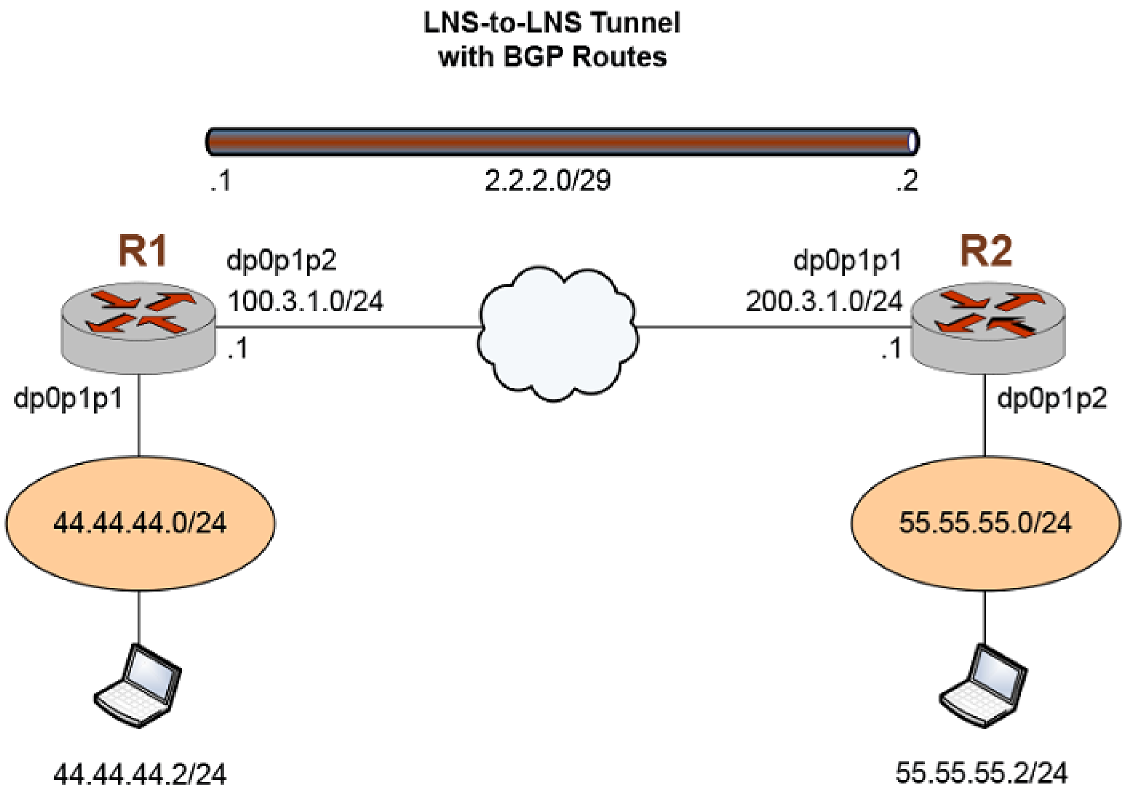
Configuring an LNS-to-LNS tunnel with BGP routes

This section shows the topology of a sample L2TPv3 LNS-to-LNS IPv4 tunnel with Border Gateway Protocol (BGP) configuration. To configure this sample LNS-to-LNS tunnel, perform the following steps in configuration mode.

1. Configure the L2TPv3 tunnel settings and the LNS settings on the R1 router.
    a. Configure the L2TPv3 tunnel settings.
    b. Configure the BGP settings.
2. Configure the L2TPv3 tunnel settings and LNS settings on the R2 router.
    a. Configure the L2TPv3 tunnel settings.
    b. Configure the BGP settings.

Info:

Figure 14: Sample LNS-to-LNS IPv4 tunnel with BGP routes



The following procedure shows how to configure the L2TPv3 tunnel interface on R1.

Table 29: Configuring the L2TPv3 tunnel interface settings on R1

Step	Command
Specify IP as the encapsulation method to use for the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session encapsulation 'ip'`
Specify the local IP address of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session local-ip '100.3.1.1'`
Specify the local session identifier of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session local-session-id '1000000'`
Specify the remote IP address of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session remote-ip '200.3.1.1'`
Specify the remote session identifier of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session remote-session-id '1000000'`

Step	Command
Specify the IP address of the tunnel interface to which the router is connected.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 address '2.2.2.1/29'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

The following procedure shows how to configure the BGP settings for the tunnel on R1. For more information about configuring BGP settings, refer to *BGP Reference Guide*.

Table 30: Configuring the BGP settings of the LNS-to-LNS tunnel on R1

Step	Command
Specify the 44.44.44.0/24 network as the network to be advertised by the BGP routing process.	`vyatta@vyatta# set protocols bgp 100 address-family ipv4-unicast network '44.44.44.0/24'`
Direct the router to store received routing updates.	`vyatta@vyatta# set protocols bgp 100 neighbor 2.2.2.2 address-family ipv4-unicast soft-reconfiguration 'inbound'`
Specify 200 as the autonomous system (AS) number of the neighbor.	`vyatta@vyatta# set protocols bgp 100 neighbor 2.2.2.2 remote-as '200'`
Set the fixed BGP router ID for the router to 2.2.2.1. This setting overrides the automatic ID selection process.	`vyatta@vyatta# set protocols bgp 100 parameters router-id '2.2.2.1'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

Step	Command

Show the l2tpeth configuration.	
	```
	vyatta@vyatta# run show l2tpeth


	L2tpeth interface: lttp2222
	   Port: 0, ifIndex: 19
	   Mac: 96:89:f9:e7:6e:d1
	   Addresses:
	        inet 2.2.2.1/29, broadcast
	 2.2.2.7
	        inet6
	 fe80::9489:f9ff:fee7:6ed1/64, scope
	 Link
	   L2TPv3: Encap IP
	      Local Address: 100.3.1.1
	 Peer Address: 200.3.1.1
	      Local Session: 2000000
	 Peer Session: 2000000
	      Local Cookie: 00
	 Peer Cookie: 00
	   Statistics:
	      Input   bytes     :
	   191229
	      Output  bytes     :
	   144752
	      Input   packets   :
	     2314
	      Output  packets   :
	     1143
	      Input  multicast  :
	      107
	```

