

# cnMatrix™ TX2000 Series Switches

## QUICK LOOK:

- **Cloud Managed**
- **Non-Blocking, Fully Managed, Enterprise Grade, L2/L3 switch**
- **Cambium (GPS) Sync – Redundant dual sources**
- **Comprehensive/Intelligent PoE Solution**
- **Dual redundant AC/DC removable Power supplies**



cnMaestro™  
XMS

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:

- Full Line Rate, non-blocking architecture
- Easy and simple, free cloud (or on premise) management with cnMaestro™ or XMS\*
- Zero-touch deployment of switches makes installation easy
- Policy Based Automation eliminates manual and time consuming configuration
- Enhanced Security with automated device profiling and segmentation
- Policy Based Automation eliminates manual configuration during adds, moves and changes of network devices
- Unified Wired-Wireless access solution

\* Feature to be included in a future release.

### The cnMatrix TX Series of Switches provides the following addition functionality:

#### Cambium Sync

- Redundant Input Sync sources
  - » Internal GPS module (with external antenna)
  - » cnPulse
- Full per-port control with stats available

#### Comprehensive/Intelligent PoE solution

- 802.3af/at/bt - up to 90W
- 24V Passive PoE - up to 15W
- 54V Passive PoE - up to 90W

#### Dual redundant removable power supplies

- 600W, 930W, & 1200W AC & DC options

#### DC supplies

- Fully Isolated – Supports positive/negative input voltages
- 36V–72V
- 600W, 930W, & 1200W options
- Grounding lug nut located on front panel

#### All interfaces located on front panel

The cnMatrix series of fully managed switches delivers full Layer 2 and Layer 3 capabilities with enhanced access security. The cnMatrix series offers flexibility with SFP+ (10 Gbps) or SFP (1 Gbps) uplink ports. These switches come with a 3-Year Limited Lifetime Warranty.

## cnMatrix™ TX2000 Series Switches

Specifications			
	TX2012R-P	TX2020R-P	TX2028RF-P
<b>Throughput</b>	96 Gbps	112 Gbps	128 Gbps
<b>Forwarding Rate in Mpps (64 Byte Packets)</b>	120	120	120
<b>10/100/1000 Mbps RJ45 Ports</b>	8	16	16
<b>1 Gbps Fiber Ports (SFP)</b>	0	0	8
<b>10 Gbps Fiber Ports (SFP+)</b>	4	4	4
<b>PoE+ Enabled Ports 802.3af/at/bt</b>	8	16	16
<b>Low Voltage Passive PoE (24 V)</b>	4	8	8
<b>High Power 4 PPoE (up to 90 W)</b>	4	8	8
<b>Serial Console</b>	Yes	Yes	Yes
<b>USB</b>	Yes	Yes	Yes
<b>Rack Mount Kit</b>	No (optional accessory)	Yes	Yes
<b>Internal Fans</b>	2	2	2
<b>Reset Button</b>	Yes	Yes	Yes
<b>MAC Address Table Size</b>	16K	16K	16K
<b>Flash Storage</b>	128 MB	128 MB	128 MB
<b>DRAM</b>	512 MB	512 MB	512 MB
<b>VLANs</b>	4K	4K	4K
<b>QinQ*</b>	Yes	Yes	Yes
<b>LACP/Trunking</b>	8 LAGs/8 links per LAG	8 LAGs/8 links per LAG	8 LAGs/8 links per LAG
<b>QoS Priority Queues</b>	8	8	8
<b>PVRST</b>	32	32	32
<b>Ingress/Egress ACL</b>	128	128	128
<b>Static ARP Entries</b>	512	512	512
<b>ARP Entries</b>	512	512	512
<b>Static Routes</b>	64	64	64
<b>Dynamic Routing</b>	512	512	512
<b>IGMP Multicast Groups</b>	256	256	256
<b>Policy Based Automation</b>	Yes	Yes	Yes
<b>Cambium Sync (via RJ45 ports)</b>	8	16	16
<b>Redunant Sync Sources</b>	Yes	Yes	Yes
<b>External Antenna Port</b>	Yes	Yes	Yes
<b>cnPulse Port</b>	Yes	Yes	Yes
<b>Removable Power Supply (CRPS)</b>	1	2	1
<b>Redundant Power Supplies</b>	No	Yes	No

\* Feature to be included in a future release.

