OpenSwitch OPX Administration Guide

Release 2.2.0

DELL EMC

2018 - 2

Rev. A02

Contents

1

Administration

This information covers tasks needed to properly maintain and upgrade the system running OpenSwitch OPX including system defaults, configuring interfaces, installing Linux packages, logging, and upgrades.

System defaults

When the system boots up, default system configuration is applied:

- All Linux interfaces are created and mapped to physical ports.
- All Linux interfaces are in an Administratively Down state.
- The Management interface is `eth0`, and the management IP address is dynamically assigned using DHCP.
- OpenSwitch OPX processes are activated after system boot up (see Run-time components in the *OpenSwitch OPX Developers Guide* for a list of processes).
- ACL entries are installed to direct control plane packets for protocols (such as LLDP and OSPF) directly to interfaces associated with physical ports (see Default XML configuration files for a list of ACL entries).
- QoS initialization sets up the default scheduler hierarchy and maps all packets to Queue 0.

Remote access

Access the system remotely via SSH, and ensure that the IP address of the Management interface is configured. By default, SSH service is enabled. The user name and password are both `admin`.

```
$ ssh admin@management_ipaddress
```

Topics:

System utility commands

- `opx-config-fanout` — enable or disable interface fan-out on a specific port (see opx-config-fanout)
- `opx-chassis-beacon` — toggle the port LED of an interface to easily identify each time a beacon is sent to check for pending packets on the interface (see opx-chassis-beacon)
- `opx-config-switch` — reconfigure the MAC age-time and view current switch values (see opx-config-switch)
- `opx-ethtool` — display statistics and media information from a Linux interface which maps to a physical port (see opx-ethtool)
- `opx_logging_cli` — enable logging for OpenSwitch OPX (see opx_logging_cli)
- `opx-show-alms` — display current alarms (see opx-show-alms)

- `opx-show-env` — display environmental system components such as temperature, fan, and voltage (see opx-show-env)
- `opx-show-packages` — display specific information for each package installed (see opx-show-packages)
- `opx-show-stats` — display detailed port and VLAN statistics (see opx-show-stats)
- `opx-show-system-status` — display system status information (see opx-show-system-status)
- `opx-show-transceivers` — display information about the current transceiver types (see opx-show-transceivers)
- `opx-show-version` — display OpenSwitch OPX software version information (see opx-show-version)
- `opx-switch-log` — enable SAI-specific logging (see opx-switch-log)

Default XML configuration files

XML configuration files are used for setting configuration defaults. Modify these files according to your network needs.

CAUTION: Modifying configuration files may negatively affect the default system behavior.

- `base_qos_init.xml` — default QoS entries applied to the NPU during system bootup as part of the `systemd` service (file is stored in */etc/opx/base_qos_init.xml*)
- `base_port_physical_mapping_table.xml` — mapping between physical ports and Linux interfaces, and all interfaces created during system boot up (file is stored in */etc/opx/base_port_physical_mapping_table.xml*)
- `config.xml` — configuration parameters for the PAS (file is stored in */etc/opx/pas/config.xml*)
- `device.xml` — platform hardware description (file is stored in */etc/opx/sdi/device.xml*)
- `dn_nas_default_init_config.xml` — default configuration of objects, such as mirroring, sFlow, and VLANs created during system boot up as part of the `systemd` service (file is stored in */etc/opx/dn_nas_default_init_config.xml*)
- `dn_nas_fanout_init_config.xml` — interfaces fanned out during system boot up (file is stored in */etc/opx/dn_nas_fanout_init_config.xml*)
- `entity.xml` — platform hardware entity resource association (file is stored in */etc/opx/sdi/entity.xml*)
- `env_tmpctl_config.xml` — environmental parameters, such as sensor names and the algorithm for the temperature control module (file is stored in */etc/opx/env-tmpctl/config.json*)
- `init.xml` — NPU-related settings during system boot up, such as physical port settings and hashing algorithms (file is stored in */etc/opx/sai/init.xml*)
- `mac_address_alloc.xml` — MAC allocation for interfaces (file is stored in */etc/opx/mac_address_alloc.xml*)
- `nas_master_list.xml` — all ACL entries installed during boot up (file is stored in */etc/opx/acl/nas_master_list.xml*)
- `nas_detail_list.xml` — all fields for ACL entries in the `nas_master_list.xml` file (file is stored in */etc/opx/acl/nas_detail_list.xml*)
- `phy_media_default_npu_setting.xml` — transceiver information, such as transceiver type and speed (file is stored in */etc/opx/phy_media_default_npu_setting.xml*)

Operations

This information describes the configuration required for OpenSwitch OPX operation.

Configure Management interface IP address

Edit the */etc/network/interfaces* file to configure the management IP address.

```
$ cat /etc/network/interfaces
# interfaces(5) file used by ifup(8) and ifdown(8)
# Include files from /etc/network/interfaces.d:
auto eth0
    iface eth0 inet static
        address 10.11.133.40
        netmask 255.255.0.0
        gateway 10.11.133.254
$ service networking restart
```

Secure Management interface

If extra security is desired other than what is provided by SSH, use `iptables` to enable Linux firewall features. You can also set up rate limiting for incoming traffic to prevent denial of service attacks.

Configure physical port

See the *OpenSwitch OPX Configuration Guide* to configure physical port attributes.

Create user accounts

Use standard Linux commands to manage user accounts. Example Linux commands include `useradd`, `userdel`, `usermod`, and `passwd`. Configure access privileges with the `usermod` command.

Configure date and time

Use the `date` command or NTP to configure the date and time.

```
$ date -s "16 FEB 2016 13:12:00"
Tue Feb 16 13:12:00 UTC 2016
```

Maintenance

This information describes how to manage Linux packages and system services.

Manage Linux packages

Use standard Linux utilities to manage Linux packages. These utilities provide a simple way to retrieve and install packages from multiple sources using the Linux command line.

Before installing a package, you must first configure the IP address of the Management port (see Operations).

NOTE: Ensure that the URLs in the sources list configuration files point to the proper repository before installing a Linux package.

Use the `apt-get update` command before installing a package, and use the `dpkg –s package_name` command to check the installation status of a particular package.

System services

To check the status of a service, use the `service service_name status` command to check if the service is up and running, or inactive.

