Lenovo RackSwitch G8296

Release Notes

For Lenovo Cloud Network Operating System 10.6

Lenovo™

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.

Second Edition (January 2018)

Release Notes

This release supplement provides the latest information regarding Lenovo Cloud Network Operating System 10.6 for the Lenovo RackSwitch G8296 (referred to as G8296 throughout this document).

This supplement modifies and extends the following Cloud NOS documentation for use with *CNOS* 10.6:

- *Lenovo Network Application Guide for Lenovo Cloud Network Operating System 10.6*
- *Lenovo Network Command Reference for Lenovo Cloud Network Operating System 10.6*
- *Lenovo Network Python Programming Guide for Lenovo Cloud Network Operating System 10.6*
- *Lenovo Network REST API Programming Guide for Lenovo Cloud Network Operating System 10.6*
- *Lenovo RackSwitch G8296 Installation Guide for Lenovo Network Operating System*

These publications are available from the following website:

http://systemx.lenovofiles.com/help/topic/com.lenovo.systemx.common.nav.doc/overview_rack_switches.html

Please keep these release notes with your product manuals.

Note: The Lenovo Cloud Network OS is based on the Embedded Linux Integration Environment (ELIE). To obtain open source code licenses, go to https://github.com/lenovo/ELIE/tree/master/elie-1.7.1/licenses/. For details on how to obtain open source code, please contact Lenovo Support.

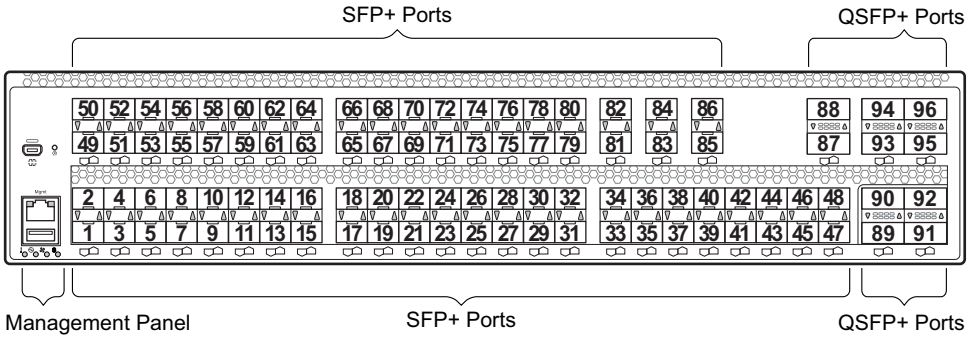
Hardware Support

CNOS 10.6 software is supported on the G8296 high performance Layer 2-3 network switches.

The G8296 is a 2U rack-mountable aggregation switch. The G8296 uses a wire-speed, non-blocking switching fabric that provides simultaneous wire-speed transport of multiple packets at low latency on all ports.

- Eighty-six 10 Gigabit Ethernet (GbE) Small Form Pluggable Plus (SFP+) ports which also support legacy 1 GbE connections
- Ten 40 GbE Quad Small Form Pluggable Plus (QSFP+) ports, two of which (Ethernet 1/87 and Ethernet 1/88) can optionally be used as four 10 GbE SFP+ ports

Figure 1. G8296 front panel



Converting the Switch Software Image from CNOS to ENOS

The new Lenovo Cloud Network OS image cannot coexist on the switch with your legacy 8.x Lenovo NOS. All previous configuration will be lost. If you are running Lenovo CNOS, follow these instructions to replace the operating system with Lenovo NOS 8.x.

