UG-0016 O&M Manual:

NoviKit

For use with NoviWare 250.3

Document Version 3.0

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Change History

Date	Revision No.	Author	Revision Description	Approved
2014-08-21	1.0	Luc Mayrand	First release of the document	Yes
2014-08-22	2.0	Luc Mayrand	Removed commands related to packetcapture that is not supported on the NoviKit	Yes
2014-09-16	3.0	Luc Mayrand	Added comments about the connection to the controllers being dropped and re-established after the commands “set config switch dpid” and “set config pipeline”. Added the command “show status techsupport”. Added the command “show log cli”. Updated the commands “save config entries” and “set status switch reboot/shutdown” to prompt the user to save the configuration. Also made miscellaneous changes to reword and clarify some descriptions.	Yes

1 Introduction

1.1 Purpose and Scope

This document describes the command line interface that facilitates the operation and maintenance features for NoviKit using NoviWare 250.3.

1.2 How to access the CLI interface

The CLI interface can be access directly via the console (CONSL) port or via the management (ETH) port. See Installation NoviKit using Noviware 250.3 Installation Manual UG-0015 for more information.

Function	Command
Access the CLI interface	ssh superuser@10.0.0.5
Enter default password	noviflow

Default address: 10.0.0.5

1.3 Contact and Support Information

For technical support, please contact support@noviflow.com.

2 Detailed Command Descriptions

2.1 General Information about the commands

Please note the commands are case sensitive and accordingly, all commands use lower case letters only.

The types of commands are listed below. To obtain the parameters within the CLI interface, use the tab key and the next level of parameters will appear as a list. Detailed information about the function of the commands including description of valid values for the parameters can be found in the following sections.

Types of commands
set config
set log
set status
set trace - RESTRICTED
del config
show config
show log
show stats

show status
show trace - RESTRICTED
save config
help
exit

Particular with the "show" commands and also applicable to all commands that will potentially output more than one page of information, please note the user can use any key to scroll down. The prompt will return once "q" (quit) is issued in the command line.

2.2 set config controller

To define the IP address and port of the OpenFlow controllers connected to the switch. There can be only one controller per IP address. The controller is identified by a controller group and a controller ID within a group and must be assigned a priority within that group. Whenever no communication is detected to the controller currently connected to the switch within a group, the switch will try to connect to the next controller within that group according to the priority order specified. If no communication is detected with the controller with the lowest priority, the switch will try to connect to the controller with the highest priority.

The Operator must define the IP address, port and security of the associated OpenFlow controller. The switch and controller mutually authenticate by setting up a TLS connection or none as specified in the command.

The settings will be recovered after a reboot.

Limits and standard values:

Maximum number of controllers per switch	128
Maximum number of controllers per group	16
Standard OpenFlow port number	6653

2.2.2 Syntax

set config controller controllergroup controllerid priority ipaddr port security

controllergroup	Controller group. Only one controller within a group is connected to the switch at any given time. The other controllers defined in that group provide redundancy in case of failure to connect. String of up to 16 characters including lower and upper case letters (a-z, A-Z), numbers (0-9) and special characters (-_).

controllerid	Controller ID. String of up to 16 characters including lower and upper case letters (a-z, A-Z), numbers (0-9) and special characters (-_). Must be unique within a group.
priority	Priority of the controller within its group. Value is between 1 (highest priority) and 8 (lowest prority).
ipaddr	OpenFlow controller IP address. Value in dotted decimal format
port	Socket port number. Value between 1024 and 65535. The standard OpenFlow port number is 6653
security	Security can be set to either “tls” or “none”.

2.2.3 Examples

set config controller controllergroup Eastern controllerid C16 priority 2 ipaddr 192.168.1.5 port 6653 security tls

2.3 set config cookie

To specify the value of the cookie sent with packet-in corresponding to different packet-in reasons. For these values to be used the user must specify that cookie values for packet-in must be taken from the user through the command “set config port portno cookie”.

Default values:

Cookie for the “table-miss” reason	0xffffffffffffffff
Cookie for the “mirror to controller” reason	0xffffffffffffffff
Cookie for the “send to controller” reason	0xffffffffffffffff

2.3.1 Syntax

set config cookie [tablemiss] [mirror] [controller]

Note: at least one of the valid parameters must be specified

tablemiss	Cookie value to be sent in packet-in when the packet-in reason is “table-miss”. Value in hexadecimal format between 0x0 and 0xffffffffffffffff.
mirror	Cookie value to be sent in packet-in when the packet-in reason is “mirror to controller”. Value in hexadecimal format between 0x0 and 0xffffffffffffffff.
controller	Cookie value to be sent in packet-in when the packet-in reason is “send to controller”. Value in hexadecimal format between 0x0 and 0xffffffffffffffff.

2.3.2 Examples

set config cookie tablemiss 0x311235 mirror 0x897456 controller 0x6231534

2.4 set config dns

To configure the address of DNS servers used for providing name resolution (name systems). Two DNS servers must be defined. Values will persist over reboot.

Default values:

Primary DNS server	8.8.4.4
Secondary DNS server	8.8.8.8

2.4.2 Syntax

set config dns server1 server2

server1	Primary DNS server IP address. Value in dotted decimal format
Server2	Secondary DNS server IP address. Value in dotted decimal format

2.4.3 Examples

set config dns server1 192.168.2.20 server2 192.168.2.25

2.5 set config meter

A meter table consists of meter entries, defining per-flow meters. Per-flow meters enable OpenFlow to implement various simple QoS operations, such as rate-limiting.

A meter measures the rate of packets assigned to it and enables controlling the rate of those packets. Meters are attached directly to flow entries. Any flow entry can specify a meter in its instruction set the meter measures and controls the rate of the aggregate of all flow entries to which it is attached. Multiple meters can be used in the same table, but in an exclusive way (disjoint set of flow entries).

Each meter may have one or more meter bands. Each band specifies the rate at which

the band applies and the way packets should be processed. Packets are processed by a single meter band based on the current measured meter rate. The meter applies the meter band with the highest configured rate that is lower than the current measured rate. If the current rate is lower than any specified meter band rate, no meter band is applied.

Warning: The meter table will persist but table entries configured will **NOT** be recovered after a reboot.

A meter table is hardcoded with table size of 2000. This table will persist after a reboot.

2.5.1 Syntax

For each meterid, a list of flags needs to be set. The flags must be set to either kbps or pktps with an optional addition of burst and/or stats. The flags set are applied across all the bands within the specified meterid. Optional parameter “stats” ensure that the meter will retain statistical data.

The parameter “bands” represent the number of bands associated with a particular meterid. For each band, type and rate need to be specified and if burst is set in the flags, then burstsize needs to be set.

If the type is set to dscpremark for any particular band, then preclevel needs to be set.

If the Operator wants to redefine the meterid or bands within a meterid, then the meterid needs to be deleted with del config meter meterid before another set config meter meterid is issued.

Set config meter meterid flags bands type rate [burstsize][preclevel]

meterid	Identifies the meter. The maximum number of meters is 64 (id=1-ffff0000).
flags	Flags must be specified and can take on the list of values, which include kbps or pktps; optionally burst or stats can be included in this list. The flags are applied across all the bands within the meterid specified.
bands	Number of meter bands (1-12) must be specified.
type	Type must be specified for each band along with the rate and can be assigned as drop, dscpremark.
rate	Rate must be specified along with the type for each type. The rate can be either in kbps or in pktps depending on the flags set. Range: 64-100,000,000 kbps or 1-1,525,000 pktps.
burstsize	Burstsize must be specified along with type and rate per band if flags include burst. If flags is set to kbps or mbps, the burstsize is in kilobits or megabits and if it is set to pktps then burstsize is in packets.In kilobits (256B-128MB) or in packets (1p-1073kp). Ranges: 0-rate kilobits/packets
preclevel	Number of drop precedence level must be included only if type is “dcpremark” range of values: 0-7

2.5.2 Examples

set config meter meterid 12 flags pktps bands 2 type dscpremark rate 128 preclevel 6 type drop rate 256

2.6 set config ntp

To configure the address of NTP servers used to synchronize the system date and time. Two NTP servers must be defined. Values will persist over reboot.

Default values:

Primary NTP server	ntp.og
Secondary NTP server	1.centos.pool.ntp.org

2.6.2 Syntax

set config ntp server1 server2
set config ntp on/off

server1	Primary NTP server hostname or IP address. Value of IP address is in dotted decimal format. To enter a hostname, a valid DNS server must be previously defined using the command “set config dns”.
Server2	Secondary NTP server hostname or IP address. Value of IP address is in dotted decimal format. To enter a hostname, a valid DNS server must be previously defined using the command “set config dns”.

Synchronization with an NTP server can be enabled or disabled by entering the value “on” or “off” instead of the parameters “server1” and “server2”. By default synchronization with an NTP server is disabled (off).

2.6.3 Examples

set config ntp server1 192.168.2.10 server2 192.168.2.15
set config ntp on

2.7 set config pipeline

The purpose of this command is to create the tables with associated tablesizes and tablewidths. The command is structured such that a list of sizes is entered sequentially, followed by a list of witdths. If n sizes and widths are entered, then n tables, corresponding to tableid 0 to n-1 (where n <= 28) are created with the associated table sizes and widths. If an error is made, then the command needs to be reissued with the revised lists.

The tables, tablesizes and tablewidths set by this command will persist after reboot. The connection towards all controllers is dropped and re-established when this command is issued.

By default, there are in total 28 tables, each having the same table size of 4095 rows. Each row is 40 bytes wide.

Matchfields are set by default for the defined tables depending on the width of the table, as noted in the description of the command “set config table”. These values can be changed by command or by the controller and the latest values defined will persist after reboot.

