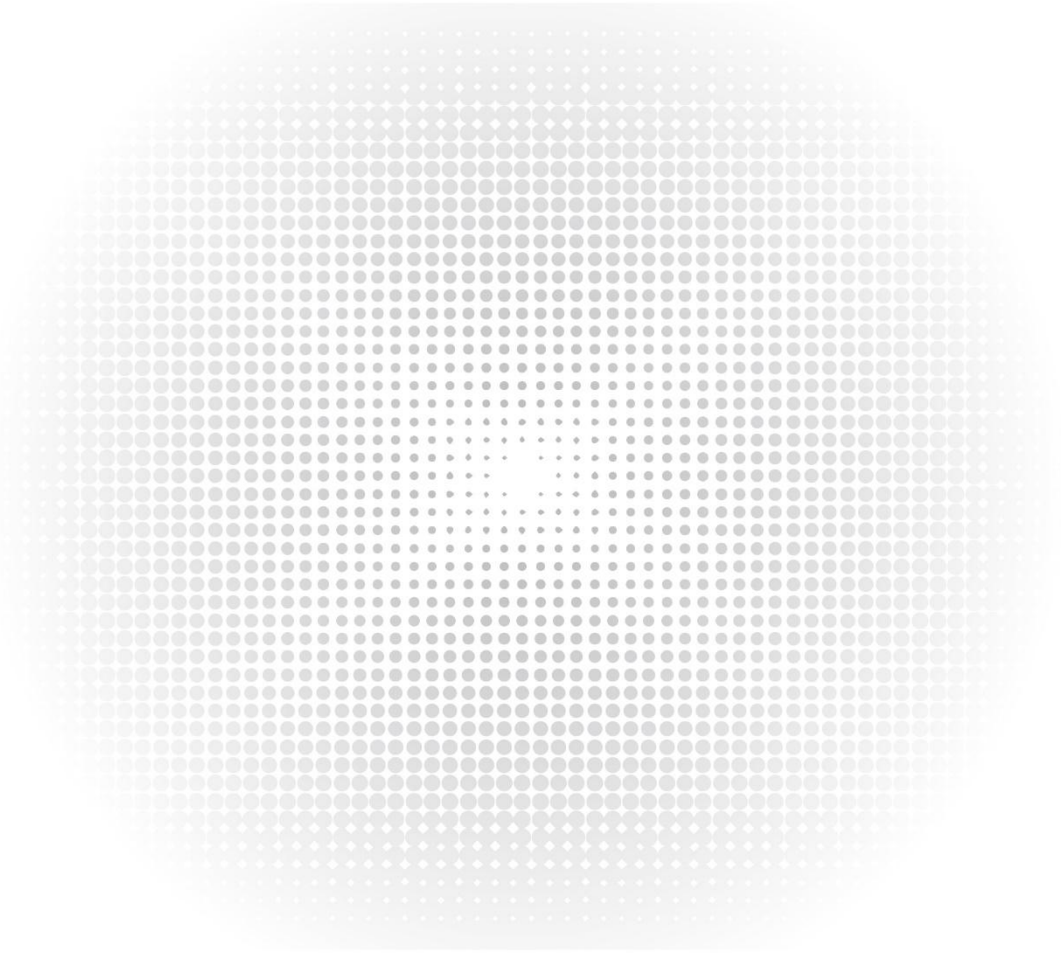
PicOS® FAQ

Models: PicOS®License、PicOS®Switches



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Chapter 1 General PicOS® FAQ

1.1 What is PicOS®?

PicOS® is Network Operating System (NOS) for enterprise networks within distributed campuses and data centers. PicOS® includes legacy Layer-2 / Layer-3 switching mode (L2/L3 mode) and OpenFlow through Open vSwitch (OVS) which is called OVS mode.

1.2 What is OpenFlow?

OpenFlow is becoming a required feature in commercial Ethernet switches, routers and wireless access points – and provides a standardized interface to the forwarding tables, to allow the advantages of an SDN architecture to be realized, independent of the internal workings of their network devices. OpenFlow is open-source software governed by the Open Networking Foundation (https://www.opennetworking.org) and is supported by Pica8.