To download all necessary software images, go to the following website:

http://support.lenovo.com

1. Download the ENOS boot image to the switch and enter **y** to confirm the download operation.

```
G8296> enable
G8296# cp tftp tftp://<tftp server IP>/G8296-8.4.1.0_Boot.imgs system-image
boot vrf management
Confirm download operation? (y/n) [n] y
Download in progress
.........
Copy Success

Install image...This takes about 90 seconds. Please wait
Check image signature succeeded
Extracting image: 100%
Installing eNOS RFS:
Updating flash: 100%
Extracting image: 100%
Installing eNOS Kernel:
Updating flash: 100%
Extracting image: 100%
Installing eNOS DFT:
Updating flash: 100%
Extracting image: 100%
Installing uboot:
Updating flash: 100%
Boot image installation succeeded.
```

2. Download the ENOS system image to the switch and enter **y** to confirm the download operation.

```
G8296# cp tftp tftp://<tftp server IP>/G8272-8.4.1.0_OS.imgs system-image os
vrf management
Confirm download operation? (y/n) [n] y
Download in progress
.........
Copy Success
Install image...This takes about 90 seconds. Please wait
Check image signature succeeded
Extracting image: 100%
Installing E-NOS image to image1
Installing image to E-NOS image1: 100%
Boot image installation failed.
OS image installation succeeded.
```

3. Reload the switch, confirming the operation when prompted.

```
G8296# reload

reboot system (y/n) ? y
```

4. After the switch reloads, log in and verify that the switch is running the ENOS 8.x image.

```
G8296# show boot

Current running image version: 8.4.1.0
Currently set to boot software image1, unknown config block.
NetBoot: disabled, NetBoot tftp server:  , NetBoot cfgfile:
Current boot Openflow protocol version: 1.0
USB Boot: disabled
Currently profile is default, set to boot with default profile next time.
Current FLASH software:
  image1: version 8.4.1.0 downloaded 10:29:59 Wed Nov 23, 2016, Mode
Stand-alone
  image2: version 8.4.1.0 downloaded 10:32:19 Wed Nov 23, 2016, Mode
Stand-alone
  boot kernel: version 8.4.1.0
Currently scheduled reboot time: none
```

Converting the Switch Software Image from ENOS to CNOS

The new Lenovo Cloud Network OS image cannot coexist on the switch with your legacy 8.x Lenovo NOS. All previous configuration will be lost. If you are running Lenovo NOS 8.x, follow these instructions to replace the operating system with Lenovo CNOS.

To download all necessary software images, go to the following website:

http://support.lenovo.com

1. Connect to the switch through the console terminal. Make sure you are running Lenovo NOS 8.4.1 or later.

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

```
G8296> show version [brief]
```

   If you are running a version of Lenovo ENOS earlier than 8.4.1, download and install a more recent version of the Lenovo NOS image before going to the next step.

2. From the 8.4.1 or later image, download the Cloud NOS image:

```
G8296> enable
G8296# copy tftp image1 address <TFTP server address> filename <location on TFTP
server relative to tftpboot location>/G8296-CNOS-10.6.2.0.imgs mgt-port
```

   Note: CNOS consists of a single image to install that contains all components, including boot and operating system.

   During the download, you are presented with the following message:

```
WARNING: This is the ONLY region with valid bootable image.
         If download fails, switch will not be able to boot.
         Please download into image2 to prevent potential fatal error!

Confirm overwriting the ONLY bootable image (y/n) ?
```

   Enter **y** to continue.

```
Confirm overwriting the ONLY bootable image (y/n) ? y
Image download started to image1
File appears valid
Download in progress
.........................
```

3. When the image is successfully downloaded, the switch will ask you to confirm the update:

```
Download Complete
Valid image detected.
Processing 10.x upgrade image - all data in /user will be lost, including
configuration
Confirm upgrade (y/n) ?
```

Enter **y** to continue.

```
Confirm upgrade (y/n) ? y
```

4. When the download has completed, reset the switch:

```
G8296# reload
Reset will use software "image1" and the active config block.
>> Note that this will RESTART the Spanning Tree,
>> which will likely cause an interruption in network service.
Confirm reload (y/n) ?
```

Enter **y** to continue the reload.

