

KY-3001EMx SERIES // SPECIFICATIONS // Engineering Specific

Each of the KY-3001EMx series includes:

10 Port, 10 GbE, Gigabit

- Shelf Mount, Military Grade
- Layer 2 Switch, Managed
- Fiber Diagnostics, DDMI
- 8 x 10/100/1000 BaseT(X) RJ45 Ports
- 2 x 1000/10000Base(X) SFP Slots
- Power: 12 ~ 48 Volts DC
- Temperature Hardened: -40C ~ 80CLAYER

Layer 2, Layer 2+, and Layer 2++ HARDENED, IP30, MANAGED, 10 PORT, 10 GbE / Gigabit, Card Rack / Shelf Mount, Military Grade, INDUSTRIAL, POWER OVER ETHERNET Plus (OPTIONAL), Ethernet Traffic SWITCH with ERPS, MRP, Fiber Diagnostics, Remote Temperature Sensing, DDMI, MAC Table, Device Binding, Cyber Secure Video (CSV) with silicon enhancements & Clean Code Technology. Supported by KY-1-Button Easy Maintenance Dongle for Data & Configuration Automated Backup.

MTBF >87,000 Hours

Made in USA



PART 1 - GENERAL

The intent of this document is to specify the minimum criteria for the engineering, design, supply, installation, and commissioning of the OB Traffic 10 port, 2 x 10 GbE, Layer 2, Layer 2+ and Layer 2++, Shelf Mount, Managed, Military Grade Industrial Power Over Ethernet Traffic Switch, with CYBER-SECURE Video (CSV), and Clean Code Technology. IP30 Hardened Casing. DC Powered. All ports and power inputs are surge protected and the switch is Fanless (Convection Cooled).

1. SUMMARY

- The Layer 2, 2+, 2++ Managed, Industrial, 10 GbE switches are a series of managed industrial edge, and or core switches that are used as access devices to provide entry points into core networks, or can be used to form a core network. The switch enables connectivity for up to eight (8) 10/100/1000BaseT(X) twisted pair copper and two (2) 1000/10000Base GbE (X) Small Form-Factor Pluggable (SFP) Gigabit sockets. The 2 SFP socket ports can be configured as 10/100/1000BASE-T(X) RJ45 copper ports, Copper VDSL2, or 1000 / 10000BASE-SX/LX/LH/ZX, LC fiber ports, in any permutation, to provide maximum network flexibility.
- The Ethernet switches can operate across a wide range of operating temperatures, in non-environmentally conditioned, industrial applications. The Ethernet switches support a communications protocol specifically designed for industrial applications to provide automatic recovery of cable and port failure in less than 5 ms. The switches are designed to be managed through several different interfaces, (GUI, Command Line, Telnet, SSH) and provide a large range of hardware and software features to ensure ease of installation and enhancement of network performance.
- All ports and power inputs are surge protected and the switch is Fanless (Convection Cooled).
- Every switch is programmed using precision programming techniques and algorithms (Clean Code Technology) and incorporates CYBER-SECURE Video (CSV) for enhanced switch protection against hackers, viruses and BOTS.

2. SECTION INCLUDES

- KY-3001EMx#** Layer 2, 2+, 2++, Industrial Hardened, 10 Port, Managed Gigabit switch – 8 X 10/100/1000BaseT(X) RJ45 ports (PoE+), 2 X 1000 / 10000Base(X) GbE SFP Ten Gigabit Sockets, – Shelf Mount, Wide Range Power Supply 12 - 48 Volts dc.

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3. REFERENCES

- A. Conformity for Europe (CE)
- B. American National Standards Institute (ANSI)
- C. Federal Communications Commission (FCC)
- D. Australian Communications Authority (C-Tick)
- E. International Electro-technical Commission (IEC)
- F. Electronic Industry Association (EIA)
- G. Institute of Electrical and Electronics Engineers (IEEE)
- H. European Standards (EN)
- I. Restriction of Hazardous Substances (RoHS)
- J. Consultative Committee for International Radio (CCIR)
- K. Underwriters Laboratories Inc. (UL)
- L. Underwriters Laboratories of Canada (ULC)
- M. Waste Electrical & Electronic Equipment (WEEE)
- N. Open Network Video Forum (ONVIF)
- O. Physical Security Interoperability Alliance (PSIA)
- P. Software Engineering Institute (SEI)
- Q. National Security Agency (NSA)
- R. Central Security Service (CSS)
- S. National Electrical Manufacturers Association (NEMA)
- T. Voluntary Control Council for Interference by Information Technology Equipment (VCCI)
- U. American Certified Ethernet (ACE)