1.3 What is OVS?

OVS stands for Open vSwitch, which is a multilayer software switch developed by Nicira and now governed by this community: https://www.openvswitch.org. OVS has been ported to the PicOS® environment and is what brings OpenFlow functionality to PicOS®.

1.4 What is ONIE?

ONIE stands for Open Network Install Environment, which is a small operating system, pre-installed as firmware on each switch. It provides an environment for automated operating system provisioning.

1.5 What are switches supported by PicOS®?

PicOS® compatible hardware includes FS, Dell, Delta, and Edgecore. For specific models, please check the documentation (PicOS® Hardware Compatibility Matrix)

1.6 What is a PicOS® License?

A PicOS® license is a legal instrument governing the use and upgrade of PicOS® on a specific device. FS is using a Perpetual License model, which means you own the software and can use your software as long as you want. If there is no legitimate license installed in the switch, only the first four physical ports will be enabled.

The expiration date is applied when you begin to upgrade the switch to a newer version of PicOS®. The upgrade will not take effect if the expiration date is earlier than the build date of the PicOS® image.

1.7 How does PicOS® pricing work? And how long is the license valid for?

FS offers a single license model, which means that each device only needs one license to use all functions anywhere on the network.The cost varies depending on the license speed. Once purchased, the license is permanently valid. If you purchase FS PicOS® switch, you will obtain PicOS® software License, and 5 years technical support service.

1.8 Does PicOS® have a regular update schedule?

We typically release new version updates every 3 to 6 months. When a new PicOS® software version is available, you can find it in the Resource section on the FS website. You have the option to download and install the update from the website, or you can get in touch with your Account Manager (AM) for details on version updates, bug fixes, and new features, as well as to obtain the installation package.

Please note: You can only install the software on hardware that is still under a valid service period. If the license has expired, it is not allowed to upgrade a major release (e.g. 4.1 to 4.2). However, it will not affect upgrading to a minor release (e.g. 4.1 .1 to 4.1.2).

1.9 What are the differences between PicOS® and Cumulus Linux?

Cumulus Linux is a network operating system based on Debian Linux and employs an open network operating system (ONOS) architecture. PicOS®, also based on Debian Linux, is developed by Pica8.

Both Cumulus Linux and PicOS® offer traditional CLI (command-line interface) management and support a wide range of network protocols and features, such as BGP, OSPF, VXLAN, and VRF.

They both provide relatively open platforms, supporting flexible network architecture and deployment options. PicOS® is cost-effective, utilizing ARM for software, which requires lower memory and storage, resulting in lower overall costs.

Cumulus Linux is typically used for building large-scale data center networks and cloud service provider networks, whereas PicOS® is commonly used in enterprise networks and smaller-scale data centers. PicOS® v4.4.x supports most data center applications that Cumulus does.

1.10 PicOS® and FSOS are installed on switches, which one performs better?

When the switch hardware is identical, both PicOS® and FSOS can maximize the chip's performance. However, PicOS® supports ZTP deployment and AmpCon unified management, which can significantly reduce your operational costs.

1.11 Can FSOS switches that have been purchased be switched to PicOS®?

The N8560, S5860, and S5810 series switches can be switched to PicOS®. However, this switch may result in functional changes. In order to ensure stability, we have strict switching protocols in place. You can get in touch with your Account Manager (AM) to submit a request for evaluation. If there is no business impact, we will assist with the switch.

1.12 Where do I download a PicOS® GA version?

If you have the SSO account, please go to "PicOS® and AmpCon™ Release" site and select the PICOS image under PICOS-GA sub-directory.

1.13 What is the MD5 file?

The MD5 and SHA512 files are the MD5 and SHA512 checksum of the associated PICOS image. It is used to check the completeness of the download.

Chapter 2 Installation and configuration

2.1 How do I access the console port?

1. Use a serial to RJ45 reverse cable (i.e. a RS232 serial connector on one end and a RJ45 connector on the other end).

2. Connect the RJ45 reverse connector to the switch's Console port.

3. Connect the RS232 connector to the host.

4. Set the host's terminal emulator:

    baud rate: 115200

    data bits: 8

    stop bits: 1

    parity bits: 0

    flow control: none

2.2 How do I use ONIE to install PicOS®?

1. Copy the PICOS installer to a TFTP, FTP or HTTP server.

2. The original installed NOS could be overwritten by PICOS after installing PICOS. If the NOS is PICOS, it will erase the original configuration.

