

# cnMatrix



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

- Easy and simple, free cloud (or on premise) management with cnMaestro™
- Zero touch deployment of switches makes installation easy
- Zero touch policy based configuration enables automation, reduces errors and network downtime
- Device profiling, automatic port configuration and network segmentation improves security posture of the network
- Wireless Aware: Together with Cambium Networks cnPilot Wi-Fi solution, enables a simple, easy-to-use cloud managed Unified Wired-Wireless access solution
- Affordable, high quality and enterprise grade Layer 2, Layer 3 feature set

The cnMatrix series of fully managed switches delivers full Layer2 and Layer 3 capabilities with enhanced access security. cnMatrix switches deliver power savings with several models offering fanless operation. The cnMatrix switch series offers flexibility with 4 SFP+ (10Gbps) uplinks on the 28 port models while offering 2 SFP (1 Gbps) uplinks on the 10 port models.

\* Feature to be included in a future release.

## SPECIFICATIONS

FEATURES	EX2028-P	EX2028	EX2010-P	EX2010
Throughput	84 Gbps	84 Gbps	84 Gbps	84 Gbps
Non-Blocking Throughput	✓	✓	✓	✓
Forwarding Rate in Mpps (64 Byte Packets)	120	120	120	120
10/100/1000 Ports	24	24	8	8
Uplink Ports	4 SFP+	4 SFP+	2 SFP	2 SFP
PoE+ Enabled Ports (802.3af/at)	24	n/a	8	n/a
Serial Console	✓	✓	✓	✓
USB*	✓	✓	✓	✓
Out-of-Band Management Port	✓	✓	✓	✓
Rack Mount Kit	✓	✓	Optional	Optional
Internal Fans	2	Fanless	Fanless	Fanless
Reset Button	Yes	Yes	Yes	Yes
MAC Address Table Size	16K	16K	16K	16K
Flash Storage	128MB	128MB	128MB	128MB
DRAM	512MB	512MB	512MB	512MB
VLANs	4K	4K	4K	4K
Port Based VLANs	4K	4K	4K	4K
LACP/Trunking	8 LAGs/8 links per LAG	8 LAGs/8 links per LAG	88 LAGs/8 links per LAG	8 LAGs/8 links per LAG
QoS Priority Queues	8	8	8	8
PVRST	32	32	32	32
Ingress/Egress ACL	128	128	128	128
Static Arp Entries	512	512	512	512
ARP Entries	512	512	512	512
Static Routes	64	64	64	64
Dynamic Routing*	512	512	512	512
IGMP Multicast Groups	256	256	256	256
Policy Based Automation	Yes	Yes	Yes	Yes

## 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>• Radius/Tacacs+/Tacacs+</li> <li>• Secure shell</li> <li>• Local username/password</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> </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 v1/v2/v3*</li> <li>• IGMP Proxy</li> <li>• Flow Control per port</li> <li>• Per VLAN STP (PVST/PVRST)</li> <li>• Port Isolation/Private VLAN Edge</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 v2/v3* fast leave</li> <li>• Port Mirroring: port based, ACL based, VLAN based</li> <li>• Link Aggregation Groups (Static/LACP)</li> <li>• Jumbo frame (9k)</li> <li>• BPDU filtering</li> <li>• DoS Protection (Port, CPU)*</li> </ul>

# SPECIFICATIONS

cnMATRIX	ALL MODELS	
Management	<ul style="list-style-type: none"> <li>• cnMaestro (cloud management)</li> <li>• DHCP Client</li> <li>• Embedded DHCP server</li> <li>• Out of Band Ethernet Management</li> <li>• SNMP v1/v2/v3</li> <li>• Simple Network Time Protocol (SNTP)</li> <li>• Policy Based Automation</li> <li>• TFTP</li> <li>• IPv6 management</li> <li>• Autoinstall support for firmware images and config files</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> <li>• Password management</li> </ul>

HW SPECIFICATIONS	EX2028-P	EX2028	EX2010-P	EX2010
Power Supply	100-240VAC	100-240VAC	100-240VAC	100-240VAC
Max Switch Power (with Traffic)	25.10W	19.50W	10.54W	9.88W
MTBF (Hours)	285,350	432,283	338,917	806,354
Weight	3.96 kg (8.75 lb)	2.77 kg (6.1 lb)	1.99 kg (4.375 lb)	1.6 kg (3.5375 lb)
Dimensions	44 x 4.4 x 25 cm (17.3 x 1.75 x 9.85 in)	44 x 4.4 x 20.9 cm (17.3 x 1.75 x 8.22 in)	21 x 4.4 x 25 cm (8.26 x 1.75 x 9.85 in)	21 x 4.4 x 25 cm (8.26 x 1.75 x 9.85 in)
CPU Speed	800Mhz	800Mhz	800Mhz	800Mhz
LEDs Per Port	Link/Activity, PoE	Link/Activity	Link/Activity, PoE	Link/Activity
PoE+ Power Budget	400W	n/a	100W	n/a
PoE+ Voltage	54V	54V	54V	54V
Max PoE+ Power Per Port	30W	30W	30W	30W
Rack Mountable	Yes 1U	Yes 1U	Yes 1U	Yes 1U
Acoustic Noise dBA Per Switch (Ambient Temperature)	40dB - < 33°C, 44.3dB - 30°C-40°C, 52dB - >43°C	Fanless	Fanless	Fanless
Temperature Ranges	-0°C to +50°C (+32°F to +122°F)	-0°C to +50°C (+32°F to +122°F)	-0°C to +50°C (+32°F to +122°F)	-0°C to +50°C (+32°F to +122°F)
Operating Humidity	+55° at 95% RH	+55° at 95% RH	+55° at 95% RH	+55° at 95% RH
Storage Temperature	-40°C to +70°C (-40°F to +158°F)	-40°C to +70°C (-40°F to +158°F)	-40°C to +70°C (-40°F to +158°F)	-40°C to +70°C (-40°F to +158°F)

