

LTE Transport Modes



For supported software information, click [here](#).

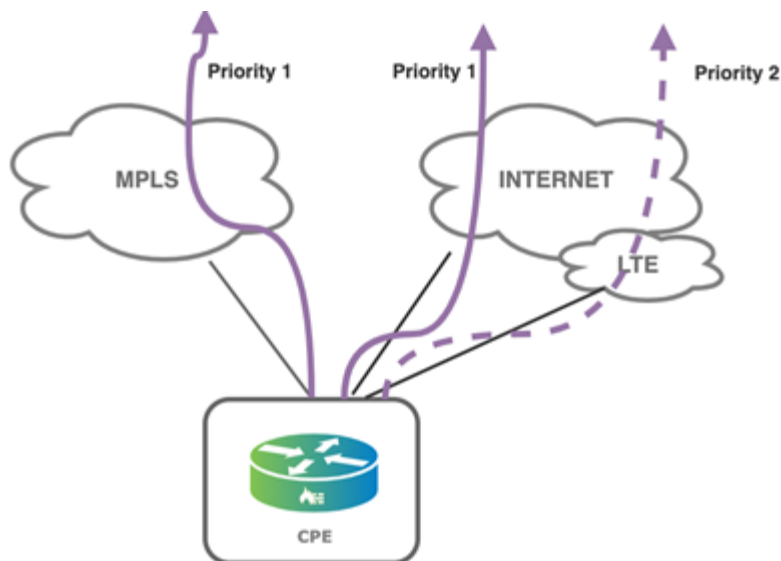
On Versa Operating System™ (VOS™) edge devices, you can use LTE as a WAN link, and it acts just like any other WAN link. However, in many scenarios, LTE is deployed as a backup path because its data costs are higher. When you use LTE as a backup transport link, you can configure it in one of the following modes:

- Hot standby mode—In this mode, the LTE interface is up and SLA packets are sent over this link to remote sites to determine the path metrics, but the LTE link is not actively used for sending traffic.
- Cold standby mode—In this mode, you configure the LTE link and place it in an administratively Down state. The link state goes to Up only when all the primary wired WAN interfaces are down.

This article discusses the LTE hot standby and cold standby modes.

Hot Standby Mode

In hot standby mode, the LTE interface is up, and SLA packets are sent over this link to remote sites to determine the path metrics. However, the LTE link is used to send traffic only when the primary wired WAN links are down or out of SLA compliance. You can configure management traffic, such as LEF logging information or branch software uploads, to avoid the LTE link when other wired WAN links are available. The following figure illustrates the traffic priorities in hot standby mode.



The following are the benefits of hot standby mode:

- When the primary wired WAN interfaces go down or are out of SLA compliance, the switchover to LTE occurs instantly.
- SLA-based steering is possible because the LTE link is actively monitored through SLA probes.
- The status and quality of the path is known at all times in standby mode. The LTE link generates alarms if the path becomes unavailable, prompting the administrator to take corrective action.

The following are the limitations of hot standby mode:

- The path through the LTE link is actively monitored. This means that SLA traffic is sent over the LTE link when it is in standby mode, thus consuming credits of the LTE data plan subscription.
- The amount of bandwidth used by the SLA traffic varies, depending on the number of network sites with which SLA peering is maintained. Also, the SLA probe interval influences the amount of data sent over the LTE link.

This section describes the following LTE hot standby configuration scenarios:

- Use LTE hot standby for SD-WAN VPN (site-to-site) traffic
 - Use the LTE link as the backup circuit on local and remote devices
 - Avoid the LTE link for non-business and scavenger traffic
- Use the LTE link as a backup for internet traffic
- Load-balance two wired WAN links, with an LTE backup
- Provide connectivity for management traffic

Configure LTE Hot Standby for SD-WAN VPN Traffic

This section discusses two scenarios for using LTE hot standby for SD-WAN VPN (site-to-site) traffic:

- Use LTE as backup circuit on local and remote device

- Avoid LTE for non-business and scavenger traffic

When you configure WAN links, a circuit media attribute is associated with each link. When you configure LTE hot standby for SD-WAN VPN (site-to-site) traffic, the circuit media can be any of the following:

- Cable
- DSL
- Ethernet
- LTE
- T1
- T3



Use LTE as Backup Circuit on the Local and Remote Branches

This section describes a scenario that requires the LTE links to be in hot standby mode. You should apply this configuration to all devices in the network, both those with LTE interfaces and those that do not have LTE interfaces.

In this scenario, the local branch decides which path to use to connect to the remote branch. This decision includes choosing the WAN circuits on the local and remote branches. In many networks, not all branches are deployed with LTE interfaces. A non-LTE branch must not use the path to the remote LTE interface if the remote wired internet interface is available.

The configuration shown here allows the local and the remote branches to use LTE only when needed.

The WAN link circuit media type is used to set the LTE link to be in hot standby mode. To verify whether the circuit media type is correct for all the WAN links:




1. In Appliance view, select the Configuration tab in the top menu bar.
2. Select Services  > SD-WAN > System > Site Configuration in the left menu bar.
3. Click the  Edit icon. The Edit WAN Interfaces popup window displays.