Check service status

```
$ service snmpd status
  snmpd.service - LSB: SNMP agents
  Loaded: loaded (/etc/init.d/snmpd)
  Active: active (running) since Wed 2016-02-17 02:16:06 UTC; 2h 39min ago
  CGroup: /system.slice/snmpd.service
          └─930 /usr/sbin/snmpd -Lsd -Lf /dev/null -u snmp -g snmp -I -smux ...
```

Stop service

```
$ service snmpd stop
$ service snmpd status
  snmpd.service - LSB: SNMP agents
  Loaded: loaded (/etc/init.d/snmpd)
  Active: inactive (dead) since Wed 2016-02-17 05:00:27 UTC; 3s ago
 Process: 3370 ExecStop=/etc/init.d/snmpd stop (code=exited, status=0/SUCCESS)
```

Start service

```
$ service snmpd start
$ service snmpd status
  snmpd.service - LSB: SNMP agents
  Loaded: loaded (/etc/init.d/snmpd)
  Active: active (running) since Wed 2016-02-17 05:00:39 UTC; 1s ago
 Process: 3370 ExecStop=/etc/init.d/snmpd stop (code=exited, status=0/SUCCESS)
 Process: 3395 ExecStart=/etc/init.d/snmpd start (code=exited, status=0/SUCCESS)
  CGroup: /system.slice/snmpd.service
          └─3399 /usr/sbin/snmpd -Lsd -Lf /dev/null -u snmp -g snmp -I -smux...
```

Restart service

```
$ service snmpd restart
$ service snmpd status
  snmpd.service - LSB: SNMP agents
  Loaded: loaded (/etc/init.d/snmpd)
  Active: active (running) since Wed 2016-02-17 05:00:46 UTC; 1s ago
 Process: 3407 ExecStop=/etc/init.d/snmpd stop (code=exited, status=0/SUCCESS)
 Process: 3412 ExecStart=/etc/init.d/snmpd start (code=exited, status=0/SUCCESS)
  CGroup: /system.slice/snmpd.service
          └─3416 /usr/sbin/snmpd -Lsd -Lf /dev/null -u snmp -g snmp -I -smux...
```

Monitoring

OpenSwitch OPX supports network monitoring features to monitor and capture network traffic in the system. It also provides tools to collect port and VLAN statistics and port media information.

System alarms

System alarms alert you to conditions that might prevent normal operation of the switch—ranked by their impact on the network. The following shows the range of alarms—from alarms that have the most impact to alarms that have the least impact on the network:

- **Critical** — critical condition exists and requires immediate action. A critical alarm may be triggered if one or more hardware components has failed, or one or more hardware components has exceeded temperature thresholds.
- **Major** — major error occurred and requires escalation or notification. A major alarm may be triggered if an interface configuration has triggered a critical warning—such as a port-channel being down.
- **Minor** — minor error or non-critical condition occurred that, if left unchecked, might cause system interruption in service or degradation in performance. A minor alarm requires monitoring or maintenance.
- **Informational** — informational error occurred which does not impact performance. An information alarm should be monitored until the condition changes.

Once an alarm is active, it has one of these states:

- **Active** — alarms that are current and not yet acknowledged or cleared
- **Cleared** — alarms that are resolved and the device has returned to normal operation

Some alarms go directly from active to cleared state and require little to no administrative effort. Other alarms with a high severity should be acknowledged or investigated.

Show alarms

```
$ opx-show-alms
2017-07-13 13:31:12.170129 Fan tray 1 absent
2017-07-13 13:34:09.012345 Temperature sensor NPU sensor warning
```

Upgrade software image

Release images are ONIE installers that contain a software image. See the *OpenSwitch OPX Installation Guide* for complete information on using ONIE to upgrade the software image.

Boot different ONIE mode

You can boot a software image from the Linux shell (in OPX runtime) into ONIE.

1 Change the next boot to ONIE using Grub.

```
$ sudo grub-reboot --boot-directory=/mnt/boot ONIE
```

2 Change ONIE mode to Install, Rescue or Uninstall mode.

```
$ sudo /mnt/onie-boot/onie/tools/bin/onie-boot-mode -o install
$ sudo /mnt/onie-boot/onie/tools/bin/onie-boot-mode -o rescue
$ sudo /mnt/onie-boot/onie/tools/bin/onie-boot-mode -o uninstall
```

3 Reboot the switch.

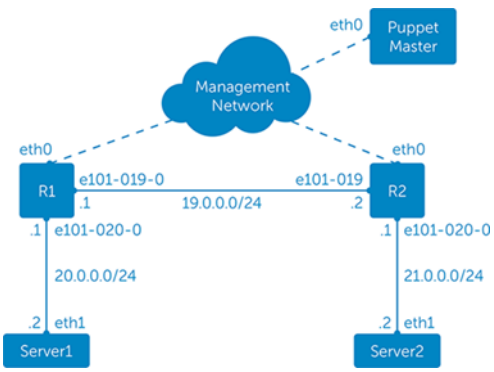
```
$ sudo reboot
```

Next boot to ONIE Install mode

```
$ sudo grub-reboot --boot-directory=/mnt/boot ONIE
$ sudo /mnt/onie-boot/onie/tools/bin/onie-boot-mode -o install
$ sudo reboot

...


  Booting `ONIE: Install OS'

ONIE: OS Install Mode ...
Version   : 3.21.1.1
Build Date: 2015-03-17T12:32-0700
Info: Mounting kernel filesystems... done.
Info: Mounting LABEL=ONIE-BOOT on /mnt/onie-boot ...
Info: Using eth0 MAC address: 34:17:eb:f2:57:c4
Info: Using eth1 MAC address: 34:17:eb:f2:57:c5
Info: eth0:  Checking link... scsi 6:0:0:0: Direct-Access     Generic  Flash Disk       8.07
PQ: 0 ANSI: 4
sd 6:0:0:0: [sdb] 15728640 512-byte logical blocks: (8.05 GB/7.50 GiB)
sd 6:0:0:0: [sdb] Write Protect is off
sd 6:0:0:0: [sdb] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
sd 6:0:0:0: [sdb] Attached SCSI removable disk
up.
Info: Trying DHCPv4 on interface: eth0
...
```

Puppet open source

This use case describes how to use Puppet to configure systems—each system is connected to a server.



1 Install the Puppet master on an external server and configure it to manage systems running the software by following the instructions at www.puppetlabs.com.