## IEEE STANDARDS

SWITCHING	
Core Switching Features	<ul style="list-style-type: none"> <li>• IEEE 802.1AB—Link Layer Discovery Protocol (LLDP)</li> <li>• IEEE 802.1D—Spanning tree compatibility</li> <li>• IEEE 802.1p—Ethernet priority with user provisioning and mapping</li> <li>• IEEE 802.1s—Multiple spanning tree compatibility</li> <li>• IEEE 802.1Q—Virtual LANs with port-based VLANs</li> <li>• IEEE 802.1X—Port-based authentication</li> </ul>
VLAN Support	<ul style="list-style-type: none"> <li>• IEEE 802.1W—Rapid spanning tree compatibility</li> <li>• IEEE 802.3—10BASE-T</li> <li>• IEEE 802.3u—100BASE-T</li> <li>• IEEE 802.3ab—1000BASE-T</li> <li>• IEEE 802.1ak—Virtual Bridged Local Area Networks - Amendment 07: Multiple Registration Protocol</li> <li>• IEEE 802.3ac—VLAN tagging</li> <li>• IEEE 802.3ad—Link aggregation</li> <li>• IEEE 802.3x —Flow control</li> <li>• Static Routing</li> </ul>
IEEE 802.1Q-2003	<ul style="list-style-type: none"> <li>• RFC 4541—Considerations for Internet Group Management Protocol (IGMP) Snooping Switches</li> <li>• ANSI/TIA-1057—LLDP-Media Endpoint Discovery (MED)</li> <li>• RFC 5171—Unidirectional Link Detection (UDLD) Protocol</li> </ul>
Advanced Layer-2 Features	<ul style="list-style-type: none"> <li>• Authentication, Authorization, and Accounting (AAA)</li> <li>• Broadcast Storm Recovery</li> <li>• Broadcast/Multicast/Unknown unicast storm recovery</li> <li>• DHCP Snooping</li> <li>• IGMP Snooping Querier</li> <li>• Independent VLAN Learning (IVL) support</li> <li>• Jumbo Ethernet frame support</li> <li>• Port MAC locking</li> <li>• Port mirroring</li> <li>• Protected ports</li> <li>• Static MAC filtering</li> </ul>

## IEEE STANDARDS

## 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

## MANAGEMENT

- 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
- Telnet
- Web GUI

## SNMP MIBs

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|---|--|---|
| FASTPATH Enterprise MIBs for Full Configuration Support of Switching Features | <ul style="list-style-type: none"> <li>• RFC 1213—MIB II</li> <li>• RFC 1493—Bridge MIB</li> <li>• RFC 1612—DNS resolver MIB extensions</li> <li>• RFC 1643—Definitions of managed objects for the Ethernet-like interface types</li> <li>• RFC 2233—Interfaces group MIB using SMI v2</li> <li>• RFC 2613—SMON MIB</li> <li>• RFC 2618—RADIUS authentication client MIB</li> <li>• RFC 2620—RADIUS accounting MIB</li> <li>• RFC 2674—VLAN MIB</li> <li>• RFC 2737—Entity MIB version 2*</li> </ul> | <ul style="list-style-type: none"> <li>• RFC 2819—RMON groups 1, 2, 3, and 9</li> <li>• RFC 2863—IF-MIB</li> <li>• RFC 2925—Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations</li> <li>• RFC 3273—RMON Groups 1, 2, and 3</li> <li>• RFC 3291—Textual conventions for Internet network addresses</li> <li>• RFC 3434—RMON Groups 1, 2, and 3</li> <li>• RFC 4022—TCP-MIB</li> <li>• RFC 4113—UDP-MIB</li> </ul> |
| Quality of Service MIBs   | <ul style="list-style-type: none"> <li>• MIBs for full configuration support of DiffServ, ACL, and CoS functionality</li> </ul>  | <ul style="list-style-type: none"> <li>• RFC 3289—Management information base for the DiffServ architecture (read-only)</li> </ul>  |

## SECURITY

- |   |   |   |
|---|---|---|
| Permit/Deny Actions for Inbound IP and Layer-2 Traffic Classification Based on: | <ul style="list-style-type: none"> <li>• Source/Destination IP address</li> <li>• TCP/UDP Source/Destination port</li> <li>• IP Protocol Type</li> <li>• Type of Service (ToS) or differentiated services (DSCP) field</li> </ul> | <ul style="list-style-type: none"> <li>• Source/Destination MAC address</li> <li>• EtherType</li> <li>• IEEE 802.1p user priority (outer and/or inner VLAN tag)</li> <li>• VLAN ID (outer and/or inner VLAN tag)</li> <li>• RFC 1858—Security Considerations for IP Fragment Filtering</li> </ul> |
|---|---|---|

Permit/Deny Actions for Inbound IP and Layer-2

## QUALITY OF SERVICE

- |   |   |  |
|---|---|--|
| Classify Traffic Based on Same Criteria as ACLs and Optionally: | <ul style="list-style-type: none"> <li>• Mark the IP DSCP or Precedence header fields</li> <li>• Police the flow to a specific rate with two-color aware support</li> <li>• RFC 2474—Definition of the differentiated services field (DS field) in the IPv4 and IPv6 headers</li> </ul> | <ul style="list-style-type: none"> <li>• RFC 2475—An architecture for differentiated services</li> <li>• RFC 2597—Assured forwarding Per-Hop Behavior</li> </ul> |
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Discover more information on cnMatrix at: <http://community.cambiumnetworks.com/>