3. Connect the host to the switch's Console port and connect the switch's Management port to the network to connect to the server.

4. Turn on the switch.

5. Select ONIE in Grub.

6. Select ONIE rescue mechanism.

7. At the ONIE prompt, set switch IP address and launch onie-nos-install. TFTP is used in the following example. It could be replaced by FTP or HTTP. a.b.c.d is the IP address and x is the subnet mask length.

    ONIE# ifconfig eth0 a.b.c.d/x

    ONIE# onie-nos-install tftp://local-tftp-server/<the-downloaded-PicOS-installer>

8. For details, please refer to "PICOS System and Configuration Guide" at http://docs.pica8.com/.

2.3 What is the next step after installing PicOS® successfully?

After installing PicOS® successfully, you can login by using the default username, "admin", and password, "pica8". PicOS® will force you to change the password. Then, you will be in a PicOS® operation mode, and the switch is running in L2/L3 mode.

2.4 When do I use sudo?

sudo stands for super user do. sudo allows the "admin" user account to run those super user executable programs, such as picos_boot, upgrade, reboot, ...

2.5 How do I upgrade the switch?

1. Copy PICOS image and its MD5 file to /cftmp in the switch.

2. Launch the upgrade2 script at /cftmp.

   Please refer to "Upgrading PicOS from Version 2.11 or Later Using Upgrade2" for the details about "upgrade2".

   Example: admin@XorPlus$ cd /cftmp

   admin@XorPlus$ sudo upgrade2 <the-downloaded-PicOS-image>

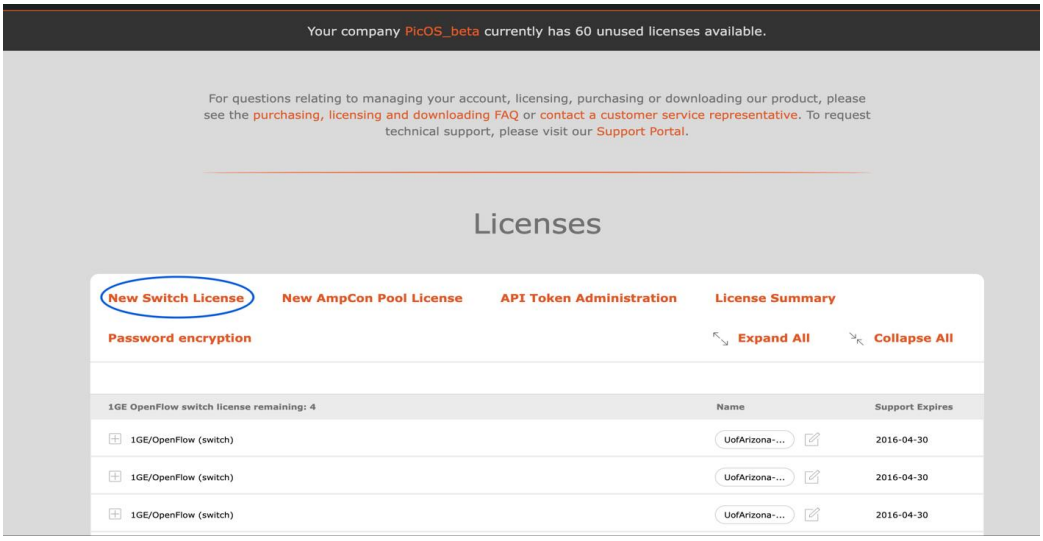
2.6 How do I generate and install the PicOS® license?

