

NoviSwitch™ 2122 High Performance OpenFlow Switch

NoviSwitch 2122 is an OpenFlow switch offering genuine wire-speed performance using the OpenFlow 1.3 to 1.5 standards and has been specifically designed for use in high bandwidth / flow-intensive network deployments. Includes the NoviWare™ 400.4 OpenFlow Switch Software for use with the Mellanox high performance NP-5 network processor.



Today's major network operators demand flexible, scalable switching solutions that deliver wire-speed performance. **NoviFlow Inc.**™ aims to change the traditional approach to networking by making switching smarter. The company was founded to deliver upon the promise of OpenFlow and Software Defined Networking (SDN) by combining the benefits of

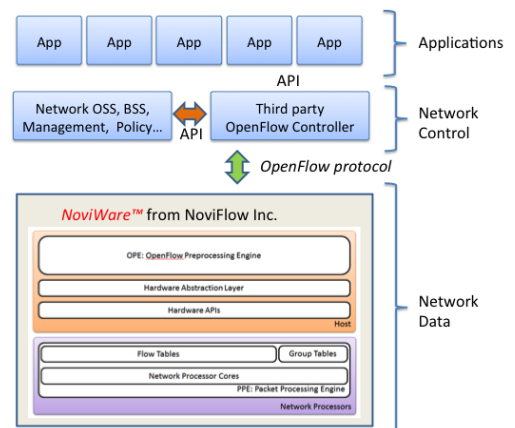
virtualization and programmability with network processors that can handle complex flows to make it possible for data centers to keep up with today's exponentially growing networking demand.

NoviSwitch 2122 was specifically designed for deployment in Wide Area Networks (WANs) and data centers looking to leverage the benefits of SDN to improve the cost/performance, security, scalability and flexibility of networks. It is a forwarding plane platform delivering maximum OpenFlow capability in a compact form factor. The system is provided in a stand-alone, self-contained, 1U rack-mountable enclosure box that can be configured to support a wide variety of networking applications to deliver unmatched performance levels.

Key Features:

NoviWare 400.4 OpenFlow switching software featuring all required and optional OF 1.3/1.4 match fields, instructions, actions and counters, as well as key OpenFlow 1.5 features, including group chaining.

- Up to 800 Gbps and 360 Mpps of switching capacity powered by a Mellanox NP-5 NPU
- 22 data plane ports:
 - 2 QSFP28 transceiver cages for 100GE
 - 20 SFP+/SFP transceiver cages for 10GE/1GE
- Up to 1 Million wildcard match flows in TCAM in up to 60 table), up to 6 Million exact match flows in DRAM in up to 60 tables, and up to 40,000 flow mods/sec
- Up to 1 Million meters and 10,000 Groups table entries
- Host Processor: Intel Core i7-4700EQ Quad core 2.4GHz with 16GB of DDR3 memory and 32GB M.2 SATA SSD for permanent storage
- Extensive O&M features optimized for large scale deployments including Plug-and-Play features such as gRPC remote automated provisioning and Switch IP address set via DHCP
- Controller support via both in-band and out-of-band ports
- Adaptors for NoviWare specific OpenFlow Experimenter-based extensions available for ODL, ONOS and RYU controllers
- OpenFlow Experimenter-based extensions:
 - L2-L7 matching, packet processing and flow management
 - Hash on user defined list of OpenFlow fields and Symmetric Hash of Fields
 - OF1.5 Copy-Field also supported on OF1.3 to 1.5 through OpenFlow Experimenter action
 - Ethernet, IP, UDP and MPLS payload matching
 - Additional tunnel encapsulation/decapsulation (VxLAN, L2MPLS, L2GRE, GTP, PPPoE, L2TP, STT) Timestamping
 - Swap fields
 - Traffic Shaping and Hierarchical Quality-of-Service (H-QoS) Optional Feature – (for more info, consult the [NoviWare FlowShaper Option Data Sheet](#))



NoviFlow's products uniquely bring together Open Systems, Network Virtualization and fully Programmable Network Logic. Our flexible platform design makes it possible for us to customize our solutions to our customers' specific network needs, whether they run a commercial Data Center, are Network Service Providers, or are building innovative flow management, cybersecurity or SDN applications.