2 Install and configure the Puppet agent on both systems by following the instructions at www.puppetlabs.com.

3 Verify if the Puppet master can communicate with the Puppet agents through the management network.

Sample configuration—manifest managing two systems

```
node 'R1.dell.com' {
   $int_enabled = true
   $int_loopback = '2.2.2.2'
   $int_layer3 = {
      e101-019-0  => {'int'=>'e101-019-0', 'address' => '19.0.0.1', 'netmask' =>
'255.255.255.0', 'cidr_netmask' => 24},
      e101-020-0  => {'int'=>'e101-020-0', 'address' => '20.0.0.1', 'netmask' =>
'255.255.255.0', 'cidr_netmask' => 24},
   }

   $bgp = {
       myasn => 65000,
       peergroupv4 => [ { name => 'R2', asn => 65000, peers => [ '19.0.0.2','20.0.0.2' ] } ]
   }
   include ibgp::switch
}

node 'R2.dell.com' {
   $int_enabled = true
   $int_loopback = '3.3.3.3'
   $int_layer3 = {
       e101-019-0  => { 'int'=> 'e101-019-0', 'address' => '19.0.0.2', 'netmask' =>
'255.255.255.0', 'cidr_netmask' => 24 },
       e101-020-0  => { 'int'=> ' e101-020-0','address' => '21.0.0.1', 'netmask' =>
'255.255.255.0', 'cidr_netmask' => 24 },
   }

   $bgp = {
       myasn => 65000,
       peergroupv4 => [ { name => 'R1', asn => 65000, peers => [ '19.0.0.1','20.0.0.1' ] } ]
   }
   include ibgp::switch
}
```

Sample configuration—class definitions

```
class ibgp::switch {
   include ibgp::quagga
}

class ibgp::quagga {
   service { 'quagga':
       ensure    => running,
       hasstatus => false,
       enable    => true,
   }

   file { '/etc/quagga/daemons':
       owner  => quagga,
       group  => quagga,
       source => 'puppet:///modules/ibgp/quagga_daemons',
       notify => Service['quagga']
   }

   file { '/etc/quagga/Quagga.conf':
       owner   => root,
       group   => quaggavty,
       mode    => '0644',
       content => template('ibgp/Quagga.conf.erb'),
       notify  => Service['quagga']
   }
}
```

Sample configuration—Quagga configuration file

```
! This file is managed by Puppet

hostname zebra
log file /var/log/quagga/zebra.log
hostname ospfd
log file /var/log/quagga/ospfd.log
log timestamp precision 6
hostname bgpd
log file /var/log/quagga/bgpd.log
!
password cn321
enable password cn321
!
<%   @int_layer3.each_pair do |layer3, options| -%>
interface <%= options["int"] %>
ip address <%=options["address"]%>/<%=options["cidr_netmask"] %>
no shutdown
<%     end -%>

route-id <%= @int_loopback %>
<% if @bgp -%>
router bgp <%= @bgp["myasn"] %>
 maximum-paths ibgp 4
 bgp router-id <%= int_loopback %>
 bgp log-neighbor-changes
 network <%= @int_loopback %>/32
<%     @int_bridges.each_pair do |bridge, options| -%>    network <%= options["address"] %>/<%=
options["cidr_netmask"] %>
<%     end -%>
<%   @bgp["peergroupv4"].each do |peergroup| -%>
 neighbor <%= peergroup["name"] %> peer-group
 neighbor <%= peergroup["name"] %> remote-as <%= peergroup["asn"] %>
<%     if peergroup["name"]["routereflectorclient"] -%>
 neighbor <% peergroup["name"] %> route-reflector-client
<%     end -%>
<%     peergroup["peers"].each do |peer| -%>
 neighbor <%= peer %> peer-group <%= peergroup["name"] %>
<%     end -%>
<%   end -%>
<% end -%>
!
<% if @int_unnumbered -%>
<%   @int_unnumbbers.each do |interface| -%>
 no passive-interface <%= interface %>
<%   end -%>
 network <%= @int_loopback %>/32 area 0.0.0.0
<%   if @hostnetranges and @is_leaf -%>
<%     @hostnetranges.each do |hostnetrange| -%>
 network <%= hostnetrange %> area 0.0.0.0
<%     end -%>
<%   end
-%>  <% end -%>
```

Sample configuration—Quagga daemons file

```
zebra=yes
bgpd=yes
ospfd=no
ospf6d=no
ripd=no
ripngd=no
isisd=no
babeld=no
```

Nagios Open Source

Nagios provides remote monitoring using a remote plugin executor (NRPE), which communicates with the `check_nrpe` plugin in the Nagios server. This use case describes how to set up a system running the software as a Nagios client (see nagios-plugins for complete information).

Configure Nagios client

To set up a system running OpenSwitch OPX as a Nagios client, install the Nagios NRPE server and Nagios plugins. The Nagios NRPE server is the agent which allows remote system monitoring.

1 Install the Nagios NRPE server on an OpenSwitch OPX system.

```
$ apt-get install nagios-nrpe-server
```

2 Edit the allowed hosts to include the Nagios server IP address. After the Nagios NRPE server successfully installs, edit the allowed hosts field in the */etc/nagios/nrpe.cfg* file and include the Nagios server IP address.

```
$ cat nrpe.cfg
# ALLOWED HOST ADDRESSES
# This is an optional comma-delimited list of IP address or hostnames
# that are allowed to talk to the NRPE daemon. Network addresses with a bit mask
# (i.e. 192.168.1.0/24) are also supported. Hostname wildcards are not currently supported.
# Note: The daemon only does rudimentary checking of the client's IP
# address.  I would highly recommend adding entries in your /etc/hosts.allow
# file to allow only the specified host to connect to the port
# you are running this daemon on.
#
# NOTE: This option is ignored if NRPE is running under either inetd or xinetd
allowed_hosts=10.11.96.94
```