4. DEFINITIONS

- A. No Substitutes: The exact make and model number identified in this specification shall be provided without exception.
- B. Or Equal: Any item may be substituted for the specified item provided that in every technical sense, the substituted item provides the same or better capability and functionality
- C. Or Approved Equal: A substitute for the specified item may be offered for approval by the Owner. The proposed substitution must, in every technical sense, provide the same or better capability and functionality as the specified item. Such requests for approval shall be submitted in accordance with the provisions of PART 1.06 – SUBMITTALS, and must be obtained within the time frames outlined.

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5. SYSTEM DESCRIPTION

A. Performance Requirements:

1. Provides managed edge connectivity into core networks.
2. Provides managed core network capability, if required.
3. Provides ERPS Ring Protection
4. Provides 2 x 10 GbE Ports
5. Provides dual redundant uplink capability.
6. Provide 8 10/100/1000BaseT(X) RJ45 (POE+) ports and 2 SFP Gigabit (1000 / 10000Base(X) SFP sockets.
7. Possess a power consumption of less than 12 Watts Typical (Excluding POE)
8. Operate in temperature ranges of -40°C to +85°C
9. Provide a casing with IP40 protection class.
10. Recover from port and cable failures in less than 5ms.
11. Provide Device Binding +
12. Provide MRP Redundant Ring (IEC 62439-2) & ERPS Ring Protection
13. Possess the ability to be configured using HyperTerminal, Telnet, SSH and a Web Browser.
14. Possess 4096 Vlan's
15. Possess Port Status indicators.
16. Possess Ring Port Status indicators
17. Provide Fiber Cable diagnostics & Remote Temperature Sensing
18. Provide full SFP Diagnostics & DDMI Support
19. Provide Copper Cabling Diagnostics
20. Provide MAC Table Display & Diagnostics
21. Possess PoE+ Indicators
22. Possess CYBER-SECURE Video with Silicon Enhancements
23. Possess Clean Code Technology (Precision Coding Algorithms)
24. IP Camera Ready
25. Possess Automatic Denial Of Service (DOS) / Distributed Denial Of Service (DDOS) attack prevention and quenching mechanisms on every port.
26. Possess IP Policing and Port Binding Mechanism for MAC Address and IP Addressing Security.
27. Quick Configuration Wizard for Cameras / HD Video
28. Switch Latency of 5 us or less
29. Supports VDSL2 SFP
30. KY-1-Button Dongle Backup Capable for Automated Data & Configuration Backup
31. All ports and power inputs are surge protected and the switch is Fanless (Convection Cooled).
32. American Certified Ethernet for protection against counterfeit Ethernet chips / chip sets.
33. Supports IPv4 & IPv6 Protocols
34. Made in USA / Traffic Cabinet Input File / MTBF > 87,000 Hours

6. SUBMITTALS

- #### A. General: Submittals shall be made in accordance with the Conditions of the Contract and Submittal Procedures Section.
- #### B. Shop Drawings and Schematics: Shall depict the Layer 2 Industrial Ethernet switch in final proposed "as built" configuration. The following must be provided:
1. Connection diagrams for interfacing equipment.
 2. List of connected equipment.
 3. Locations for all major equipment components to be installed under this specification.
- #### C. Product Data: The following shall be provided:
1. Technical data sheets.
 2. A complete set of product instruction manuals.
- #### D. Quality Assurance Submittals: The following shall be submitted:
1. Test Report: The final test report shall indicate that every device was tested successfully in a system test.