Show the configuration information for lttp2222.	
	```
	vyatta@vyatta# run show interfaces
	 lttp2222
	lttp2222:
	 <BROADCAST,MULTICAST,UP,LOWER_UP> mtu
	 1488 qdisc pfifo_fast state UNKNOWN
	 group default qlen 1000
	    link/ether 96:89:f9:e7:6e:d1 brd
	 ff:ff:ff:ff:ff:ff
	    inet 2.2.2.1/29 brd 2.2.2.7 scope
	 global lttp2222
	       valid_lft forever preferred_lft
	 forever
	    inet6 fe80::9489:f9ff:fee7:6ed1/64
	 scope link
	       valid_lft forever preferred_lft
	 forever

	    RX:  bytes    packets     errors
	  dropped    overrun      mcast
	         86696      1082          0
	        0          0          0
	    TX:  bytes    packets     errors
	  dropped    carrier collisions
	         85646      1118          0
	        0          0          0
	```

Step	Command

Show a summary of the BGP settings.	`vyatta@vyatta# run show ip bgp summary`
	`BGP router identifier 2.2.2.1, local`
	` AS number 100`
	`BGP table version is 192`
	`2 BGP AS-PATH entries`
	`0 BGP community entries`
	
	`IPv4 Unicast address family:`
	`Neighbor        V            AS MsgRcvd`
	` MsgSent   TblVer  InQ OutQ Up/Down`
	` Statd`
	`2.2.2.2         4           200     383`
	`     383      192    0     0 03:10:16`
	`     1`
	`Total number of neighbors 1`

Show the BGP settings.	`vyatta@vyatta# run show ip bgp`
	`BGP table version is 192, local router`
	` ID is 2.2.2.1`
	`Status codes: s suppressed, d damped,`
	` h history, * valid, > best, i -`
	` internal, l - labeled`
	`              S Stale`
	`Origin codes: i - IGP, e - EGP, ? -`
	` incomplete`
	
	`    Network          Next Hop`
	`   Metric    LocPrf       Weight Path`
	`*> 44.44.44.0/24    0.0.0.0`
	`            100          32768   i`
	`*> 55.55.55.0/24    2.2.2.2`
	`   0                     0       200 i`
	
	`Total number of prefixes 2`

Show the route information for the 55.55.55.2 system.	`vyatta@vyatta# run show ip route`
	` 55.55.55.2`
	`Routing entry for 55.55.55.0/24`
	`  Known via "bgp", distance 20, metric`
	` 0, best`
	`  Last update 00:04:06 ago`
	`  * 2.2.2.2, via lttp2222`

The following procedure shows how to configure the L2TPv3 tunnel interface on R2.

Table 31: Configuring the L2TPv3 tunnel interface settings on R2

Step	Command

Specify IP as the encapsulation method to use for the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth`
	` lttp2222 l2tp-session encapsulation`
	` 'ip'`

Step	Command
Specify the local IP address of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session local-ip '200.3.1.1'`
Specify the local session identifier of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session local-session-id '2000000'`
Specify the remote IP address of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session remote-ip '100.3.1.1'`
Specify the remote session identifier of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session remote-session-id '2000000'`
Specify the IP address of the tunnel interface to which the router is connected.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 address '2.2.2.2/29'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

The following procedure shows how to configure the BGP settings for the tunnel on R2. For more information about configuring BGP settings, refer to *BGP Reference Guide*.

Table 32: Configuring the BGP settings of the LNS-to-LNS tunnel on R2

Step	Command
Specify the 55.55.55.0/24 network as the network to be advertised by the BGP routing process.	`vyatta@vyatta# set protocols bgp 100 address-family ipv4-unicast network '55.55.55.0/24'`
Direct the router to store received routing updates.	`vyatta@vyatta# set protocols bgp 100 neighbor 2.2.2.1 address-family ipv4-unicast soft-reconfiguration 'inbound'`
Specify 100 as the AS number of the neighbor.	`vyatta@vyatta# set protocols bgp 100 neighbor 2.2.2.1 remote-as '200'`
Set the fixed BGP router ID for the router to 2.2.2.2. This setting overrides the automatic ID selection process.	`vyatta@vyatta# set protocols bgp 100 parameters router-id '2.2.2.2'`
Commit the configuration.	`vyatta@vyatta# commit`

