Lenovo Flex System Fabric EN4093R 10Gb Scalable Switch

Release Notes

for Lenovo Network OS 8.4



Note: Before using this information and the product it supports, read the general information in the *Safety information and Environmental Notices* and *User Guide* documents on the Lenovo *Documentation* CD and the *Warranty Information* document that comes with the product.

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Release Notes

This release supplement provides the latest information regarding Lenovo Network OS 8.4 for the EN4093R 10Gb Scalable Switch.

This supplement modifies and extends the following Lenovo N OS documentation for use with N/OS 8.4:

- EN4093R 10Gb Scalable Switch Application Guide for Lenovo Network OS 8.4
- EN4093R 10Gb Scalable Switch Command Reference for Lenovo Network OS 8.4
- EN4093R 10Gb Scalable Switch Installation Guide

The publications listed are available at the following address:

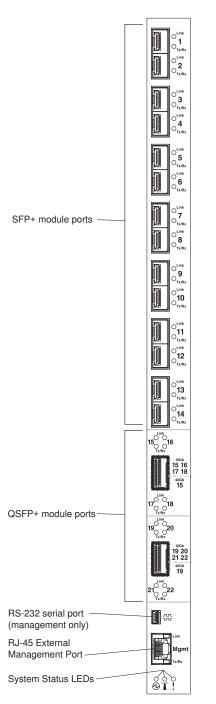
http://flexsystem.lenovofiles.com/help/index.jsp

Please keep these release notes with your product manuals.

Hardware Support

Lenovo Network OS 8.4 software is supported on the EN4093R 10Gb Scalable Switch for the Lenovo Flex System. The EN4093R 10Gb Scalable Switch (EN4093R), shown in Figure 1, is a high performance Layer 2-3 embedded network switch that features tight integration with the Lenovo Flex System chassis management module.

Figure 1. EN4093R 10Gb Scalable Switch Faceplate



The EN4093R has the following port capacities:

- Fourteen 10Gb SFP+ ports
- Two 40Gb QSFP+ ports
- Forty-Two internal ports (maximum)
- One 1Gb RJ-45 external management port
- One 1Gb internal management port
- One mini-USB serial port

Updating the Switch Software Image

The switch software image is the executable code running on the EN4093R. A version of the image comes pre-installed on the device. As new versions of the image are released, you can upgrade the software running on your switch. To get the latest version of software supported for your EN4093R, go to the following website:

http://support.lenovo.com

To determine the software version currently used on the switch, use the following switch command:

EN4093R> show version

The typical upgrade process for the software image consists of the following steps:

- Load a new software image and boot image onto a SFTP, FTP, or TFTP server on your network.
- Transfer the new images to your switch.
- Specify the new software image as the one which will be loaded into switch memory the next time a switch reset occurs.
- Reload the switch.

For instructions on the typical upgrade process, see "Loading New Software to Your Switch" on page 7.

Loading New Software to Your Switch

The EN4093R can store up to two different switch software images (called image1 and image2) as well as special boot software (called boot). When you load new software, you must specify where it should be placed: either into image1, image2, or boot.

For example, if your active image is currently loaded into image1, you would probably load the new image software into image2. This lets you test the new software and reload the original active image (stored in image1), if needed.

Note: EN4093R models do not support image releases prior to 7.5.

ATTENTION: When you upgrade the switch software image, always load the new boot image and the new software image before you reset the switch. If you do not load a new boot image, your switch might not boot properly (To recover, see "Recovering from a Failed Image Upgrade" on page 12).

To load a new software image to your switch, you will need the following:

• The image and boot software loaded on a SFTP, FTP, or TFTP server on your network.

Note: Be sure to download both the new boot file and the new image file.

• The hostname or IP address of the SFTP, FTP, or TFTP server.

Note: The DNS parameters must be configured if specifying hostnames.

• The name of the new software image or boot file.

When the software requirements are met, use the following procedure to download the new software to your switch.

Loading Software via the Command Line Interface

Follow these steps to load software onto your switch:

1. In Privileged EXEC mode, enter the following command:

EN4093R# copy {sftp|tftp|ftp} {image1|image2|boot-image}

2. Enter the hostname or IP address of the SFTP, FTP or TFTP server.

Address or name of remote host: <name or IP address>

3. Enter the name of the new software file on the server.

Source file name: <filename>

The exact form of the name will vary by server. However, the file location is normally relative to the SFTP, FTP or TFTP directory (for example, tftpboot).