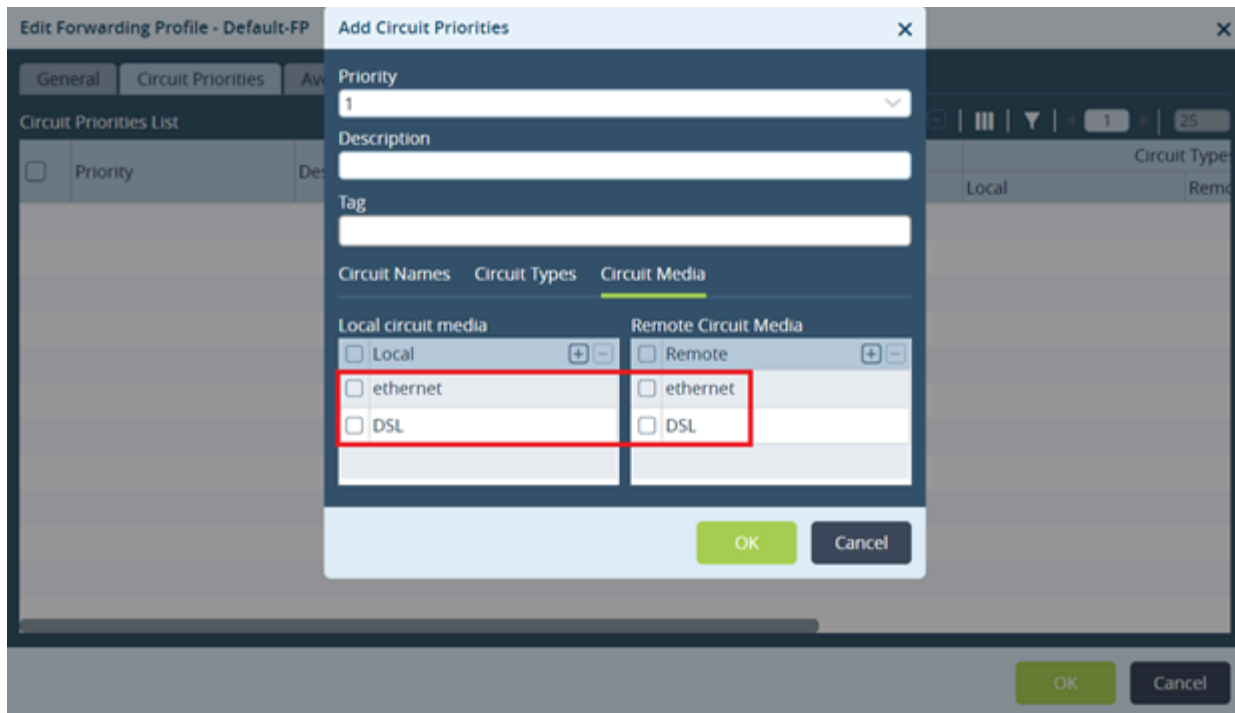
The screenshot shows the 'Edit WAN Interfaces' window. The 'Media' dropdown is highlighted with a red box and contains the text 'Ethernet'. The 'Interfaces' dropdown shows 'vni-0/0.0'. The 'Transport Domain' section has three options: 'Transport Domain' (checked), 'Internet', and 'MPLS'. The 'Type' dropdown is set to '--Select--'. The 'Service Provider' field has a gear icon. The 'Inter Chassis Link' dropdown is set to '--Select--'. The 'IPv4' section shows 'Circuit Name' as 'BB1-mix' and an empty 'Public IP Address' field. The 'IPv6' section is empty. At the bottom right are 'OK' and 'Cancel' buttons.

In the Media field, check that the media type is set to either Ethernet, DSL, or LTE, depending on the type of WAN link. The Ethernet interfaces are displayed as vni-0/0 and vni-0/1, and the LTE interfaces are displayed as vni-0/100 and vni-0/101.

To configure the LTE interface to be in hot standby mode, you set the circuit priority on the local and remote branches. Because the branch that initiates the traffic chooses the path, it is important that the local branch not prioritize the LTE link on the remote branch. This configuration applies when the sending branch does not have an LTE circuit, for example, to allow communication with a branch in a data center.

You configure the circuit priorities in the default SD-WAN forwarding profile. To configure the circuit priorities:


1. In Appliance view, select the Configuration tab in the top menu bar.
2. Select Configuration > Services  > SD-WAN > Forwarding Profiles.
3. Click the  Add icon. The Add Forwarding Profile popup window displays.
4. Select the Circuit Priorities tab.
5. Click the  Add icon. The Add Circuit Priorities popup window displays.

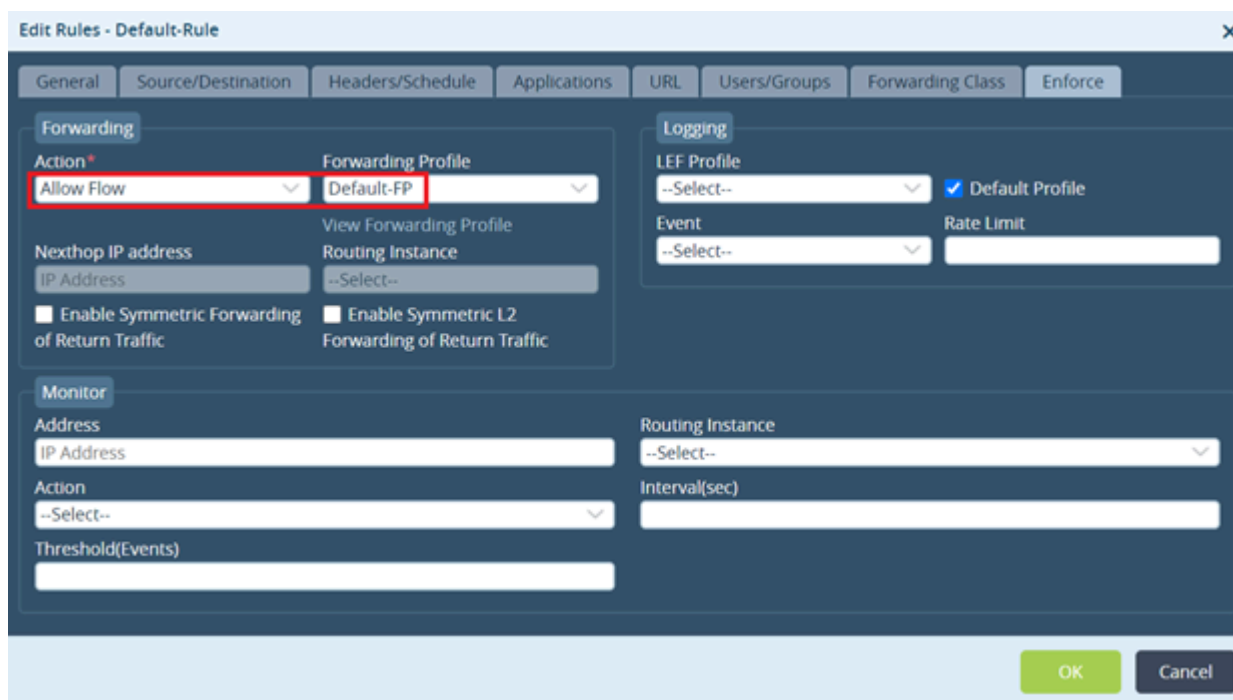


Set the circuit priorities as shown in the following table. Note that if the local and remote circuit media are other types of WAN links, such as E1 or T1, you can include them in the priority groups that contain Ethernet media. For circuit priorities, a lower value indicates a more preferred link and a higher value indicates a less preferred link.