5. When the switch finishes rebooting, log in and verify the image to make sure it is the correct image running the correct version of the software:

```
G8296> enable
G8296# display boot
Current ZTP State: Enable
Current FLASH software:
  active image: version 10.6.2.0, downloaded 08:56:56 UTC Tue Feb 7 2017
  standby image: version 10.6.2.0, downloaded 10:56:42 UTC Tue Feb 7 2017
  Uboot: version 10.6.2.0, downloaded 08:56:58 UTC Tue Feb 7 2017
  ONIE: version 10.6.2.0, downloaded 14:48:08 UTC Tue Feb 7 2017
Currently set to boot software active image
Current port mode: default mode
```

Note: If this is first time switching NOS versions the image version may appear as unknown. To fix this:

6. Reinstall the CNOS image again following standard image install methods:

```
G8296# cp tftp tftp://<TFTP server address>/G8296-CNOS-10.6.2.0.imgs
system-image all vrf management
Confirm download operation? (y/n) [n] y
```

7. When prompted to change the active boot image to the standby image, enter **y** to confirm:

```
Boot loader now contains Software Version 10.6.2.0
Standby image now contains Software Version 10.6.2.0
Switch is currently set to boot active image.
Do you want to change that to the standby image? (y/n) [n] y
Switch is to be booted with standby image.
```

Note: After this step, reloading the switch is not mandatory.

Supplemental Information

This section provides additional information about configuring and operating the G8296 and CNOS.

The Boot Management Menu

The Boot Management menu allows you to switch the software image 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.

```
The system is going down for reboot NOW!
INIT: reboot: Restarting system
...

Press shift-B for startup menu or shift-R for recovery mode: ..
Running Startup Menu
...

Boot Management Menu
        I - Change booting image
        C - Change configuration to factory default
        R - Boot in recovery mode (tftp and xmodem download of images to
recover switch)
        P - Reset the Network Administrator (admin) password
        B - Reset the password required to enter privileged exec mode
        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 reset the switch configuration to factory defaults, press **C** and follow the screen prompts.
- To boot in recovery mode, press **R**.
- To reset the Network Administrator account (admin) password, press **P** and follow the screen prompts.
- To reset the password required to enter Privileged EXEC configuration mode, press **B** and follow the screen prompts.
- To reload the switch, press **Q**. The reloading process will start again.
- To exit the Boot Management menu, press **E**. The reloading process continues.

Recovering from a Failed Software Upgrade

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

1. Connect a PC to the serial port of the switch.
2. Open a terminal emulator program that supports TFTP (preferred) or Xmodem download (for example, HyperTerminal, SecureCRT, PuTTY). If using Xmodem, make sure the following settings are in effect:
   - 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 G8296, and when the system begins displaying Memory Test progress (a series of dots), press **Shift + B**. The Boot Management menu will display:

```
The system is going down for reboot NOW!
INIT: reboot: Restarting system
...

Press shift-B for startup menu or shift-R for recovery mode: ..
Running Startup Menu
...

Boot Management Menu
        I - Change booting image
        C - Change configuration to factory default
        R - Boot in recovery mode (tftp and xmodem download of images to
recover switch)
        P - Reset the Network Administrator (admin) password
        B - Reset the password required to enter privileged exec mode
        Q - Reboot
        E - Exit
Please choose your menu option:
```

4. Select **R** for Boot in recovery mode. You will see the following display:

```
Entering Rescue Mode.
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)
        F) Filesystem check
        R) Reboot
        E) Exit

Option?:
```

- If you choose option **T** (TFTP download), go to step 5.
- If you choose option **X** (Xmodem serial download), go to step 6.

5. **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**.

b. 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 G8296-CNOS-10.6.2.0_OS.imgs from TFTP server
10.10.98.100
```

c. When you see the following prompt, enter the image number where you want to install the new software and press **Enter**.

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

d. The following message is displayed when the image download is complete. Continue to step 7.

```
Entering Rescue Mode.
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)
        F) Filesystem check
        R) Reboot
        E) Exit

Option?:
```

6. **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 <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.