- 4. If required by the SFTP, FTP or TFTP server, enter the appropriate username and password.
- 5. The switch will prompt you to confirm your request.

Once confirmed, the software will begin loading into the switch.

6. When loading is complete, use the following commands to enter Global Configuration mode to select which software image (image1 or image2) you want to run in switch memory for the next reboot:

EN4093R# configure terminal EN4093R(config)# boot image {image1|image2}

The system will then verify which image is set to be loaded at the next reset:

```
Next boot will use switch software image1 instead of image2.
```

7. Reboot the switch to run the new software:

EN4093R(config)# reload

The system prompts you to confirm your request. Once confirmed, the switch will reboot to use the new software.

Note: If you select "No" when asked to confirm the reload, any changes made to the configuration since the last reboot will be lost.

Loading Software via BBI

You can use the Browser-Based Interface to load software onto the EN4093R. The software image to load can reside in one of the following locations:

- SFTP server
- FTP server
- TFTP server
- Local computer

After you log onto the BBI, perform the following steps to load a software image:

- 1. Click the Configure context tab in the toolbar.
- 2. In the Navigation Window, select System > Config/Image Control.

The Switch Image and Configuration Management page appears.

- **3**. If you are loading software from your computer (HTTP client), skip this step and go to the next. Otherwise, if you are loading software from a SFTP/FTP/TFTP server, enter the server's information in the SFTP/FTP/TFTP settings section.
- 4. In the Image Settings section, select the image version you want to replace (Image for Transfer).
 - If you are loading software from an SFTP/FTP/TFTP server, enter the file name and click **Get Image**.
 - If you are loading software from your computer, click Browse.
 In the File Upload Dialog, select the file and click OK. Then click Download via Browser.

Once the image has loaded, the page refreshes to show the new software.

Updating vLAG Switches with Lenovo Networking OS 8.x

Below are the steps for updating the software and boot images for switches configured with vLAG:

1. Save the configuration on both switches using the following command:

EN4093R# copy running-config startup-config

- 2. Use FTP, STFP or TFTP to copy the new Networking OS and boot images onto both vLAG switches. For more details, see "Loading Software via the Command Line Interface" on page 8.
- **3**. Shutdown all ports except the ISL ports and the health check port on the primary switch (Switch 1).

Note: Do not save this configuration.

- 4. Reload Switch 1. Switch 2 will assume the vLAG primary role. Once Switch 1 has rebooted, Switch 1 will take the vLAG secondary role.
- 5. Shutdown all ports except the ISL ports and the health check port on Switch 2.

Note: Do not save this configuration.

- 6. Reload Switch 2. Switch 1 will assume the vLAG primary role. Once Switch 2 has rebooted, make sure that Switch 1 is now the vLAG primary switch and Switch 2 is now the vLAG secondary switch.
- 7. Verify the all the vLAG clients have converged using the following command:

EN4093R> show vlag information

Supplemental Information

This section provides additional information about configuring and operating the EN4093R and N/OS.

The Boot Management Menu

The Boot Management menu allows you to switch the software image, reset the switch to factory defaults, or to recover from a failed software download.

You can interrupt the boot process and enter the Boot Management menu from the serial console port. When the system displays Memory Test, press **<Shift + B>**. The Boot Management menu appears.

```
Resetting the System ...

Memory Test .....

Boot Management Menu

I - Change booting image

C - Change configuration block

R - Boot in recovery mode (tftp and xmodem download of images to

recover switch)

Q - Reboot

E - Exit

Please choose your menu option:
```

The Boot Management menu allows you to perform the following actions:

- To change the booting image, press I and follow the screen prompts.
- To change the configuration block, press **C** and follow the screen prompts.
- To perform a software image recovery, press **R** and follow the screen prompts.
- To reboot the switch press **Q** and follow the screen prompts.
- To exit the Boot Management menu, press **E**. The booting process continues.

Recovering from a Failed Image Upgrade

The Boot Management menu allows you to perform fundamental device management operations, such as selecting which software image will be loaded, resetting the EN4093R to factory defaults or recovering from a failed image download.

Use the following procedure to recover from a failed image upgrade.