Priority	Purpose	Local Circuit Media	Remote Circuit Media
1	Use this circuit when local and remote wired WAN links are up	Ethernet, DSL	Ethernet, DSL
2	Use this circuit when the wired WAN links on the local branch are down and LTE is the only available WAN link	LTE	Ethernet, DSL
3	Use this circuit when the wired WAN links on the remote branch are down and LTE is the only available WAN link	Ethernet, DSL	LTE
4	Use this circuit when LTE is the only WAN link available on both the local and remote branches; you do not need to configure this priority		

Then you configure an SD-WAN policy rule to match the traffic and have it follow the WAN link priority order. To create an SD-WAN policy rule that matches all traffic (a wildcard match):

1. In Appliance view, select the Configuration tab in the top menu bar.
2. Select Services  > SD-WAN > Policies in the left menu bar.
3. Select the Rules tab to create a new rule. For a wildcard catch all rule, do not configure any match conditions. Select the Enforce tab, in the Forwarding Profile field, select the SD-WAN forwarding profile that you created above, in this example called Default-FP.



Avoid LTE for Non-Business and Scavenger Traffic

You can configure the local circuit media or a combination of local and remote circuit media to completely avoid using LTE circuits for non-business critical traffic and scavenger traffic. (Scavenger traffic is a QoS category that includes suspect traffic that may be dangerous to the network.) To do this, when you configure an SD-WAN forwarding profile, you define the circuits to avoid.

This configuration is the same as that shown in the previous section. However, in the Avoid connections tab, you define the circuits to avoid. These circuits are never used even if the path is the only one that is available.

You then create an SD-WAN policy rule to classify the scavenger traffic and attach the rule to the forwarding policy that specifies to never use LTE.

Note that the forwarding profile configuration affects egress traffic decisions. For an effective implementation, you must apply this configuration uniformly across the network to prevent ingress traffic from arriving on the LTE link.

Configure LTE as a Backup for Internet Traffic

This section describes how to configure an LTE link to be a backup for local internet breakout (DIA) traffic. The scenarios in this section have either one wired link and one LTE link, or more than one wired link and one LTE link.

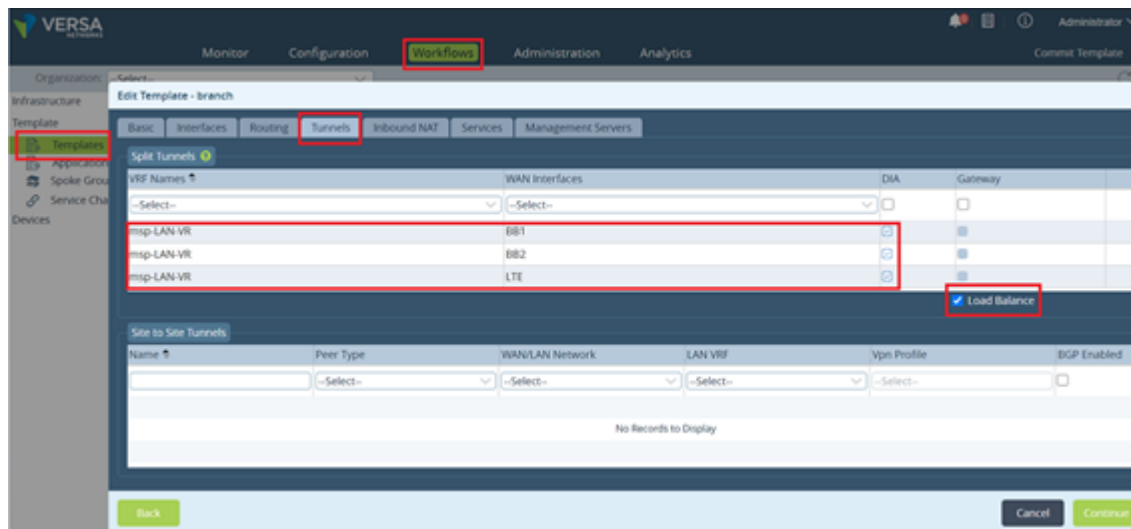
To use LTE as a hot standby for direct internet access (DIA) traffic, in the Workflows template, in the Tunnels tab, do not click the Load Balance option.

WAN Interfaces	DIA	Gateway
BB1	<input type="checkbox"/>	<input type="checkbox"/>
LTE	<input type="checkbox"/>	<input type="checkbox"/>

The Workflows template automatically creates two BGP sessions over a virtual interface pair that run between the WAN transport VR and the MSP LAN VR. The default route is advertised from each of the WAN transport VRs to the LAN VR. The default route from the BB1 transport VR has a BGP local preference value of 120 by default, and the default route from the LTE transport VR has a BGP local preference value of 119. Based on the local preference values, the LAN VR installs the default route from the BB1 transport VR as the active default route, thus making BB1 WAN link the primary WAN link for local internet-bound traffic.

To load-balance between two wired WAN links for DIA, while having an LTE link as a hot-standby backup, you enable

DIA on all internet WAN and check the load balance knob. This configuration sets all WAN links to the same local preference.



Because you select the load balance option, all the default routes from the BB1, BB2, and LTE transport VRs are advertised to the LAN VR with a BGP local preference value of 120. The result is that traffic is load-balanced across all the three WAN links. To have the LTE link be the backup and be active only when the two wired WAN links are down, modify the BGP local preference of the default route advertised by the LTE VR to a value of 119 or lower.

To modify the local preference value:

1. In Appliance view, select the Configuration tab in the top menu bar.
2. Select Networking > Virtual Routers in the left menu bar, and select a virtual router instance. The Virtual Router popup window displays.
3. Select the BGP tab in the left menu bar. The main pane displays a list of the BGP instances that are already configured.
4. Select the BGP instance for the LTE link. The Edit BGP Instance popup window displays.
5. Select the Peer/Group Policy tab. The Add Add Peer/Group Policy popup window displays.
6. Select the Action tab, and change the local preference value to a value of 119 or lower.