2.7.1 Syntax

set config pipeline tablesizes [tablewidths]
set config pipeline default

tablesizes	List of table sizes. Value for each table varies depending on the value of the associated table width. See the table below. The sum of all B values for all tables must be between 1 and 124 on the NS-1132. On the NS-1248 the sum of all B values must be between 1 and 248 but only the value for table 0 can be greater than 124.
tablewidths	List of table widths. Value can be 10, 20, 40 or 80 bytes. If this parameter is not specified the default value for all tables is 40.
default	To reset the pipeline configuration to its default values (28 tables with 4095 rows and 40 bytes wide). No value is required for this parameter

Table width	N	Table size
10	4096	B*N-1
20	2048	
40	1024	
80	512	

2.7.2 Examples

set config pipeline tablesizes 20479 2047 10239 tablewidths 10 20 40

2.8 set config port

To manually configure the ports. Unlike in a conventional switch, in the OpenFlow context the OpenFlow controller normally configures the ports. However, for troubleshooting or testing purposes, the operator may want to configure the ports manually.

The ports are configured by default to support link rates of 1 Gb or 10Gb full duplex depending on the type of port modules inserted in the switch.

It is also possible to assign certain types of messages to a priority queue or to specify how cookie values are set on the controller port used for sending Packet-in messages.

Warning: The controller will be informed of these changes in the port configurations, and these changes can be either ignored or overridden by the controller. The configuration set for the ports will be recovered after a reboot.

Default values:

portdown	off
nopacketin	off
norecv	off
nofwd	off
cookie	controllerdefined

2.8.2 Syntax

set config port portno [portdown] [norecv] [nofwd] [nopacketin]
set config port portno cookie

portno	Port number. Value between 1 and 28 or “controller”. Please refer to the NoviKit Configurations document UG-0002 for the maximum port number.
portdown	Port is administratively down. Value is “on” or “off” where “on” means the port is down.
norecv	Drop all packets received by port. Value is “on” or “off” where “on” means all packets are dropped by the port.
nofwd	Drop packets forwarded to port. Value is “on” or “off” where “on means all packets forwarded to port will be dropped.
nopacketin	Do not send packet-in messages for port. Value is “on” or “off”, where “on” means no packet-in-messages will be received by this port.
cookie	Select if the value of the cookie sent in packet-in is taken from the flow entry sent by the controller or from the user through the command “set config cookie”. Only valid when portno=controller. Value is “controllerdefined” or “userdefined”.

2.8.3 Examples

set config port portno 16 portdown on
set config port portno 5 nofwd on
set config port portno controller cookie userdefined

2.9 set config switch

To define the configuration of the switch, including

1) Changing the IP address of the switch “of” port and if required the corresponding netmask;
2) Enabling DHCP;
3) Specifying the maximum number of bytes of a packet that should be sent to the OpenFlow controller – miss_send_len;
4) Setting the Datapath ID - dpid;

5) Specifying the interval between echo messages;
6) Specifying the network routing IP address for the “of” port and if required the corresponding netmask, gateway;
7) Setting the system date and time;
8) Setting the system host name;
9) Setting the TCP buffer size for the OpenFlow interface.

All set configuration will be recovered after a reboot.

Default values:

IP address and netmask of the switch	10.0.0.5 255.255.0.0
netipaddr	0.0.0.0 255.255.0.0
gateway	10.0.0.1
DHCP	off
miss_send_len	128
dpid	0x00FAxxxxxxxxxxx
echo interval	15
tcpbufferin	16
tcpbufferout	16

2.9.2 Syntax

set config switch device ipaddr netmask
set config switch device [dhcp]
set config switch [misssendlen] [dpid] [echo]
set config switch device netipaddr netmask gateway
set config switch [date] [time] [timezone]
set config switch hostname
set config switch device [tcpbufferin] [tcpbufferout]

device	Port designation. The only valid value for NoviKit is “eth”. This port is used as the management port and for the OpenFlow interface towards to controller
ipaddr	Switch IP address. Value in dotted decimal format
netmask	IP address netmask. Value in dotted decimal format

dhcp	Enable DHCP. The only valid value is “on”. DHCP is turned off by configuring a static IP address using the parameters “device” and “ipaddr”
misssendlen	Maximum number of bytes of a packet that should be sent to the OpenFlow controller. Value between 0 and 1518 WARNING: The controller will be informed of these changes in the flow tables, and these changes can be either ignored or overridden by the controller.
dpid	Datapath ID. Value in 0xXXXXXXXXXXXXXXXX format. By default the lower 48-bits is a MAC address, while the upper 16-bits are user defined. By default, the upper 16-bits reflect the NoviWare version, i.e. 250 or 0x00FA. The connection towards all controllers is dropped and re-established when this value is changed.
echo	Interval between Echo messages. Value in seconds between 2 and 255. Also sets the maximum time to receive an Echo Reply message before the connection to the controller is dropped to echo-1.5 seconds
netipaddr	IP of forwarding network/subnet.
gateway	Network routing gateway. Value in dotted decimal format
date	System date. The value in dd/mm/yyyy format
time	System time based on 24 hour clock. The value in hh:mm:ss format
timezone	Time zone abbreviation format UTC±HH[:MM].
hostname	System host name used as the system prompt. String of up to 32 characters including lower and upper case letters (a-z, A-Z), numbers (0-9) and special characters (-_).
tcpbufferin	TCP buffer size for the incoming OpenFlow interface. Value between 2 and 8192 in KB (must be a power of 2). One of the 2 TCP buffer size parameters must be specified.
tcpbufferout	TCP buffer size for the outgoing OpenFlow interface. Value between 2 and 8192 in KB (must be a power of 2). One of the 2 TCP buffer size parameters must be specified.

2.9.3 Examples

set config switch device eth ipaddr 192.168.1.1 netmask 255.255.255.0

set config switch device eth dhcp on

set config switch misssendlen 1500

set config switch dpid 0x00FA123456789ABC

set config switch echo 5

set config switch device eth netipaddr 192.168.1.1 netmask 255.255.255.0
gateway 10.1.1.2

set config switch date 12/09/2013 time 21:43:00 timezone UTC-5

set config switch hostname switch253

set config switch device eth tcpbufferout 32

2.10 set config table

To manually reconfigure the default matchfields associated with the existing tables.

The OpenFlow controller normally configures the tables. However, for troubleshooting or testing purposes, the operator may want to configure the tables manually. This command corresponds to a Multipart Table Features Request message in the OpenFlow protocol.

The total size of the match fields associated to a table cannot exceed 80 bytes and is limited by the width of the table. TCP, UDP and SCTP addresses (SRC and DST) share the same storage space since they are mutually exclusive. If one of these source or destination address match fields is specified, all of these source or destination address match fields get associated with the table. The number of match fields specified in the list is limited and dependant on the fields selected even if the total width is less than the table width.

To change the match fields associated to a table, the command "set config table" must be reissued to overwrite the configuration of this table.

Warning: The controller can override the match fields set. The **values set by command or by the controller** will be recovered after a reboot.

2.10.1 Syntax

set config table tableid matchfields

tableid	Table ID. Value between 0 and 27
matchfields	List of match fields separated by spaces. See valid values in the table below

MATCH FIELD	VALUE	DESCRIPTION
OFPXMT_OFB_IN_PORT	0	Switch input port.
OFPXMT_OFB_IN_PHY_PORT	1	Switch physical input port.
OFPXMT_OFB_METADATA	2	Metadata passed between tables.
OFPXMT_OFB_ETH_DST	3	Ethernet destination address.
OFPXMT_OFB_ETH_SRC	4	Ethernet source address.
OFPXMT_OFB_ETH_TYPE	5	Ethernet frame type.
OFPXMT_OFB_VLAN_VID	6	VLAN id.
OFPXMT_OFB_VLAN_PCP	7	VLAN priority.
OFPXMT_OFB_IP_DSCP	8	IPDSCP (6 bits in ToS field).
OFPXMT_OFB_IP_ECN	9	IPECN (2 bits in ToS field).
OFPXMT_OFB_IP_PROTO	10	IP protocol.
OFPXMT_OFB_IPV4_SRC	11	IPv4 source address.
OFPXMT_OFB_IPV4_DST	12	IPv4 destination address.
OFPXMT_OFB_TCP_SRC	13	TCP source port.
OFPXMT_OFB_TCP_DST	14	TCP destination port.
OFPXMT_OFB_UDP_SRC	15	UDP source port.
OFPXMT_OFB_UDP_DST	16	UDP destination port.
OFPXMT_OFB_SCTP_SRC	17	SCTP source port.
OFPXMT_OFB_SCTP_DST	18	SCTP destination port.
OFPXMT_OFB_ICMPV4_TYPE	19	ICMP type.
OFPXMT_OFB_ICMPV4_CODE	20	ICMP code.
OFPXMT_OFB_ARP_OP	21	ARP opcode.
OFPXMT_OFB_ARP_SPA	22	ARP source IPv4 address.
OFPXMT_OFB_ARP_TPA	23	ARP target IPv4 address.
OFPXMT_OFB_ARP_SHA	24	ARP source hardware address.
OFPXMT_OFB_ARP_THA	25	ARP target hardware address.
OFPXMT_OFB_IPV6_SRC	26	IPv6 source address.
OFPXMT_OFB_IPV6_DST	27	IPv6 destination address.
OFPXMT_OFB_IPV6_FLABEL	28	IPv6 Flow Label
OFPXMT_OFB_ICMPV6_TYPE	29	ICMPv6 type.
OFPXMT_OFB_ICMPV6_CODE	30	ICMPv6 code.
OFPXMT_OFB_IPV6_ND_TARGET	31	Target address for ND.
OFPXMT_OFB_IPV6_ND_SLL	32	Source link-layer for ND.
OFPXMT_OFB_IPV6_ND_TLL	33	Target link-layer for ND.
OFPXMT_OFB_MPLS_LABEL	34	MPLS label.
OFPXMT_OFB_MPLS_TC	35	MPLS TC.
OFPXMT_OFP_MPLS_BOS	36	MPLS BoS bit.
OFPXMT_OFB_PBB_ISID	37	PBB I-SID.
OFPXMT_OFB_TUNNEL_ID	38	Logical Port Metadata.
OFPXMT_OFB_IPV6_EXTHDR	39	IPv6 Extension Header pseudo-field

