

---

## Configuring Cellular Interfaces

To enable LTE connectivity, you configure cellular interfaces on vEdge routers that have a cellular module. The cellular module provides wireless connectivity over a service provider's cellular network. One use case is to provide wireless connectivity for branch offices.

A cellular network is commonly used as a backup WAN link, to provide network connectivity if all the wired WAN tunnel interfaces on the router become unavailable. You can also use a cellular network as the primary WAN link for a branch office, depending on usage patterns within the branch office and the data rates supported by the core of the service provider's cellular network.

When you configure a cellular interface on a vEdge router, you can connect the router to the Internet or other WAN simply by plugging in the router's power cable. The vEdge router then automatically begins the process of joining the overlay network, by contacting and authenticating with vBond orchestrators, vSmart controllers, and vManage NMSs.

In Release 16.3.0, vEdge routers support only one radio access technology (RAT) type, which is LTE. In Releases 16.3.2 and later, vEdge routers support both LTE and CDMA RAT types.

---

### Configure a Cellular Interface

To use the CLI to configure a cellular interface on a vEdge router that has a cellular module:

1. Create a cellular profile:

```
vEdge(config)# cellular cellularnumber  
vEdge(config-cellular)# profile profile-id
```

Each router has only one LTE module, so *number* must be 0. The profile identifier can be a value from 1 through 15.

2. If your ISP requires that you configure profile properties, configure one or more of the following:

```
vEdge(config-profile)# apn name  
vEdge(config-profile)# auth auth-method  
vEdge(config-profile)# ip-addr ip-address  
vEdge(config-profile)# name name  
vEdge(config-profile)# pdn-type type  
vEdge(config-profile)# primary-dns ip-address  
vEdge(config-profile)# secondary-dns ip-address  
vEdge(config-profile)# user-name username  
vEdge(config-profile)# user-pass password
```

**Note:** If you want to remove a property from the cellular profile, delete the profile entirely from the configuration, and create it again with only the required parameters.

3. Create the cellular interface:

```
vEdge(config)# vpn 0 interface cellular0
```

4. Enable the cellular interface:

```
vEdge(config-interface)# no shutdown
```



5. For cellular interfaces, you must use a DHCP client to dynamically configure the IP address. This is the default option. To explicitly configure this:  

```
vEdge(config-interface) # ip dhcp-client [dhcp-distance number]
```

*number* is the administrative distance of routes learned from a DHCP server. You can configure it to a value from 1 through 255.
6. Associate the cellular profile with the cellular interface:  

```
vEdge(config-interface) # profile profile-id
```

The profile identifier is the number you configured in Step 1.
7. Set the interface MTU:  

```
vEdge(config-interface) # mtu bytes
```

The MTU can be 1428 bytes or smaller.
8. By default, the radio access technology (RAT) type is LTE. For 2G/3G networks, change it to CDMA:  

```
vEdge(config-interface) # technology cdma
```

If you are using the interface for ZTP, change the technology to **auto**:  

```
vEdge(config-interface) # technology auto
```
9. Configure any other desired interface properties.
10. Create a tunnel interface on the cellular interface:  

```
vEdge(config-interface) # tunnel-interface  
vEdge(config-tunnel-interface) # color color  
vEdge(config-tunnel-interface) # encapsulation (gre | ipsec)
```
11. By default, the tunnel interface associated with a cellular interface is not considered to be the circuit of last resort. To allow the tunnel to be the circuit of last resort:  

```
vEdge(config-tunnel-interface) # last-resort-circuit
```

When the interface is configured as a circuit of last resort, the cellular modem becomes dormant and no traffic is sent over the circuit. However, the cellular modem is kept in online mode so that the modem radio can be monitored at all times and to allow for faster switchover in the case the tunnel interface needs to be used as the last resort. By default, there is a delay of 7 seconds before switching back to the primary tunnel interface from a circuit of last resort. This delay is to ensure that the primary interface is once again fully operational and is not still flapping.
12. To minimize the amount of control plane keepalive traffic on the cellular interface, increase the Hello packet interval and tolerance on the tunnel interface:  

```
vEdge(config-tunnel-interface) # hello-interval milliseconds  
vEdge(config-tunnel-interface) # hello-tolerance seconds
```

The default hello interval is 1000 milliseconds, and it can be a time in the range 100 through 600000 milliseconds (10 minutes). The default hello tolerance is 12 seconds, and it can be a time in the range 12 through 600 seconds (10 minutes). To reduce outgoing control packets on a TLOC, it is recommended that on the tunnel interface you set the hello interface to 60000 milliseconds (10 minutes) and the hello tolerance to 600 seconds (10 minutes) and include the [no track-transport](#) to disable regular checking of the DTLS connection between the router and the vBond orchestrator. For a tunnel connection between a vEdge router and any controller device, the tunnel uses the hello interval and tolerance times configured on the router. This choice is made to minimize the amount of traffic sent over the tunnel, to allow for situations where the cost of a link is a function of the amount of traffic traversing the link. The hello interval and tolerance times are chosen separately for each tunnel between a vEdge router and a controller device. Another step taken to minimize the amount of control plane traffic is to not send or receive OMP control traffic over a



cellular interface when other interfaces are available. This behavior is inherent in the software and is not configurable.