Term Name*
Color_ST_Routes

Match Action Slave Action

Accept/Reject
Accept

Origin * Next Hop * Local Preference *
--Select-- 119

AS Path * Local AS Prepend Count * AS Path Prepend *
--Select-- Allowed Range is 1 - 255 Allowed Range is 1 - 4294967295

Damping * Community Action * Community *
Append the value of set-com... 64513:64513

Preference for this route Extended Community Action * Extended Community *
--Select--

Metric Action Metric
--Select-- Allowed Range is 1 - 4294967295

Next Term
--Select--


OK Cancel

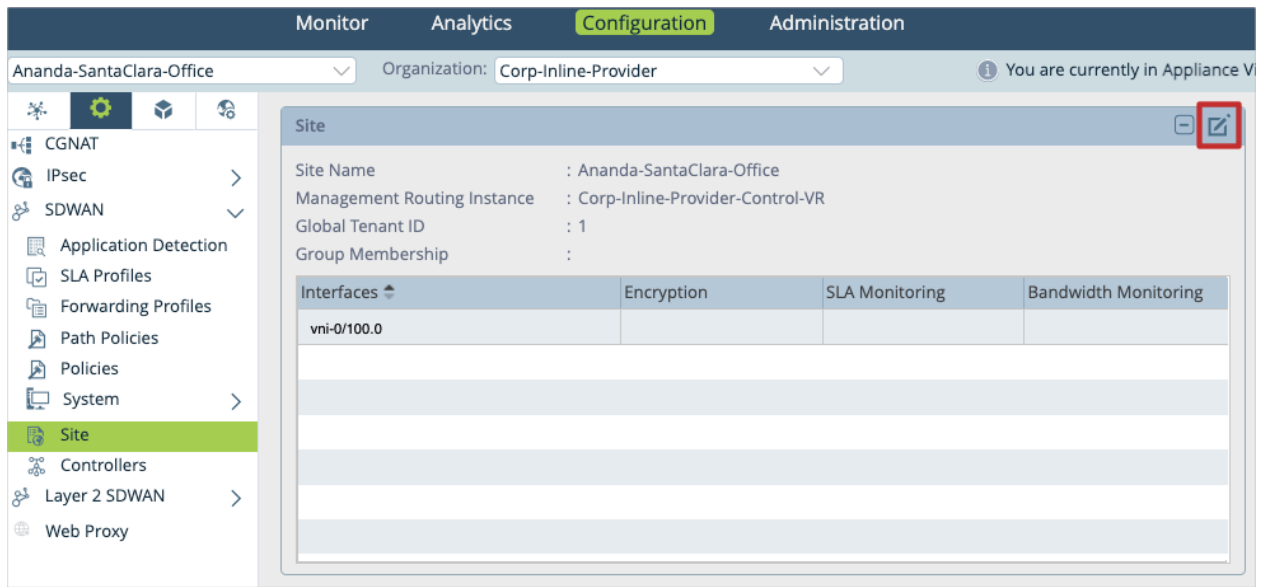
Minimize the Sending of Management Traffic on LTE Links

By default, the VOS device randomly assigns an available link to provide connectivity to the Controller nodes and Versa Networks headend devices. This means that the LTE link could be used to send management traffic. Management traffic is all traffic towards the Controller and headend devices, including LEF logging information, which is sent to the Analytics node, or uploading software image files.

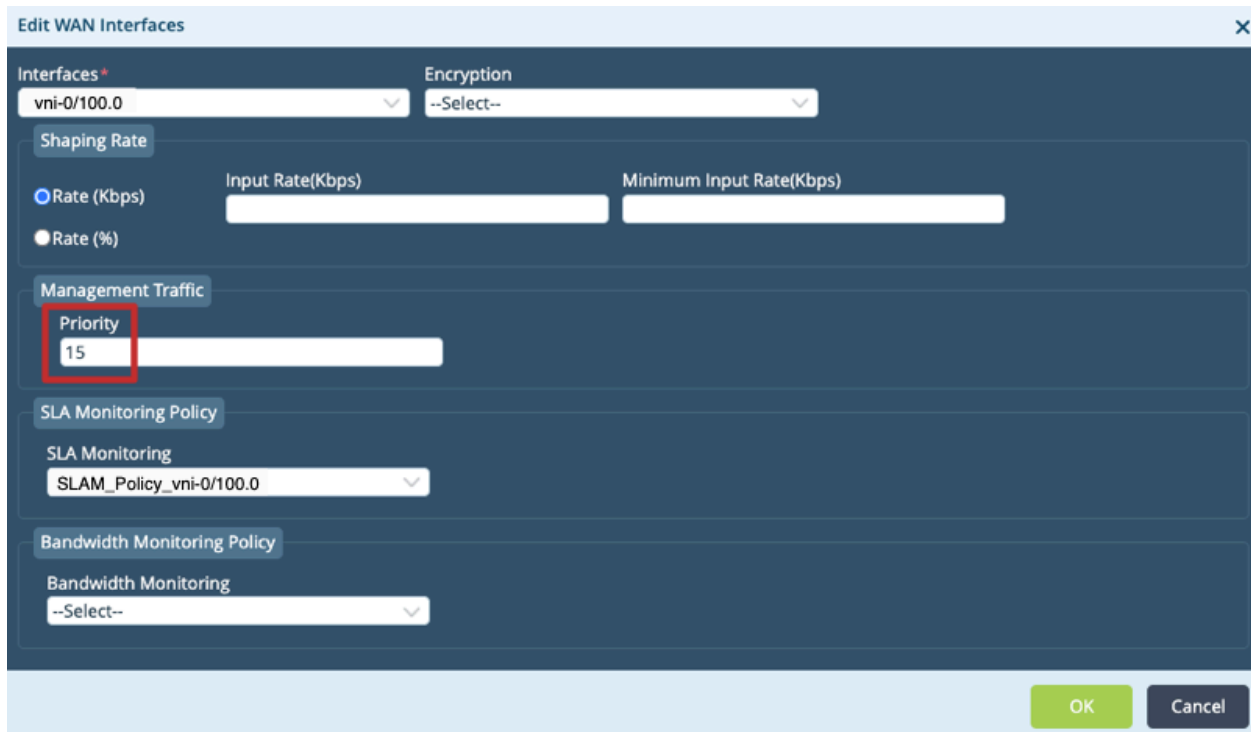
To prevent the unnecessary use of the LTE data plan, you configure management traffic so that the preferred links are the wired WAN links. To do this, you set the management priority of the LTE WAN links to a value that is lower than that of the wired WAN links. For management priorities, a value 0 indicates the highest priority and a value 15 is the lowest.