NOVI_OXM_PAYLOAD	1 (EXP)	UDP Payload (only set via OpenFlow)

Default table config (supported match fields) for table 0 =

TABLE 0 – WIDTH 10 BYTES	TABLE 0 – WIDTH 20 BYTES	TABLE 0 – WIDTH 40 BYTES	TABLE 0 – WIDTH 80 BYTES
OFPXMT_OFB_IN_PORT	OFPXMT_OFB_IN_PORT	OFPXMT_OFB_IN_PORT	OFPXMT_OFB_IN_PORT
OFPXMT_OFB_ETH_DST	OFPXMT_OFB_ETH_DST	OFPXMT_OFB_ETH_DST	OFPXMT_OFB_IN_PHY_PORT
OFPXMT_OFB_ETH_TYPE	OFPXMT_OFB_ETH_SRC	OFPXMT_OFB_ETH_SRC	OFPXMT_OFB_ETH_DST
	OFPXMT_OFB_ETH_TYPE	OFPXMT_OFB_ETH_TYPE	OFPXMT_OFB_ETH_SRC
	OFPXMT_OFB_VLAN_VID	OFPXMT_OFB_VLAN_VID	OFPXMT_OFB_ETH_TYPE
	OFPXMT_OFB_VLAN_PCP	OFPXMT_OFB_VLAN_PCP	OFPXMT_OFB_VLAN_VID
	OFPXMT_OFB_IP_PROTO	OFPXMT_OFB_IP_PROTO	OFPXMT_OFB_VLAN_PCP
		OFPXMT_OFB_IPV4_SRC	OFPXMT_OFB_IP_PROTO
		OFPXMT_OFB_IPV4_DST	OFPXMT_OFB_IPV4_SRC
		OFPXMT_OFB_TCP_SRC	OFPXMT_OFB_IPV4_DST
		OFPXMT_OFB_TCP_DST	OFPXMT_OFB_TCP_SRC
		OFPXMT_OFB_UDP_SRC	OFPXMT_OFB_TCP_DST
		OFPXMT_OFB_UDP_DST	OFPXMT_OFB_UDP_SRC
			OFPXMT_OFB_UDP_DST
			OFPXMT_OFB_SCTP_SRC
			OFPXMT_OFB_SCTP_DST
			OFPXMT_OFB_ICMPV4_TYPE
			OFPXMT_OFB_ICMPV4_CODE
			OFPXMT_OFB_ARP_OP
			OFPXMT_OFB_IPV6_SRC
			OFPXMT_OFB_IPV6_DST
			OFPXMT_OFB_ICMPV6_TYPE
			OFPXMT_OFB_ICMPV6_CODE
			OFPXMT_OFB_MPLS_LABEL
			OFPXMT_OFB_PBB_ISID

Default table config (supported match fields) for table 1 =

TABLE 1 – WIDTH 10 BYTES	TABLE 1 – WIDTH 20 BYTES	TABLE 1 – WIDTH 40 BYTES	TABLE 1 – WIDTH 80 BYTES
OFPXMT_OFB_IN_PORT	OFPXMT_OFB_IN_PORT	OFPXMT_OFB_IN_PORT	OFPXMT_OFB_IN_PORT
OFPXMT_OFB_IN_PHY_PORT	OFPXMT_OFB_IN_PHY_PORT	OFPXMT_OFB_IN_PHY_PORT	OFPXMT_OFB_IN_PHY_PORT
OFPXMT_OFB_ETH_DST	OFPXMT_OFB_ETH_DST	OFPXMT_OFB_ETH_DST	OFPXMT_OFB_ETH_DST
		OFPXMT_OFB_IPV6_SRC	OFPXMT_OFB_ETH_SRC
		OFPXMT_OFB_IPV6_DST	OFPXMT_OFB_ETH_TYPE
			OFPXMT_OFB_VLAN_VID
			OFPXMT_OFB_VLAN_PCP
			OFPXMT_OFB_IP_PROTO

			OFPXMT_OFB_IPV4_SRC
			OFPXMT_OFB_IPV4_DST
			OFPXMT_OFB_TCP_SRC
			OFPXMT_OFB_TCP_DST
			OFPXMT_OFB_UDP_SRC
			OFPXMT_OFB_UDP_DST
			OFPXMT_OFB_SCTP_SRC
			OFPXMT_OFB_SCTP_DST
			OFPXMT_OFB_ICMPV4_TYPE
			OFPXMT_OFB_ICMPV4_CODE
			OFPXMT_OFB_ARP_OP
			OFPXMT_OFB_IPV6_SRC
			OFPXMT_OFB_IPV6_DST
			OFPXMT_OFB_ICMPV6_TYPE
			OFPXMT_OFB_ICMPV6_CODE
			OFPXMT_OFB_MPLS_LABEL
			OFPXMT_OFB_PBB_ISID

Default table config (supported match fields) for table 2 to 27 =

TABLE X – WIDTH 10 BYTES	TABLE X – WIDTH 20 BYTES	TABLE X – WIDTH 40 BYTES	TABLE X – WIDTH 80 BYTES
OFPXMT_OFB_IN_PORT	OFPXMT_OFB_METADATA	OFPXMT_OFB_METADATA	OFPXMT_OFB_METADATA
OFPXMT_OFB_ETH_DST	OFPXMT_OFB_IN_PORT	OFPXMT_OFB_IN_PORT	OFPXMT_OFB_IN_PORT
OFPXMT_OFB_ETH_TYPE	OFPXMT_OFB_ETH_DST	OFPXMT_OFB_ETH_DST	OFPXMT_OFB_IN_PHY_PORT
	OFPXMT_OFB_ETH_SRC	OFPXMT_OFB_ETH_SRC	OFPXMT_OFB_ETH_DST
	OFPXMT_OFB_ETH_TYPE	OFPXMT_OFB_ETH_TYPE	OFPXMT_OFB_ETH_SRC
		OFPXMT_OFB_VLAN_VID	OFPXMT_OFB_ETH_TYPE
		OFPXMT_OFB_IP_PROTO	OFPXMT_OFB_VLAN_VID
		OFPXMT_OFB_IPV4_SRC	OFPXMT_OFB_VLAN_PCP
		OFPXMT_OFB_IPV4_DST	OFPXMT_OFB_IP_PROTO
		OFPXMT_OFB_TCP_SRC	OFPXMT_OFB_IPV4_SRC
		OFPXMT_OFB_TCP_DST	OFPXMT_OFB_IPV4_DST
		OFPXMT_OFB_UDP_SRC	OFPXMT_OFB_TCP_SRC
		OFPXMT_OFB_UDP_DST	OFPXMT_OFB_TCP_DST
			OFPXMT_OFB_UDP_SRC
			OFPXMT_OFB_UDP_DST
			OFPXMT_OFB_SCTP_SRC
			OFPXMT_OFB_SCTP_DST
			OFPXMT_OFB_ICMPV4_TYPE
			OFPXMT_OFB_ICMPV4_CODE

			OFPXMT_OFB_IPV6_SRC
			OFPXMT_OFB_IPV6_DST
			OFPXMT_OFB_MPLS_LABEL
			OFPXMT_OFB_PBB_ISID

2.10.2 Examples

set config table tableid 2 matchfields 1 10 11

2.11 set config user

To configure user access to the management and console ports.

Warning: This command is restricted to the user “superuser” and any additional users created by “superuser” in “admin” group. User names “all”, “root” and “superuser” are not valid or reserved. Users in the “admin” group can create users in the “monitoring” group but NOT other users in the “admin” group. “superuser” can create users in the “admin” group and in the “monitoring” group.

Users already configured need to be deleted prior to changing the password or group associated with the users, except for “superuser” that cannot be deleted.

All users set will be recovered after a reboot.

2.11.1 Syntax

set config user username password group

username	User name. String of up to 32 characters including lower and upper case letters (a-z, A-Z), numbers (0-9) and special characters (-_.). The user name “superuser” exists by default and cannot be deleted. User names “all” and “root” are not valid
password	User password. String of up to 32 characters including lower and upper case letters (a-z, A-Z), numbers (0-9) and special characters (-_.). The default password for “superuser” is “noviflow”
group	User group. “root” and “superuser” are reserved. Valid values are “admin” with access to all commands except user related commands and “monitoring” with access only to the show commands. Group is not specified when user=superuser

2.11.2 Examples

set config user username operator_1 password opUser3425 group monitoring

set config user username superuser password superuserpw

2.12 set log

To manage the logging of flow entry changes (add, modify, delete), OpenFlow errors, and OpenFlow messages.

Default value:

Log set for flow	off
Log set for oferrors	off
Log set for messages	off
Log set for packets	off

Any setting defined will return to its default value after a reboot.

2.12.1 Syntax

set log all
set log [flow] [oferrors] [messages]
Note: at least one of the valid parameters must be specified

all	Turn off all of the logging set to capture flow, oferrors, and messages. Therefore the only valid value is “off”.
flow	Turn on/off flow entries logging. Value is “on” or “off”. When “on” all flow entries changes will be logged in an internal file flow_entries.log. The content of the file can be shown on the screen by using the command show log flow.
oferrors	Turn on/off OpenFlow errors logging. Value is “on” or “off”. When “on” all errors messages will be logged in an internal file novi_ofl_messages.log. The content of the file will be shown on the screen by using the command show log oferrors.
messages	Turn on/off logging of OpenFlow message type and length. Value is “on” or “off”. When “on” all incoming and outgoing messages types and length will be logged in an internal file novi_ofl_messages.log. The content of the file can be shown on the screen by using the command show log messages.

2.12.2 Examples

set log all off
set log flow on
set log oferrors off

2.13 set status switch

To upgrade/update the software running on the switch or manually reboot the switch. Uploading a new image of the software can be done using TFTP or Secure FTP.

