

# 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 management with cnMaestro
- Zero touch deployment of switches makes deployment 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 - 10 Gbps (SFP+) uplinks on the 28 port models while offering 2 - 1Gbps (SFP) uplink ports on the 10 port models.

\* Feature to be included in release 2

## SPECIFICATIONS

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 units (watts)	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
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

## 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	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)
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°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> </ul>	<ul style="list-style-type: none"> <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 with Guest</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> </ul>	<ul style="list-style-type: none"> <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> </ul>	<ul style="list-style-type: none"> <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>Multicast VLAN Registration (MVR)</li> <li>Independent VLAN Learning (IVL) support</li> </ul>	<ul style="list-style-type: none"> <li>IPv6 Classification APIs</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>
TACACS+	<ul style="list-style-type: none"> <li>Voice VLANs</li> <li>Unauthenticated VLAN</li> <li>Internal 802.1X Authentication Server</li> </ul>	<ul style="list-style-type: none"> <li>CLI Filtering</li> <li>Switchport mode configuration</li> <li>Link Dependency</li> </ul>

### 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

## 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>• Time-Based ACL</li> <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> |
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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/>