1. Get the switch's speed type and hardware ID by issuing the following command at switch's Linux prompt:

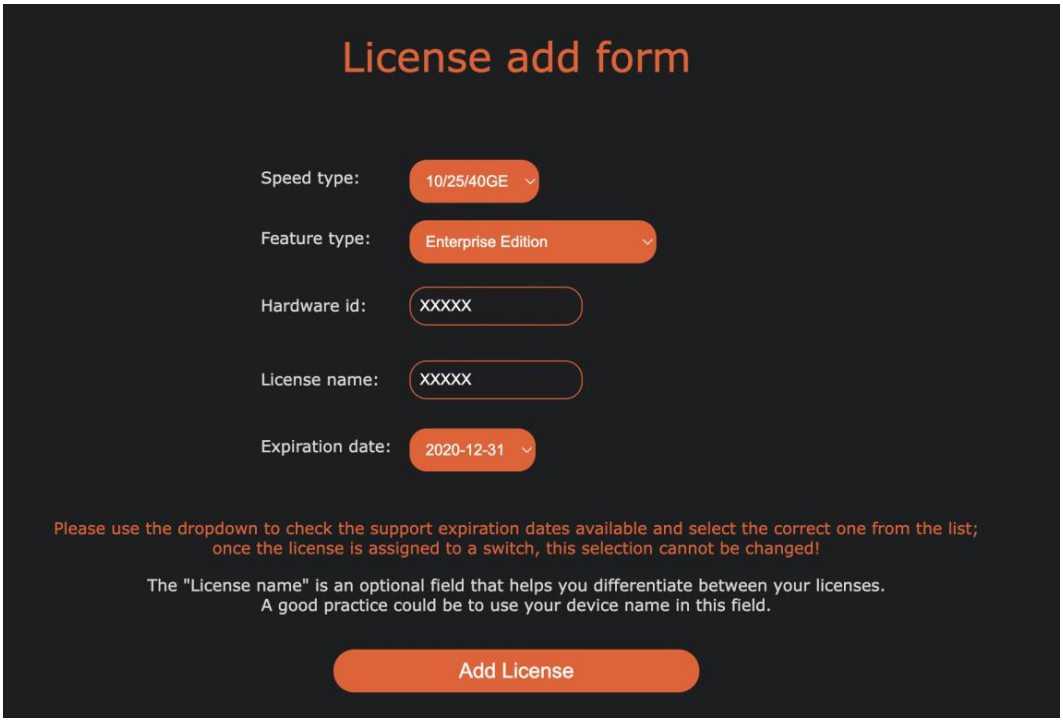
admin@XorPlus$ license –s

2. Use the assigned credential (SSO) by PicOS® License team (license@pica8.com) to login at "License Portal" website.

3. In the "License Portal" page, click "New Switch License" as shown below:

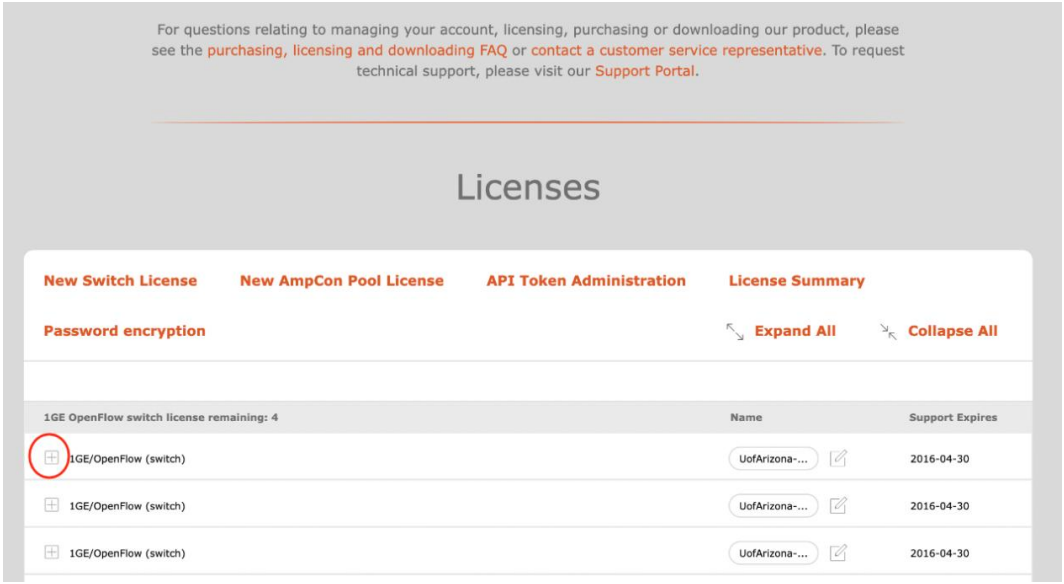


4. In "New Switch License" page, select Speed type and Feature type based on your purchased order. Then, enter the switch's hardware ID. License name is optional.

