

# cnMatrix



Cambium Networks' next generation switching platform offers a cloud supported, high performance, feature rich ethernet switching solution. The cnMatrix™ platform of switches provides:

- Energy efficient gigabit
- Layer 3 (OSPF and RIP)
- Flexible Power over Ethernet (PoE) options
- Multiple port density options

The cnMatrix series of fully managed switches delivers full Layer2 capabilities with enhanced access security. Switches deliver power savings with several models offering “fanless” operation. The cnMatrix switch series offers flexibility with 4 - 10 Gbps (SFP+) uplinks on the 28 port models while offering 2 - 1Gbps (SFP) uplink ports on the 10 port models.

## cnMATRIX SWITCHING MODELS

FEATURES	EX2028P	EX2028	EX2010P	EX2010
Throughput	128 Gbps	128 Gbps	20 Gbps	20 Gbps
Non-Blocking	✓	✓	✓	✓
PoE enabled ports	24	n/a	8	n/a
PoE power budget	400	n/a	100	n/a
10/100/1000 ports	24	24	8	8
Uplink ports	4 SFP+	4 SFP+	2 SFP	2 SFP
Serial console	✓	✓	✓	✓
USB*	✓	✓	✓	✓
OOB port	✓	✓	✓	✓
Rack mount kit	✓	✓	Optional	Optional
Internal fans	2	Fanless	Fanless	Fanless

\* Feature to be included in release 2

## SPECIFICATIONS

cnMATRIX MODELS	EX2028P	EX2028	EX2010P	EX2010
Switching capacity	128 Gbps	128 Gbps	20 Gbps	20 Gbps
10/100/1000 Mbps ports	24	24	8	8
Number of uplink ports	(4) SFP+	(4) SFP+	(2) SFP	2 (SFP)
PoE enabled ports	24	24	8	8
PoE power budget	400W	n/a	100W	n/a
Base IPv4 (static)	64	64	64	64
Maximum MAC addresses	16384	16384	16384	16384
Maximum ARP entries	512	512	512	512
Max VLANs	4094	4094	4094	4094
Maximum MSTPs	8	8	8	8
Maximum routes (Static)	64	64	64	64
Dynamic routing*	512	512	512	512
LACP/trunking	8 LAGs / 8 links per 9216	8 LAGs / 8 links per 9216	8 LAGs / 8 links per 9216	8 LAGs / 8 links per 9216
QoS priority queues	8	8	8	8
Maximum IGMP multicast groups	256	256	256	256
Max PVRST	32	32	32	32
Fan support	2	Fanless	Fanless	Fanless

cnMATRIX	ALL MODELS	
Quality of Service	<ul style="list-style-type: none"> <li>• ACL mapping and marking of ToS/DSCP (COS)</li> <li>• ACL mapping to priority queue</li> <li>• Honoring DSCP and 802.1p(CoS)</li> <li>• Priority queue management using Weighted Round Robin (WRR), Strict Priority (SP) and a combination of WRR and SP</li> </ul>	<ul style="list-style-type: none"> <li>• ACL mapping marking of 802.1p</li> <li>• DiffServ support</li> <li>• Traffic shaping/metering</li> </ul>
Traffic Management	<ul style="list-style-type: none"> <li>• ACL-based inbound rate limiting policies</li> <li>• Inbound rate limiting per port</li> </ul>	<ul style="list-style-type: none"> <li>• Broadcast, multicast and unknown unicast rate limiting</li> <li>• Outbound rate limiting per port/queue</li> </ul>
Security	<ul style="list-style-type: none"> <li>• 802.1x authentication</li> <li>• DHCP snooping</li> <li>• Neighbor Discovery (ND) inspection</li> <li>• Radius/Tacacs+/Tacacs+</li> <li>• Secure shell</li> </ul>	<ul style="list-style-type: none"> <li>• MAC authentication</li> <li>• RADIUS authentication/authorization</li> <li>• Authentication, Authorization, and Accounting (AAA)</li> <li>• Secure copy (SCP)</li> <li>• Local username/password</li> </ul>
Layer 2 feature set	<ul style="list-style-type: none"> <li>• 802.1s multiple spanning tree</li> <li>• 802.1d</li> <li>• Auto MDI/MDIX</li> <li>• IGMP Snooping V1v2</li> <li>• IGMP Proxy</li> <li>• Flow Control per port/per queue</li> <li>• Per VLAN STP (PVST/PVRST)</li> <li>• Private VLAN edge/port isolation</li> <li>• Rate limiting/Storm Control</li> <li>• DHCP snooping</li> <li>• Broadcast/Multicast/Unlearned Unicast (Storm Control)</li> <li>• Ping/TraceRoute/ICMPv6</li> </ul>	<ul style="list-style-type: none"> <li>• VLAN, Port, Protocol, 802.1q</li> <li>• 802.1x authentication</li> <li>• Bpdu guard, Root Guard</li> <li>• LLDP/LLDP Med</li> <li>• Static MAC</li> <li>• IGMP v2v3 fast leave</li> <li>• Port Mirroring: port based, ACL based, VLAN based</li> <li>• Link Aggregation Groups (Static/LACP)</li> <li>• Jumbo frame support</li> <li>• BPDU filtering</li> <li>• DoS Protection (Port, CPU)</li> </ul>
Management	<ul style="list-style-type: none"> <li>• cnMaestro (cloud management)</li> <li>• DHCP autoconfiguration</li> <li>• Embedded DHCP server</li> <li>• Out of band Ethernet management client/server</li> <li>• SNMP v1v2</li> <li>• System Network Time Protocol (SNTP)</li> <li>• Auto Edge / Auto Attach</li> <li>• TFTP</li> </ul>	<ul style="list-style-type: none"> <li>• Industry standard Command Line Interface (CLI)</li> <li>• Embedded web management (HTTP/HTTPS)</li> <li>• USB file management and storage</li> <li>• SSH /SSH v2</li> <li>• DHCP relay</li> <li>• Local/remote system logging</li> <li>• Display log messages multiple terminals</li> <li>• Telnet client/server</li> </ul>