## cnMatrix™ TX2000 Series Switches

Hardware Specifications			
	TX2012R-P	TX2020R-P	TX2028RF-P
<b>Power Supply</b>	CRPS dependent	CRPS dependent	CRPS dependent
<b>Max Switch Power (WITH TRAFFIC)</b>	38.88W	39.24W	46.98W
<b>MTBF (hours)</b>	393648	250744	202977
<b>Unit Weight</b>	2.24 kg (4.98 lbs)	4.3 kg (9.46 lbs)	4.37 kg (9.61 lbs)
<b>Unit Dimensions (H x L x W)</b>	4.4 x 25 x 26 cm (1.7 x 9.8 x 10.2 in)	4.4 x 35 x 44 cm (1.7 x 13.8 x 17.3 in)	4.4 x 35 x 44 cm (1.7 x 13.8 x 17.3 in)
<b>Boxed Weight</b>	2.73 kg (6 lbs)	5.35 kg ( 11.77 lbs)	5.4 kg (11.88 lbs)
<b>Boxed Dimensions (H x L x W)</b>	9.2 x 37.5 x 31.5 cm (3.62 x 14.76 x 12.4 in)	12.8 x 55.1 x 48.5 cm (5.04 x 21.69 x 19.09 in)	12.8 x 55.1 x 48.5 cm (5.04 x 21.69 x 19.09 in)
<b>CPU Speed</b>	800 MHz	800 MHz	800 MHz
<b>LEDs per port</b>	Link/Activity, PoE	Link/Activity, PoE	Link/Activity, PoE
<b>PoE Power Budget</b>	CRPS dependent (see table)	CRPS dependent (see table)	CRPS dependent (see table)
<b>802.3af/at/bt PoE (54V)</b>	Ports 1–8	Ports 1–16	Ports 1–16
<b>24V Passive PoE - up to 15W</b>	Ports 5–8	Ports 9–16	Ports 9–16
<b>54V Passive PoE - up to 90W</b>	Ports 1–4	Ports 1–8	Ports 1–8
<b>54V Passive PoE - up to 30W</b>	Ports 1–4	Ports 9–16	Ports 9–16
<b>PoE Max Power Per Port</b>	30W/90W	30W/90W	30W/90W
<b>Rack Mountable</b>	Not included	Yes 1U	Yes 1U
<b>Wall Mountable</b>	Yes (Optional Accessory)	Yes	Yes
<b>Temperature Ranges</b>	-10°C up to 65°C	-10°C up to 65°C	-10°C up to 65°C
<b>Operating Humidity</b>	55°C at 95% RH	55°C at 95% RH	55°C at 95% RH
<b>Storage Temperature</b>	-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)

## cnMatrix™ TX2000 Series Switches

### Specifications - All Models

<b>Quality of Service</b>	ACL mapping and marking of ToS/DSCP (COS)	<b>Layer 2 Feature Set</b>	802.1s multiple spanning tree
	ACL mapping marking of 802.1p		VLAN, Port, Protocol, 802.1q
	ACL mapping to priority queue		QinQ*
	DiffServ support		802.1d
	Honoring DSCP and 802.1p (CoS)		802.1x authentication
	Traffic shaping/metering		Auto MDI/MDIX
	Priority queue management using Weighted Round Robin (WRR), Strict Priority (SP) and a combination of WRR and SP		BPDU Guard, Root Guard
<b>Traffic Management</b>	ACL-based inbound rate limiting policies		IGMP Snooping v1/v2/v3*, Fast Leave
	Broadcast, multicast and unknown unicast rate limiting		LLDP/LLDP MED
	Inbound rate limiting per port		IGMP Proxy
	Outbound rate limiting per port/queue		Static MAC
<b>Security</b>	802.1x authentication		Flow Control per port
	MAC authentication*		Per VLAN STP (PVST/PVRST)
	DHCP snooping		Port Mirroring: port based, ACL based, VLAN based
	RADIUS authentication/authorization	Port Isolation/Private VLAN Edge	
	Radius/Tacacs/Tacacs+	Link Aggregation Groups (Static/LACP)	
	Authentication, Authorization, and Accounting (AAA)	Rate Limiting/Storm Control	
	Secure shell	Jumbo frame (9k)	
	Secure copy (SCP)*	DHCP Snooping	
	Local username/password	BPDU filtering	
		Broadcast/Multicast/Unlearned Unicast (Storm Control)	
	DoS Protection		
	Ping/TraceRoute/ICMPv6		
<b>Layer 3 Feature Set</b>	Inter-VLAN Routing	Dynamic Routing – RIPv1/v2	
	Static ARPs	Dynamic Routing – OSPFv2	
	Static Routes	Route Redistribution	
	DHCP Relay		