3 Restart the Nagios NRPE server on the system for the allowed host changes to take effect.

```
$ service nagios-nrpe-server restart
$ service nagios-nrpe-server status
  nagios-nrpe-server.service - LSB: Start/Stop the Nagios remote plugin execution daemon
  Loaded: loaded (/etc/init.d/nagios-nrpe-server)
  Active: active (running) since Wed 2016-02-17 22:27:57 UTC; 4s ago
 Process: 8340 ExecStop=/etc/init.d/nagios-nrpe-server stop (code=exited, status=0/SUCCESS)
 Process: 8345 ExecStart=/etc/init.d/nagios-nrpe-server start (code=exited, status=0/SUCCESS)
  CGroup: /system.slice/nagios-nrpe-server.service
          └─8348 /usr/sbin/nrpe -c /etc/nagios/nrpe.cfg -d

[...]
```

4 Install the Nagios plugins. Nagios plugins are extensions to the Nagios Core (Nagios Core is the daemon running on the Nagios server). A plugin monitors the services and resources on an OpenSwitch OPX system and returns the results to the Nagios server. See Nagios.org for more information.

```
$ apt-get install nagios-plugin
```

Configure Nagios server monitoring

1 Update the `clients.cfg` file on the Nagios server with the system IP address to enable monitoring.

```
define host{
        use                     linux-server
        host_name               Dell_OPX
        alias                   client
        address                 10.x.x.x
      }
```

2 Enter check commands in the `commands.cfg` file on the Nagios server to reference the host, service, and contact definitions.

```
define command{
        command_name       check_nrpe
        command_line       $USER1$/check_nrpe -H $HOSTADDRESS$ -c $ARG1$
        }


define command{
```

```
        command_name        check_remote_disk
        command_line        $USER1$/check_disk -w $ARG1$ -c $ARG2$ -p $ARG3$
        }


define command{
        command_name        check_remote_procs
        command_line        $USER1$/check_procs -w $ARG1$ -c $ARG2$ -s $ARG3$
        }
```

3 Edit the `clients.cfg` file on the Nagios server to configure services to be monitored on the system.

```
define service{
        use                             generic-service
           host_name                       Dell_OPX
        service_description             Current Processes
        check_command                   check_nrpe!check_total_procs
        }

define service{
        use                             generic-service
                host_name                       Dell_OPX
        service_description             Current Disk Space
        check_command                   check_nrpe!check_remote_disk
        }
```

2

Troubleshooting

You can use methods and tools available for gathering information and debugging OpenSwitch OPX including coredumps and firmware versions.

Firmware versions	To display version information about installed firmware, open the */var/log/firmware_versions* file.
Transceivers	See opx-show-transceivers to view current transceiver information.

Topics:

Debug port interfaces

During system startup, physical ports map to Linux network interfaces. See Physical ports in the *OpenSwitch OPX Configuration Guide* for information about the naming convention of Linux network interfaces.

Troubleshoot interfaces

- If Linux network interfaces are not created:
  - Check that the NAS process is running, and check the */var/log/syslog* file for errors.
  - If the NAS is not running, check if other processes on which NAS depends are running.
- If physical port interfaces are not enabled (administratively up) in the NPU, check that the SAI/NPU SDK has initialized correctly. You can also use the `journalctl` utility.

Layer 2 troubleshooting

Use Linux commands to troubleshoot Layer 2, and see the `ip link show` command to verify that all Linux network interfaces are created.

Enable NAS and SAI Layer 2 logging

- `opx_logging_cli enable NAS_L2`
- `opx_logging_cli enable INTERFACE`
- `opx_logging_cli enable L2MAC`
- `opx_logging_cli enable SAI_FDB`
- `opx_logging_cli enable SAI_STP`

View NPU-related status

- `opx-switch-shell “l2 show”`
- `opx-switch-shell “stp show”`
- `opx-switch-shell “vlan show”`

Layer 3 troubleshooting

Use `opx_logging_cli` commands to view the contents of NPU log files in Layer 3.

Verify routing-related tables

- `ip route show`
- `arp -a`

IPv6 debugging

- `ip -6 neighbor show`
- `ip -6 route show`

Troubleshoot routing issues in the NPU

- `opx-switch-shell "l3 defip show"`
- `opx-switch-shell "l3 l3table show"`
- `opx-switch-shell "l3 egress show"`

IPv6 routes

- `opx-switch-shell "l3 ip6route show"`
- `opx-switch-shell "l3 ip6host show"`

Multi-path routes

- `opx-switch-shell "l3 multipath show"`
- `opx-switch-shell "l3 egress show"`

Traffic

- `opx-switch-shell "show c"`

Enable NAS and SAI Layer 3 logging

- `opx_logging_cli enable ROUTE`
- `opx_logging_cli enable INTERFACE`
- `opx_logging_cli enable NETLINK`
- `opx_logging_cli enable SAI_NEXT_HOP`
- `opx_logging_cli enable SAI_ROUTE`

Log management

OpenSwitch OPX utilizes primary `systemd-journald` for all system logging. Log entries captured by `journald` can be viewed by the `journalctl` command.

Application logging format

The Syslog format for logging application events is *`date timestamp hostname severity process_name filename function_name line_number string`*.

PAS logging

```
Jun 16 18:16:52 OPX pas_svc: [PAS:PAS]:pas_entity.c:dn_entity_poll:366, PSU 1 is present
Jun 16 18:16:52 OPX pas_svc: [PAS:PAS]:pas_entity.c:dn_entity_poll:366, Fan Tray 1 is present
```

NAS logging

```
Jun 24 18:49:18 OPX nas_svc: [INTERFACE:INT-CREATE]:port/nas_int_port.cpp:nas_int_port_create:
347, Interface created 0:29:e101-021-0 - 22
Jun 24 18:49:18 OPX nas_svc: [INTERFACE:NAS-INT-CREATE], Interface e101-021-0 initial link
state is 2
Jun 24 18:49:18 OPX nas_svc: [INTERFACE:INT-STATE]:port/
nas_int_port.cpp:nas_int_port_link_change:312, Interface state change 0:29 to 2
```

Enable and display application logs (except SAI)

Use the `opx_logging_cli` command to enable/disable logging and display logged events for OpenSwitch OPX applications, except SAI. In the following `opx_logging_cli` commands, OpenSwitch OPX applications are identified by a *module-id* value. Valid values for *module-id* are either the module ID numbers or the modules names (for example, `L3_SERVICES`) shown in the `opx_logging_cli show-id` command output.