Step	Command
Save the configuration.	`vyatta@vyatta# save`

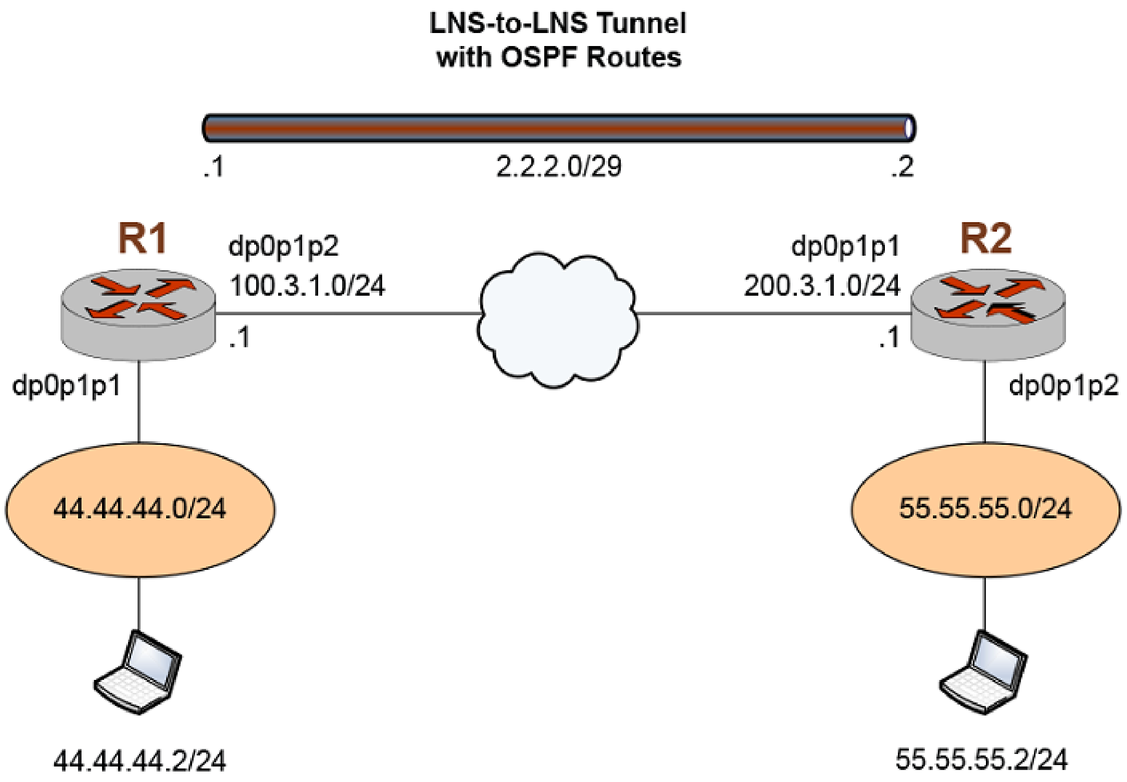
Configuring an LNS-to-LNS tunnel with OSPF routes

This section shows the topology of a sample L2TPv3 LNS-to-LNS IPv4 tunnel with Open Shortest Path First (OSPF) configuration. To configure this sample LNS-to-LNS tunnel, perform the following steps in configuration mode.

1. Configure the L2TPv3 tunnel settings and the LNS settings on the R1 router.
   a. Configure the L2TPv3 tunnel settings.
   b. Configure the OSPF settings.
2. Configure the L2TPv3 tunnel settings and LNS settings on the R2 router.
   a. Configure the L2TPv3 tunnel settings.
   b. Configure the OSPF settings.

Info:

Figure 15: Sample LNS-to-LNS IPv4 tunnel with OSPF routes



The following procedure shows how to configure the L2TPv3 tunnel interface on R1.

Table 33: Configuring the L2TPv3 tunnel interface settings on R1

Step	Command
Specify IP as the encapsulation method to use for the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session encapsulation 'ip'`
Specify the local IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-ip '100.3.1.1'`
Specify the local session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-session-id '1000000'`
Specify the remote IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-ip '200.3.1.1'`
Specify the remote session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-session-id '1000000'`
Specify the IP address of the tunnel interface to which the router is connected.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 address '2.2.2.1/29'`

The following procedure shows how to configure the OSPF settings for the tunnel on R1. For more information about configuring OSPF settings, refer to *OSPF Reference Guide*.

Table 34: Configuring the OSPF settings of the LNS-to-LNS tunnel on R1

Step	Command
Specify the network address of the OSPF area.	`vyatta@vyatta# set protocols ospf area 0 network '2.2.2.0/29'`
Specify the network address of the OSPF area.	`vyatta@vyatta# set protocols ospf area 0 network '44.44.44.0/24'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

Step	Command

Show the OSPF route information.	`vyatta@vyatta# run show ip ospf route`
	
	`OSPF process 0:`
	`Codes: C - connected, D - Discard, O -`
	` OSPF, IA - OSPF inter area`
	`       N1 - OSPF NSSA external type 1,`
	` N2 - OSPF NSSA external type 2`
	`       E1 - OSPF external type 1, E2 -`
	` OSPF external type 2`
	
	`C  2.2.2.0/29 [10] is directly`
	` connected, lttp2222, Area 0.0.0.0`
	`C  44.44.44.0/24 [10] is directly`
	` connected, dp0p224p1, Area 0.0.0.0`
	`O  55.55.55.0/24 [20] via 2.2.2.2,`
	` lttp2222, Area 0.0.0.0`

Show the OSPF database information.	`vyatta@vyatta# run show ip ospf`
	` database`
	
	`           OSPF Router with ID`
	` (100.3.1.1) (Process ID 0 VRF`
	` default)`
	
	`               Router Link States`
	` (Area 0.0.0.0)`
	
	`Link ID         ADV Router       Age`
	`    Seq#       CkSum  Link count`
	`100.3.1.1       100.3.1.1        309`
	`    0x80000006 0x0d98 2`
	`200.3.1.1       200.3.1.1        288`
	`    0x80000004 0xf9c2 2`
	
	`               Net Link States (Area`
	` 0.0.0.0)`
	
	`Link ID         ADV Router       Age`
	`    Seq#       CkSum`
	`2.2.2.1         100.3.1.1        325`
	`    0x80000001 0x4059`

The following procedure shows how to configure the L2TPv3 tunnel interface on R2.

Table 35: Configuring the L2TPv3 tunnel interface settings on R2

Step	Command

Specify IP as the encapsulation method to use for the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth`
	` lttp1111 l2tp-session encapsulation`
	` 'ip'`

Step	Command
Specify the local IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-ip '200.3.1.1'`
Specify the local session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-session-id '20000000'`
Specify the remote IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-ip '100.3.1.1'`
Specify the remote session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-session-id '2000000'`
Specify the IP address of the tunnel interface to which the router is connected.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 address '2.2.2.2/29'`

The following procedure shows how to configure the OSPF settings for the tunnel on R2. For more information about configuring OSPF settings, refer to *OSPF Reference Guide*.