7. DELIVERY, STORAGE AND HANDLING

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- A. General: Delivery, storage, and handling of the Layer 2, 2+, 2++ Industrial Ethernet switch shall be in accordance with the manufacturer's recommendations.
 - B. Ordering: The manufacturer's ordering instructions and lead-time requirements must be followed in order to avoid installation delays.
 - C. Delivery: The Layer 2, 2+, 2++ Industrial Power Over Ethernet switch shall be delivered in the manufacturer's original, unopened, undamaged container with identification labels intact.
 - D. Storage and Protection: The Layer 2, 2+, 2++ Industrial Ethernet Traffic switch shall be stored and protected from exposure to harmful weather conditions and at the environmental conditions recommended by the manufacturer.
8. PROJECT/SITE CONDITIONS
- A. Temperature Requirements: Layer 2, 2+, 2++ Industrial Ethernet switch products shall operate in an environmental temperature range of -40 °C to +85 °C // -40 °F to +185 °F
 - B. Humidity Requirements: Products shall operate in an environment with relative humidity of 0% to 97% (non-condensing).
9. WARRANTY
- A. Manufacturer shall warrant the Layer 2, 2+, 2++ Industrial Power Over Ethernet switch products to be free from defects in material or workmanship for a Limited Lifetime Warranty. Maintenance releases for embedded software shall be supported for the full warranty period.

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PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

- B. Substitutions: Not Permitted
- C. All Ethernet switches and SFP modules shall be supplied from a single manufacturer.
- D. SFP Modules MUST be temperature hardened

2. SYSTEM PERFORMANCE

- A. The Layer 2 Industrial Ethernet switch products shall include, as a minimum, the following features/functions/specifications:
 - 1. The system shall provide managed edge network connectivity into core networks.
 - 2. The system shall provide managed core network connectivity, if required.
 - 3. The system shall provide 8 x 10/100/1000BaseT(X), RJ45 ports, 2 x 1000 /10000Base(X) SFP Gigabit socket ports, and one shielded RJ45 Console interface.
 - 4. The system shall provide a casing with an IP30 protection class rating.
 - 5. The system shall support eRing protocols (recovery time 10ms) and RSTP/STP (IEEE 802.1w/d) and ring redundant protocols.
 - 6. Configuration of the system shall be achieved by HyperTerminal, Telnet, or a Web Browser.
 - 7. The system shall provide port status indicators, – where applicable.
 - 8. The system shall provide the ability when configured in a Ring network to have an additional uplink port.
 - 9. The system shall provide MRP, MAC Table, Device Binding Plus, SFP Diagnostics, Temperature Monitoring, Broadcast Storm Control, Port Mirroring, Static FDB, Multicast, Quality of Service (QoS), Virtual Local Area Networks (VLANs), Port Trunking, RMON Configuration, Secure Shell (SSH), Authentication, DHCP Server, DHCP Client, LACP/VLAN's, Automatic DOS & DDOS Quenching, MSTP, Cyber Secure Video (CSV),TOS, COS, DiffServ, Protocol 41, Jumbo Frames(up to 9K),IGMP Snooping, IGMPv3,IP based Bandwidth Management, SNMPv3, GVRP, MAC based Port Security, IP Based Port Security, MAC & IP based Port Security, TACACS, NEMA TS-2, Configuration Wizards, Multicast, Authorization, Authentication and Accounting (AAA).
 - 10. The system shall use Store & Forward as its switching method.
 - 11. The system's transfer rate shall be 148,810pps Fast Ethernet Port, 1,488,100pps Gigabit Ethernet Port, 14,881,000 10 GbE Port, its backplane switch capacity shall be 64 Gbps, it shall provide up to 4094 VLANs, 128 IGMP Multicast Groups for Each VLAN, an 8K MAC address table, 16 Security Queues and 16 Priority Queues.
 - 12. The system shall support the following protocols: Simple Network Management Protocol (SNMP) v3.0, Internet Group Management Protocol (IGMPv1,v2, v3) Snooping, Address Resolution Protocol (ARP), Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), eRing (proprietary redundant ring protocol), Simple Network Time Protocol (SNTP)
 - 13. The system shall have an operating temperature of -40°C to +85°C; have an operating humidity of 0 to 97% non-condensing and a MTBF of > 87,000 hours.
 - 14. The module shall have a power consumption figure of <12 Watts Typical
 - 15. The system shall provide built in over-current protection.
 - 16. The system radiated emission shall be compliant with FCC Part 15/EN55022, Class A.
 - 17. The system shall be available in PoE / PoE+ and Non PoE configurations.
 - 18. All ports and power inputs are surge protected and the switch is Fanless (Convection Cooled).
 - 19. The system will be American Certified Ethernet – guaranteed protection against counterfeit chips / chip sets.
 - 20. The system will be manufactured in the USA.