- 1. Connect a PC to the serial Console port of the EN4093R.
- 2. Open a terminal emulator program that supports XModem Download (for example, HyperTerminal, SecureCRT or PuTTY) and select the following port characteristics:

• Speed:	9,600 bps
• Data Bits:	8
• Stop Bits:	1
• Parity:	None
• Flow Control:	None

3. To access the Boot Management menu, you must interrupt the boot process from the Console port. Boot the EN4093R, and when the system begins displaying Memory Test progress (a series of dots), press **<Shift + B>**.

The Boot Management menu will appear:

Resetting the System ... Memory Test Boot Management Menu I - Change booting image C - Change configuration block R - Boot in recovery mode (tftp and xmodem download of images to recover switch) Q - Reboot E - Exit Please choose your menu option:

4. Select **R** to boot in recovery mode. The following menu will appear:

ntering Rescue Mode.
lease select one of the following options:
T) Configure networking and tftp download an image
X) Use xmodem 1K to serial download an image
P) Physical presence (low security mode)
R) Reboot
E) Exit
ption? :

If you choose option **X** (Xmodem serial download), go to Step 5.

If you choose option **T** (TFTP download), go to Step 6.

5. **Xmodem download:** When you see the following message, change the serial port characteristics to 115,200 bps:

```
Change the baud rate to 115200 bps and hit the \ensuremath{\mathsf{ENTER}} key before initiating the download.
```

a. Press **<Enter>** to set the system into download accept mode. When the readiness meter displays (a series of "C" characters), start XModem on your terminal emulator. You will see a display similar to the following:

```
... Waiting for the <Enter> key to be hit before the download can
start...
CC
```

b. When you see the following message, change the serial port characteristics to 9,600 bps:

```
Change the baud rate back to 9600 bps, hit the <ESC> key.
```

c. Press **<Enter>** to start installing the image. If the file is a software image, enter the image number:

```
install software image 1 or 2 (hit return to just boot image):
```

The image install will begin. After the procedure is complete, the Recovery Mode menu will be re-displayed.

```
Extracting images ... Do *NOT* power cycle the switch.
Installing Root Filesystem:
Image signature verified. 100%
Installing Kernel:
Image signature verified. 100%
Installing Device Tree:
Image signature verified. 100%
Installing Boot Loader: 100%
Updating install log. File image installed from xmodem at 18:06:02 on
13-3-2015
Please select one of the following options:
        T) Configure networking and tftp download an image
        X) Use xmodem 1K to serial download an image
        P) Physical presence (low security mode)
        R) Reboot
        E) Exit
Option? :
```

Continue to Step 7.

6. TFTP download: The switch prompts you to enter the following information:

```
Performing TFTP rescue. Please answer the following questions (enter 'q'
to quit):
IP Addr :
Server Addr:
Netmask :
Gateway :
Image Filename:
```

a. Enter the required information and press **<Enter>**. You will see a display similar to the following:

```
Host IP : 10.10.98.110
Server IP : 10.10.98.100
Netmask : 255.255.255.0
Broadcast : 10.10.98.255
Gateway : 10.10.98.254
Installing image 8.4.0_0S.img from TFTP server 10.10.98.100
```

b. If the file is a software image, you will be prompted to enter an image number:

Install image as image 1 or 2 (hit return to just boot image):

The following message is displayed when the image download is complete:

Image2 updated succeeded	
Updating install log. File 8.4.0_OS.img installe	d from 10.10.98.100 at
15:29:30 on 12-3-2015	
Please select one of the following options:	
T) Configure networking and tftp downloa	d an image
X) Use xmodem 1K to serial download an i	mage
P) Physical presence (low security mode)	
R) Reboot	
E) Exit	
Option? :	

Continue to Step 7.

- 7. Image recovery is complete. Perform one of the following steps:
 - Press R to reboot the switch.
 - Press **E** to exit the Boot Management menu.
 - Press the Escape key (**<Esc>**) to re-display the Boot Management menu.

Chassis Management Module

When configuring the IP interface, which is dedicated to the internal management port (IF128, MGT1), you cannot use a subnet that is already configured on any other enabled interface (IF1-127). This results in IF128 being disabled and an IP configuration of all zeros displayed on the CMM user interface. The CMM event log will indicate that a "Duplicate route" was detected.