To set the management traffic priority to minimize the use of LTE links for management traffic:

1. In Appliance view, select the Configuration tab in the top menu bar.
2. Select Services  > SD-WAN > Site in the left menu bar. The following screen displays.



3. Click the Edit icon in the main pane. The Edit Site popup window displays.
4. In the WAN Interfaces table, select the LTE interface. The Edit WAN Interfaces popup window displays.



5. In the Management Traffic > Priority field, enter a value of 15. Note that for management priorities, a value 0 indicates the highest priority and a value 15 is the lowest.
6. Click OK.

Cold Standby Mode

In cold standby mode, you configure the LTE link in an administratively Down state. Only when all the primary wired WAN interfaces are down does the LTE link state change to Up.

The primary benefits of cold standby mode is that no data is used on the LTE link until all the primary WAN links are down.

The following are the limitations of cold standby mode:

- The VOS edge device does not know the actual status of the LTE connection until the primary WAN links go down and the VOS devices tries to bring up the LTE connection.
- The traffic failover is not instantaneous, because there is lag time while registering the SIM to the mobile network. Data transfer can begin only after the mobile data context is enabled on the SIM and the Versa Networks control plane is established on that path.

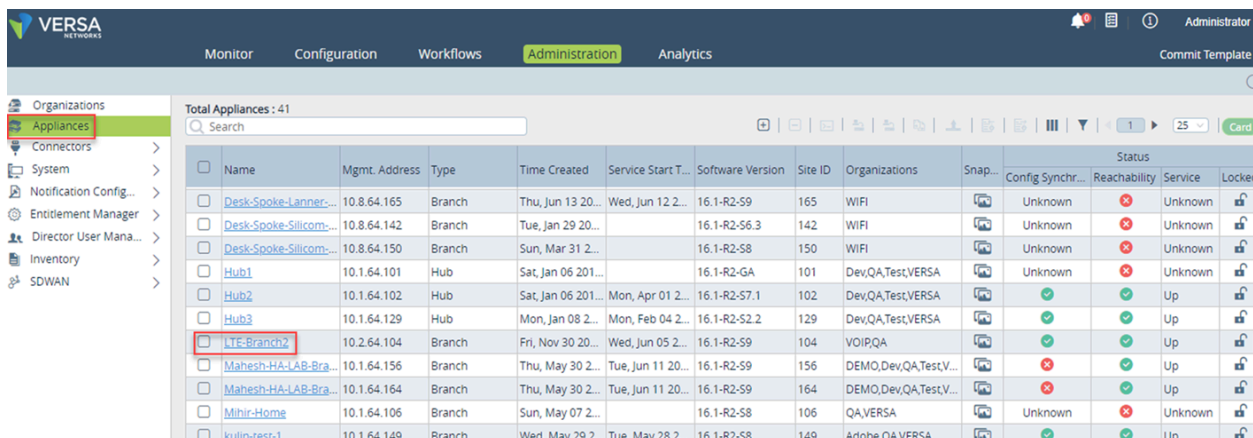
To configure LTE cold standby mode, you configure the LTE interface to be in an administratively Down state, and you configure an active wired interface that has an active monitor (an IP SLA monitor) to the active interface's next hop. When the IP SLA monitor determines that the next hop is no longer reachable, the LTE link is activated automatically and starts building neighbor sessions with all its peers in the transport domain.

To configure cold standby mode, you do the following:

1. Create a monitor for the primary WAN circuit.
2. Create monitor-group to check the status of the primary links.
3. Associate the monitor group to the LTE interface as a standby.

To create a primary WAN interface:

1. In Director view, select the Administration tab in the top menu bar.
2. Select Appliances in the left menu bar.
3. Select a device in the main pane. In the following screenshot the device is LTE-Branch2.





	Name	Mgmt. Address	Type	Time Created	Service Start T...	Software Version	Site ID	Organizations	Snap...	Config Synchron...	Reachability	Service	Locked
<input type="checkbox"/>	Desk-Spoke-Lanner...	10.8.64.165	Branch	Thu, Jun 13 20...	Wed, Jun 12 2...	16.1-R2-S9	165	WIFI		Unknown	✗	Unknown	🔒
<input type="checkbox"/>	Desk-Spoke-Silicom...	10.8.64.142	Branch	Tue, Jan 29 20...		16.1-R2-S6.3	142	WIFI		Unknown	✗	Unknown	🔒
<input type="checkbox"/>	Desk-Spoke-Silicom...	10.8.64.150	Branch	Sun, Mar 31 2...		16.1-R2-S8	150	WIFI		Unknown	✗	Unknown	🔒
<input type="checkbox"/>	Hub1	10.1.64.101	Hub	Sat, Jan 06 201...		16.1-R2-GA	101	Dev,QA,Test,VERSA		Unknown	✗	Unknown	🔒
<input type="checkbox"/>	Hub2	10.1.64.102	Hub	Sat, Jan 06 201...	Mon, Apr 01 2...	16.1-R2-S7.1	102	Dev,QA,Test,VERSA		✓	✓	Up	🔒
<input type="checkbox"/>	Hub3	10.1.64.129	Hub	Mon, Jan 08 2...	Mon, Feb 04 2...	16.1-R2-S2.2	129	Dev,QA,Test,VERSA		✓	✓	Up	🔒
<input type="checkbox"/>	LTE-Branch2	10.2.64.104	Branch	Fri, Nov 30 20...	Wed, Jun 05 2...	16.1-R2-S9	104	VOIPQA		✓	✓	Up	🔒
<input type="checkbox"/>	Mahesh-HA-LAB-Bra...	10.1.64.156	Branch	Thu, May 30 2...	Tue, Jun 11 20...	16.1-R2-S9	156	DEMO,Dev,QA,TestV...		✗	✓	Up	🔒
<input type="checkbox"/>	Mahesh-HA-LAB-Bra...	10.1.64.164	Branch	Thu, May 30 2...	Tue, Jun 11 20...	16.1-R2-S9	164	DEMO,Dev,QA,TestV...		✗	✓	Up	🔒
<input type="checkbox"/>	Mihir-Home	10.1.64.106	Branch	Sun, May 07 2...		16.1-R2-S8	106	QA,VERSA		Unknown	✗	Unknown	🔒
<input type="checkbox"/>	kulin-test-1	10.1.64.149	Branch	Wed, May 29 2...	Tue, May 28 2...	16.1-R2-S8	149	Adobe,QA,VERSA		✓	✓	Up	🔒