Table 36: Configuring the OSPF settings of the LNS-to-LNS tunnel on R2

Step	Command
Specify the network address of the OSPF area.	`vyatta@vyatta# set protocols ospf area 0 network '2.2.2.0/29'`
Specify the network address of the OSPF area.	`vyatta@vyatta# set protocols ospf area 0 network '55.55.55.0/24'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

Step	Command

Show the RIP settings.	`vyatta@vyatta# run show ip ospf`
	
	`Codes: R - RIP, Rc - RIP connected, Rs`
	` - RIP static, K - Kernel,`
	`       C - Connected, S - Static, O -`
	` OSPF, I - IS-IS, B - BGP`
	
	`   Network            Next Hop`
	` Metric From            If     Time`
	`Rc 2.2.2.0/29`
	`      1                lttp2222`
	`Rc 44.44.44.0/24`
	`      1                dp0p224p1`
	`R  55.55.55.0/24      2.2.2.2`
	`      2 2.2.2.2        lttp2222 02:40`

	`vyatta@vyatta# run show ip rip status`
	
	`RIP Database for VRF (default)`
	`Routing Protocol is "rip"`
	`  Sending updates every 30 seconds`
	` with +/-50%, next due in 17 seconds`
	`  Timeout after 180 seconds, garbage`
	` collect after 120 seconds`
	`  Outgoing update filter list for all`
	` interface is not set`
	`  Incoming update filter list for all`
	` interface is not set`
	`  Default redistribution metric is 1`
	`  Redistributing:`
	`  Default version control: send`
	` version 2, receive version 2`
	`    Interface        Send  Recv   Key-`
	`chain`
	`    dp0p224p1        2     2`
	`    lttp2222         2     2`
	`  Split horizon:`
	`    dp0p224p1        Enabled with`
	` Poisoned Reversed`
	`    lttp2222         Enabled with`
	` Poisoned Reversed`
	`  Routing for Networks:`
	`    2.2.2.0/29`
	`    44.44.44.0/24`
	`  Routing Information Sources:`
	`    Gateway          Distance  Last`
	` Update  Bad Packets  Bad Routes`
	`    2.2.2.2               120`
	` 00:00:12              0           0`
	`  Number of routes (including`
	` connected): 3`
	`  Distance: (default is 120)`

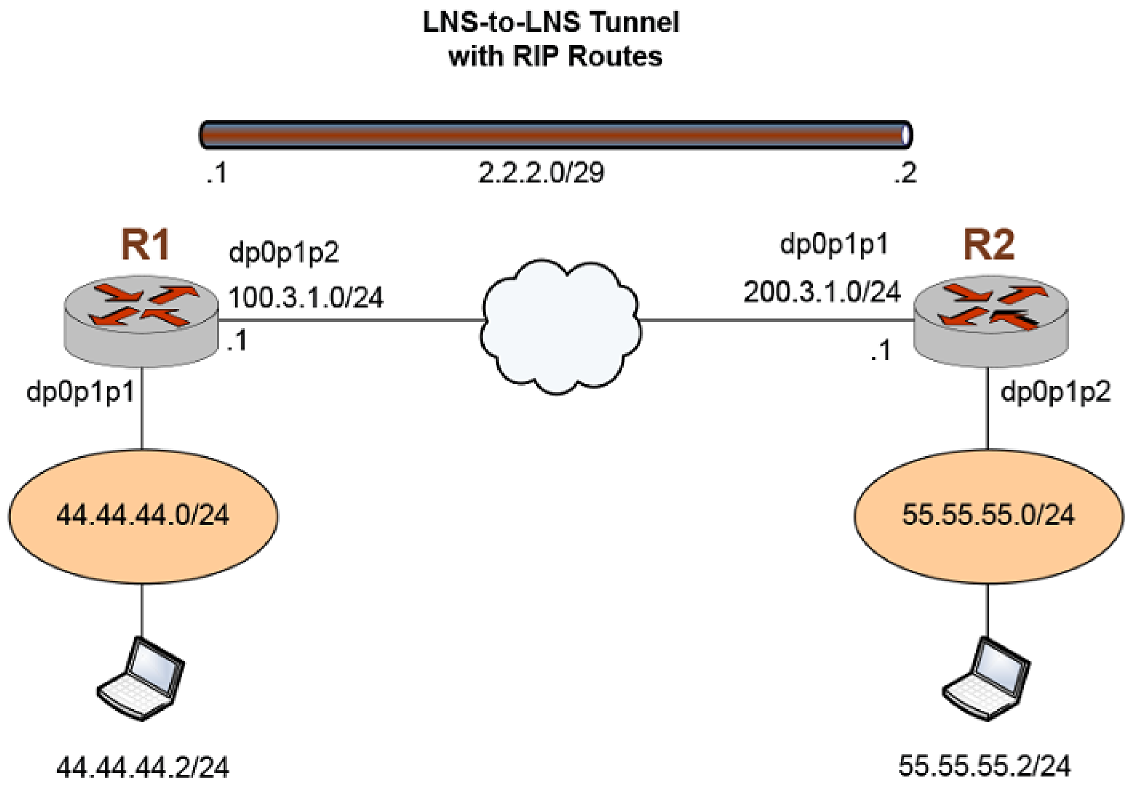
Configuring an LNS-to-LNS tunnel with RIP routes

This section shows the topology of a sample L2TPv3 LNS-to-LNS IPv4 tunnel with Routing Information Protocol (RIP) routes. To configure this sample LNS-to-LNS tunnel, perform the following steps in configuration mode.

1. Configure the L2TPv3 tunnel settings and the LNS settings on the R1 router.
   a. Configure the L2TPv3 tunnel settings.
   b. Configure the RIP settings.
2. Configure the L2TPv3 tunnel settings and LNS settings on the R2 router.
   a. Configure the L2TPv3 tunnel settings.
   b. Configure the RIP settings.

Info:

Figure 16: Sample LNS-to-LNS IPv4 tunnel with RIP routes



The following procedure shows how to configure the L2TPv3 tunnel interface on R1.