13. If the router has two or more cellular interfaces, you can minimize the amount of traffic between the vManage NMS and the cellular interfaces by setting one of the interfaces to be the preferred one to use when sending updates to the vManage NMS and receiving configurations from the vManage NMS:

```
vEdge(config-tunnel-interface) # vmanage-connection-preference number
```

The preference can be a value from 0 through 8. The default preference is 5. To have a tunnel interface never connect to the vManage NMS, set the number to 0. At least one tunnel interface on the router must have a nonzero vManage connection preference.

14. Configure any other desired tunnel interface properties.
15. To minimize the amount of data plane keepalive traffic on the cellular interface, increase the BFD Hello packet interval:  

```
vEdge(bfd-color-lte) # hello-interval milliseconds
```

The default hello interval is 1000 milliseconds (1 second), and it can be a time in the range 100 through 300000 milliseconds (5 minutes).

To determine the status of the cellular hardware, use the [show cellular status](#) command.

To determine whether a vEdge has a cellular module, use the [show hardware inventory](#) command.

To determine whether a cellular interface is configured as a last-resort circuit, use the [show control affinity config](#) and [show control local-properties](#) commands.

Note: When you activate the configuration on a router with cellular interfaces, the primary interfaces (that is, those interfaces not configured as circuits of last resort) and the circuit of last resort come up. In this process, all the interfaces begin the process of establishing control and BFD connections. When one or more of the primary interfaces establishes a TLOC connection, the circuit of last resort shuts itself down because it is not needed. During this shutdown process, the circuit of last resort triggers a BFD TLOC Down alarm and a Control TLOC Down alarm on the vEdge router. These two alarms are cleared only when all the primary interfaces lose their BFD connections to remote nodes and the circuit of last resort activates itself. This generation and clearing of alarms is expected behavior.

---

## Best Practices for Configuring Cellular Interfaces

Cellular technology on Viptela devices can be used in a number of ways:

- Circuit of last resort—You can use a cellular interface as a backup circuit on a vEdge router. Such a circuit is activated only if all transport links on the router fail. In this mode the radio interface is turned off, and no control or data connections exist over the cellular interface. To configure an cellular interface to be a circuit of last resort, include the [last-resort-circuit](#) command when you configure the cellular interface's tunnel interface.
- Active circuit—You can choose to use a cellular interface as an active circuit, perhaps because it is the only last-mile circuit or to always keep the cellular interface active so that you can measure the performance of the circuit. In this scenario the amount of bandwidth utilized to maintain control and data connections over the cellular interface can become a concern. Here are some best practices to minimize bandwidth usage over a cellular interface:
  - When the vEdge router with cellular interface is deployed as a spoke and data tunnels are established in a hub-and-spoke manner, you can configure the cellular interface as a low-bandwidth interface. To do this, include the



[low-bandwidth-link](#) command when you configure the cellular interface's tunnel interface. When the cellular interface is operating as a low-bandwidth interface, the vEdge router spoke site is able to synchronize all outgoing control packets. The spoke site can also proactively ensure that no control traffic, except for routing updates, is generated from one of the remote hub nodes. Routing updates continue to be sent, because they are considered to be critical updates.

- Increase control packet timers—To minimize control traffic on a cellular interface, you can decrease how often protocol update messages are sent on the interface. OMP sends Update packets every second, by default. You can increase this interval to a maximum of 65535 seconds (about 18 hours) by including the [omp timers advertisement-interval](#) configuration command. BFD sends Hello packets every second, by default. You can increase this interval to a maximum of 5 minutes (300000 milliseconds) by including the [bfd color hello-interval](#) configuration command. (Note that you specify the OMP Update packet interval in seconds and the BFD Hello packet interval in milliseconds.)
- Prioritize vManage control traffic over a non-cellular interface—When a vEdge router has both cellular and non-cellular transport interfaces, by default, the router chooses one of the interfaces to use to exchange control traffic with the vManage NMS. You can configure the router to never use the cellular interface to exchange traffic with the NMS, or you can configure a lower preference for using the cellular interface for this traffic. You configure the preference by including the [vmanage-connection-preference](#) command when configuring the tunnel interface. By default, all tunnel interface have a vManage connection preference value of 5. The value can range from 0 through 8, where a higher value is more preferred. A tunnel with a preference value of 0 can never exchange control traffic with the vManage NMS.

Note: At least one tunnel interface on the vEdge router must have a non-0 vManage connection preference value. Otherwise, the router has no control connections.

---

## Additional Information

[Configuring DHCP](#)

[Configuring Network Interfaces](#)

[Configuring PPPoE](#)

[Configuring VRRP](#)

[Configuring WLAN Interfaces](#)

[Software Caveats in Release 16.3 Release Notes](#)

[Troubleshoot Cellular Interfaces](#)