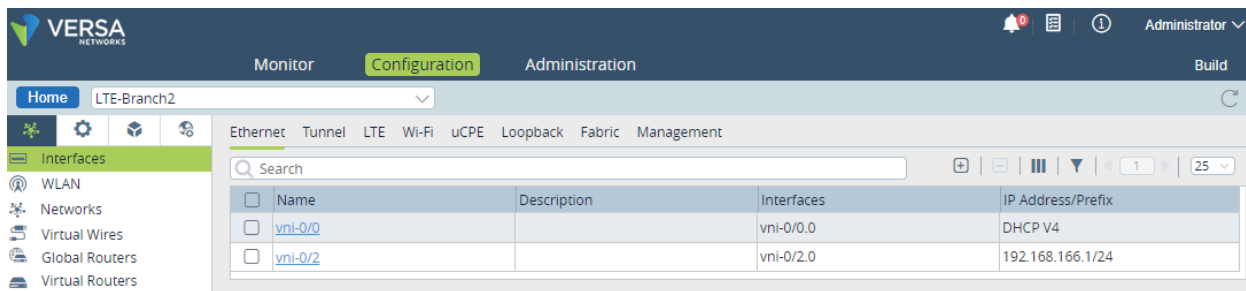
4. Select the Configuration tab in the top menu bar.



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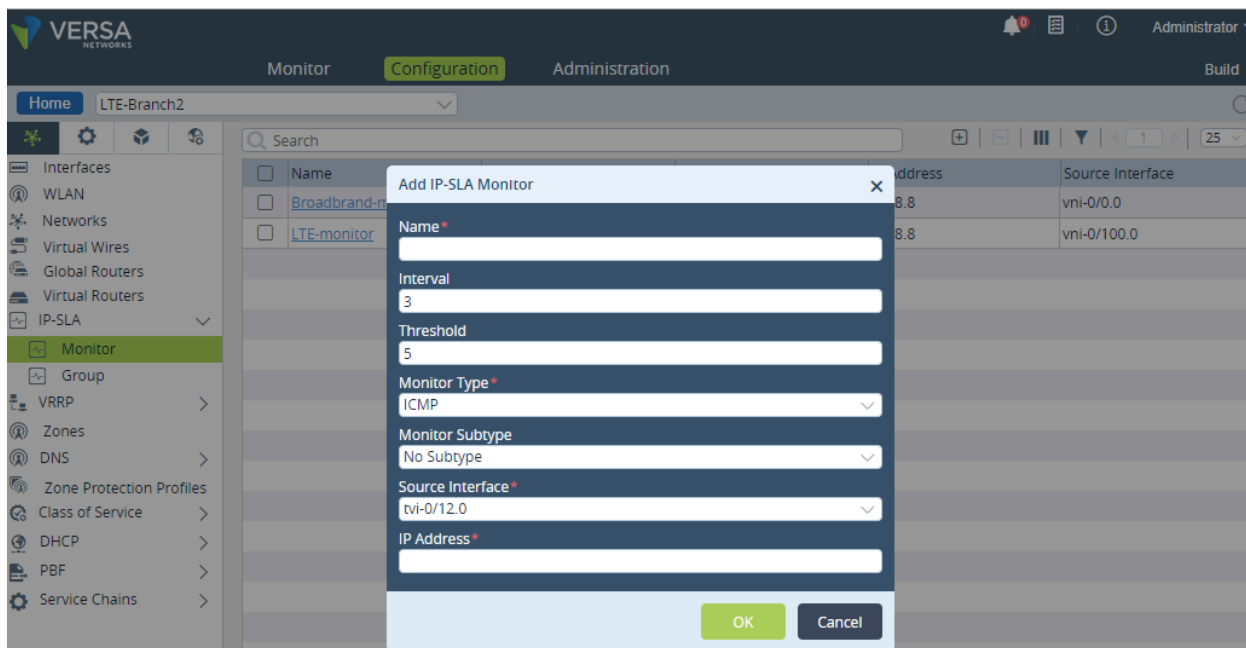
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5. Select Network  > Interfaces in the left menu bar.
6. Click the  Add icon to create an interface. This example configures vni-0/00 as the primary link.





7. Select Network  > IP SLA > Monitor in the left menu bar.
8. Click the  Add icon to create a monitor for the primary WAN interface. The Add IP SLA Monitor popup window displays. Enter information for the following fields.