Table 37: Configuring the L2TPv3 tunnel settings on R1

Step	Command
Specify IP as the encapsulation method to use for the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session encapsulation 'ip'`
Specify the local IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-ip '100.3.1.1'`
Specify the local session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-session-id '40000000000'`

Step	Command
Specify the remote IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-ip '200.3.1.1'`
Specify the remote session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-session-id '4000000000'`
Specify the IP address of the tunnel interface to which the R1 router is connected.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 address '2.2.2.1/29'`
Specify IP as the encapsulation method to use for the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session encapsulation 'ip'`
Specify the local IP address of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session local-ip '100.3.1.1'`
Specify the local session identifier of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session local-session-id '40000000000'`
Specify the remote IP address of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session remote-ip '200.3.1.1'`
Specify the remote session identifier of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session remote-session-id '4000000000'`
Specify the IP address of R1 (the local router).	`vyatta@vyatta# set interfaces l2tpeth lttp2222 address '2.2.2.2/29'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

The following procedure shows how to configure the RIP settings for the tunnel on R1. For more information about configuring these settings, refer to *RIP Installing and Upgrading*.

Table 38: Configuring the BGP settings of the LNS-to-LNS tunnel on R1

Step	Command
Specify a network for RIP.	`vyatta@vyatta# set protocols rip network '2.2.2.0/29'`

Step	Command
Specify a network for RIP.	`vyatta@vyatta# set protocols rip network '44.44.44.0/24'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`
Exit the configuration mode.	`vyatta@vyatta# exit`

Show the configuration information for the lttp2222 interface.	
	```
	vyatta@vyatta:~$ show interfaces
	 l2tpeth lttp2222

	address 2.2.2.1/29
	l2tp-session {
	        encapsulation ip
	        local-ip 100.3.1.1
	        local-session-id 2000000
	        remote-ip 200.3.1.1
	        remote-session-id 2000000
	}
	```

Show the configured RIP protocols.	
	```
	vyatta@vyatta:~$ show protocols rip

	 rip {
	        network 2.2.2.0/29
	        network 44.44.44.0/24
	 }
	```

The following procedure shows how to configure the L2TPv3 tunnel interface on R2.

Table 39: Configuring the L2TPv3 tunnel interface settings on R2

Step	Command
Specify IP as the encapsulation method to use for the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session encapsulation 'ip'`
Specify the local IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-ip '200.3.1.1'`
Specify the local session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session local-session-id '40000000000'`
Specify the remote IP address of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-ip '100.3.1.1'`

Step	Command
Specify the remote session identifier of the lttp1111 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 l2tp-session remote-session-id '4000000000'`
Specify the IP address of the tunnel interface to which the router is connected.	`vyatta@vyatta# set interfaces l2tpeth lttp1111 address '1.1.1.2/24'`
Specify IP as the encapsulation method to use for the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session encapsulation 'ip'`
Specify the local IP address of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session local-ip '200.3.1.1'`
Specify the local session identifier of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session local-session-id '40000000000'`
Specify the remote IP address of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session remote-ip '100.3.1.1'`
Specify the IP address of the tunnel interface to which the router is connected.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 address '2.2.2.2/29'`
Specify the remote session identifier of the lttp2222 L2TPv3 tunnel interface.	`vyatta@vyatta# set interfaces l2tpeth lttp2222 l2tp-session remote-session-id '4000000000'`
Commit the configuration.	`vyatta@vyatta# commit`
Save the configuration.	`vyatta@vyatta# save`

The following procedure shows how to configure the RIP settings for the tunnel on R2. For more information about configuring these settings, refer to *RIP Installing and Upgrading*.

Table 40: Configuring the RIP settings of the LNS-to-LNS tunnel on R2

Step	Command
Specify a network for RIP.	`vyatta@vyatta# set protocols rip network '2.2.2.0/29'`
Specify a network for RIP.	`vyatta@vyatta# set protocols rip network '55.55.55.0/24'`
Commit the configuration.	`vyatta@vyatta# commit`

Step	Command
Save the configuration.	`save`

L2TPv3 Data Plane Interfaces Commands

interfaces l2tpeth <lttpN> l2tp-session encapsulation <encapsulation-method>

Specifies either IP or UDP as the encapsulation method to use for an L2TPv3 tunnel interface.

Syntax:
`set interfaces l2tpeth` *lttpN* **`l2tp-session encapsulation`** *encapsulation-method*

Syntax:
`delete interfaces l2tpeth` *lttpN* **`l2tp-session encapsulation`** *encapsulation-method*

lttpN
: L2TPv3 static L2TPv3 tunnel interface. The interface ranges from **`lttp0`** through **`lttp`***N*, where *N* is a non-negative integer.

encapsulation-method
: Encapsulation method (IP or UDP) to use for the interface.

Configuration mode

```
interfaces {
     l2tpeth lttpN {
          l2tp-session {
               encapsulation encapsulation-method
          }
     }
}
```

Use the `set` form of this command to specify either IP or UDP as the encapsulation method to use for an L2TPv3 interface.

Use the `delete` form of this command to remove the encapsulation method from an L2TPv3 tunnel interface.

interfaces l2tpeth <lttpN> l2tp-session local-cookie <cookie-string>

Specifies a local cookie string.

Syntax:
`set interfaces l2tpeth` *lttpN* **`l2tp-session local-cookie`** *cookie-string*

Syntax:
`delete interfaces l2tpeth` *lttpN* **`l2tp-session local-cookie`** *cookie-string*

lttpN
: L2TPv3 static L2TPv3 tunnel interface. The interface ranges from **`lttp0`** through **`lttp`***N*, where *N* is a non-negative integer.

cookie-string
: Cookie string. An 8- or 16-byte hexadecimal string (for example, abcdef01).

Configuration mode

```
interfaces {
     l2tpeth lttpN {
          l2tp-session {
               local-cookie cookie-string
          }
     }
}
```

Use the `set` form of this command to specify a local cookie string.

Use the `delete` form of this command to remove a local cookie string.

interfaces l2tpeth <lttpN> l2tp-session local-ip <local-ip-address>

Specifies a local IP address of an L2TPv3 tunnel interface.