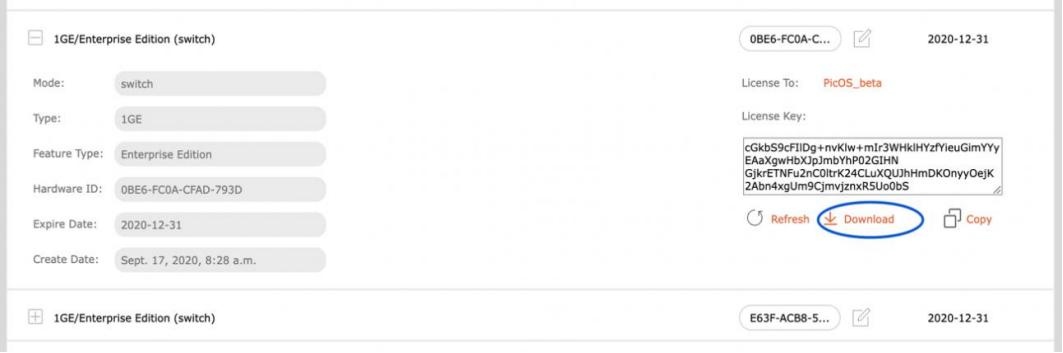


5. After clicking the "Add License" button, the license will be added to the database.

6. Click the "+" sign of the newly added license to display the "Download" button.



7. Click the "Download" button to download the license to the host. The license file name is "hardware_ID.lic". For example: xxxx-xxxx-xxxx-xxxx.lic



8. Copy the downloaded license file (xxxx.lic) to the switch's /home/admin/ folder

9. Install the license by issuing the following command: admin@XorPlus$ sudo license -i /home/admin/xxxx.lic

10. Restart the PicOS® service to activate the license: admin@XorPlus$ sudo reboot

2.7 What happens to the license and configuration after upgrading to a new version?

ONIE installer does not save the license and configuration before installing a different version of PicOS®. Use the upgrade2 script to upgrade the switch to a different version if you want to preserve the license and configuration.

2.8 How do I configure PICOS to start in OVS mode?

By default, the switch starts at L2/L3 mode. Run the "picos_boot" command, enter the needed information and restart the PICOS service.

admin@XorPlus$ sudo picos_boot

Enter the needed information by picos_boot script.

admin@XorPlus$ sudo service picos restart

For details, please refer to "Changing PicOS® Mode from CLI".

2.9 Am I running in L2/L3 mode or OVS mode?

If you can launch the CLI, you are running in L2/L3 mode. Otherwise, you are running in OVS mode.

Example:

admin@PICOS> show version ←CLI command

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==========

Base ethernet MAC Address : 8c:ea:1b:88:5b:81

Hardware Model : AS4610_54T_B

Linux System Version/Revision : 4.3.0/110f8aa30d

Linux System Released Date : 07/09/2022

L2/L3 Version/Revision : 4.3.0/110f8aa30d

L2/L3 Released Date : 07/09/2022

2.10 What are SFP, SFP+ and QSFP optical modules supported by PicOS®?

PicOS® supports any off-the-shelf SFP, SFP+ and QSFP optical modules as long as they are compatible to the standard.

2.11 What is the PicOS® interface naming convention?

PicOS® interface name starts with two alphabetical letters. The first letter identifies the speed, and the second letter is always "e" as in Ethernet. The first two letters are followed by "-1/1"(chassis-number/board-number) and then the last number is the physical port number of the switch.

Here are examples, where x is the port number:

1G/2.5G: ge-1/1/x

10G/25G: te-1/1/x

40G/100G: xe-1/1/x (PICOS 3.2+ release)

2.12 Can I connect the SFP optical module to SFP+ port?

Yes, it will work only if the SFP+ port's link speed is set to 1G.

1. In OVS mode, here is the command to set the interface speed to 1G.

admin@XorPlus$ ovs-vsctl set interface te-1/1/x options:link_speed=1G

2. In L2/L3 mode, here is the CLI command to set the interface speed to 1G.

admin@XorPlus> configure

admin@XorPlus# set interface gigabit-ethernet te-1/1/x speed 1000

admin@XorPlus# commit

You may need to configure the speed of its peer to 1G as well in order to bring up the connection.