2.13.1 Syntax

set status switch upload ipaddr path
set status switch upgrade
set status switch reboot
set status switch shutdown

upload	Used to upload the new image of the software from an external TFTP server to the switch memory. No value is required for this parameter
ipaddr	IP address of the external TFTP server where the new image of the software is stored. Value in dotted decimal format
path	Path on the external TFTP server where the files containing the new image of the software is stored.
upgrade	Used to upgrade the system to run the new image of the software uploaded in memory. That new image of the software becomes the "latest" running image. The previously running image is kept in memory as "previous" for a possible rollback. No value is required for this parameter
reboot	Used to reboot the system and specify which image of the software to run. Possible values are "latest" to run the image loaded during the last software upgrade/update, "previous" to run the image that was loaded during the software upgrade/update before the last software upgrade/update, and "default" to run the factory default image. If a value is not specified, reboot is set to "latest". The user is prompted to save the running configuration before proceeding (all/noentries/none). See the command "save config all" for details
shutdown	Used to gracefully shutdown the system before powering it off. The user is prompted to save the running configuration before proceeding (all/noentries/none). See the command "save config all" for details

2.13.2 Examples

set status switch upload ipaddr 10.0.0.2 path noviware-default-NS1248-250.1.4-1.x86_64.rpm
set status switch upgrade
set status switch reboot previous
    Do you want to save the running configuration? [all/noentries/none]
set status switch shutdown
    Do you want to save the running configuration? [all/noentries/none]

2.14 set trace

To manage the tracing of all incoming and outgoing OpenFlow messages and internal traces and errors.

Warning: This command is restricted to NoviFlow Support users

2.14.1 Syntax

set trace all
set trace [messages] [internal]

all	Turn off all OpenFlow messages and internal tracing. Valid value is “off” only
messages	Turn on/off incoming and outgoing OpenFlow messages tracing. Value is “on” or “off”. When “on” all incoming and outgoing OpenFlow messages are logged in a file
internal	Turn on/off internal tracing. Value is “on” or “off”. When “on” all internal break points executed are logged in a file

Note: at least one of the valid parameters must be specified

2.14.2 Examples

set trace all off
set trace messages on
set trace internal off

2.15 del config controller

To delete and disconnect an OpenFlow controller connected to the switch.

2.15.1 Syntax

del config controller controllergroup controllerid

controllergroup	Controller group. String of up to 16 characters including lower and upper case letters (a-z, A-Z), numbers (0-9) and special characters (-_).
controllerid	Controller ID. String of up to 16 characters including lower and upper case letters (a-z, A-Z), numbers (0-9) and special characters (-_).

2.15.2 Examples

del config controller controllergroup Western controllerid C5

2.16 del config meter

To delete a meter configured in the switch.

2.16.1 Syntax

del config meter meterid

meterid	Identifies the meter. The maximum number of meters is 64 (id=1-ffff0000).

2.16.2 Examples

del config meter meterid 50

2.17 del config switch

To delete the routing of the switch which could be the network address (netipaddr).

2.17.1 Syntax

del config switch device netipaddr netmask gateway

device	Port designation. The only valid value for NoviKit is “eth”. This port is used as the management port and for the OpenFlow interface towards to controller
netipaddr	IP of forwarding network/subnet
netmask	IP address netmask. Value in dotted decimal format
gateway	Network routing gateway. Value in dotted decimal format

2.17.2 Examples

del config switch device eth netipaddr 192.168.1.1 netmask 255.255.255.0
gateway 10.1.1.2

2.18 del config user

To delete a user.

Warning: This command is restricted to the user “superuser” and any users assigned in the “admin” group. Users in the “admin” group can delete users in the “monitoring group” but not other users in the “admin” group. “superuser” can delete the other users in the “admin” group and users in the “monitoring” group.

2.18.1 Syntax

del config user username

username	User name. String of up to 32 characters including lower and upper case letters (a-z, A-Z), numbers (0-9) and special characters (-_.). The user name “superuser” and “root” exist by default and cannot be deleted.

2.18.2 Examples

del config user operator_3

2.19 show config controller

To display the priority, IP address, and port used of all OpenFlow controllers defined in the switch.

2.19.1 Syntax

show config controller

There are no parameters for this command.

2.19.2 Examples

show config controller

Group	Id	Prio	IpAddr	Port	Security
1	1	1	192.168.2.3	6633	None
First	1	1	192.168.2.2	7500	None

2.20 show config cookie

To display the value of the cookie sent with packet-in corresponding to different packet-in reasons. For these values to be used the user must specify that cookie values for

packet-in must be taken from the user through the command “set config port portno cookie”.

2.20.1 Syntax

show config cookie

There are no parameters for this command.

2.20.2 Examples

show config cookie

```
Cookie Settings    : Userdefined
Tablemiss          : 0x123
Mirror             : 0x123
Controller         : 0x132
```

2.21 show config dns

To display the address of the DNS servers defined for providing name resolution (name systems).

2.21.1 Syntax

show config dns

2.21.2 Examples

show config dns

```
DNS Server1: 8.8.8.8
DNS Server2: 8.8.4.4
```

2.22 show config group

To display the values of all configuration parameters associated with a group.

2.22.1 Syntax

show config group groupid

groupid	Group identifier. Value in decimal or hexadecimal format between 0 (0x00000000) and 4294967040 (0xffffff00) or “all”.

2.22.2 Examples

show config group groupid 1

Group id: 1
Group type: 0
Bucket count: 2

2.23 show config meter

To display the values of all configuration parameters associated with a meter.

2.23.1 Syntax

show config meter meterid

meterid	Identifies the meter. The maximum number of meters is 64 (id=1-ffff0000) or “all”.

2.23.2 Examples

show config meter meterid 1

------- Meter 1
Flags: OFPMF_KBPS
Bands count: 1
--------Band 0
Type: OFPMBT_DROP
Rate: 10000
Burst size: 0

2.24 show config ntp

To display the status of the synchronization (on/off) and the address of the NTP servers defined to synchronize the system date and time.

2.24.1 Syntax

show config ntp

2.24.2 Examples

show config ntp

service ntp status: off
ntp server1: 3.centos.pool.ntp.org
ntp server2: 2.centos.pool.ntp.org

2.25 show config pipeline

To display the values of all configured table sizes associated with the pipeline.

2.25.1 Syntax

show config pipeline

2.25.2 Examples

show config pipeline

Tables count: 28
0 - size = 4095, width = 10
1 - size = 4095, width = 10
2 - size = 4095, width = 10
3 - size = 4095, width = 10
…

2.26 show config port

To display the values of all configuration parameters associated with a port.

Port_no	Port number
HW_addr	xx.xx.xx.xx.xx.xx
Name	Name of the port, e.g. novi_port_x
Config	OFPPC_PORT_DOWN /* Port is administratively down. */ OFPPC_NO_PACKET_IN /* Do not send packet-in msgs for port. */
State	OFPPS_LINK_DOWN /* No physical link present. */ OFPPS_BLOCKED /* Port is blocked */ OFPPS_LIVE /* Live for Fast Failover Group. */
Curr Advertised Supported Peer	OFPPF_10MB_HD /* 10 Mb half-duplex rate support. */ OFPPF_10MB_FD /* 10 Mb full-duplex rate support. */ OFPPF_100MB_HD /* 100 Mb half-duplex rate support. */ OFPPF_100MB_FD /* 100 Mb full-duplex rate support. */ OFPPF_1GB_HD /* 1 Gb half-duplex rate support. */ OFPPF_1GB_FD /* 1 Gb full-duplex rate support. */ OFPPF_10GB_FD /* 10 Gb full-duplex rate support. */ OFPPF_40GB_FD /* 40 Gb full-duplex rate support. */ OFPPF_100GB_FD /* 100 Gb full-duplex rate support. */ OFPPF_1TB_FD /* 1 Tb full-duplex rate support. */ OFPPF_OTHER /* Other rate, not in the list. */ OFPPF_COPPER /* Copper medium. */ OFPPF_FIBER /* Fiber medium. */
Curr_speed	Current port bitrate in kbps
Max_speed	Maximum port bitrate in kbps

2.26.1 Syntax

show config port portno

portno	Port number. Value between 1 and 28 or “controller” or “all”. Please refer to the NoviKit Configurations document UG-0002 for the maximum port number.

2.26.2 Examples

show config port portno 1

--------Port_no: 1

HWaddr: 00:00:00:00:00:00

Name: novi_port_0

Config: 0x1

OFPPC_PORT_DOWN: on

OFPPC_NO_RECV: off

OFPPC_NO_FWD: off

OFPPC_NO_PACKET_IN: off

State: 0x4

OFPPS_LIVE

Curr: 0x1020

OFPPF_1GB_FD

OFPPF_FIBER

Advertised: 0x20

OFPPF_1GB_FD

Supported: 0xf86c

OFPPF_1GB_FD

OFPPF_10GB_FD

OFPPF_COPPER

OFPPF_FIBER

Peer: 0

Curr_speed: 1000000 kbps

Max_speed: 10000000 kbps

show config port portno controller

Number of queues: 8
Queue: 0, packettype: -
Queue: 1, packettype: ALL
Queue: 2, packettype: -

Queue: 3, packettype: -
Queue: 4, packettype: -
Queue: 5, packettype: -
Queue: 6, packettype: LLDP
Queue: 7, packettype: -

2.27 show config switch

To display the values of configuration parameters associated with the switch

1) IP address, gateway, netmask and MAC address of the OF interface
2) Network routing IP address for the “of” port and the corresponding netmask
3) DHCP status
4) Maximum number of bytes of a packet that should be sent to the OpenFlow controller
5) Datapath ID
6) Interval between echo messages
7) System date and time

2.27.1 Syntax

show config switch all
show config switch device ipaddr
show config switch device dhcp
show config switch misssendlen
show config switch dpid
show config switch echo
show config switch device netipaddr
show config switch date
show config switch device tcpbuffer

all	Display the values of all configuration parameters associated with the switch. No value is required for this parameter
device	Port designation. The only valid value for NoviKit is “eth”. This port is used as the management port and for the OpenFlow interface towards to controller
ipaddr	Switch IP address. No value is required for this parameter
dhcp	DHCP status. No value is required for this parameter
misssendlen	Maximum number of bytes of a packet that should be sent to the OpenFlow controller. No value is required for this parameter
dpid	Datapath ID. No value is required for this parameter
echo	Interval between Echo messages. No value is required for this parameter
netipaddr	IP of forwarding network/subnet. No value is required for this parameter
date	System date. No value is required for this parameter

tcpbuffer	TCP buffer size for the incoming and outgoing OpenFlow interface. No value is required for this parameter.