Syntax:
`set interfaces l2tpeth` *lttpN* **`l2tp-session local-ip`** *local-ip-address*

Syntax:
`delete interfaces l2tpeth` *lttpN* **`l2tp-session local-ip`** *local-ip-address*

lttpN
L2TPv3 static L2TPv3 tunnel interface. The interface ranges from **`lttp0`** through **`lttp`***N*, where *N* is a non-negative integer.

local-ip-address
IPv4 or IPv6 local IP address of the tunnel interface.

Configuration mode

```
interfaces {
     l2tpeth lttpN {
          l2tp-session {
               local-ip local-ip-address
          }
     }
}
```

Use the `set` form of this command to specify a local IP address of an L2TPv3 tunnel interface.

Use the `delete` form of this command to remove a local IP address from an L2TPv3 tunnel interface.

interfaces l2tpeth <lttpN> l2tp-session local-session-id <id>

Specifies a local session identifier of an L2TPv3 tunnel interface.

Syntax:
`set interfaces l2tpeth` *lttpN* **`l2tp-session local-session-id`** *id*

Syntax:
`delete interfaces l2tpeth` *lttpN* **`l2tp-session local-session-id`** *id*

lttpN
L2TPv3 static L2TPv3 tunnel interface. The interface ranges from **`lttp0`** through **`lttp`***N*, where *N* is a non-negative integer.

id
Local session identifier of the interface. The identifier ranges from 0 through 4294967295.

Configuration mode

```
interfaces {
     l2tpeth lttpN {
          l2tp-session {
               local-session-id id
          }
     }
}
```

Use the `set` form of this command to specify a local session identifier of an L2TPv3 tunnel interface.

Use the `delete` form of this command to remove a local session identifier from an L2TPv3 tunnel interface.

interfaces l2tpeth <lttpN> l2tp-session local-udp-port <udp-port>

Specifies a local UDP port of an L2TPv3 tunnel interface.

Syntax:
`set interfaces l2tpeth` *lttpN* **`l2tp-session`** **`local-udp-port`** *udp-port*

Syntax:
`delete interfaces l2tpeth` *lttpN* **`l2tp-session`** **`local-udp-port`** *udp-port*

lttpN
L2TPv3 static L2TPv3 tunnel interface. The interface ranges from **`lttp0`** through **`lttp`***N*, where *N* is a non-negative integer.

udp-port
Local UDP port for the tunnel interface. The port ranges from 1 through 65535.

Configuration mode

```
interfaces {
     l2tpeth lttpN {
          l2tp-session {
               local-udp-port udp-port
          }
     }
}
```

Use the `set` form of this command to specify a local UDP port of an L2TPv3 tunnel interface.

Use the `delete` form of this command to remove a local UDP port from an L2TPv3 tunnel interface.

interfaces l2tpeth <lttpN> l2tp-session remote-cookie <cookie-string>

Specifies a remote cookie string.

Syntax:
`set interfaces l2tpeth` *lttpN* **`l2tp-session`** **`remote-cookie`** *cookie-string*

Syntax:
`delete interfaces l2tpeth` *lttpN* **`l2tp-session`** **`remote-cookie`** *cookie-string*

lttpN
L2TPv3 static L2TPv3 tunnel interface. The interface ranges from **`lttp0`** through **`lttp`***N*, where *N* is a non-negative integer.

cookie-string
Cookie string. An 8- or 16-byte hexadecimal string (for example, abcdef01).

Configuration mode

```
interfaces {
     l2tpeth lttpN {
          l2tp-session {
               remote-cookie cookie-string
          }
     }
}
```

Use the `set` form of this command to specify a remote cookie string.

Use the `delete` form of this command to remove a remote cookie string.

interfaces l2tpeth <lttpN> l2tp-session remote-ip <remote-ip-address>

Specifies a remote IP address of an L2TPv3 tunnel interface.

Syntax:
`set interfaces l2tpeth` *lttpN* **`l2tp-session remote-ip`** *remote-ip-address*

Syntax:
`delete interfaces l2tpeth` *lttpN* **`l2tp-session remote-ip`** *remote-ip-address*

lttpN
L2TPv3 static L2TPv3 tunnel interface. The interface ranges from **`lttp0`** through **`lttp`***N*, where *N* is a non-negative integer.

remote-ip-address
Encapsulation method (IP or UDP) to use for the interface.

Configuration mode

```
interfaces {
     l2tpeth lttpN {
          l2tp-session {
               remote-ip remote-ip-address
          }
     }
}
```

Use the `set` form of this command to specify a remote IP address of an L2TPv3 tunnel interface.

Use the `delete` form of this command to remove a remote IP address from an L2TPv3 tunnel interface.

interfaces l2tpeth <lttpN> l2tp-session remote-session-id <id>

Specifies a remote session identifier of an L2TPv3 tunnel interface.

Syntax:
`set interfaces l2tpeth` *lttpN* **`l2tp-session remote-session-id`** *id*

Syntax:
`delete interfaces l2tpeth` *lttpN* **`l2tp-session remote-session-id`** *id*

lttpN

L2TPv3 static L2TPv3 tunnel interface. The interface ranges from `lttp0` through `lttp`*N*, where *N* is a non-negative integer.

id

Remote session identifier of the interface. The identifier ranges from 0 through 4294967295.

Configuration mode

```
interfaces {
     l2tpeth lttpN {
          l2tp-session {
               remote-session-id id
          }
     }
}
```

Use the `set` form of this command to specify a remote session identifier of an L2TPv3 tunnel interface.

Use the `delete` form of this command to remove a remote session identifier from an L2TPv3 tunnel interface.

interfaces l2tpeth <lttpN> l2tp-session remote-udp-port <udp-port>

Specifies a remote UDP port of a tunnel interface.