3. Switch Specifications:

A. Physical Ports:

- 1. 10/100/1000 BaseT(X) Ports – RJ45 (Auto MDI /MDIX with PSE)
8 PORTS (30 Watts Per Port // POE+ / OPTIONAL) IEEE802.3at, Bidirectional, Surge Protected Auto-Negotiable
- 2. 100/1000 Base-(X) SFP Sockets
2 SFP Sockets, Bidirectional , Surge Protected, Auto-Negotiable

B. Ethernet Standards:

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1. IEEE802.3 for 10BaseT / IEEE802.3ae
2. IEEE802.3u for 100BaseTX
3. IEEE802.3z for 1000Base-X
4. IEEE802.3ab for 1000 Base-T
5. IEEE802.3x for Flow Control
6. IEEE802.3ad for LACP (Link Aggregation Control Protocol)
7. IEEE802.1D for STP (Spanning Tree Protocol)
8. IEEE802.1p for Cos (Class of Service)
9. IEEE802.1Q for VLAN Tagging
10. IEEE802.1w for RSTP (Rapid Spanning Tree Protocol)
11. IEEE802.1x for Authentication
12. IEC 62439-2 – Media Redundancy Protocol
13. DDMI
14. ERPS

C. Ethernet Interface Specifications

1. Ethernet Compliance: IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX & 100BASE-FX, IEEE 802.3x Full Duplex, IEEE 802.3z Gigabit Fiber, IEEE 802.1AB, IEEE 802.1d Spanning Tree, IEEE 802.1w Rapid Spanning Tree, IEEE 802.1p Class of Service and IEEE 802.1q VLAN Tagging. LLDP, Jumbo-Frames
2. Interface: RJ45 Auto-MDI/MDI-X & 1000 Base SFP.
3. Data Rate: 10/100/1000 Mbps (Manual or auto-negotiate) and SFP ports that can be configured as 1000Base-TX or 1000Base-SX/LX/LH/ZX.
4. Operating Mode: Half or full-duplex
5. Network Protocols: Unicast/Multicast/Broadcast, SNMP v3.0, IGMP, ARP, STP, RSTP, eRing & SNTP.

D. Switch Specifications

1. Switching Method: Store & Forward.
2. Transfer Rate: 148,810pps Fast Ethernet Port, 1,488,100pps Gigabit Ethernet Port
Or 14,881,000 pps 10 GbE
3. Backplane Switch Capacity: 64 Gbps
4. Mac Address Table: 8192 Addresses
5. Number of VLANs: 4094
6. Number of Priority Queues: 8
7. Number of Security Queues: 8
8. Switching Latency: 6µs
9. Switching Bandwidth: 64 Gbps
10. Maximum Available VLANs: 256
11. IGMP Multicast Groups: 128 for Each VLAN
12. Port Rate Limiting: User Defined
13. Jumbo Frame Support: 9K Bytes
14. MRP Ring Support
15. DDMI (Full fiber diagnostics and remote temperature sensing)
16. Copper Cable diagnostics
17. MTBF 87,725 Hours
17. All ports and power inputs are surge protected and the switch is Fanless (Convection Cooled).
18. Made in USA

E. Status Indicators

1. **Power Indicator: (PWR)** Green Power Indicator
2. **System Ready Indicator: (STA)** Green : Indicates System Ready / Blinking: System is upgrading firmware
3. **Ring Master Indicator: (RM)** Green Indicates the system is operating in Ring Master Mode
4. **Ring Indicator: (Ring)** Green Indicates the system is operating in Ring Mode. // Blinking indicates the ring is broken,
5. **System Running Indicator: (RUN)** System operated continuously
6. **Reset to Default Running Indicator: (DEF)** Green Indicates system reset to default configuration
7. **10/100/1000BaseT(X) RJ45 Indicator:** Green for port Link/Activity Amber for Duplex /Collision