For example, consider that the interface dedicated to the external management port (EXTM, IF127) is configured or enabled to the following IP address and mask:

```
Interface information:
127: IP4 192.168.71.120 255.255.255.0
```

The switch will reject an attempt made from the CMM CLI to configure the internal management port (MGT1, IF128) to the following IP address and mask:

system:switch[1]> ifconfig -i 192.168.71.130 -s 255.255.255.0

In this scenario, the switch rejects the attempt by disabling any current configuration on IF128, and responds to the CMM with an IP address, mask, and gateway that contains all zeros.

On the CMM CLI, the resulting condition appears as follows:

```
system:switch[1]> ifconfig
Ethernet ScSE
Enabled
-c static
-i 0.0.0.0
-s 0.0.0.0
-g 0.0.0.0
system:mm[1]> displaylog
1 I I0Mod_01 04/03/12 08:02:49 (iomodule01) Duplicate route detected
to I/0 module iomodule01.
2 I I0Mod_01 04/03/12 08:02:49 (iomodule01) I/0 module 1 IP address
was changed to 0.0.0.0
```

VLAGs

For optimal VLAG operation, adhere to the following configuration recommendations:

- Any port-related configuration, such as applied ACLs, should be the same for all ports included in the same VLAG, across both peer switches.
- Configure VLAG health checking as shown in the Application Guide.

After configuring VLAG, if you need to change any configuration on the VLAG ports, you must follow these guidelines:

- If you want to change the STP mode, first disable VLAG on both the peers. Make the STP mode-related changes and re-enable VLAG on the peers.
- If you have MSTP on, and you need to change the configuration of the VLAG ports, follow these steps:

On the VLAG Secondary Peer:

- 1. Shutdown the VLAG ports on which you need to make the change.
- 2. Disable their VLAG instance using one of the following commands:

EN4093R(config)# no vlag adminkey <key> enable

EN4093R(config)# no vlag portchannel <number> enable

3. Change the configuration as needed.

On the VLAG Primary Peer:

- 4. Disable the VLAG instance.
- 5. Change the configuration as needed.
- 6. Enable the VLAG instance.

On the VLAG Secondary Peer:

- 7. Enable the VLAG instance.
- 8. Enable the VLAG ports.

Note: This is not required on non-VLAG ports or when STP is off or when STP is PVRST.

External Port Link Negotiation

Autonegotiation settings for each external switch port must be the same as those of the devices being connected. In a valid configuration, both ends of a port link are set with autonegotiation on, or both ends are set to specific speed and link properties with autonegotiation disabled.

Port Mirroring Tags BPDU Packets

When you perform port mirroring, Spanning Tree BPDU packets are VLAN tagged at the monitoring port. This is standard behavior of port mirroring on the EN4093R. All mirrored egress traffic is tagged.

Secure Management Network

The following EN4093R attributes are reserved to provide secure management access to and from the chassis management module:

- MGT port (MGT1)
- VLAN 4095
- IP interface 127, 128
- Gateway 4
- STG 128

For more information about remotely managing the EN4093R through the external ports, see "Accessing the Switch" in the *Lenovo Network OS 8.4 Application Guide*.

Note: The external uplink ports (EXT*x*) cannot be members of management VLANs.

Secure Shell (SSH)

Because SSH key generation is CPU intensive, the EN4093R attempts to avoid unnecessary key generation. The process generates three server keys:

- 1. One key is generated to replace the current server key, if used.
- 2. A second key is generated as a spare, in case the current server key is used and the specified interval expires.
- 3. A third key is generated for use at the next reboot.

Therefore, if you never login via SSH, you will only see two key generation events. You may see all three events directly following a reboot. If you want to witness the key generation after the specified interval has expired, then you must login via SSH at least once during each expiration interval.

Spanning Tree Configuration Tips

To ensure proper operation with switches that use Cisco Per VLAN Spanning Tree (PVST+), you must do one of the following:

- Create a separate Spanning Tree Group for each VLAN.
- Manually add all associated VLANs into a single Spanning Tree Group.

When using Layer 2 Trunk Failover, disable Spanning Tree Protocol on external ports.

Syslog Configuration Tip

The *facility* parameter traditionally is used to correlate services (such as IP, CLI, etc.) to messages. This is done to distinguish between the different services that are running in the network/device. However, for the EN4093R, there is a single configured facility value (0-7) used on all messages. By configuring a unique facility value for each switch, a single SYSLOG server can distinguish between the various EN4093Rs in the network. Refer to "System Host Log Configuration" in the *Command Reference*.