Syntax:
`set interfaces l2tpeth` *lttpN* **`l2tp-session remote-udp-port`** *udp-port*

Syntax:
`delete interfaces l2tpeth` *lttpN* **`l2tp-session remote-udp-port`** *udp-port*

lttpN

L2TPv3 static L2TPv3 tunnel interface. The interface ranges from `lttp0` through `lttp`*N*, where *N* is a non-negative integer.

udp-port

Remote UDP port of the interface. The port ranges from 1 through 65535.

Configuration mode

```
interfaces {
     l2tpeth lttpN {
          l2tp-session {
               remote-udp-port udp-port
          }
     }
}
```

Use the `set` form of this command to specify a remote UDP port of an L2TPv3 tunnel interface.

Use the `delete` form of this command to remove a remote UDP port from an L2TPv3 tunnel interface.

interfaces dataplane <interface-name> xconnect l2tpeth <tunnel-interface-name>

Specifies the cross-connect parameters of an L2TPv3 tunnel interface.

Syntax:
`set interfaces dataplane` *interface-name* **`xconnect l2tpeth`** *tunnel-interface-name*

Syntax:

`delete interfaces dataplane` *interface-name* **`xconnect l2tpeth`** *tunnel-interface-name*

interface-name
: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

tunnel-interface-name
: L2TPv3 tunnel interface name.

Configuration mode

```
interfaces {
    dataplane interface-name {
         xconnect {
              l2tpeth tunnel-interface-name
         }
    }
}
```

Use the `set` form of this command to specify the cross-connect parameters of an L2TPv3 tunnel interface.

Use the `delete` form of this command to remove the cross-connect parameters of an L2TPv3 tunnel interface.

interfaces dataplane <interface-name> vif <id> xconnect l2tpeth <tunnel-interface-name>

Specifies a virtual interface (VIF) identifier and the cross-connect parameters of an L2TPv3 tunnel interface.

Syntax:
`set interfaces dataplane` *interface-name* **`vif`** *id* **`xconnect l2tpeth`** *tunnel-interface-name*

Syntax:
`delete interfaces dataplane` *interface-name* **`vif`** *id* **`xconnect l2tpeth`** *tunnel-interface-name*

interface-name
: Data plane interface to which the L2TPv3 tunnel is connected.

: The name of a data plane interface. For more information about the supported interface name formats, refer to Data Plane Interface *(page 155)*.

id
: Virtual interface identifier. The identifier ranges from 1 through 4094.

tunnel-interface-name
: L2TPv3 tunnel interface name.

Configuration mode

```
interfaces {
    dataplane interface-name {
              vif id {
                 xconnect {
                     l2tpeth tunnel-interface-name
                 }
              }
    }
}
```

Use the `set` form of this command to specify a VIF identifier and the cross-connect parameters of an L2TPv3 tunnel interface.

Use the `delete` form of this command to remove a VIF identifier and the cross-connect parameters of an L2TPv3 tunnel interface.

show interfaces <lttpN>

Displays configuration information for an L2TPv3 tunnel interface.

Syntax:

```
show interfaces lttpN
```

lttpN

L2TPv3 static L2TPv3 tunnel interface. The interface ranges from **lttp0** through **lttp***N*, where *N* is a non-negative integer.

Operational mode

The following example shows how to display configuration information for the lttp3333 L2TPv3 tunnel interface.

```
vyatta@vyatta# show interfaces lttp3333
lttp3333: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1488 qdisc pfifo_fast state UNKNOWN group
 default qlen 1000
    link/ether 7a:fe:0c:b7:88:16 brd ff:ff:ff:ff:ff:ff
    inet 3.3.3.2/29 brd 3.3.3.7 scope global lttp3333
       valid_lft forever preferred_lft forever
    inet6 fe80::78fe:cff:feb7:8816/64 scope link
       valid_lft forever preferred_lft forever
    RX:  bytes    packets     errors     dropped    overrun      mcast
          1436         14          0           0          0          0
    TX:  bytes    packets     errors     dropped    carrier collisions
          1018         11          0           0          0          0
```

show l2tpeth

Displays a list of configured L2TPv3 tunnel interfaces.

Syntax:

```
show l2tpeth
```

Operational mode

The following example shows how to display a list of configured L2TPv3 tunnel interfaces.

```
vyatta@vyatta# show l2tpeth
L2tpeth interface: lttp3333
   Port: 0, ifIndex: 13
   Mac: 7a:fe:c:b7:88:16
   Addresses:
        inet 3.3.3.2/29, broadcast 3.3.3.7
        inet6 fe80::78fe:cff:feb7:8816/64, scope Link
   L2TPv3: Encap IP
      Local Address: 173.1.1.1       Peer Address: 172.1.1.1
      Local Session: 3333            Peer Session: 3333
      Local Cookie: 00               Peer Cookie: 00
   Statistics:
      Input   bytes     :                 4150
```

```
       Output  bytes     :                   160
       Input   packets   :                    41
       Output  packets   :                     2
       Input  multicast  :                    41
```

show l2tpeth <lttpN>

Displays configuration information for a configured L2TPv3 tunnel interface.

Syntax:

`show l2tpeth lttpN`

lttpN

L2TPv3 static L2TPv3 tunnel interface. The interface ranges from **`lttp0`** through **`lttp`***N*, where *N* is a non-negative integer.