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8. **100/1000Base(X) SFP Port Indicator:** Green for port LINK/ACTIVITY
9. **System Status**

4. POWER SPECIFICATIONS

- A. Power Input:
 1. 12 ~ 48 Volts DC – Backplane (Works in NEMA and NON-NEMA Traffic Cabinets)
- B. Frequency: 50-60 Hz
- C. Power Consumption: < 12 Watts Typical
- D. Overload Current Protection: Yes
- E. Surge Protected: Yes

5. MECHANICAL SPECIFICATIONS

- A. Dimensions: 96.4 (W) x 108.5 (D) x 154 (H) mm (3.8 x 4.2.7 x 6.06 inch)
- B. Weight: 1,400g
- C. Casing: IP40 Protection

6. Regulatory Approvals

- A. **EMI:** FCC Part 15, CISPR (EN55022) Class A, IEC-60255-5
- B. **EMS:** EN61000-4-2 (ESD), EN61000-4-3 (RS), EN61000-4-4 (EFT), EN61000-4-5 (Surge) EN61000-4-11, EN61000-4-8, EN61000-4-6 (CS) EN61000-4-12, 61000-4-16, EN61000-4-17
- C. **SHOCK:** IEC60068-2-27
- D. **FREE FALL:** IEC60068-2-32
- E. **VIBRATION:** IEC60068-2-6
- F. **NEMA:** Exceeds NEMA TS-2 for Traffic Control Equipment
- G. **IEEE1613:** IEEE C3790.1, IEEE C3790.2, IEEE C3790.3

7. ENVIRONMENTAL SPECIFICATIONS

- A. Operating Temperature: -40°C to +85°C
- B. Storage Temperature: -40°C to +85°C
- C. Humidity: 0% to 97% (non-condensing)
- D. Emissions: FCC CFR47 Part 15/EN55022, Class A
- E. IEC 600068-2-1, IEC 600068-2-2, IEC 600068-2-30. IEC 60255-21-1, IEC 60255-21-2
- F. Mean Time between Failure: >87,000 hours

8. SFP MODULES

The SFP modules used shall be supplied by OB Traffic. The SFP modules shall have a hot-pluggable SFP footprint, low power dissipation, a metal enclosure for lower EMI, a single 3.3V power supply and an operating temperature range of -40°C to +85°C. SFP's must support DDMI. The switch shall support but not be limited to supporting the following SFP Gigabit modules: (Note: D is for Diagnostics / nm is nanometer / S is Single-mode / M is Multi-mode)

- | | | | |
|-----|--|--------------------------------|-----------------------------|
| 1. | Copper, 10/100/1000 Mbps, | 100m, RJ45. | KY-CGSFP-TXRJ |
| 2. | Copper, 100 Mbps, 1 / 2 Pair, Twisted, | Up to 2400 m, VDSL2, RJ-45, D. | KY-VDSL2SFP |
| 3. | Fiber, 1000 Mbps, 2 fibers, multi-mode, | 550m, 850nm, LC, D. | KY-MGSFP-550MD |
| 4. | Fiber, 1000 Mbps, 2 fibers, multi-mode, | 2KM, 1310nm, LC, D | KY-MGSFP-LR2KMD |
| 5. | Fiber, 1000 Mbps, 1 fiber, single-mode, | 3KM, 1310/1550nm, LC, D. | KY-BIDISGSFP-LR3KMD |
| 6. | Fiber, 1000 Mbps, 2 fibers, single-mode, | 10KM, 1310nm, LC, D. | KY-SGSFP-LX10KMD |
| 7. | Fiber, 1000 Mbps, 2 fibers, single-mode, | 20KM, 1310nm, LC, D | KY-SGSFP-LX20KMD |
| 8. | Fiber, 1000 Mbps, 2 fibers, single-mode, | 40KM, 1550nm, LC, D | KY-SGSFP-LX40KMD |
| 9. | Fiber, 1000 Mbps, 2 fibers, single-mode, | 80KM, 1550nm, LC, D | KY-SGSFP-ZX80KMD |
| 10. | Fiber, 1000 Mbps, 2 fibers, single-mode, | 120KM, 1550nm, LC, D | KY-SGSFP-ZX120KMD |
| 11. | Fiber, 1000 Mbps, 1 fiber, single-mode | 10KM, 1550nm/1310nm, D. | KY-BIDISGSFP-LX10KMD |