   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. When you see the following prompt, enter the image number where you want to install the new software and press **Enter**.

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

   d. The following message is displayed when the image download is complete. Continue to step 7.

```
Entering Rescue Mode.
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)
        F) Filesystem check
        R) Reboot
        E) Exit

Option?:
```

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 **Esc** to re-display the Boot Management menu

New Features in This Release

This release of Lenovo Cloud Network OS contains the following significant fixes, enhancements, and other changes.

Access Control List Logging

ACL logging provides insight into traffic as it passes the network or is dropped by the switch. ACL logging can be CPU intensive and can slow traffic going through the network device. There are two main factors that contribute to the CPU load increase from ACL logging:

- process switching of packets that match log-enabled access control entries (ACEs)
- generating and transmitting log messages

Access Control Lists Remarks

A remark is comment text that can be added to an Access Control List (ACL) to make the ACL configuration easier to understand.

Address Resolution Protocol Refresh

Each Address Resolution Protocol (ARP) entry is checked periodically to determine its state. Based on the entry's state, ARP undertakes certain actions, like refreshing the entry or removing it from the ARP table.

Border Gateway Protocol and Differentiated Services

Border Gateway Protocol (BGP) works with the Differentiated Services (DS) computer networking architecture. You can use differentiated services with BGP to provide low latency to critical network traffic, such as VoIP, while providing best-effort service to noncritical services.

Border Gateway Protocol Unnumbered

Border Gateway Protocol (BGP) unnumbered is useful for quickly setting up large configurations for CLOS based network design. In a multi-chassis system you have a set of lower layer or line card switches that all interconnect through a different set of upper layer or fabric card switches to the fabric chassis.

Boot Management Menu Password Reset

The Boot Management Menu now includes options to reset the network administrator account password and to reset the password required to enter Privileged EXEC configuration mode. For more details, see "The Boot Management Menu" on page 9.

Dynamic ACL/QoS Provisioning for Lenovo HCI Solution with Nutanix

Guest virtual machines (VMs) can now have Access Control Lists (ACLs) attached to them and these ACLs follow the guest from one host to another within the same Nutanix cluster. IP and MAC security filters, QoS and Queue filters for prioritization can be deployed. Filters must be associated with the VM in the configurations of all switches attached to the Nutanix hosts - this can't be done from PRISM.

Dynamic Peer BFD Support

BFD now provides sub-second failure detection between two dynamic BGP peers.

Hybrid Bridge Port Mode

Hybrid bridge port mode is a trunk bridge port mode that lets you have more than one egress untagged VLAN. Like a trunk port, a hybrid port can carry multiple VLANs to receive and pass traffic for them. The hybrid bridge port mode lets you control which VLANs receive tagged egress traffic and which VLANs receive untagged egress traffic. Unlike trunk bridge port mode, the native VLAN is not considered the only VLAN that can send untagged traffic.

IP Subnet VLAN Assignment

IP subnet VLAN assignment lets you configure the switch to assign a VLAN based on the IP subnet for incoming untagged or priority-tagged packets. This feature can also assign a priority to untagged traffic.

IPv6 Neighbor Table Threshold

The IPv6 Neighbor Table threshold has been increased from 7,040 to 40,000 entries.

Layer 2 Failover

The main purpose of Layer 2 Failover is to support Network Adapter Teaming. With Network Adapter Teaming, all the NICs on each server share the same IP address and are configured into a team. One NIC is the primary link and the other is a standby link.

The Manual Monitor (MMON) enables you to configure a set of ports or LAGs to monitor for link failures (a monitor list), and another set of ports or LAGs to disable when the number of forwarding monitor links is less than the trigger limit (a control list). When the switch detects a link failure on the monitor list, it automatically disables the items in the control list. When server ports are disabled, the corresponding server's network adapter can detect the disabled link and trigger a network adapter failover to another port or LAG on the switch or another switch.