2.27.2 Examples

show config switch all

Device name: eth
IP address: 192.168.2.100
Subnet Mask: 255.255.255.0
MAC address: 52:54:00:8a:70:a9
-
Device name: eth

Destination	Gateway	Mask
192.168.2.0	0.0.0.0	255.255.255.0

-
Device name: eth
Dhcp status: off
-
Miss send length: 128 bytes
-
Datapath id: 0xc800c0f002e7
-
Tue Nov 11 5:12:19 2014 UTC-1:00
-
Switch to Controller Echo Interval : 15 seconds

show config switch device eth ipaddr

IP address: 192.168.2.101
Subnet Mask: 255.255.255.0
MAC address: 52:54:00:8a:70:a9

show config switch device eth dhcp

Device name: eth
Dhcp status: on

show config switch misssendlen

Miss send length: 128 bytes

show config switch dpid

Datapath id: 0xc800c0f002c4

show config switch echo

Switch to Controller Echo Interval : 15 seconds

show config switch device eth netipaddr

Device name: eth

Destination	Gateway	Mask
192.168.2.0	0.0.0.0	255.255.255.0

show config switch date

Tue Nov 11 5:12:0 2014 UTC-1:00

show config switch device of tcpbuffer

tcpbufferout:16 KB , tcpbufferin:16 KB

2.28 show config table

To display the match fields associated with an existing table.

2.28.1 Syntax

show config table tableid

tableid	Table ID. Value between 0 and 27 or “all”

The output includes the following information:

Match Fields	Field types 0-39. See the description of the command “set config table” above
Name	novi_table_table id
Metadata_match	Bits that metadata can match
Metadata_write	Bits that metadata can write
Config	Bitmap of OFPTC_* values OFPTC_DEPRECATED_MASK = 3, /* Deprecated bits */
Max_entries	Maximum entries supported

2.28.2 Examples

show config table tableid 1

--------Table id: 1
Match Fields (12):
0: OFPXMT_OFB_IN_PORT
3: OFPXMT_OFB_ETH_DST
4: OFPXMT_OFB_ETH_SRC
5: OFPXMT_OFB_ETH_TYPE
6: OFPXMT_OFB_VLAN_VID
7: OFPXMT_OFB_VLAN_PCP
34: OFPXMT_OFB_MPLS_LABEL
10: OFPXMT_OFB_IP_PROTO
11: OFPXMT_OFB_IPV4_SRC
12: OFPXMT_OFB_IPV4_DST
13: OFPXMT_OFB_TCP_SRC
14: OFPXMT_OFB_TCP_DST
Name: novi_table_1
Metadata_match: 0x00000000ffffffff
Metadata_write: 0x00000000ffffffff
Active entries: 12
Max_entries: 4095

2.29 show config user

To display the username of all users defined in the system. This command can be used by any user.

2.29.1 Syntax

show config user

There are no parameters for this command.

2.29.2 Examples

show config user

Super users:
superuser
Admin users:
user23

Monitoring users:

2.30 show log cli

To display a log of all CLI commands entered indicating the date, time and username for each command.

2.30.1 Syntax

show log cli [username]

username	User name. String of up to 32 characters including lower and upper case letters (a-z, A-Z), numbers (0-9) and special characters (-_.) or “all”. If this parameter is omitted the value “all” is used by default.

2.30.2 Examples

show log cli

Tue Sep 9 01:01:13 2014 [superuser] show config table tableid 0
Tue Sep 9 01:03:33 2014 [superuser] show status cli
Tue Sep 9 01:04:26 2014 [superuser] show log cli
Tue Sep 9 01:04:48 2014 [superuser] show config user
Tue Sep 9 01:05:06 2014 [superuser] set config user username user1 password **** group admin
Tue Sep 9 01:05:10 2014 [superuser] exit
Tue Sep 9 01:05:29 2014 [user1] show config controller
Tue Sep 9 01:05:36 2014 [user1] show config stats
Tue Sep 9 01:05:44 2014 [user1] show config switch all
Tue Sep 9 01:05:55 2014 [user1] show log cli

2.31 show log flow

To display flow entry changes (add, modify, delete) performed on a table while logging of flow entry changes was turned on.

2.31.1 Syntax

show log flow tableid

tableid	Table ID. Value between 0 and 27 or “all”

2.31.2 Examples

show log flow tableid 0

Fri Jun 13 19:49:42 2014| Table 0: Command del (3), priority 32768
Fri Jun 13 19:49:42 2014| Clear flow table
Fri Jun 13 19:49:43 2014| Table 0: Command add (0), priority 3000
Fri Jun 13 19:49:43 2014| Matchfields: oxm{eth_dst="12:12:12:23:23:23"}
Fri Jun 13 19:49:43 2014| Instructions: apply{acts=[out{port="2"}, out{port="3"}, out{port="4"}, out{port="5"}, out{port="6"}, out{port="7"}, out{port="8"}, out{port="9"}, out{port="10"}, out{port="11"}, out{port="12"}, out{port="13"}, out{port="14"}, out{port="15"}, out{port="16"}, out{port="17"}, out{port="18"}, out{port="19"}, out{port="20"}, out{port="21"}, out{port="22"}, out{port="23"}, out{port="24"}, out{port="25"}, out{port="26"}, out{port="27"}]}
Fri Jun 13 19:49:47 2014| Table 255: Command del (3), priority 32768
…

2.32 show log messages

To display the messages that were sent and received through the OpenFlow interface while logging of OpenFlow messages was turned on.

2.32.1 Syntax

show log messages

There are no parameters for this command.

2.32.2 Examples

show log messages

2.33 show log oferrors

To display the errors messages that were returned through the OpenFlow interface while logging of OpenFlow errors was turned on.

2.33.1 Syntax

show log oferrors

There are no parameters for this command.

2.33.2 Examples

show log oferrors

2.34 show log system

To display the system logs.

2.34.1 Syntax

show log system

There are no parameters for this command.

2.34.2 Examples

show log system

2.35 show stats group

To display all statistics associated with a group including statistics for group buckets.

2.35.1 Syntax

show stats group groupid

groupid	Group ID. Value in decimal format between 0 (0x00000000) and 4294967040 (0xffffff00)

2.35.2 Examples

show stats group groupid 830785680

```
Group id:       830785680
Reference Count:  1
Packet Count:    49728
Byte Count:      4624704
Bucket  1:
Packet Count:  49728
Byte Count:    4624704
Bucket  1:
Packet Count:  49728
Byte Count:    4624704
```

2.36 show stats meter

To display all statistics associated with a meter including statistics for meter bands.

2.36.1 Syntax

show stats meter meterid

meterid	Identifies the meter. The maximum number of meters is 64 (id=1-ffff0000).

2.36.2 Examples

show stats meter meterid 1

Byte in count: 3092
Duration (sec): 111
Duration (nsec): 1111
Meter bands count: 2
Band 0
Packet count: 12
Byte count: 213
Band 1
Packet count: 4
Byte count: 342

2.37 show stats packetinout

To display the number of Packet-in messages sent to the controllers and the number of Packet-out messages received from the controllers. For Packet-in, the number of packets that did not match any flow entry (table-miss flow entry leading to), the number of actions explicitly output to the controller and the number of packets with an invalid IP TTL or MPLS TTL rejected by the pipeline and passed to the controller are also included.

2.37.1 Syntax

show stats packetinout

2.37.2 Examples

show stats packetinout

Packet-in
Total packets: 3476527
No match : 54
Action : 16
Invalid TTL : 0

Packet-out
Total packets: 782645

2.38 show stats port

To display all statistics associated with a port.

2.38.1 Syntax

show stats port portno

portno	Port number. Value between 1 and 28 or “controller”. Please refer to the NoviKit Configurations document UG-0002 for the maximum port number.

2.38.2 Examples

show stats port portno 1

-------> Port 1
Rx packets: 0 (0 Bytes)
Tx packets: 0 (0 Bytes)
Rx errors: 0
Tx errors: 0
Rx align errors: 0
Rx CRC errors: 0
Port alive for: 0 (sec.) 0 (nsec.)

show stats port portno controller

Packet-out
Total packets: 782645

Packet-in
Total packets: 3476527
No match : 54
Action : 16
Invalid TTL : 0

Queue id: 0 | Tx : 0 (0 Bytes)
Queue id: 1 | Tx : 3476527 (1679162541 Bytes)
Queue id: 2 | Tx : 0 (0 Bytes)
Queue id: 3 | Tx : 0 (0 Bytes)
Queue id: 4 | Tx : 0 (0 Bytes)
Queue id: 5 | Tx : 0 (0 Bytes)
Queue id: 6 | Tx : 0 (0 Bytes)
Queue id: 7 | Tx : 0 (0 Bytes)

2.39 show stats table

To display all statistics associated with an existing table.

2.39.1 Syntax

show stats table tableid

tableid	Table ID. Value between 0 and 27

2.39.2 Examples

show stats table tableid 1

Active Count: 0
Max_entries: 4095
Lookup Count: 7
Match Count: 7

2.40 show status destination

To test the reachability of a destination host on the network. This command is similar to the ping utility.