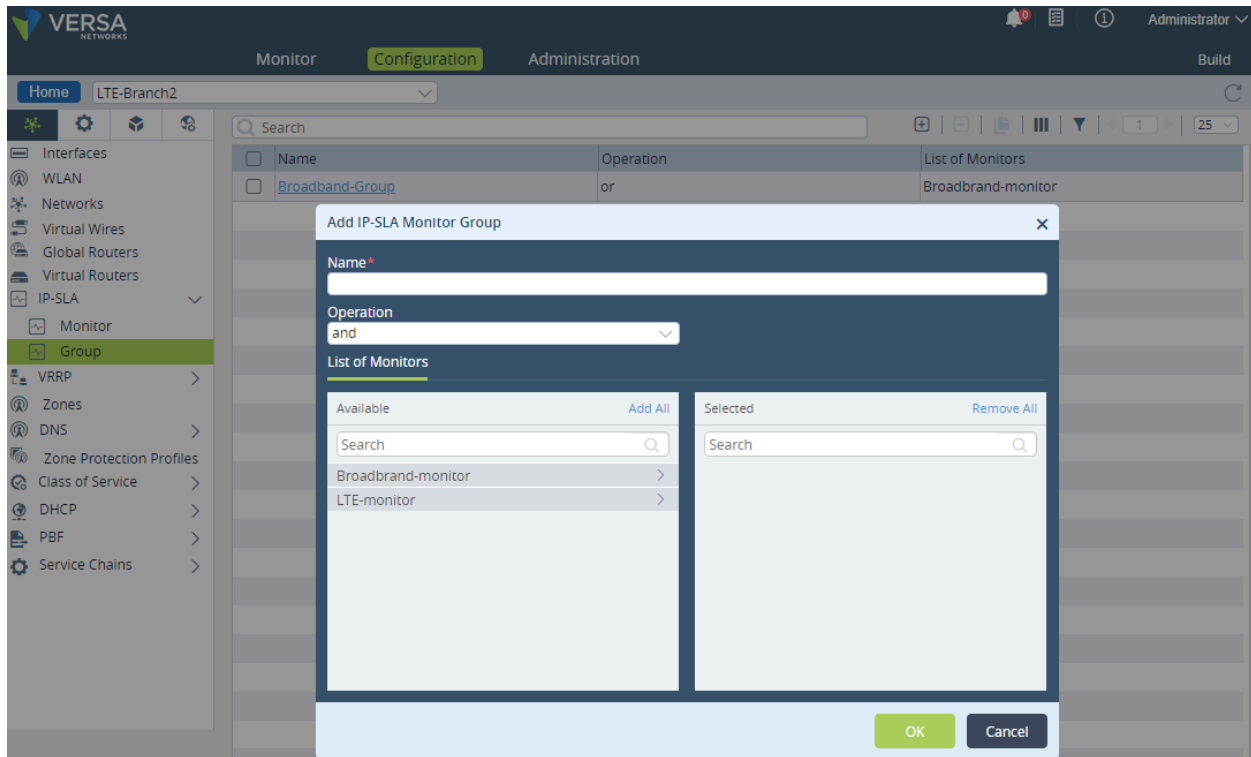


Field	Description
Name	Enter a name for the IP SLA monitor object. This example uses the name Broadband-monitor.
Interval	<p>Click, and enter the frequency, in seconds, at which to send ICMP packets to the IP address.</p> <p><i>Range:</i> 1 through 60 seconds</p> <p><i>Default:</i> 3 seconds</p>
Threshold	<p>Enter the maximum number of ICMP packets to send to the IP address. If the IP address does not respond after this number of packets, the monitor object, and hence the IP address, is marked as down.</p> <p><i>Range:</i> 1 through 60</p> <p><i>Default:</i> 5</p>
Monitor Type	Select the type of packets sent to the IP address. The available options are DNS, ICMP, or TCP.
Monitor Subtype	<p>Select the subtype:</p> <ul style="list-style-type: none"> ◦ HA probe type—Select to avoid interchassis HA split brain. For more information, see Configure Interchassis HA. ◦ Layer 2 loopback type—Select to monitor an external service node configured as a Layer 2 loopback (virtual wire). ◦ No subtype—Do not use a monitor subtype. This is the default. <p><i>Default:</i> No subtype</p>
Source Interface	Select the source interface on which to send the probe packets. This interface determines the routing instance through which to send the probe packets. This routing instance is the target routing instance for the probe packets.
IP Address	Enter the IP address to monitor.

9. Click OK.

To create a monitor group and add the monitor object:


1. Continuing from the previous procedure, select Network  > IP SLA > Group in the left menu bar.
2. Click the  Add icon to create a monitor group. The Add IP SLA Monitor Group popup window displays. Enter information for the following fields.

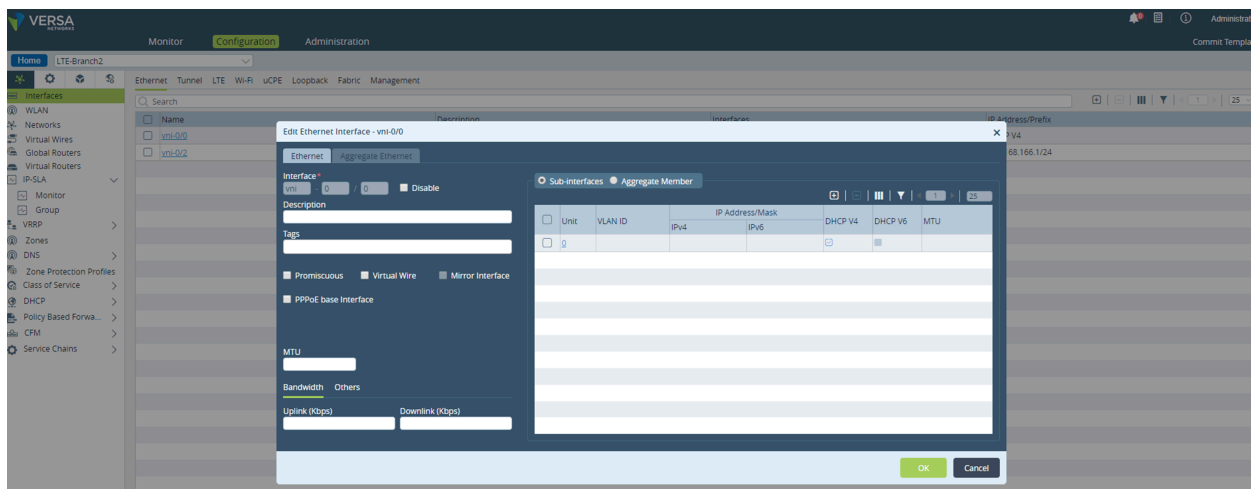


Field	Description
Name	Enter a name for the IP SLA monitor group. This example uses the name Broadband-Group.
Operation	<p>Select the boolean operation to perform on the monitors:</p> <ul style="list-style-type: none"> AND—In an AND operation, the monitor group result is Up only if all monitors are Up. Otherwise, the monitor group result is Down. OR—In an OR operation, the monitor group result is Up if at least one of the monitors is Up. It is down only if all monitors are Down.
List of Monitors (Table)	
<ul style="list-style-type: none"> Available 	Displays the list of available monitors for this appliance. Select and click on the monitor that you want to add to the group, here, Broadband-monitor.
<ul style="list-style-type: none"> Selected 	Displays the monitor that you added to the group.