Layer 2 Failover works together with static LAGs, Link Aggregation Control Protocol (LACP), and with Spanning Tree Protocol (STP).

Lenovo Ganglia Plug-in

Lenovo Ganglia plug-in helps the telemetry agent to integrate with Ganglia. It provides pull and push mode support to collect telemetry BST statistics, translates data to Ganglia metrics, and provides a visualization tool.

Lightweight Directory Access Protocol

Lightweight Directory Access Protocol (LDAP) is a protocol for accessing distributed directory information services over a network. LDAP is used for authentication and authorization. With an LDAP client enabled, the switch will authenticate a user and determine the user's privilege level by checking with one or more directory servers instead of a local database of users. This prevents customers from having to configure local user accounts on multiple switches; they can maintain a centralized directory instead.

Proxy Address Resolution Protocol

Proxy Address Resolution Protocol (ARP) is a technique in which a device on a given network answers ARP requests intended for another device. The proxy ARP is aware of the location of the traffic's destination and offers its own MAC address as the destination. The received traffic is then routed by the proxy device to the intended destination via another interface or a tunnel. Proxy ARP is primarily used when hosts in the connected subnet are separated by features such as a private VLAN.

Reserved VLANs

Some features, such as OpenFlow and Layer 3 ports (routed ports), require internal VLANs for their operations. You can expand the range of internal VLANs by reserving a contiguous block of VLANs to guarantee the delivery and operation of features with such requirements. These reserved VLANs cannot be created, deleted, modified, or manipulated, unless the reserved VLAN range is reset to the default range (4000-4094).

Sampled Flow

Sampled Flow (sFlow) a technology for monitoring traffic in networks containing switches and routers. The sFlow monitoring system consists of an sFlow Agent and a central sFlow Collector. The sFlow architecture and sampling techniques were designed for providing continuous site-wide and enterprise-wide traffic monitoring of high speed switched and routed networks.

Scheduled Switch Reloads

This feature lets you schedule a switch reload for a later time, enabling you to perform switch upgrades during off-peak hours.

Secure Mode

Secure mode allows you to determine which protocols can be enabled. In secure mode, only secured traffic and secured authentication management are allowed.

Syslog User Action Logging

You can configure whether user actions are logged to the console or to terminals.

VLAN Access Control Lists over Switch Virtual Interfaces

A VLAN ACL is an Access Control List (ACL) that can be assigned to a VLAN rather than to a switch port as with IPv4 ACLs. This is particularly useful in a virtualized environment where traffic filtering and metering policies must follow virtual machines (VMs) as they migrate between hypervisors.

ACLs can now be also configured over Layer 3 Switch Virtual Interfaces (SVIs).

vNIC Statistics for Lenovo HCI Solution with Nutanix

Statistical data is now generated for traffic in and out of a vNIC as defined in PRISM. These statistics are retrieved from the switch(es) attached to the Nutanix hosts.

Warning Message Displayed when Changing the Default Network Administrator Password

The following warning message is displayed reminding the users to change the default Network Administrator password as soon as possible:

```
Warning: Please change the default Network Administrator password as soon
as possible. Note that in the next CNOS release (10.7.x or later), user
will be forced to change the default password upon first successful
login.
```

Weighted ECMP Routes

In traditional ECMP with next hops, each hop is added to the ECMP multipath once so traffic is distributed equally among the next hops. However, in some scenarios, traffic may use one path more than others, causing congestion. A lack of balance can occur because the ECMP hashing algorithm only considers the source, destination, or both when selecting the path, but not the use of the link.

Weighted ECMP lets you configure the multipath based on the use of each link, thus avoiding congestion and obtaining a better balance of traffic. This is achieved by adding the next hops in the multipath from one to four times.

Known Issues

This section describes known issues for CNOS 10.6 on the Lenovo RackSwitch G8296.