\* Feature to be included in a future release.

## cnMatrix™ TX2000 Series Switches

### Specifications - All Models cont'd

#### Management

cnMaestro cloud management	DHCP relay
XMS* cloud management	Simple Network Time Protocol (SNTP)
Industry standard Command Line Interface (CLI)	Local/remote system logging
DHCP Client	Policy Based Automation
Embedded web management (HTTP/HTTPS)	Display log messages multiple terminals*
Embedded DHCP server	TFTP/SFTP
USB file management and storage	Telnet client/server
Out-of-Band Ethernet Management	IPv6 management
SSH / SSH v2	Password management
SNMP v1/v2/v3	Autoinstall support for firmware images and config files

#### Security

PERMIT/DENY ACTIONS FOR INBOUND IP AND LAYER 2 TRAFFIC CLASSIFICATION BASED ON:

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

\* Feature to be included in a future release.

### Acoustic Noise dBA Per Switch (Ambient Temperature)

#### TX2012R-P

##### AC CRPS

1 x 1200W AC: 52.7 dB < 33°C, 52.8 dB 33°C-43°C, 53.5dB - >43°C,

1 x 930W AC: 51.3 dB < 33°C, 51.6 dB 33°C-43°C, 52dB - >43°C,

1 x 600W AC: 60 dB < 33°C, 59.8dB 33°C-43°C, 59.6dB - >43°C,

##### DC CRPS

1 x 1200W DC: 69.2 dB < 33°C, 70.5dB 33°C-43°C, 70.6dB - >43°C,

1 x 930W DC: 64.3 dB < 33°C, 68.5 dB 33°C-43°C, 68.5dB - >43°C,

1 x 600W DC: 59 dB < 33°C, 65.5 dB 33°C-43°C, 65.5dB - >43°C,

#### TX2028RF-P

##### AC CRPS

1 x 1200W AC: 70.3dB < 33°C, 70.3dB 33°C-43°C, 70.1dB - >43°C

1 x 930W AC: 68.6 dB < 33°C, 68.6dB 33°C-43°C, 68.6dB - >43°C,

1 x 600W AC: 58.6 dB < 33°C, 58.7dB 33°C-43°C, 58.9dB - >43°C,

##### DC CRPS

1 x 1200W DC: 69.2 dB < 33°C, 73.7 dB 33°C-43°C, 73.9 dB - >43°C,

1 x 930W DC: 66.5 dB < 33°C, 69.7dB 33°C-43°C, 69.8dB - >43°C,

1 x 600W DC: 59.3 dB < 33°C, 67dB 33°C-43°C, 67.1dB - >43°C,

#### TX2020R-P

##### AC CRPS

1 x 1200W AC : 71.4 dB < 33°C, 71.5dB 33°C-43°C, 71.5dB - >43°C,

2 x 1200W AC : 55.6 dB < 33°C, 55.7dB 33°C-43°C, 56.1dB - >43°C,

1 x 930W AC : 67.9 dB < 33°C, 68.0dB 33°C-43°C, 68.1dB - >43°C,

2 x 930W AC : 54.8 dB < 33°C, 55.1dB 33°C-43°C, 55.4dB - >43°C,

1 x 600W AC : 58.2 dB < 33°C, 58.4dB 33°C-43°C, 58.6dB - >43°C,

2 x 600W AC : 52.8 dB < 33°C, 53.3dB 33°C-43°C, 53.9dB - >43°C,

##### DC CRPS

1 x 1200W DC : 68.9 dB < 33°C, 71.2dB 33°C-43°C, 71.2dB - >43°C,

2 x 1200W DC : 72.9 dB < 33°C, 74.0dB 33°C-43°C, 74.0dB - >43°C,

1 x 930W DC : 64.3 dB < 33°C, 68.9dB 33°C-43°C, 68.9dB - >43°C,