Trunk Group Configuration Tips

Please be aware of the following information when you configure trunk groups:

- Always configure trunk groups first, on both ends, before you physically connect the links.
- Configure all ports in a trunk group to the same speed (you cannot aggregate 1Gb ports with 10GBASE-SFP+ ports).
- Configure all ports in a trunk group with the same duplex.
- Configure all ports in a trunk group with the same flow control.

vCenter Synchronization

When applying distributed VM group configuration changes, the switch will attempt to synchronize settings with the VMware vCenter for virtualization management. If the vCenter is unavailable, an error message will be displayed on the switch. Be sure to evaluate all error message and take the appropriate actions to ensure the expected changes are properly applied. If corrective actions are not taken, synchronization may remain incomplete when connection with the vCenter is restored.

Solution: When the switch connection with the vCenter is restored, use the following operational command to force synchronization:

EN4093R(config)# virt vmware scan

VRRP Configuration

Although the Virtual Router Redundancy Protocol (VRRP) standard permits up to 255 virtual router instances, the N/OS 8.4 implementation only allows up to 128 virtual router instances (corresponding to the number of supported IP interfaces). Each virtual router instance can be assigned a unique Virtual Router ID (VRID) between 1 and 255.

New and Updated Features

Lenovo Network OS 8.4 for EN4093R has been updated to include several new features, summarized in the following sections. For more detailed information about configuring EN4093R features and capabilities, refer to the complete N/OS 8.4 documentation as listed on page 3.

ACL Enhancement

Syslog messages generated by Access Control Lists (ACLs) are now logged by the switch. If ACL logging is enabled on the switch, then packet samples that match the ACL filter will be forwarded to the CPU.

ACL Redirect to Trunk Support

This feature enables the switch to direct traffic based on a combination of an ethernet port and Layer 2-4 protocol header fields.

DHCP Snooping

DHCP Snooping acts like a firewall between untrusted hosts and DHCP servers. It provides security by filtering untrusted DHCP packets and by building or maintaining a DHCP Snooping binding table.

Dynamic ARP Inspection

This enhancement enables the device to intercept and examine all ARP requests and response packets in a subnet. Dynamic ARP Inspection (DAI) discards those packets with invalid IP to MAC address bindings. This capability protects the network from some man-in-the-middle attacks.

EasyConnect

This feature is designed to simplify switch configuration by applying predefined configuration modes. Once launched, the user is requested a minimal set of input information (for example, hostname, netmask, uplink ports, or vLAG) and the tool automatically configures the switch accordingly.

IGMP Reports over the Current 3K Limit must be Forwarded to the Mrouter

IGMP reports over the current 3K limit will be forwarded to a Mrouter. If no Mrouter exists, such IGMP reports will be discarded. IGMPv2 leaves for groups not known by the switch will also be forwarded to the multicast router.

Network Mask Enhancement

Adds support for /31 network mask for point-to-point configurations involving class B and class C IP addresses.

Openflow Static LACP Support

OpenFlow version 1.3.1 now supports static LACP Link Aggregation Groups (LAGs) to be added to OpenFlow instances.

Password Encryption

All passwords configured on the switch are encrypted using industry-standard encryption methods.

SIOM

Secure Input/Output Module (SIOM) is a feature that ensures a high security level on the switch as required by the Chassis Management Module (CMM). The CMM pushes necessary configurations to the I/O Module (switch) using the secure connection channel established between the CMM and the IOM.

The switch can be in two operating modes in regards to SIOM:

- Secure I/O Module (SIOM) mode the CMM successfully configures the switch and imposes the security policy
- Legacy I/O Module (LIOM) mode the switch operates with its own security setting

If the switch and the CMM are both running firmware versions that support SIOM, then by default both the switch and the CMM will operate in SIOM mode.

If either the switch or the CMM is running a firmware version that does not support SIOM, then by default both the switch and the CMM will operate in LIOM mode.

In SIOM mode, a secure version of LDAP using StartTLS and LDAPS is supported. Cryptographic provisioning is also supported.

In SIOM mode, the switch will be fully provisioned by the CMM.

Note: In a stacking environment, only the master switch will be provisioned by the CMM.