## SPECIFICATIONS

cnMATRIX MODELS	EX2028P	EX2028	EX2010P	EX2010
Cambium Auto Edge	Yes	Yes	Yes	Yes
MTBF (hours)	285,350.90	432,283.26	338,917.20	806,354.10
Power budget	400W	n/a	100W	n/a
Power supply	AC/Internal	AC/Internal	AC/Internal	AC/Internal
Weight	8 lbs 12 oz	6 lbs 1.6oz	4 lbs 6 oz	3 lbs 8.6 oz
Dimensions	440x44x250	440x44x209	210x44x250	210x44x250
LEDs per port	Link/activity Poe	Link/activity	Link/activity Poe	Link/activity
Rack mountable	Yes 1U	Yes 1U	Yes 1U	Yes 1U
Temperature ranges	-0-50c	-0-50c	-0-50c	-0-50c
Operating humidity	+55° at 95% RH	+55° at 95% RH	+55° at 95% RH	+55° at 95% RH
Storage temperature	-40 - 70°C	40 - 70°C	40 - 70°C	40 - 70°C

## IEEE STANDARDS

### SWITCHING

- Core Switching Features
- IEEE 802.1AB—Link Layer Discovery Protocol (LLDP)
  - IEEE 802.1D—Spanning tree compatibility
  - IEEE 802.1p—Ethernet priority with user provisioning and mapping
  - IEEE 802.1s—Multiple spanning tree compatibility
  - IEEE 802.1Q—Virtual LANs with port-based VLANs
  - IEEE 802.1X—Port-based authentication with Guest

- VLAN support
- IEEE 802.1W—Rapid spanning tree compatibility
  - IEEE 802.3—10BASE-T
  - IEEE 802.3u—100BASE-T
  - IEEE 802.3ab—1000BASE-T
  - IEEE 802.1ak—Virtual Bridged Local Area Networks - Amendment 07: Multiple Registration Protocol
  - IEEE 802.3ac—VLAN tagging
  - IEEE 802.3ad—Link aggregation
  - IEEE 802.3x —Flow control
  - Static Routing

- IEEE 802.1Q-2003
- RFC 4541—Considerations for Internet Group Management Protocol (IGMP) Snooping Switches
  - ANSI/TIA-1057—LLDP-Media Endpoint Discovery (MED)
  - RFC 5171—Unidirectional Link Detection (UDLD) Protocol

- Advanced Layer-2 Features
- Authentication, Authorization, and Accounting (AAA)
  - Broadcast Storm Recovery
  - Broadcast/Multicast/Unknown unicast storm recovery
  - DHCP Snooping
  - IGMP Snooping Querier
  - Multicast VLAN Registration (MVR)
  - Independent VLAN Learning (IVL) support
  - IPv6 Classification APIs
  - Jumbo Ethernet frame support
  - Port MAC locking
  - Port mirroring
  - Protected ports
  - Static MAC filtering

- TACACS+
- Voice VLANs
  - Unauthenticated VLAN
  - Internal 802.1X Authentication Server
  - CLI Filtering
  - Switchport mode configuration
  - Link Dependency