2 x 930W DC : 61.3 dB < 33°C, 68.6dB 33°C-43°C, 68.7dB - >43°C,

1 x 600W DC : 60.7 dB < 33°C, 66.6dB 33°C-43°C, 66.7dB - >43°C,

2x600W DC : 55.8 dB < 33°C, 67.3dB 33°C-43°C, 67.3dB - >43°C,

## cnMatrix™ TX2000 Series Switches

### Type (AC/DC) PoE Load Temperature

AC < 700W up to 65

AC > 700W up to 60

DC < 700W up to 60

DC > 700W up to 55

Power Supply	Type (AC/DC)	Available PoE Load	PoE Load	Temperature
1200W	AC	~1000W	<700W	-10°C up to 65°C
1200W	AC	~1000W	>700W	-10°C up to 65°C
1200W	DC	~960W	<700W	-10°C up to 65°C
1200W	DC	~960W	>700W	-10°C up to 65°C
930W	AC	~800W	<600W	-10°C up to 65°C
930W	AC	~800W	>600W	-10°C up to 65°C
930W	DC	~840W	<600W	-10°C up to 65°C
930W	DC	~840W	>600W	-10°C up to 65°C
600W	AC	~500W	<450W	-10°C up to 65°C
600W	AC	~500W	>450W	-10°C up to 65°C
600W	DC	~500W	<450W	-10°C up to 65°C
600W	DC	~500W	>450W	-10°C up to 65°C

Part #	Power Supply	Type (AC/DC)	DC-in Voltage	Available PoE Load	High-Temp Mode	Normal Mode
MXCRPSAC1200A0	1200W (110V)	AC	NA	900W	700W	900W
MXCRPSAC1200A0	1200W (220V)	AC	NA	960W	700W	960W
MXCRPSDC1200A0	1200W	DC	48–72V	960W	700W	960W
MXCRPSDC1200A0	1200W	DC	36–47V	740W	700W	740W
MXCRPSAC930A0	930W	AC	NA	840W	600W	840W
MXCRPSDC930A0	930W	DC	48–72V	840W	600W	840W
MXCRPSDC930A0	930W	DC	36–47V	740W	600W	740W
MXCRPSAC600A0	600W	AC	NA	500W	450W	500W
MXCRPSDC600A0	600W	DC	48–72V	500W	450W	500W
MXCRPSDC600A0	600W	DC	36–47V	500W	450W	500W

## cnMatrix™ TX2000 Series Switches

### 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

##### 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 802.3ac—VLAN tagging

IEEE 802.3ad—Link aggregation

IEEE 802.3x —Flow control

Bridged Local Area Networks - Amendment 07: Multiple Registration Protocol

##### IEEE 802.1Q-2003

RFC 4541—Considerations for Internet Group Management Protocol (IGMP) Snooping Switches

ANSI/TIA-1057—LLDP-MEDia Endpoint Discovery (MED)

##### Advanced Layer 2 Features

Authentication, Authorization, and Accounting (AAA)

IEEE 802.1ad (QinQ)\*

Broadcast/Multicast/Unknown unicast storm recovery

DHCP Snooping

IGMP Snooping Querier

Independent VLAN Learning (IVL) support

Jumbo Ethernet frame support

Port MAC locking

Port mirroring

Protected ports

Static MAC filtering

##### Layer 3 Features

Inter-VLAN Routing

Static ARP

Static Routes

RFC 2131 – DHCP Relay

RFC 2328 – OSPF Version 2

RFC 2453 – RIP Version 2

\* Feature to be included in a future release.