2.40.1 Syntax

show status destination ipaddr

ipaddr	Destination host IP address. Value in dotted decimal format

2.40.2 Examples

show status destination ipaddr 192.168.2.100

```
PING 192.168.2.100 (192.168.2.100): 56 data bytes
64 bytes from 192.168.2.100: icmp_seq=0 ttl=64 time=4.899 ms
64 bytes from 192.168.2.100: icmp_seq=1 ttl=64 time=3.331 ms
64 bytes from 192.168.2.100: icmp_seq=2 ttl=64 time=3.045 ms
64 bytes from 192.168.2.100: icmp_seq=3 ttl=64 time=5.114 ms
64 bytes from 192.168.2.100: icmp_seq=4 ttl=64 time=4.271 ms

--- 192.168.2.100 ping statistics ---
5 packets transmitted, 5 packets received, 0.0% packet loss, time 3999ms
rtt min/avg/max/stddev = 3.045/4.132/5.114/0.824 ms
```

2.41 show status flow

To display the currently running flow entries.

2.41.1 Syntax

show status flow tableid

tableid	Table ID. Value between 0 and 27

2.41.2 Examples

show status flow tableid 0

```
+---------------------------------------------------------------------+
                    Table 0 (1 entries)
+---------------------------------------------------------------------+
--- 0 ---
Timestamp     : Thu Aug 14 04:52:48 2014
Priority      : 3000
Idle timeout  : 0                 Hard timeout  : 0
Packet count  : 0                 Byte count    : 0
Cookie        : 0                 Send flow rem : false
Matchfields   : oxm{eth_dst="12:af:0e:aa:83:23"}
Instructions  : write{acts=[out{port="ctrl", mlen="128"}]}
```

2.42 show status group

To display the currently running group entries.

2.42.1 Syntax

show status group

There are no parameters for this command.

2.42.2 Examples

show status group

```
Group Id  : 1
Timestamp : Wed Aug 20 18:20:31 2014
{type="all", group="1", buckets=[{w="0", wprt="any", wgrp="any",
acts=[set_field{field:tcp_src="123"}, out{port="in_port"}]}, {w="0",
wprt="any", wgrp="any", acts=[set_field{field:tcp_src="345"},
out{port="in_port"}]}]}
```

2.43 show status meter

To display the currently running meter entries.

2.43.1 Syntax

show status meter

There are no parameters for this command.

2.43.2 Examples

show status meter

```
Meter Id  : 120
Timestamp : Fri Nov 29 08:52:51 46605
{meter= 78"", flags="1", bands=[{type = drop, rate="10000",
burst_size="0"}]}
```

2.44 show status ofchannel

To display the IP address and status of the OpenFlow channel connection of all the controllers defined in the system and the role of each controller. The possible roles are Master, Slave or Equal. By default, controllers get the role Equal.

2.44.1 Syntax

show status ofchannel

There are no parameters for this command.

2.44.2 Examples

show status ofchannel

```
   Group        Id          Prio  IpAddress      Port  Security Status Role
   ContA        A1            1   192.168.2.2    6633  None     C      E
C = Connected   D = Disconnected     E = Equal      M = Master     S = Slave
```

2.45 show status port

To display the administrative state and link state of a port.

2.45.1 Syntax

show status port portno

portno	Port number. Value between 1 and 28 or “all”. Please refer to the NoviKit Configurations document UG-0002 for the maximum port number.

2.45.2 Examples

show status port portno all

```
Port Status
                Admin         Link
                ______        ____
Port   1 :      up            up
Port   2 :      up            down
Port   3 :      down          down
…
```

2.46 show status process

To display the status of the internal switch processes. The printout includes the process ID and relevant statistics for each process.

2.46.1 Syntax

show status process all
show status process novicore
show status process noviengine
show status process ofchannel
show status process novilogd
show status process cliengine

all	Display the status of all running internal switch processes. All processes listed below in this table should be running. No value is required for this parameter
novicore	Display the status of the NoviCore process. If the process is not running "Error 134: Process is not running" is returned. No value is required for this parameter
noviengine	Display the status of the NoviEngine process. If the process is not running "Error 134: Process is not running" is returned. No value is required for this parameter
ofchannel	Display the status of the OFChannel process. If the process is not running "Error 134: Process is not running" is returned. No value is required for this parameter
novilogd	Display the status of the NoviLogd process. If the process is not running "Error 134: Process is not running" is returned. No value is required for this parameter
cliengine	Display the status of the CLIEngine process. If the process is not running "Error 134: Process is not running" is returned. No value is required for this parameter

2.46.2 Examples

show status process all

Process name	State	Pid	Cpu(%)	Mem(KB)	Start time
noviengine	Sleep	6480	1.02302	701263	Wed Apr 9 08:23:50 2014
ofChannel	Sleep	6495	5.08906	70889	Wed Apr 9 08:23:50 2014
novilogd	Sleep	6364	1.06667	4169	Wed Apr 9 08:18:27 2014
novicore	Sleep	6400	45.1039	1049071	Wed Apr 9 08:18:27 2014
cliengine	Running	6504	0	19951	Wed Apr 9 08:23:50 2014

Normal states are running and sleep.

2.47 show status switch

Provides the software version of NoviWare and EZdriver loaded on the switch.

2.47.1 Syntax

show status switch

There are no parameters for this command.

2.47.2 Examples

show status switch

Switch uptime: 1 days 01:11:56

-- latest -- (current)

NoviWare-OPE version: NW250.1.3 cae52f2fe735fe8659405836a46fcc798ab0cf81

NoviWare-PPE version: NW250.1.3 e085150ff7612d7d81e227e7010bb9683b9a0f17

EZDriver version: 8.46a

-- previous

NoviWare-OPE version: NW250.1.2 cae52f2fe735fe8659409846a46fcc798ab0cf81

NoviWare-PPE version: NW250.1.2 e085150ff7612d7d81e227e7010bb1809b9a0f17

EZDriver version: 8.46a

-- default

NoviWare-OPE version: NW250.1.0 cae52f2fe735fe8655938475a46fcc798ab0cf81

NoviWare-PPE version: NW250.1.0 e085150ff7612d7d81e988e7010bb1809b9a0f17

EZDriver version: 8.46a

2.48 show status techsupport

To display all relevant information required by NoviFlow technical customer support to troubleshoot an issue or answer questions.

The outputs of the following commands are concatenated in the output of this command:

- show status switch

- show status process all
- show config switch all
- show config controller
- show status ofchannel
- show config cookie
- show config user
- show stats packetinout
- show status vlan
- show config vlan vid all
- show config pipeline
- show stats port portno controller
- show status port portno all
- show stats port portno 1-48
- show config port portno 1-48
- show config pipeline
- show config table tableid all
- show stats table tableid 0-27
- show status flow tableid all
- show config group groupid all
- show config meter meterid all
- show status group
- show status meter

Note: The output of this command is saved in the files tech_support.log. This file can be retrieved by transferring it using Secure FTP. To do that the user must first login under the username “novisftp”. This can be done using any tool on the PC that gives access to Secure FTP (like Putty or WinSCP under Windows) or the command *sftp novisftp@<ipaddr>* under Linux where *<ipaddr>* is the IP address of the OF interface and then change the directory to novisftp/logs and issue the command *get <filename>*.

2.48.1 Syntax

show status techsupport

There are no parameters for this command.

2.48.2 Examples

show status techsupport

```
show status switch
--------------------------------------------------------------------------------
Switch uptime: 0 days 00:04:47
-- latest -- (current)
NoviWare-OPE version: dev 6d613d0d1c1f349fc5a1555cad0014bc0a6fe276
NoviWare-PPE version: dev f18651097741440170b5b78b2f077216ffd37a09
EZDriver version: 8.46a-build-4
-- previous --
NoviWare-OPE version: NW250.3.0 fcdbcc5cecdfd0f0063e87d5602e3af5e1828c2d
NoviWare-PPE version: NW250.3.0 624c31179147e0a15fb30d7e156286d0ccce2eca
EZDriver version: 8.46a
-- default --
NoviWare-OPE version: NW250.1.7 9f0d9bd544adaf6869be729bcd2f4e56ede89e51
NoviWare-PPE version: NW250.1.7 e4d3e6b5c4670d2279240f6348387dfd2b4a9104
EZDriver version: 8.46a
--------------------------------------------------------------------------------
show status process all
--------------------------------------------------------------------------------
Process name  State     Pid   Cpu(%)  Mem(KB)   Start time
novicore      Sleep     1249  17      1061916   Sep 15 13:12:09 2014
ofChannel     Sleep     1349  6       158912    Sep 15 13:12:36 2014
cliengine     Running   1352  0       20971     Sep 15 13:12:36 2014
novilogd      Sleep     1242  0       4161      Sep 15 13:12:09 2014
noviengine    Sleep     1332  0       783867    Sep 15 13:12:35 2014
…
```

2.49 show trace

To display the incoming and outgoing OpenFlow messages or internal traces and errors while tracing of OpenFlow messages or internal traces and errors was turned on.
Warning: This command is restricted to NoviFlow Support users

2.49.1 Syntax

```
show trace messages
show trace internal
```

messages	Display all incoming and outgoing OpenFlow messages that are logged in a file. No value is required for this parameter
internal	Display all internal traces and errors that are logged in a file. No value is required for this parameter

2.49.2 Examples

show trace messages
show trace internal

2.50 save config all

To save the running configuration of the switch. All configuration data entered via the CLI or the OpenFlow interface is saved. Optionally the user can request that flow entries, the group table and the meter table be omitted. This configuration is reloaded at reboot.

2.50.1 Syntax

save config all [noentries]

noentries	If this parameter is specified, flow entries, the group table and the meter table are not saved.

2.50.2 Examples

save config all
save config all noentries
This will save everything except the flow/meter/group entries, pipeline and tables configurations. Do you wish to continue? (y/n)

2.51 save config entries

To save the running configuration of the flow entries, the group table and the meter table. This configuration is reloaded at reboot.

Note: The configuration is saved in the files saved_flows.txt, saved_groups.txt and saved_meters.txt. These files can be retrieved by transferring them using Secure FTP. To do that the user must first login under the username “novisftp”. This can be done using any tool on the PC that gives access to Secure FTP (like Putty or WinSCP under Windows) or the command *sftp novisftp@<ipaddr>* under Linux where *<ipaddr>* is the IP address of the OF interface and then change the directory to novisftp/logs and issue the command *get <filename>*.