### SYSTEM FACILITIES

- Event and error logging facility
- Run-time and configuration download capability
- PING utility
- FTP Transfers via IPv4/IPv6
- RFC 768—UDP
- RFC 783—TFTP
- RFC 791—IP
- RFC 792—ICMP
- RFC 793—TCP
- RFC 826—ARP
- RFC 894—Transmission of IP datagrams over Ethernet networks
- RFC 896—Congestion control in IP/TCP networks
- RFC 951—BOOTP
- RFC 1034—Domain names - concepts and facilities
- RFC 1035—Domain names - implementation and specification
- RFC 1321—Message digest algorithm
- RFC 1534—Interoperability between BOOTP and DHCP
- RFC 2021—Remote network monitoring management information base version 2
- RFC 2030—Simple Network Time Protocol (SNTP)
- RFC 2131—DHCP relay
- RFC 2132—DHCP options and BOOTP vendor extensions
- RFC 2819—Remote Network Monitoring Management Information Base
- RFC 2865—RADIUS client
- RFC 2866—RADIUS accounting
- RFC 2868—RADIUS attributes for tunnel protocol support
- RFC 2869—RADIUS Extensions
- RFC 3579—RADIUS support for EAP
- RFC 3580—IEEE 802.1X RADIUS usage guidelines
- RFC 3164—The BSD syslog protocol
- RFC 3580—802.1X RADIUS Usage Guidelines
- RFC 5176—Dynamic Authorization Server (Disconnect-Request processing only)

## IEEE STANDARDS

### MANAGEMENT

- cnMaestro
- Industry-standard CLI
- IPv6 management
- Password management
- Autoinstall support for firmware images and config files
- SNMP v1, v2, and v3
- SSH 1.5 and 2.0
- RFC 4252: SSH authentication protocol
- RFC 4253: SSH transport layer protocol
- RFC 4254: SSH connection protocol
- RFC 4251: SSH protocol architecture
- RFC 4716: SECSH public key file format
- RFC 4419: Diffie-Hellman group exchange for the SSH transport layer protocol
- SSL 3.0 and TLS 1.0
- RFC 2246: The TLS protocol, version 1.0
- RFC 2818: HTTP over TLS
- RFC 3268: AES cipher suites for transport layer security
- Secure
- Telnet
- Web

### SECURITY

Permit/deny actions for inbound IP and Layer-2 traffic classification based on:

- Time-Based ACL
- Source/Destination IP address
- TCP/UDP Source/Destination port
- IP Protocol Type
- Type of Service (ToS) or differentiated services (DSCP) field
- Source/Destination MAC address
- EtherType
- IEEE 802.1p user priority (outer and/or inner VLAN tag)
- VLAN ID (outer and/or inner VLAN tag)
- RFC 1858—Security Considerations for IP Fragment Filtering

Permit/deny actions for inbound IP and Layer-2

### SNMP MIBs

FASTPATH Enterprise MIBs for full configuration support of switching features

- RFC 1213—MIB II
- RFC 1493—Bridge MIB
- RFC 1612—DNS resolver MIB extensions
- RFC 1643—Definitions of managed objects for the Ethernet-like interface types
- RFC 2233—Interfaces group MIB using SMI v2
- RFC 2613—SMON MIB
- RFC 2618—RADIUS authentication client MIB
- RFC 2620—RADIUS accounting MIB
- RFC 2674—VLAN MIB
- RFC 2737—Entity MIB version 2
- RFC 2819—RMON groups 1, 2, 3, and 9
- RFC 2863—IF-MIB
- RFC 2925—Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations
- RFC 3273—RMON Groups 1, 2, and 3
- RFC 3291—Textual conventions for Internet network addresses
- RFC 3434—RMON Groups 1, 2, and 3
- RFC 4022—TCP-MIB
- RFC 4113—UDP-MIB

Quality of Service MIBs

- MIBs for full configuration support of DiffServ, ACL, and CoS functionality
- RFC 3289—Management information base for the DiffServ architecture (read-only)

### QUALITY OF SERVICE

Classify traffic based on same criteria as ACLs and optionally:

- Mark the IP DSCP or Precedence header fields
- Police the flow to a specific rate with two-color aware support
- RFC 2474—Definition of the differentiated services field (DS field) in the IPv4 and IPv6 headers
- RFC 2475—An architecture for differentiated services
- RFC 2597—Assured forwarding Per-Hop Behavior

Discover more information on cnMatrix at: <http://community.cambiumnetworks.com/>