## cnMatrix™ TX2000 Series Switches

### 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 2132—DHCP options and BOOTP vendor extensions

RFC 2819—Remote Network Monitoring Management Information Base

RFC 2865—RADIUS client

RFC 2869—RADIUS Extensions

RFC 3579—RADIUS support for EAP

RFC 3580—IEEE 802.1X RADIUS usage guidelines

RFC 3164—BSD syslog protocol

RFC 3580—802.1X RADIUS Usage Guidelines

\* Feature to be included in a future release.

### 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 SSH transport layer protocol

SSL 3.0 and TLS 1.2

RFC 2246—TLS protocol, version 1.2

RFC 2818—HTTP over TLS

RFC 3268—AES cipher suites for transport layer security

Telnet

Web GUI



## cnMatrix™ TX2000 Series Switches

### SNMP MIBs

#### Enterprise MIBs for Full Configuration Support of Switching Features

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

\* Feature to be included in a future release.

#### Quality of Service MIBs

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

#### Classify Traffic Based on Same Criteria as ACLs and Optionally:

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

## cnMatrix™ TX2000 Series Switches

Ordering Information			
Type	Model	Part Number	Description
Switch	TX2012R-P	MXTX2012GxPA10	Intelligent Ethernet PoE Switch, Cambium Sync, 8 x 1 Gbps, and 4 SFP+, Removable Power Supply (not included) - no pwr cord
Switch	TX2020R-P	MXTX2020GxPA10	Intelligent Ethernet PoE Switch, Cambium Sync, 16 x 1 Gbps and 4 SFP+, Removable & Redundant Power Supplies (not included) - no pwr cord
Switch	TX2028RF-P	MXTX2028GFPA10	Intelligent Ethernet PoE Switch, Cambium Sync, 16 x 1 Gbps, 8 x SFP, and 4 SFP+, Removable Power Supply (not included) - no pwr cord
CRPS	AC	MXCRPSAC600A0	600W total power, no power cord
CRPS	AC	MXCRPSAC930A0	930W total power, no power cord
CRPS	AC	MXCRPSAC1200A0	1200W total power, no power cord
CRPS	DC	MXCRPSDC600A0	600W total Power, 36v–72v, includes 3m cable connector
CRPS	DC	MXCRPSDC930A0	930W total Power, 36v–72v, includes 3m cable connector
CRPS	DC	MXCRPSDC1200A0	1200W total Power, 36v–72v, includes 3m cable connector
Power Cord		N000900L092A	AC line cord, US Type B, 15A, 1.2 m C13 connector
Power Cord		N000900L040A	AC line cord, US Type B, 1.2m C13 connector
Rack Mounts		MX-RACK-TX2K-0	48.26 cm (19 in) Rack mount kit for cnMatrix TX2012R-P
Rack Mounts		MX-EXTXFULLA-1	Full-width switch rack mount kit for cnMatrix TX2020R-P and TX2028RF-P
Transceiver		SFP-10G-SR	10G SFP+ MMF SR Transceiver, 850 nm. -40°C to 85°C (-40°F to 185°F)
Transceiver		SFP-1G-SX	1G SFP MMF SX Transceiver, 850 nm. -40°C to 85°C (-40°F to 185°F)
Transceiver		SFP-10G-LR	10G SFP+ SMF LR Transceiver, 1310 nm. -40°C to 85°C (-40°F to 185°F)
Transceiver		SFP-1G-LX	1G SFP SMF LX Transceiver, 1310 nm. -40°C to 85°C (-40°F to 185°F)
Transceiver		SFP-1G-Copper	1000 Base-T (RJ45) SFP Transceiver. -40°C to 85°C (-40°F to 185°F)
Transceiver		SFP-10G-Copper	10G Base-T (RJ45) SFP Transceiver. 0°C to 70°C (-40°F to 185°F)

### ABOUT CAMBIUM NETWORKS

Cambium Networks empowers millions of people with wireless connectivity worldwide. Its wireless portfolio is used by commercial and government network operators as well as broadband service providers to connect people, places and things. With a single network architecture spanning fixed wireless and Wi-Fi, Cambium Networks enables operators to achieve maximum performance with minimal spectrum. End-to-end cloud management transforms networks into dynamic environments that evolve to meet changing needs with minimal physical human intervention. Cambium Networks empowers a growing ecosystem of partners who design and deliver gigabit wireless solutions that just work.