2.51.1 Syntax

save config entries

There are no parameters for this command.

2.51.2 Examples

save config entries

This will save the flow/meter/group entries, pipeline and tables configurations. Do you wish to continue? (y/n)

2.52 Help

Provides help on all supported CLI commands.

2.52.1 Syntax

help

There are no parameters for this command.

2.52.2 Examples

help

2.53 help del

Provides help on all del CLI commands.

2.53.1 Syntax

help del config

There are no parameters for this command.

2.53.2 Examples

help del config

2.54 help set

Provides help on all set CLI commands.

2.54.1 Syntax

help set config
help set log
help set trace
help set status

There are no parameters for this command.

2.54.2 Examples

```
help set config
help set log
help set trace
help set status
```

2.55 help save

Provides help on all save CLI commands.

2.55.1 Syntax

```
help save
```

There are no parameters for this command.

2.55.2 Examples

```
help save
```

2.56 help show

Provides help on all show CLI commands.

2.56.1 Syntax

```
help show config
help show stats
help show log
help show trace
help show status
```

There are no parameters for this command.

2.56.2 Examples

```
help show config
help show stats
help show log
help show trace
```

help show status

2.57 exit

Used to exit the CLI and log off the switch.

2.57.1 Syntax

exit

There are no parameters for this command.

2.57.2 Examples

exit

3 Error Codes

Error 1: System error: please contact NoviFlow support.
Error 2: System error: please contact NoviFlow support.
Error 3: System error: please contact NoviFlow support.
Error 4: System error: please contact NoviFlow support.
Error 5: Invalid command entered.
Error 6: Incomplete command. Hit "tab" key twice for auto-completion options.
Error 7: Too many arguments for a single command.
Error 8: There are at least two redundant arguments.
Error 9: Command length is too long.
Error 10: System error: please contact NoviFlow support.
Error 11: Command is reserved for NoviFlow Support.
Error 12: Unrecognized non-ASCII character.
Error 13: Invalid parameter. Please see 'help' command for supported parameters.
Error 14: Parameter value provided is invalid.
Error 15: Invalid command entered.
Error 16: Command not yet supported.
Error 17: Config value is invalid. Expected format is 'on'.
Error 18: Config value is invalid. Expected format is 'off'.
Error 19: Config value is invalid. Expected format is 'on' or 'off'.
Error 20: Could not recognize interface.
Error 21: System error: please contact NoviFlow support.
Error 22: System error: please contact NoviFlow support.
Error 23: System error: please contact NoviFlow support.
Error 24: System error: please contact NoviFlow support.
Error 25: System error: please contact NoviFlow support.
Error 26: System error: please contact NoviFlow support.
Error 27: Invalid IPv4 address.

Error 28: Netmask provided is invalid. Format should be 'XXX.XXX.XXX.XXX'.
Error 29: Invalid Netmask value.
Error 30: Bad combination of IP and Netmask.
Error 31: Invalid portno value.
Error 32: Interface provided is invalid.
Error 36: System error: please contact NoviFlow support.
Error 37: System error: please contact NoviFlow support.
Error 38: System error: please contact NoviFlow support.
Error 39: System error: please contact NoviFlow support.
Error 40: System error: please contact NoviFlow support.
Error 41: System error: please contact NoviFlow support.
Error 42: System error: please contact NoviFlow support.
Error 43: Date format is invalid. Expected format is DD[/MM[/YYYY]].
Error 44: Time format is invalid. Expected format is HH[:MM[:SS]].
Error 45: Timezone format is invalid. Expected format is UTC±HH[:MM]. Valid values for MM 0 or 30
Error 46: This timezone does not exist.
Error 47: System error: please contact NoviFlow support.
Error 48: Username is reserved.
Error 49: Format is invalid. Expecting: username <username> password <password> group <admin/monitoring>
Error 50: User does not have Privilege
Error 51: Only superuser can modify superuser or admin accounts.
Error 52: This command is reserved to admins.
Error 53: Could not find user.
Error 54: Only superuser password can be changed. Please delete and create new accounts for other users.
Error 55: This account does not have the privileges to delete target user.
Error 56: User already exists.
Error 57: No user found.
Error 58: System error: please contact NoviFlow support.
Error 59: System error: please contact NoviFlow support.
Error 60: Echo format is invalid. Expected format is an integer between 1 and 255.
Error 61: Match format is invalid. Expected format is a list of integers between 0 and 39.
Error 62: OFPXMT_OFB_METADATA cannot be added to table 0
Error 63: Maximum size of matchfield exceeded.
Error 64: Build provided is invalid. Expected 'default'/'latest'/'previous'.
Error 65: RPM not found
Error 66: TFTP Download Failed, please Check the Path/filename or IP address
Error 67: Upload failed due to TFTP server timeout.
Error 68: Noviware Upgrade file not found, please upload new Package first
Error 69: Noviware upgrade file not found
Error 70: Could not extract Noviware Package
Error 71: Noviware Package is invalid

Error 72: Could not finish Noviware upgrade
Error 73: System error: please contact NoviFlow support.
Error 74: System error: please contact NoviFlow support.
Error 75: Could not create backup during Noviware upgrade
Error 76: System error: please contact NoviFlow support.
Error 77: Could not launch NoviWare, old build reverted.
Error 78: System error: please contact NoviFlow support.
Error 79: System error: please contact NoviFlow support.
Error 80: System error: please contact NoviFlow support.
Error 81: MissSendLen format is invalid. Expected format is an integer between 0 and 1518.
Error 82: Datapath ID format is invalid. Expected format is a 64 bits integer.
Error 83: Provided port number cannot be found.
Error 84: Port is already configured this way.
Error 85: Invalid tableid value.
Error 86: Provided tableid cannot be found.
Error 87: Provided table has no features.
Error 88: Invalid groupid value.
Error 89: Provided groupid cannot be found.
Error 90: Provided controller cannot be found.
Error 91: Provided controller is already set up.
Error 92: System error: please contact NoviFlow support.
Error 93: ofChannel is not running. Please reboot the switch.
Error 98: Invalid meterid value.
Error 99: Supported meter flags are 'kbps' and/or 'pktps' and burst and stats.
Error 100: Meter rates can only be one of PKTPS or KBPS at once.
Error 101: Valid range 1 to 8192.
Error 102: Valid tablesizes,tablewidths values are positive integers.
Error 103: The maximum number of tables supported is 28.
Error 104: Total size of all tables is too big, please see documentation for more details.
Error 105: System error: please contact NoviFlow support
Error 106: System error: please contact NoviFlow support
Error 107: System error: please contact NoviFlow support
Error 108: Noviware Package is either corrupt or not signed, please download again or contact Noviflow support
Error 109: Switch is booting up, please wait.
Error 110: Hostname provided is too long. Maximum is 32 characters.
Error 111: Hostname should include only letters, underscore and dash characters.
Error 112: Provided meterid cannot be found.
Error 113: Invalid Port configuration. Use show to see supported features for current port.
Error 114: Provided meter configuration cannot be added.
Error 115: Number of meter bands (1-12).
Error 116: Valid meter band types are drop and dscpremark.
Error 117: Valid meter band rate 64-100,000,000 kbps or 1-1,525,000 pktps.

Error 118: Valid meter band burst is 0-rate kbits/packets.
Error 119: Noviware RPM not found, please check the file/path.
Error 120: Noviware upgrade failed, rolling back to default.
Error 121: Could not uninstall Noviware rpm.
Error 122: Invalid Noviware RPM file.
Error 125: Provided Meter entry already exists.
Error 126: User not found.
Error 127: Command Syntax error
Error 128: Can't delete user already logged in.
Error 129: Can't update user-group file
Error 130: Failed to delete home directory.
Error 131: Could not get packet stats.
Error 132: Valid security types are 'none' and 'tls'.
Error 134: Process is not running
Error 135: Specified vlan id is reserved. See 'help' for more information.
Error 136: Specified VLAN already exists.
Error 137: Could not add VLAN. Maximum number of VLANs reached.
Error 138: Invalid gateway value.
Error 139: Duplicate match fields found in provided values.
Error 140: Valid tablewidths values are 10, 20, 40 and 80.
Error 141: Expecting tablewidths parameter or a valid table size value.
Error 142: Table is currently busy.
Error 143: Multiple files found in upload directory, only latest noviware RPM should be kept.
Error 144: Process does not exist.
Error 145: Invalid hostname,please provide valid hostname.
Error 146: Invalid upload path provided, path must include Noviware rpm file.
Error 149: Tablesizes value is invalid, please see documentation for more details.
Error 150: Tablesizes value missing.
Error 151: Number of tablewidth provided should align with tablesizes provided
Error 152: NTP server not configured.
Error 153: Host/IP provided not reachable, please check DNS servers or netroute of the switch
Error 154: NTP configuration template missing.
Error 155: Could not synchronize time with NTP server, please check the NTPserver names &/or connection to DNS servers.
Error 156: Priority Value must be integer.
Error 157: Controller/Group length too long , it should be less than 16 chars.
Error 158: Found duplicate controller id.
Error 159: Found duplicate controller priority.
Error 160: Invalid controller priority.
Error 161: Found Duplicate Group name.
Error 162: Invalid packet type. Only LLDP is supported.
Error 163: Invalid TCP Send buffer value, provided value must be in 2’s power and between 2-8192

(KB) inclusive
Error 164: Invalid TCP Receive buffer value, provided value must be in 2's power and between 2-8192 (KB) inclusive
Error 165: Invalid TCP Send & Receive buffer value, provided value must be in 2's power and between 2-8192 (KB) inclusive
Error 166: Could not set tcp buffers value. No connected controllers found to set tcp buffers.
Error 167: Max entries reached in TCAM, provide values using [(table_0*width_0/2 + table_1*witdh_1 + .. +table_n*width_n)/10< 507904] where table_x and width_x are size and width of the respective tables.
Error 168: Only positive integer values are accepted.
Error 169: Only hexadecimal values are accepted.
Error 170: Max limit for controllergroups has reached. Only 16 controllergroups can be configured.
Error 171: Controllergroup/controllerid should include only letters, numbers and dash character.
Error 172: LLDP is only supported on queue 1 & 6.
Error 173: Requested configuration is not supported for this port
Error 174: Bad combination of netipaddr, netmask and gateway.
Error 179: Invalid UDP payload configuration.
Error 180: Packet capture already in progress.
Error 181: Packet capture unknown error. Please try again.
Error 182: Packet capture not running.
Error 183: No controller is configured.
Error 192: Invalid user name.