3. Click OK.

Next, you associate the monitor group (Broadband-Group) with an LTE interface as the standby option, with the match state configured as "down". To configure this use case scenario:

- Continuing from the previous procedure, select Network  > Interfaces in the left menu bar.
- Select the LTE link (vni-0/100) in the main pane. The Edit Ethernet Interface popup window displays.



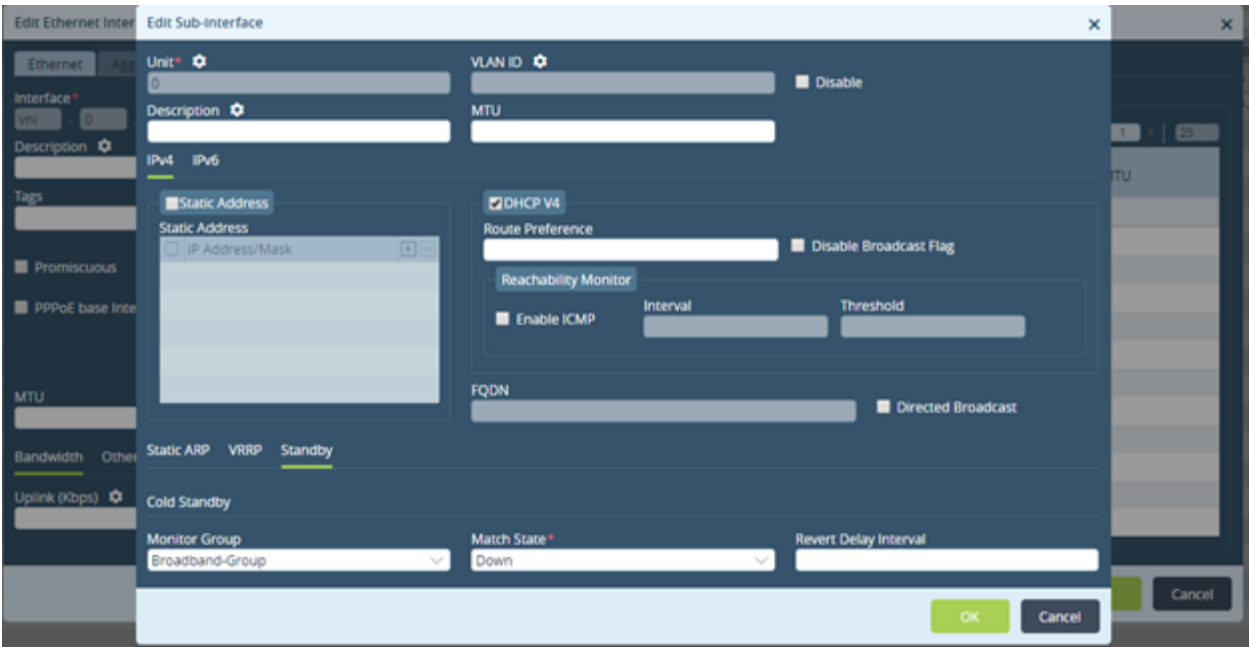
3. Select Subinterfaces

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4. Select the Standby tab and enter information for the following fields.

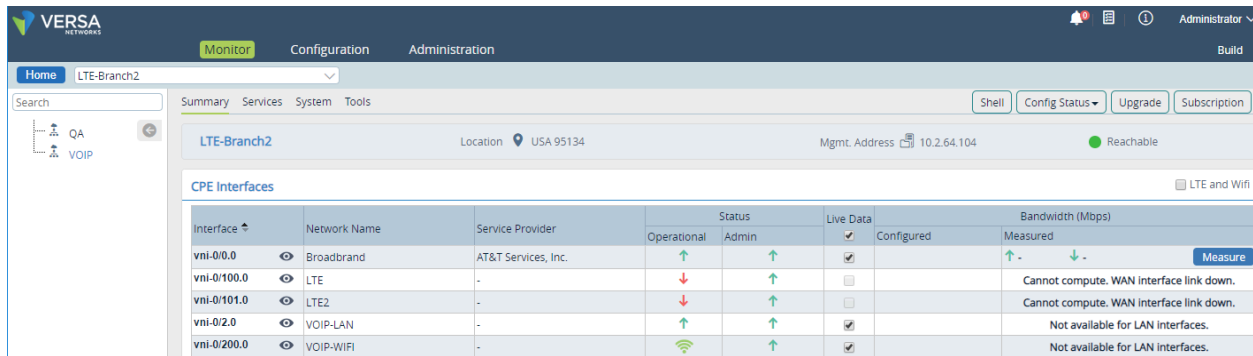


Field	Description
Monitor Group	Select the monitor group, here, Broadband-Group.
Match State	Select "down."

5. Click OK.

To verify the interface status:

1. In Director view, select the Administration tab in the top menu bar.
2. Select Appliances in the left menu bar.
3. Select the LTE-Branch2 device in the main pane. The view changes to Appliance view.
4. Select the Monitor tab in the top menu bar. The main pane displays the monitor dashboard for the LTE-Branch2 device.
5. Check the operational status of the branch's interfaces. If all the primary links are Up, the backup LTE interface should show a Down. status. If all the primary links are down, the backup LTE link status should show as up.



Comparison of LTE Hot Standby Mode and Cold Standby Mode

The following table compares hot standby mode and cold standby mode.

	Hot Standby Mode	Cold Standby Mode
LTE link status	Up	Down
Egress data traffic	Only SLA traffic	None
Ingress data traffic	SLA traffic but possibly also data traffic depending on the remote device configuration	None
Traffic failover to standby mode	Instantaneous	Not Instantaneous
Alarm generated when LTE link is down	Yes	No
Can be used for traffic when primary path SLA's are violated	Yes	No
Can use LTE as standby for selective traffic classes	Yes	No

Supported Software Information

Releases 20.2 and later support all content described in this article.

Additional Information

[Configure IP SLA Monitor Objects](#)

[Configure LTE](#)

[Configure SD-WAN Traffic Steering](#)

https://docs.versa-networks.com/Solutions/SD-WAN_Design/04_LTE_Transport_Modes

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