- `opx_logging_cli show [all | module-id] {log-level} {log-sub-level}` — display the current log for all, or a specified, OpenSwitch OPX application modules with information at a specified level and sublevel.
- `opx_logging_cli {enable | disable} {all log-level | module-id [log-level]` — enable or disable logging for all OpenSwitch OPX application modules at all levels or for a specified application module at all levels or a specified level.

  If you enter only a module ID, all log levels and log sublevels are enabled or disabled—if you enter only a module ID and log level, all log sublevels are enabled or disabled.

Enable and view SAI application log

The SAI application module has its own specific logging. To enable SAI-specific logs, enter the `opx-switch-log set` command:

```
opx-switch-log set [module_name] [level_name]
```

where:

- *module_name* specifies a SAI module:
  - WRED
  - FDB
  - ROUTE
  - VLAN
  - HOST_INTERFACE
  - ACL
  - MIRROR
  - QOS_QUEUE
  - SCHEDULER_GROUP
  - PORT
  - VIRTUAL_ROUTER
  - NEXT_HOP_GROUP
  - SWITCH
  - POLICER
  - NEIGHBOR
  - UNSPECIFIED
  - SAMPLEPACKET
  - QOS_MAPS

- ALL
- STP
- LAG
- ROUTER_INTERFACE
- NEXT_HOP
- SCHEDULER

- *level_name* sets the SAI logging level to `debug`, `info`, `notice`, `warning`, `critical`, or `error`.

Password recovery

You may need to recover a lost password.

1 Connect to the serial console port and verify that the serials settings are 115200 baud, 8 data bits, no parity.

2 Reboot or power up the system, then press **ESC** at the GNU GRUB prompt to view the boot menu.

```
+----------------------------------------------------------------------------+
|*OPX-A                                                                      |
| OPX-B                                                                      |
| ONIE                                                                        |
+----------------------------------------------------------------------------+
```

3 Press `e` to open the OpenSwitch OPX GRUB editor.

4 Use the arrow keys to highlight the line that starts with `linux`. At the end of the line, add `init=/bin/bash`.

```
+----------------------------------------------------------------------------+
|setparams 'OPX-A'                                                           |
|                                                                             |
|    set root='(hd0,gpt7)'                                                    |
|    echo    'Loading OPX-Base ...'                                                |
|    linux   (hd0,gpt7)/boot/opx.linux console=ttyS0,115200 root=/dev/sda7 \|
|rw init=/bin/bash                                                            |
|    initrd  (hd0,gpt7)/boot/opx.initrd                                       |
+----------------------------------------------------------------------------+
```

5 Press `Ctrl+x` to reboot the system to a password-less root shell.

6 Enter the root password and username.

```
root@OPX:/# passwd admin
```

7 Enter a new password to change the default `admin` password.

```
root@OPX:/# passwd admin
Enter new UNIX password: xxxxxxxxx
Retype new UNIX password: xxxxxxxxxx
passwd: password updated successfully
```

8 Reboot the system to load the OpenSwitch OPX, then enter the new password.

```
root@OPX:/# reboot -f
Rebooting.[  822.327073] sd 0:0:0:0: [sda] Synchronizing SCSI cache

[  822.340656] reboot: Restarting system

[  822.344339] reboot: machine restart
BIOS (Dell Inc) Boot Selector
S6000-ON 3.20.0.0 (32-port TE/FG)
```

Port statistics

Use the `opx-show-stats` command to perform a dump of port and VLAN interface statistics.

- `opx-show-stats if_stat [`*iface_name*`] [`*filter_list*`]` — retrieve statistics for all or specified port interfaces, where:
  - *iface_name* — physical port (such as `opx-show-stats if_stat e101-001-0`)
  - *filter_list* — filters to use to retrieve desired statistics (no filters are applied by default)

- `opx-show-stats vlan_stat [vlan_ifindex] [filter_list]` — retrieve statistics for all or specified VLAN interfaces, where:
  - *`vlan_ifindex`* — VLAN using the interface index
  - *`filter_list`* — filters to use to retrieve desired statistics (no filters are applied by default)
- `opx-show-stats clear [iface_name | vlan_ifindex]` — delete statistics for all or specified port or VLAN interfaces

See Statistics in the *OpenSwitch OPX Configuration Guide* for more information about the `opx-show-stats` command.

3

Linux management

Topics:

opx-config-fanout

Enables or disables interface fan-out on a specific port.

Syntax `opx-config-fanout portID {true | false}`

Parameter

portID	Enter the port ID to enable or disable.

Default None

Example

```
$ opx-config-fanout e101-005-0 true
Key: 1.20.1310766.1310754.1310755.1310756.1310757.
base-port/physical/unit-id = 0
base-port/physical/phy-media = 1
base-port/physical/front-panel-number = 0
base-port/physical/loopback = 0
base-port/physical/hardware-port-id = 45
base-port/physical/npu-id = 0
base-port/physical/fanout-mode = 4
base-port/physical/breakout-capabilities  =  4,2
base-port/physical/port-id = 45
base-port/physical/slot-id = 0
Deleting.. e101-005-0
Completed...

Creating interface e101-005-1
Creating interface e101-005-2
Creating interface e101-005-3
Creating interface e101-005-4
Successfully created interfaces...
```

opx-chassis-beacon

Toggles the port LED of an interface to easily identify each time a beacon is sent to check for pending packets on the interface.

Syntax `opx-chassis-beacon [on | off]`

Parameters

on	Enable the beacon LED.
off	Disable the beacon LED.

Default None

Example

```
$ opx-chassis-beacon on
```

opx-config-switch

Sets and gets values of different switching entities.

Syntax `opx-config-switch [set | show]`

Parameters

set	Reconfigure MAC age-timer and set switch values.
show	Display current switch values.