4 Configuration of the System

4.1 To connect the switch to the network

1) IP address for the switch defaults at 10.0.0.5. The IP address and the netmask can be modified. Additionally, the routing of the switch to the access router may require to be set or changed. This can be done with:
    a. set config switch device ipaddr netmask
    b. set config switch device netipaddr netmask gateway
2) The switch DPID may need to be changed from the default set by the manufacturer. The command to reconfigure the DPID is
    a. set config switch dpid
3) If a DHCP server is available in the network then the switch can be configured to turn DHCP on using the command:
    a. set config switch device dhcp
4) If an NTP server is available in the network then the switch can be configured to synchronize its date and time with this server using the command:
    a. set config ntp
5) If a DNS server is available in the network then the switch can be configured to use it for name resolution using the command:

a. set config dns

6) A series of show commands are available to retrace the configuration of the switch. The complete configuration can be retrieved using:
    a. show config switch all
7) Verify the settings.

Function	Command
Change IP address and/or netmask of the switch	set config switch device ipaddr netmask
Change routing of the OF channel of the switch	set config switch device netipaddr netmask gateway
Change DPID of the switch	set config switch dpid
Activate dhcp	set config switch device dhcp
Synchronize date and time with NTP server	set config ntp
Use a DNS server for name resolution	set config dns
Show switch configuration	show config switch all

4.2 Connecting to the Controller(s)

The controller(s) and the switch MUST be in the same network.

1) Show status of Noviflow processes. If the processes are not active, then please skip to the next section verifying the software loaded and possible upgrade. If the switch is newly installed, please contact Noviflow support.
2) Ping the controller. If the controller cannot be pinged, then review the network setup of the controller(s) vis-à-vis the switch and the PC.
3) Set up the OFchannel(s) by identifying the IP address and port number (OpenFlow port number is set at 6653). Security must be set to “tls” or none.
    a. set config controller ipaddr port security

Function	Command
Show status of switch, in particular five specific processes: NoviCore, NoviEngine, OFChannel, CliEngine and Novilogd	show status process [all] [novicore] [noviengine] [ofchannel] [cliengine] [novilogd]
Ping the controller	show status destination ipaddr
Set IP address, port and the security of the controller connected to the switch. This command can be issued multiple times to set up switch connections to multiple controllers.	set config controller ipaddr port security

4.3 Other Switch Configuration Commands for NoviSwitch

Manufacture's values have been set for echo, while the master controller usually sets missendlen. Changes to echo and missendlen will be communicated to the controller, however, for missendlen, the controller may refuse the "set" value. These values will be recoverable when the switch is rebooted.

Function	Command
Set the missendlen, the maximum length of bytes the switch can send to the controller	set config switch missendlen
Set echo delay	set config switch echo

5 Administration of the Users

The password of the superuser can be changed. Disclaimer: Loss of access due to forgotten password for the superuser can be reset by NoviFlow technical support, see section "Contact and Support Information".

1) The default password for superuser is "noviflow", to change it use the command:
    a. set config user superuser password xxxxx
2) Users can be categorized as admin or monitoring users. The "admin" group has access to all commands except commands for creating other "admin" users and the "monitoring" group can only use the show commands. The user name "superuser" exists by default and cannot be deleted. User names "all" and "root" are not valid.
    a. set config user username password group
3) Show the "users" and type of access defined for the device.
4) All users except superuser and root can be deleted from the system with the command below. Superuser can delete all other users and users in "admin" group can only delete users in "monitoring" group:
    a. del config user username

Function	Command
Change password for superuser or set new users	set config user username password group
Show users	show config user
Delete users except the superuser	del config user username

6 Verifying and Upgrading the NoviSwitch Software and Driver

The NoviSwitch software and driver are packaged as upgrade packages. When the switch requires an upgrade, the following steps should be followed:

1) Verify what Noviware version is installed in NoviSwitch. If upgrade is required, continue.
2) Set the path where the upgrade is stored and perform the upgrade.

3) Reboot the switch
4) Verify the switch has the latest upgrade and EZdriver version: show status switch
5) If required, shut down the switch before powering it off.

Function	Command
Show the NoviWare version and the EZdriver revision installed on NoviSwitch	show status switch
Upload and upgrade the switch, if required	set status switch upload ipaddr path set status switch upgrade
Reboot the switch	set status switch reboot
Show the NoviWare version and the EZdriver revision installed on NoviSwitch	show status switch
Shutdown the switch before powering it off, if required	set status switch shutdown

7 O&M to Troubleshoot, to Monitor Switch Activities or to Experiment New Flows

7.1 General Troubleshooting Checklist

Function	Command
Check power is on.	
Verify the switch Is connected properly in the network. If no, set the configuration, see the section “Configuration of the System”.	show config switch all
Verify the switch processes are running. If not, verify NoviWare Build, see section “Verifying and Upgrading the NoviSwitch Software and Driver”.	show status process all
Show the status of the connections between the switch and the controllers If not connected, verify the configuration of the connected controller, see section “Connecting to the Controller(s)”.	show status ofchannel
Verify the configuration, status of all ports and statistics of each port	show config port portno all show status port portno all show stats port portno
Verify the tables have all been sized	show config pipeline
Verify the matchfields are set, that there are flow entries and verify that flow entries are actively entered into the flow tables by the controller by verifying the table stats of each table.	show config table tableid all show stats table tableid
Verify there are group entries, if applicable. Also if groups were set up, verify the group statistics for each group..	show config group groupid all show stats group groupid
Verify there are no errors. Check log. See section “O&M of the logs”.	See section “O&M of the logs”

7.2 O&M of the Logs

The logs are configured with CLI interface by the operator to track the flow entries, OpenFlow messages and possible OpenFlow errors within the switch. The logs are circular and therefore, it is not necessary to delete the logs before resetting them.

Function	Command
Logs can be set to record the flows and the OpenFlow messages and error codes. Each log must be turned on individually. They can be turned off individually.	set log [flow] [oferrors] [message]
All logs can be turned off with one command.	set log all off
The command will show all the entries of a given table, as recorded upon the set command above.	show log flow tableid
This command shows the log of OpenFlow messages on the screen as recorded upon the set command above.	show log messages
This command shows the log of OpenFlow errors on the screen as recorded upon the set command above.	show log oferrors
This command shows the system logs that are continuously recorded.	show log system

7.3 O&M of Ports

Unlike in a conventional switch, in the OpenFlow context the OpenFlow controller normally configures the ports. However, for troubleshooting or testing purposes, the operator may want to configure the ports manually.

The “show” commands allows the operator view the configuration or the status of any one or all ports.

Warning: The controller will be informed of these changes in the port configurations, and these changes can be either ignored or overridden by the controller. These values will be recoverable when the switch is rebooted.

Function	Command
Configure the port	set config port portno [portdown] [norecv] [nofwd] [nopacketin]
Show port configuration.	show config port portno (value “all” is supported)
Show port status of all ports and port statistics of each port.	show status port portno all show stats port portno

7.4 O&M of the Flow Tables and Definition of the Pipeline

The pipeline can be configured to re-establish the tables and tablesizes set as default for the switch.

By default, there are total 28 tables, each having the same table size of 4096 rows. Each row is 40 bytes wide.

Matchfields are set by default for the defined tables, as noted in the description of the command “set config table”. These default values persist after reboot.

Group table size is hardcoded with a value of 10000.

The “show” commands allows the operator view the configuration or the status or specific flow entries of any one or all tables.

Warning: The controller will be informed of the matchfields set in the flow tables. These values can be either ignored or overridden by the controller. All flow entries will be flushed upon reboot.

Function	Command
Configure the pipeline	Set config pipeline tablesizes [tablewidths]
Configure the specific table by listing the match fields used in the table.	set config table tableid matchfields
Show table configuration, which includes transparency with respect to the flow entries residing in the table.	show config table tableid (value “all” is supported)
Show table status and for each table, retrieve its statistics. This indicates the activity level and the number of active flow entries in the table.	show status table tableid all show stats table tableid

7.5 O&M of the Meters

The meters and meter bands can be defined for the switch. Please review the command structure above to ensure valid settings of the meters and the associated meter bands.

Meter table is hardcoded with table size of 2000 rows.

Warning: The meter settings will not be recoverable when the switch is rebooted.

Function	Command
Configure the specific meter.	Set config meter meterid flags bands type rate [burstsize][preclevel]
Show table configuration, which includes transparency with respect to the flow entries residing in the table.	show meter meterid
Show meter status for each meter and can also retrieve its statistics. This indicates the rate limiting activity and the speed of active flows.	show status meter meterid show stats meter meterid

8 Help

The “help” command provides online reference to the commands, as grouped by its utility “set”, “del” or “show” the configuration, the stats, the log, the trace (limited users), and the status.

Function	Command
Print out all the commands	help
Print all the set commands	help set [config] [log] [trace] [status]
Print all the delete configuration commands	help del config
Print all the save configuration commands	help save
Print all the combinations of show commands.	help show [config] [stats] [log] [trace] [status]

Function	Command
Print out all the commands	help
Print all the set commands	help set [config] [log] [trace] [status]
Print all the delete configuration commands	help del config
Print all the save configuration commands	help save
Print all the combinations of show commands.	help show [config] [stats] [log] [trace] [status]

9 Exiting the CLI interface

The user needs to exit the CLI interface by using the command:

a. exit