NoviWare 400.4 Features Summary:

- Multiple Controllers and Controller role-change
- OpenFlow version negotiation (1.3, 1.4 and 1.5)
- All OpenFlow 1.3/1.4 required and optional match fields (41 of 41)
- All OpenFlow 1.3/1.4 instructions (6 of 6)
- 59 of 60 OpenFlow 1.3/1.4 actions
- TAGS: Push/Pop MPLS, multiple MPLS, VLAN (802.1Q), multiple VLAN (802.1ad "Q-in-Q") and Provider Backbone Bridging (802.1ah "MAC-in-MAC") tags to/from packets
- Flexible flow entry width (10B, 20B, 40B or 80B) for wild card matching in TCAM based flow tables
- 48-byte flow entry width for exact matching in DRAM based flow tables
- Multiple tables support: any match field or combination of match fields, any instruction and any action may be used in any table
- Group Table supporting all OpenFlow 1.3/1.4 required and optional Group types (ALL, SELECT, INDIRECT, FAST FAILOVER) for complex forwarding such as multicasting
- Up to 8 queues per port (port slicing)
- Up to 1 Million meters (Drop, DSCP Remark) compliant with RFC2697 srTCM and RFC2698/ MEF 5 trTCM
- Bundles, Eviction, Vacancy Events, Role Status Events, Group and Meter change notifications
- Link Aggregation Group (LAG) with dynamic provisioning of ports
- Up to 32-byte wide user defined (width and offset) IP and UDP payload exact or wild card match fields and maskable set fields actions through experimenter match field and actions
- Network virtualization via transport of Ethernet frames inside VxLAN/L2GRE/L2MPLS/GTP frames
- MPLS networks for layer 2 PTP or PTMP MPLS services

Special Features:

- Support of Multicast
- BFD Link Monitoring
- Tunnel Metadata for GRE, MPLS and VxLAN
- Push/pop PPPoE and protocol specific match fields
- Matching on Logical Port
- Packet timestamping
- Time synchronization via NTP or PTP
- Additional stats counters and logs:
 - Number of packets received, dropped and transmitted per flow
 - Per port counters
 - Logs: errors, table entries
 - Matching entries per protocol
 - Multipart message support
 - Queues support
 - Per-flow meters
- O&M Features:
 - TACACS+ for AAA services
 - RADIUS for CLI access control and accounting
 - Access Control Lists (allowed IP addresses) for switch management ports
 - VLAN on management ports
 - CLI command log file with accessing IP address for configuration change traceability
 - CLI command log file export to external server
 - CLI command for H-QoS to show and configure the QoS hierarchy, shaping and priority for flows
 - Load new/rollback to previous switch software revision

- Set port configuration
- Set tables, user names, passwords
- TLS CA certificates
- Commands for adding and deleting flow entries
- Set traces on/off for monitoring of OpenFlow messages to/from the controller
- Show configuration for switch, controller, transceivers, OF channel, tables, users
- Show switch stats, logs, software revision, OF channel status
- Manual and automatic (remote server based) switch configuration
- Switch configuration file export/import to remote server in binary and text formats
- OF-Config 1.1.1/1.2
- SNMP v2/v3 traps for hardware fault alarms, SNMPGet and SNMPwalk (port status, CPU usage, etc.)
- Redundant physical OF Channel ports

Hardware features:

- Dual redundant power supplies, each one capable of operating appliance under full load
- Minimum boot and soft reboot time
- Separate LEDs for link and data traffic for each data plane port
- 32 GB M.2 SATA SSD storage
- Four front-facing triple speed Ethernet ports:
 - OF1 and OF2: redundant OF Controller ports
 - CLI: Remote management via CLI (SSH)
 - MGT: for hardware management
- RJ45 serial console port
- USB port (type A) to host CPU
- Power LED: Green ON, Orange Standby, Red blinking: Fault, Green blinking 1 out of 2 power supply is missing
- Event logs
- Linux® operating system on host CPU
- Remote power and reset control
- Remote KVM and upgrade capability
- Platform temperature and power supply monitoring

Physical and Electrical Specifications

- EIA/TIA standard 19" rack mount in 1U high and 16" deep
- Dual Redundant 90~264V AC or -48V DC power supplies
- Factory configurable airflow direction
- Field serviceable and redundant fans:
 - Five (5) dual rotor fans located at rear of chassis
 - Each Fan rotor can be individually monitored and throttled reducing noise under lower power load
- Operating Temperature: 0°C to +40°C
- Relative Humidity: 0% to 95% non-condensing
- Compliance: FCC Class A, CE, IEC 60950
- Typical power consumption: 350W

Ordering Information (Model Number):

- 100-000-501: AC, front-to-back airflow ext. TCAM
- 100-000-502: AC, back-to-front airflow ext. TCAM
- 100-000-503: DC, front-to-back airflow ext. TCAM
- 100-000-504: DC, back-to-front airflow ext. TCAM
- 100-000-505: AC, front-to-back airflow int. TCAM
- 100-000-506: AC, back-to-front airflow int. TCAM
- 100-000-507: DC, front-to-back airflow int. TCAM
- 100-000-508: DC, back-to-front airflow int. TCAM

FOR MORE INFORMATION

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