One of the things provisioned by the CMM is SNMPv3 user accounts with customized attributes. For each SNMPv3 user account, the IOM will create a local SNMPv3 user account. When SNMPv3 accounts are centrally managed by the CMM:

- SNMP v1/v2 access is disabled
- the factory default and user configured local SNMPv3 accounts are disabled.
 Only CMM provisioned accounts are allowed to access the switch via SNMPv3.

STP Display Enhancement

The STP output generated when running the **show spanning-tree command** has been enhanced to display current and previous STP STG root information. Also added commands to display STP statistics and STP topology changes.

STP Range Enhancement

The number of STP groups supported in PVRST mode has been increased to 256. For optimal performance, it is recommended that you stay within a maximum of ten interfaces or aggregated ports (including vLAGs) with 4K MAC table entries when deploying 256 STP groups.

TACACS+ Two Level Authentication

This feature enables the TACACS+ server to request a second level of authentication when a user attempts to access the switch's Privileged EXEC command mode. The feature is active only if TACACS+ is used to control access to the switch and Privileged EXEC command mode is configured to require a password.

vLAG Peer Gateway

This feature enables a vLAG switch to act as an active gateway for packets that are addressed to the router MAC address of its vLAG peer.

Known Issues

This section describes known issues for N/OS 8.4 on the EN4093R 10Gb Scalable Switch.

Note: Please review the Change History documentation posted with the Switch Firmware to check if any of these issues have been fixed in the latest release.

Stacking

Port mirroring does not capture all packets. (ID: 37782)

• In stacking environment port mirroring is not working for ingress/egress traffic with more than one 802.1p priority in scenarios where mirror end monitor ports are configured on different units. As a workaround we recommend that monitor and mirror ports to be configured on the same stack unit.

Statistics

The unicast traffic counter is not incremented for member unit port when sending tagged traffic. (ID: 37800)

• Packets that have invalid length in EtherType/Length field from Ethernet header are counted as multicast packets even though they are unicast packets (invalid means that the length specified is not the same as packet length).

SIOM

- To ensure that the Secure Input/Output Module (SIOM) works correctly, the Chassis Management Module (CMM) needs to use a digest algorithm that is supported by the switch. If the switch has cryptographic mode enabled and the CMM uses a weak digest algorithm that is not supported under cryptographic mode (for example, SHA-1), then cryptographic mode needs to be disabled on the switch or the digest algorithm needs be changed on the CMM (for example, to SHA-256). (ID: 59962)
- When establishing an HTTPS connection, the certificate used by the switch to identify itself will use only the static IPv4 and IPv6 addresses that are configured on the Chassis Management Module (CMM) as the IP address of the switch's internal management port. If the IP addresses are changed from the CMM, the certificate used by the HTTPS server will be regenerated using the new IP addresses after the switch is restarted. (ID: 63118)

STP

A topology change incorrectly appears when port goes down after disabling STP Portfast. (ID: 38072)

• If STP mode is MSTP, shutting down a port which state is operational spanning tree portfast and not administrative portfast may cause spanning tree topolgy change and messages will be prompted on console. This topology change will not influence the traffic.

Not all 16 STGs converge simultaneously after a root bridge change. (ID: 7478)

• On a setup with 16 active STGs, 3-5 of them converge after 30 seconds instead of 2 sec as normal behavior.

UFP

Traffic behavior when having ETS and Bandwidth mode enabled on different ports. (ID: 5706)

- The bandwidth ratios of PGs for ETS can't be guaranteed when running traffic between ETS UFP-enabled port and Bandwidth mode UFP-enabled port. Based on the current implementation of UFP VLAN, for ingress traffic into UFP-enabled port, it won't copy the inner priority to outer priority. For UFP QoS Bandwidth mode port, all the traffic sent from the server is assigned to PG0, regardless of the priority set in the inner TAG. As a result, for PFC priority and ETS it's only guaranteed minimum bandwidth for PGs.
- Also, when a vPort is expected to be lossless, it should be configured with FCoE network mode.

Virtual Link Aggregation Groups (vLAG)

Mrouter/IGMP group synchronization fails after primary or secondary DUT reload in a vLAG scenario. (ID: 40177)

- When topology change occurs on the STP root which is a VLAG switch and it is rebooted, IGMP groups are removed.
- IGMP groups are removed when STP Root bridge, which is also a vLAG switch, recovers after a reboot.

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