Lenovo HCI Solution with Nutanix

This release supports Nutanix AOS software versions 5.1.0 and 5.1.1.

Note: The release of Nutanix AOS 5.1.2 inadvertently removed the network APIs so it cannot be used with ThinkAgile Network Orchestrator. The APIs will be restored in AOS 5.1.3. ThinkAgile Network Orchestrator is supported with Nutanix AOS v5.1.1.3 or 5.1.3.

NSX Gateway

The following limitations exist:

- For optimal performance, it is recommended that the number of VLAN-VxLAN Network Identifier (VNI) mappings does not exceed 1,000 entries. Going above this limit leads to longer convergence times when attaching or detaching the Lenovo hardware Layer 2 gateway to or from NSX logical switches. (ID: 99467)
- For optimal Equal Cost Multiple Paths (ECMP) load balancing, it is recommended that only Layer 3 routed ports are used for connecting to spine switches. (ID: 123627)
- When broadcast, unknown unicast, and multicast (BUM) traffic is received on the switch, it is replicated on all member ports of the same VxLAN Network, except the port that is the source port of the BUM traffic. This is displayed in the source port statistics as dropped packets. (ID: 95658)
- Throughput statistics of the southbound interface of the VxLAN gateway do not display on the NSX GUI. (ID: 113832)
- After Bidirectional Forwarding Detection (BFD) failover, when using the default value for the probe interval of 300 ms, the active service node election takes approximately three seconds to occur. (ID: 116882)
- In the switch Application-specific Integrated Circuit (ASIC), the lookup to VxLAN-translation takes place first, before the dot1q tunnel VLAN. The dot1q tunnel VLAN is not used during VxLAN processing. Therefore, dot1q tunnel feature in conjunction with VxLAN is not operational. (ID: 101708)
- The VLAN used in VLAN-VxLAN Network Identifier (VNI) mapping must be used exclusively for switching within the associated VNI domain. Different access vPorts belonging to the same VLAN must be mapped to the same VNI. Hence, only one-to-one VLAN-VNI bindings are supported. (ID: 100606, 123143)
- In case the vLAG instance goes down on one of the vLAG switches, the MAC addresses learned on that instance are not be moved to the ISL. This means that the traffic will be flooded on both ISL and other potential access ports. The flooding on ISL means that the traffic eventually gets to the vLAG instance on the peer, so no traffic is lost. The hosts on the other access ports drop the traffic as it is not addressed to them. (ID: 108729)

- In case all network ports go down on one of the vLAG switches, all ingress traffic received on the local access ports is flooded to all other local access ports from the same VxLAN Network Identifier (VNI). Flooding stops when the network ports are back up. (ID: 110732)
- In High Availability (HA) mode, the recommended maximum number of local unicast MAC addresses is 32,000. If this limit is exceeded, MAC address synchronization between the vLAG switches might not work properly. More than 32,000 unicast MAC addresses can be used, but the synchronization process fails to function normally. (ID: 113145)

Privileged EXEC Mode Password Persistence

When upgrading the switch firmware image from CNOS version 10.3 or 10.4 to CNOS version 10.6, if there exists a previously configured encrypted password used to enter Privileged EXEC mode, it persists across the upgrade process. It is overwritten only when configuring a new clear text password and the switch running configuration is saved.

If a previously configured encrypted password is still used for entering Privileged EXEC configuration mode after the upgrade process, then only the first eight characters are checked when entering the password.

When downgrading the switch firmware image from CNOS version 10.6 to a previous version, if a previously configured Privileged EXEC encrypted password is present in the switch startup configuration file, then the password persist across the downgrade process. The password is required to enter Privileged EXEC configuration mode after the downgrade process is done. (ID: 119771)

Routed Ports

On the Lenovo RackSwitch G8296, the maximum number of routed ports is 94.

Virtual Ports

Inconsistent behavior occurs when IEEE 802.1Q (dot1q) tunnel traffic is received on a virtual port. (ID: 101708)