Default None

Example (set)

```
$ opx-config-switch set switch-id=0 mac-age-timer=1900
Success
```

Example (show)

```
$ opx-config-switch show
Key: 2.2.0966121.
base-switch/switching-entities/switch-count = 1
Key: 1.30.1966121.1966082.1966085.
base-switch/switching-entities/switching-entity/bridge-table-size = 163840
base-switch/switching-entities/switching-entity/acl-table-max-priority = 11
base-switch/switching-entities/switching-entity/acl-entry-min-priority = 0
base-switch/switching-entities/switching-entity/acl-table-min-priority = 0
base-switch/switching-entities/switching-entity/ecmp-hash-fields  =
8,9,5,3,10,4,2,1,7,6
base-switch/switching-entities/switching-entity/npu-identifiers  =  0
base-switch/switching-entities/switching-entity/mac-age-timer = 1800
base-switch/switching-entities/switching-entity/lag-hash-algorithm = 2
base-switch/switching-entities/switching-entity/switch-id = 0
base-switch/switching-entities/switching-entity/temperature = 45
base-switch/switching-entities/switching-entity/switch-mode = 2
base-switch/switching-entities/switching-entity/lag-hash-fields  =
8,9,5,3,10,4,2,1,7,6
base-switch/switching-entities/switching-entity/max-ecmp-entry-per-group = 64
base-switch/switching-entities/switching-entity/ecmp-hash-algorithm = 2
base-switch/switching-entities/switching-entity/acl-entry-max-priority =
2147483647
base-switch/switching-entities/switching-entity/default-mac-address =
90:b1:1c:f4:aa:81
base-switch/switching-entities/switching-entity/max-mtu = 9216
```

opx-ethtool

Display statistics and media information from a Linux interface which maps to a physical port. The output is a subset of the `show-stats` output for the same physical port interface.

Syntax

```
opx-ethtool [-v | -e | -s | -S]
```

Parameters

-v	Display version information
-e	Display transceiver statistics
-s	Display port speed, duplex, and auto-negotiation settings
-S	Display port statistics

Default

None

Example (transceiver statistics)

```
$ opx-ethtool -e e101-001-0
Show media info for e101-001-0
if_index is 17
Key: 2.19.1245389.1245248.1245249.1245250.
base-pas/media/rate-identifier = 0
base-pas/media/oper-status = 0
base-pas/media/category = 3
base-pas/media/voltage-state = 1
base-pas/media/bias-low-warning-threshold =
base-pas/media/vendor-pn = 568400002
base-pas/media/current-temperature = ??
base-pas/media/insertion-cnt = 0
base-pas/media/voltage-low-warning-threshold =
base-pas/media/cc_ext = 162
base-pas/media/length-om2 = 0
base-pas/media/length-om3 = 0
base-pas/media/rx-power-low-alarm-threshold =
base-pas/media/length-om1 = 0
base-pas/media/vendor-id = AP
base-pas/media/media-category/sfp-plus/br-max = 0
base-pas/media/connector = 33
base-pas/media/ext-transceiver = 0
base-pas/media/vendor-Specific =
ffffffffffffff00000000000000000000000000000000000000000000000000
base-pas/media/media-category/sfp-plus/br-min = 0
base-pas/media/encoding = 0
base-pas/media/tx-power-high-warning-threshold =
base-pas/media/vendor-name = Amphenol
base-pas/media/rx-power-low-warning-threshold =
base-pas/media/slot = 1
base-pas/media/port = 1
base-pas/media/vendor-rev = 4700
base-pas/media/slot = 1
base-pas/media/port = 1
base-pas/media/tx-power-low-alarm-threshold =
base-pas/media/bias-low-alarm-threshold =
base-pas/media/capability = 6
base-pas/media/media-category/sfp-plus/sff-8472-compliance = 0
base-pas/media/diag-mon-type = 0
base-pas/media/temp-state = 1
base-pas/media/type = 43
base-pas/media/media-category/qsfp-plus/wavelength-tolerance = 0
base-pas/media/ext-identifier = 0
base-pas/media/temp-low-warning-threshold =
base-pas/media/voltage-high-warning-threshold =
base-pas/media/temp-high-alarm-threshold =
base-pas/media/length-sfm = 0
base-pas/media/rate-select-state = 0
```

```
base-pas/media/rx-power-measurement-type = 0
base-pas/media/wavelength = 0
base-pas/media/cc_base = 54
base-pas/media/temp-low-alarm-threshold =
base-pas/media/tx-power-low-warning-threshold =
base-pas/media/insertion-timestamp = 0
base-pas/media/current-voltage =
base-pas/media/bias-high-alarm-threshold =
base-pas/media/high-power-mode = 1
base-pas/media/br-nominal = 0
base-pas/media/options = 0
base-pas/media/rx-power-high-warning-threshold =
base-pas/media/date-code = 3131303632322000
base-pas/media/present = 1
base-pas/media/transceiver = 0000000000000000205c
base-pas/media/length-cable = 2
base-pas/media/voltage-high-alarm-threshold =
base-pas/media/identifier = 12
base-pas/media/voltage-low-alarm-threshold =
base-pas/media/dell-qualified = 0
base-pas/media/length-sfm-km = 0
base-pas/media/rx-power-high-alarm-threshold =
base-pas/media/admin-status = 0
base-pas/media/serial-number = APF11240020140
base-pas/media/tx-power-high-alarm-threshold =
base-pas/media/temp-high-warning-threshold =
base-pas/media/bias-high-warning-threshold =
base-pas/media/enhanced-options = 0
base-pas/media/media-category/qsfp-plus/max-case-temp = 70
```

Example (port statistics)

```
$ opx-ethtool -S e101-001-0
Statistics for interface e101-001-0
  Ether statistics:
    rx_bytes: 9185614848
    rx_no_errors: 0
    tx_no_errors: 9003181
    tx_total_collision: 0
    rx_undersize_packets: 0
    rx_jabbers: 0
    rx_fragments: 0
    rx_align_errors: 0
    rx_discards: 0
    rx_mcast_packets: 35445
    rx_bcast_packets: 0
    rx_oversize_packets: 0
    tx_oversize_packets: 0
    rx_64_byte_packets: 0
    rx_65_to_127_byte_packets: 0
    rx_128_to_255_byte_packets: 0
    rx_256_to_511_byte_packets: 0
    rx_512_to_1023_byte_packets: 0
    rx_1024_to_1518_byte_packets: 0
    rx_1519_to_2047_byte_packets: 0
    rx_2048_to_4095_byte_packets: 0
    rx_4096_to_9216_byte_packets: 0
    tx_64_byte_packets: 0
    tx_65_to_127_byte_packets: 33217
    tx_128_to_255_byte_packets: 2228
    tx_256_to_511_byte_packets: 0
    tx_512_to_1023_byte_packets: 0
    tx_1024_to_1518_byte_packets: 8967736
    tx_1519_to_2047_byte_packets: 0
    tx_2048_to_4095_byte_packets: 0
    tx_4096_to_9216_byte_packets: 0
```

opx_logging_cli

Enables logging which is maintained in the *var/log/syslog* file. You must restart the module after changing logging levels.