2.13 Can I split the QSFP port into four SFP+ ports?

In general, the answer is yes. Due to the hardware limitation, some of the ports are restricted to 40G or 100G only. For

details, please refer to "40G Changes too 4*10G in L2/L3".

2.14 How do I know which PicOS® version is running?

Run "show version" at the Linux prompt to display the running PICOS version.

```
> show version
```

2.15 Can I access switch via ssh?

Yes. By default, you can access the switch via ssh. Telnet is disable by default.

2.16 Where are the PicOS® documents?

The PICOS documents are at https://docs.pica8.com/

Chapter 3 L2/L3 Mode

3.1 What is CLI?

CLI stands for Command Line Interface. It is a user interface to show and configure the L2/L3 configuration.

3.2 How do I launch CLI?

PICOS starts in CLI operation mode if it is running in L2/L3 mode

3.3 How can I enter CLI Configuration mode?

After entering CLI, you are in Operation mode. In Operation mode, you can only enter the CLI commands to display the current configuration. You need to issue "configure" to enter the Configuration mode. Then, you are eligible to configure the current configuration.

```
admin@XorPlus> configure

admin@XorPlus#
```

3.4 What is the IP address of the Management port?

By default, the Management port will get its IP address from the DHCP server. Use the following CLI command to show it:

```
admin@XorPlus> show system management-ethernet
```

You can also configure it to a static IPv4 address in CLI Configuration mode:

```
admin@XorPlus# set system management-ethernet eth0 ip-address IPv4 a.b.c.d/x

admin@XorPlus# commit
```

3.5 Does PicOS® support OpenFlow in L2/L3 mode?

The simple answer is Yes. For details, please refer to "OpenFlow in Crossflow Mode".

3.6 Where are the L2/L3 configuration files?

The L2/L3 configuration files are in the /pica/config/ folder. "pica.conf" is the current running configuration file and "pica_startup.boot" is the configuration file used at service initialization.

3.7 What can I do if I have a problem to report?

Send a problem report to support@pica8.com. The report includes the description of the problem, the network topology and the file generated by the following CLI command:

```
admin@XorPlus> show tech_support
```

3.8 How can I reset the L2/L3 configuration to factory default?

Issue the following CLI command in configuration mode:

```
# rollback default

# commit
```

Chapter 4 OVS Mode

4.1 Which OVS version am I running?

You can get the OVS version running inside the PicOS® with this command: *admin@XorPlus$ ovs-appctl version*

4.2 Why does "ovs-ofctl show < newly-added-bridge-name>" fail after upgrading PicOS®?

It is possibly caused by the changes in OVS DB schemas. Please send the OVS configuration (/ovs/ovs-vswitchd.conf.db) and version information (old and new) to support@pica8.com to evaluate. At the same time, perform the following steps to recover:

admin@XorPlus$ sudo cp /ovs/ovs-vswitchd.conf.db /ovs/ovs-vswitchd.conf.db.orig

admin@XorPlus$ sudo rm /ovs/ovs-vswitchd.conf.db

admin@XorPlus$ sudo service picos restart

Base on /ovs/ovs-vswitchd.conf.db.orig to configure again.

4.3 Why is the link not up after connecting the DAC (Direct Attach Copper) cable?

For DAC cable, the system needs this information to perform properly. admin@XorPlus$ ovs-vsctl set interface <interface-name> options:is_dac=true

4.4 How do I configure a trunk port?

By default, each port is an access port. Issue the following command to configure the port to trunk:

admin@XorPlus$ ovs-vsctl set port <interface-name> vlan_mode=trunk

4.5 How do I change the default VLAN ID?

In PICOS, the default VLAN ID is 1 no matter whether it is access or trunk. You can change it by issuing the following command: admin@XorPlus$ ovs-vsctl set port <interface-name> tag=x

4.6 How do I add VLANs to the trunk port?

If it is not specified, the trunk port supports the entire set of valid VLAN numbers, from 1 to 4094. It only supports the VLANs defined as in trunks as the example below: admin@XorPlus$ ovs-vsctl set port <interface-name> trunks=100,200,300

4.7 I know that the switch behaves according to the application of the Controller. What happens when it is not connected to the Controller?