Operational mode

The following example shows how to display configuration information for the lttp3333 L2TPv3 tunnel interface.

```
vyatta@vyatta:~$ show l2tpeth lttp3333
L2tpeth interface: lttp3333
   Port: 0, ifIndex: 13
   Mac: 7a:fe:c:b7:88:16
   Addresses:
        inet 3.3.3.2/29, broadcast 3.3.3.7
        inet6 fe80::78fe:cff:feb7:8816/64, scope Link
   L2TPv3: Encap IP
      Local Address: 173.1.1.1       Peer Address: 172.1.1.1
      Local Session: 3333            Peer Session: 3333
      Local Cookie: 00               Peer Cookie: 00
   Statistics:
      Input   bytes     :                 4150
      ...
```

Data Plane Interface

The name of a data plane interface. Following are the supported formats of the interface name:

- `dp`*x*`p`*y*`p`*z*—The name of a data plane interface, where
  - `dp`*x* specifies the data plane identifier (ID). Currently, only dp0 is supported.
  - p*y* specifies a physical or virtual PCI slot index (for example, p129).
  - `p`*z* specifies a port index (for example, p1). For example, dp0p1p2, dp0p160p1, and dp0p192p1.
- `dp`*x*`em`*y*—The name of a data plane interface on a LAN-on-motherboard (LOM) device that does not have a PCI slot, where `em`*y* specifies an embedded network interface number (typically, a small number). For example, dp0em3.
- `dp`*x*`s`*y*—The name of a data plane interface in a system in which the BIOS identifies the network interface card to reside in a particular physical or virtual slot *y*, where *y* is typically a small number. For example, for the dp0s2 interface, the BIOS identifies slot 2 in the system to contain this interface.
- `dp`*x*`P`*n*`p`*y*`p`*z*—The name of a data plane interface on a device that is installed on a secondary PCI bus, where `P`*n* specifies the bus number. You can use this format to name data plane interfaces on large physical devices with multiple PCI buses. For these devices, it is possible to have network interface cards installed on different buses with these cards having the same slot ID. The value of *n* must be an integer greater than 0. For example, dp0P1p162p1 and dp0P2p162p1.

List of Acronyms

Acronym	Description
ACL	access control list
ADSL	Asymmetric Digital Subscriber Line
AH	Authentication Header
AMI	Amazon Machine Image
API	Application Programming Interface
AS	autonomous system
ARP	Address Resolution Protocol
AWS	Amazon Web Services
BGP	Border Gateway Protocol
BIOS	Basic Input Output System
BPDU	Bridge Protocol Data Unit
CA	certificate authority
CCMP	AES in counter mode with CBC-MAC
CHAP	Challenge Handshake Authentication Protocol
CLI	command-line interface
DDNS	dynamic DNS
DHCP	Dynamic Host Configuration Protocol
DHCPv6	Dynamic Host Configuration Protocol version 6
DLCI	data-link connection identifier
DMI	desktop management interface
DMVPN	dynamic multipoint VPN
DMZ	demilitarized zone
DN	distinguished name
DNS	Domain Name System
DSCP	Differentiated Services Code Point
DSL	Digital Subscriber Line
eBGP	external BGP
EBS	Amazon Elastic Block Storage
EC2	Amazon Elastic Compute Cloud
EGP	Exterior Gateway Protocol
ECMP	equal-cost multipath
ESP	Encapsulating Security Payload
FIB	Forwarding Information Base
FTP	File Transfer Protocol
GRE	Generic Routing Encapsulation
HDLC	High-Level Data Link Control
I/O	Input/Output
ICMP	Internet Control Message Protocol
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineers

Acronym	Description
IGMP	Internet Group Management Protocol
IGP	Interior Gateway Protocol
IPS	Intrusion Protection System
IKE	Internet Key Exchange
IP	Internet Protocol
IPOA	IP over ATM
IPsec	IP Security
IPv4	IP Version 4
IPv6	IP Version 6
ISAKMP	Internet Security Association and Key Management Protocol
ISM	Internet Standard Multicast
ISP	Internet Service Provider
KVM	Kernel-Based Virtual Machine
L2TP	Layer 2 Tunneling Protocol
LACP	Link Aggregation Control Protocol
LAN	local area network
LDAP	Lightweight Directory Access Protocol
LLDP	Link Layer Discovery Protocol
MAC	medium access control
mGRE	multipoint GRE
MIB	Management Information Base
MLD	Multicast Listener Discovery
MLPPP	multilink PPP
MRRU	maximum received reconstructed unit
MTU	maximum transmission unit
NAT	Network Address Translation
NBMA	Non-Broadcast Multi-Access
ND	Neighbor Discovery
NHRP	Next Hop Resolution Protocol
NIC	network interface card
NTP	Network Time Protocol
OSPF	Open Shortest Path First
OSPFv2	OSPF Version 2
OSPFv3	OSPF Version 3
PAM	Pluggable Authentication Module
PAP	Password Authentication Protocol
PAT	Port Address Translation
PCI	peripheral component interconnect
PIM	Protocol Independent Multicast
PIM-DM	PIM Dense Mode
PIM-SM	PIM Sparse Mode
PKI	Public Key Infrastructure
PPP	Point-to-Point Protocol
PPPoA	PPP over ATM

Acronym	Description
PPPoE	PPP over Ethernet
PPTP	Point-to-Point Tunneling Protocol
PTMU	Path Maximum Transfer Unit
PVC	permanent virtual circuit
QoS	quality of service
RADIUS	Remote Authentication Dial-In User Service
RHEL	Red Hat Enterprise Linux
RIB	Routing Information Base
RIP	Routing Information Protocol
RIPng	RIP next generation
RP	Rendezvous Point
RPF	Reverse Path Forwarding
RSA	Rivest, Shamir, and Adleman
Rx	receive
S3	Amazon Simple Storage Service
SLAAC	Stateless Address Auto-Configuration
SNMP	Simple Network Management Protocol
SMTP	Simple Mail Transfer Protocol
SONET	Synchronous Optical Network
SPT	Shortest Path Tree
SSH	Secure Shell
SSID	Service Set Identifier
SSM	Source-Specific Multicast
STP	Spanning Tree Protocol
TACACS+	Terminal Access Controller Access Control System Plus
TBF	Token Bucket Filter
TCP	Transmission Control Protocol
TKIP	Temporal Key Integrity Protocol
ToS	Type of Service
TSS	TCP Maximum Segment Size
Tx	transmit
UDP	User Datagram Protocol
VHD	virtual hard disk
vif	virtual interface
VLAN	virtual LAN
VPC	Amazon virtual private cloud
VPN	virtual private network
VRRP	Virtual Router Redundancy Protocol
WAN	wide area network
WAP	wireless access point
WPA	Wired Protected Access