Syntax

```
opx_logging_cli [show-id | show all module-id {log-level value} | enable | disable]
```

Parameters

show-id	Display module IDs and current logging levels.
show	Display current logging status for all or specific module IDs and logging levels.
enable	Enable logging status for all or specific module IDs and logging levels.
disable	Disable logging status for all or specific module IDs and logging levels.
log-level *value*	Set logging levels: · debug · info · notice · warning · error · critical · alert · emerg

Default None

Example

```
$ opx_logging_cli enable all
```

Example (module ID)

```
$ opx_logging_cli enable L3_SERVICES
```

opx-show-alms

Displays current alarms.

Syntax

```
opx-show-alms
```

Parameters None

Default None

Example

```
$ opx-show-alms
2017-07-13 13:31:12.170129 Fan tray 1 absent
2017-07-13 13:34:09.012345 Temperature sensor NPU sensor warning
```

opx-show-env

Displays information about environmental system components, such as temperature, fan, and voltage.

Syntax

```
opx-show-env
```

Parameters None

Default None

Example

```
$ opx-show-env

Node
        Vendor name:                Dell
        Service tag:                 69Y8VS1
        PPID:                                CN-08YWFG-28298-3AR-0087-A00
        Platform name:
        Product name:                        S6000
        Hardware version:
        Number of MAC addresses:         129
        Base MAC address:                 90:b1:1c:f4:a8:30
        Operating status:                 Fail
Power supplies
        Slot 1
            Present:                        Yes
            Vendor name:
            Service tag:
            PPID:                               CN0T9FNW282983AR020
            Platform name:
            Product name:                   CN0T9FNW282983AR020
            Hardware version:
            Operating status:               Up
            Input:                           AC
            Fan airflow:                   Normal
        Slot 2
            Present:                        Yes
            Vendor name:
            Service tag:
            PPID:
            Platform name:
            Product name:
            Hardware version:
            Operating status:               Up
            Input:                           Invalid
            Fan airflow:                   Invalid
Fan trays
        Slot 1
            Present:                        Yes
            Vendor name:
            Service tag:
            PPID:                               CN0MGDH8282983AR028
            Platform name:
            Product name:                   CN0MGDH8282983AR028
            Hardware version:
            Operating status:               Up
            Fan airflow:                   Reverse
        Slot 2
            Present:                        Yes
            Vendor name:
            Service tag:
            PPID:                               CN0MGDH8282983AR028
            Platform name:
            Product name:                   CN0MGDH8282983AR028
            Hardware version:
            Operating status:               Up
            Fan airflow:                   Reverse
        Slot 3
            Present:                        Yes
            Vendor name:
            Service tag:
            PPID:                               CN0MGDH8282983AR028
            Platform name:
            Product name:                   CN0MGDH8282983AR028
            Hardware version:
            Operating status:               Up
            Fan airflow:                   Reverse
Fans
```

```
        Fan 1, PSU slot 1
            Operating status:                Up
            Speed (RPM):                    6720
            Speed (%):                        37
        Fan 1, Fan tray slot 1
            Operating status:                Up
            Speed (RPM):                    6916
            Speed (%):                        38
        Fan 2, Fan tray slot 1
            Operating status:                Up
            Speed (RPM):                    6803
            Speed (%):                        37
        Fan 1, Fan tray slot 2
            Operating status:                Up
            Speed (RPM):                    7188
            Speed (%):                        39
        Fan 2, Fan tray slot 2
            Operating status:                Up
            Speed (RPM):                    7175
            Speed (%):                        39
        Fan 1, Fan tray slot 3
            Operating status:                Up
            Speed (RPM):                    7201
            Speed (%):                        40
        Fan 2, Fan tray slot 3
            Operating status:                Up
            Speed (RPM):                    6698
            Speed (%):                        37
Temperature sensors
        Sensor T2 temp sensor, Card slot 1
            Operating status:                Up
            Temperature (degrees C):    33
        Sensor system-NIC temp sensor, Card slot 1
            Operating status:                Up
            Temperature (degrees C):    25
        Sensor Ambient temp sensor, Card slot 1
            Operating status:                Up
            Temperature (degrees C):    27
    Sensor NPU temp sensor, Card slot 1
            Operating status:                Up
            Temperature (degrees C):    46
```

opx-show-packages

Provides detailed information on OPX packages including name, original and current version, if the package was altered since installation, and a short package description.

Syntax `opx-show-packages`

Parameters None

Default None

Example

```
$ opx-show-packages
Name                 Original Version  Current Version  Altered
Description
================================================================================

libopx-nas-l3-1      2.2.0             2.2.0            No       This package
contains
base layer 3 functionality for the Openswitch software

libopx-nas-l2-1      1.12.0            1.12.0           No       This package
contains
L2 Network abstraction features
```

opx-show-stats

Displays a dump of port and VLAN statistics.

Syntax

```
opx-show-stats [if_stat iface_name filter_list | vlan_stat vlan_ifindex
filter_list | clear iface_name vlan_ifindex]
```

Parameters

if_stat	Statistics for all or specified port interfaces
iface_name	Physical port such as e101-001-0
filter_list	Filters to use to retrieve statistics (no filters are applied by default)
vlan_stat	Statistics for all or a specified VLAN interface
vlan_ifindex	VLAN ID using the interface index
clear	Delete statistics for all or a specific port or VLAN