The behavior of the bridge is defined by its controller failure mode: secure and standalone. By default, a newly added bridge is in secure mode. It can be changed by: admin@XorPlus$ ovs-vsctl set-fail-mode <bridge-name> [standalone |

secure]

4.8 Why does the switch keep dropping the traffic even after adding bridge and ports?

PicOS®/OVS mode adds a default DROP flow (priority=0, actions=drop) to the hardware table when the bridge is in secure mode. If there are no other flows added in the table, the ingress packets will be discarded.

4.9 What happens to the flows added manually before connecting to the Controller?

By default, PicOS®/OVS mode flushes the flows in the hardware table after connecting to the Controller. If you prefer to keep these flows, issue the following command: admin@XorPlus$ ovs-vsctl set bridge <bridge-name> other_config:enable-flush=false

4.10 How will the bridge behave if it is in standalone mode?

PicOS®/OVS mode adds the NORMAL flow (priority=0, actions=normal) to the hardware table when the bridge is in standalone mode. In this case, the bridge will behave as a L2 switch by adding the flows to the hardware table according to the ingress packets.

4.11 Can I delete a flow by using its cookie number?

Yes, the command is: admin@XorPlus$ ovs-ofctl del-flows br0 cookie=<cookie-number>/-1

4.12 What is the command to dump the flows in a bridge's flow table?

admin@XorPlus$ ovs-ofctl dump-flows <bridge-name>

4.13 What is the command to dump the flows in hardware?

admin@XorPlus$ ovs-appctl pica/dump-flows

4.14 How do I disable in-band management?

By default, the remote in-band management to each bridge is enabled in OVS mode. You can disable in-band management by issuing the following command:

admin@XorPlus$ ovs-vsctl set bridge <bridge-name> other-config:disable-in-band=true

4.15 How can I reset OVS configuration to factory default?

Delete the OVS configuration file and restart the PICOS service.

admin@XorPlus$ sudo rm /ovs/ovs-vswitchd.conf.db

admin@XorPlus$ sudo service picos restart

Chapter 5 Service and Warranty

5.1 Can FS provide technical support and maintenance services?

Of course, we have a professional engineering team ready to provide prompt technical support and maintenance services. You can purchase them on-demand through the FS website: https://www.fs.com/c/picos-license-4226. If you already own an FS PicOS® switch, it includes 5 years of free technical service, so no additional purchase is necessary. For more details on our support and maintenance services, please review the following agreements: EULA (End User License Agreement): https://www.fs.com/policies/end_user_license_agreement.html and Standard Software Maintenance and Support Agreement: https://www.fs.com/policies/standard_software_maintenance_and_support_agreement.html.

5.2 Does PicOS® support product demonstrations or trials so that users can better understand the actual operation and effect of the software?

We provide free PicOS-V virtual machines without additional hardware investment, making it easier for users to understand the software function and experience its operation in advance. If you want to know more about PicOS-V, you can check out the FS official website https://www.fs.com/products/195659.html and click Start Trial to start the trial. And if you have any questions during the trial process, you can contact our local customer service in time at https://www.fs.com/contact_us.html.

5.3 Does PicOS® support customization functions?

Yes, FS has established a strategic partnership with Pica8 to offer software development and customization services to our customers, meeting their network customization and future upgrade needs. These services include hardware OEM model adaptation, software product OEM customization, and the development of specific functions tailored to your requirements.

5.4 Does the PicOS® license support only one device?

PicOS® uses a single license model, requiring one license per device. When purchasing a license, make sure to choose the correct speed. Once activated, the license is valid for the lifetime of the device and covers all features. If the switch does not have a valid license installed, only the first four physical ports will be enabled.

5.5 What is the expiration date of the technical support services?

The PicOS® license offers service terms of 1, 3, and 5 years. FS PicOS® switches include five years of free service. After this period, timely renewal is required. If you renew before the original service expires, the new term starts from the original expiration date. If you renew after the original service expires, the new term starts from the order date. For example, if the original service expired on 2023.12.31 and the service was interrupted for 2 months before the customer placed an order on 2024.3.1 for a 1-year service, the renewed service would expire on 2025.2.28.

https://www.fs.com