Default

None

Example

```
$ opx-show-stats if_stat e101-001-0
Key:
if/interfaces-state/interface/statistics/out-discards = 0
dell-if/if/interfaces-state/interface/statistics/ether-oversize-pkts = 0
dell-if/if/interfaces-state/interface/statistics/ether-in-pkts-1024-to-1518-
octets = 1
dell-if/if/interfaces-state/interface/statistics/green-discard-dropped-packets
= 0
if/interfaces-state/interface/statistics/out-unicast-pkts = 1268
dell-if/if/interfaces-state/interface/statistics/ether-undersize-pkts = 0
dell-if/if/interfaces-state/interface/statistics/ether-drop-events = 0
dell-if/if/interfaces-state/interface/statistics/ether-out-pkts-4096-to-9216-
octets = 0
dell-if/if/interfaces-state/interface/statistics/ether-fragments = 0
dell-if/if/interfaces-state/interface/statistics/ether-in-pkts-64-octets = 2
dell-if/if/interfaces-state/interface/statistics/ether-tx-oversize-pkts = 0
dell-if/if/interfaces-state/interface/statistics/ether-octets = 1346983
dell-if/if/interfaces-state/interface/statistics/red-discard-dropped-packets =
0
dell-if/if/interfaces-state/interface/statistics/ether-out-pkts-1024-to-1518-
octets = 1250
if/interfaces-state/interface/statistics/in-discards = 0
if/interfaces-state/interface/statistics/in-broadcast-pkts = 1
if/interfaces-state/interface/statistics/out-errors = 0
dell-if/if/interfaces-state/interface/statistics/ether-rx-no-errors = 32
dell-if/if/interfaces-state/interface/statistics/ether-in-pkts-4096-to-9216-
octets = 0
if/interfaces-state/interface/statistics/out-octets = 1341201
dell-if/if/interfaces-state/interface/statistics/ether-in-pkts-1519-to-2047-
octets = 0
dell-base-if-cmn/if/interfaces-state/interface/statistics/time-stamp =
1499559072
dell-if/if/interfaces-state/interface/statistics/ether-collisions = 0
if/interfaces-state/interface/statistics/in-unknown-protos = 0
dell-if/if/interfaces-state/interface/statistics/ether-in-pkts-128-to-255-
octets = 11
dell-if/if/interfaces-state/interface/statistics/ether-out-pkts-512-to-1023-
octets = 0
dell-if/if/interfaces-state/interface/statistics/ether-tx-no-errors = 1282
dell-if/if/interfaces-state/interface/statistics/ether-crc-align-errors = 0
dell-if/if/interfaces-state/interface/statistics/ether-out-pkts-128-to-255-
octets = 9
dell-if/if/interfaces-state/interface/statistics/ether-pkts = 1314
```

```
if/interfaces-state/interface/statistics/in-unicast-pkts = 17
if/interfaces-state/interface/statistics/out-multicast-pkts = 14
dell-if/if/interfaces-state/interface/statistics/ether-multicast-pkts = 28
dell-if/if/interfaces-state/interface/statistics/ether-broadcast-pkts = 1
dell-if/if/interfaces-state/interface/statistics/ether-out-pkts-65-to-127-
octets = 20
if/interfaces-state/interface/statistics/in-multicast-pkts = 14
dell-if/if/interfaces-state/interface/statistics/ether-in-pkts-512-to-1023-
octets = 1
dell-if/if/interfaces-state/interface/statistics/yellow-discard-dropped-
packets = 0
dell-if/if/interfaces-state/interface/statistics/ether-out-pkts-256-to-511-
octets = 0
dell-if/if/interfaces-state/interface/statistics/ether-rx-oversize-pkts = 0
if/interfaces-state/interface/statistics/in-octets = 5782
dell-if/if/interfaces-state/interface/statistics/ether-jabbers = 0
dell-if/if/interfaces-state/interface/statistics/ether-in-pkts-2048-to-4095-
octets = 0
dell-if/if/interfaces-state/interface/statistics/if-out-qlen = 0
dell-if/if/interfaces-state/interface/statistics/ether-in-pkts-65-to-127-
octets = 17
if/interfaces-state/interface/statistics/in-errors = 0
dell-if/if/interfaces-state/interface/statistics/ether-out-pkts-1519-to-2047-
octets = 0
dell-if/if/interfaces-state/interface/statistics/ether-out-pkts-64-octets = 3
dell-if/if/interfaces-state/interface/statistics/ether-in-pkts-256-to-511-
octets = 0
if/interfaces-state/interface/statistics/out-broadcast-pkts = 0
dell-if/if/interfaces-state/interface/statistics/ether-out-pkts-2048-to-4095-
octets = 0
```

opx-show-system-status

Displays system status information including failed services and corrupted packages.

Syntax `opx-show-system-status`

Parameters None

Default None

Example

```
$ opx-show-system-status
System State:  running
No Failed Service
No Modified Package
```

opx-show-transceivers

Displays information about the transceiver types present.

Syntax `opx-show-transceivers [summary]`

Parameter

summary (Optional) transceiver types summary

Default None

Example

```
$ opx-show-transceivers summary
Front Panel Port  Media Type      Part Number     Serial Number DellQualified
1             QSFP 40GBASE SR4    AFBR-79E4Z-D-FT1 7503832L005V    Yes
2             QSFP 40GBASE SR4    AFBR-79EQDZ-FT1  482943B200GW    Yes
3             QSFP 40GBASE CR4 3M 616750003        CN0FC6KV35D6864 Yes
4             Not Present
5             Not Present
```

```
...
32              Not Present
```

opx-show-version

Displays OpenSwitch OPX software version information.

Syntax `opx-show-version`

Parameters None

Default None

Example

```
$ opx-show-version
OS_NAME="OPX"
OS_VERSION="2.2.0"
PLATFORM="S6000-ON"
ARCHITECTURE="x86_64"
INTERNAL_BUILD_ID="OpenSwitch blueprint for Dell 1.0.0"
BUILD_VERSION="2.2.0.0-dev"
BUILD_DATE="2017-10-27T22:22:51+0000"
INSTALL_DATE="2018-01-11T23:37:31+0000"
SYSTEM_UPTIME= 21 minutes
SYSTEM_STATE= degraded
UPGRADED_PACKAGES=no
ALTERED_PACKAGES=no
```

opx-switch-log

Enables SAI-specific logs.

Syntax `opx-switch-log set [module_name] [level_name]`

Parameters

module_name SAI module:

- WRED
- FDB
- ROUTE
- VLAN
- HOST_INTERFACE
- ACL
- MIRROR
- QOS_QUEUE
- SCHEDULER_GROUP
- PORT
- VIRTUAL_ROUTER
- NEXT_HOP_GROUP
- SWITCH
- POLICER
- NEIGHBOR
- UNSPECIFIED
- SAMPLEPACKET
- QOS_MAPS

- ALL
- STP
- LAG
- ROUTER_INTERFACE
- NEXT_HOP
- SCHEDULER

level_name SAI logging level:

- debug
- info
- notice
- warning
- critical
- error

Default None

Example

```
$ opx-switch-log set wred debug
```