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| 12. | Fiber, 1000 Mbps, 1 fiber, single-mode | 20KM, 1550nm/1310nm, LC, D. | KY-BIDISGSFP-LX20KMD |
| 13. | Fiber, 1000 Mbps, 1 fiber, single-mode | 40KM, 1550nm/1490nm, LC, D. | KY-BIDISGSFP-LX40KMD |
| 14. | Fiber, 1000 Mbps, 1 fiber, single-mode | 80KM, 1550nm/1490nm, LC, D. | KY-BIDISGSFP-ZX80KMD |
| 15. | Fiber, 10000 Mbps, 2 fibers, multi-mode, | 3KM, 1310nm, LC, D | KY-MGSFP-LR3KMD |

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Inspect modules before installation to verify physical condition as well as inclusion of all peripheral materials
- B. Modules shall be free of any cosmetic defects or damage.
- C. Shipping box shall include the module, power supply (surface mount units) and operations manual.

3.02 PREPARATION

- A. Wall Mount
 - 1. Shall be mounted on a properly prepared surface adequate for the size and weight of module. The placement of the unit shall allow provision for cable installation and maintenance as indicated on the approved detail drawings and in accordance with the installation manual.
- B. Rack Mount
 - 1. Shall be mounted on a properly installed equipment cabinet or rack adequate for the size and weight of the unit. The placement of the unit shall allow provision for cable installation and maintenance as indicated on the approved detail drawings and in compliance with the installation manual.

3.03 INSTALLATION

- A. General: The Layer 2, 2+, 2++ Industrial Ethernet switch products must be installed, configured, and tested in accordance with the manufacturer's instructions.

3.04 TESTING AND CERTIFICATION

- A. The Contractor shall demonstrate the functionality of the Layer 3, 2, 2+, 2++ POE Ethernet switch on completion of installation, documenting the result of all tests and providing these results to the Owner. The Layer 2, Ethernet switch shall be tested in accordance with the following:
 - 1. The Contractor shall conduct a complete inspection and test of all installed Layer 2, 2+, 2++, Ethernet switch equipment. This includes testing and verifying operation with connected equipment and network infrastructure.
 - 2. The Contractor shall provide staff to test all devices and all operational features of the system for witness by the Owner's representative and the Authority having jurisdiction. All testing must be witnessed by the Owner's representative, prior to acceptance.

END OF SECTION

Brief Specification

The Layer 2, 2+, 2++, IP40, 10 GbE, Managed Industrial Ethernet Edge switch products shall be model KY-3001EMx. Refer to contract drawings for mounting type. The system shall provide edge connectivity into both edge and core networks. The system shall provide 8 10/100/1000BaseT(X) RJ45 ports, 2 1000 /10000Base(X) 10 GbE SFP Gigabit / 10 Gigabit sockets, 2 Back Plane Connectivity for power / ground Inputs, a shielded RJ45 Console interface (KY-1-Button support. The SFP ports shall be configured as either 10/100/1000BASE-T(X) RJ45 copper ports or 1000BASE / 10000BASE -SX/LX/LH/ZX, LC fiber ports, in any permutation, to provide maximum network flexibility. The system shall provide a casing with an IP30 protection class rating. The system shall have high speed redundant ring technology (MRP / ERPS) and be able to recover from port and cable failures in less than 5 ms. Configuration of the system shall be achieved by either HyperTerminal, Telnet or a Web Browser. The system shall provide port status indicator. The system shall provide the ability to be configured in a Ring network and shall have an additional uplink port. MRP Rings MUST be supported. The system shall provide Broadcast Storm Control, Device Binding Plus, MAC Table, DDMI, Automated Configuration Backup Dongle, Copper & Fiber Cable Diagnostics, Remote Temperature Sensing, Port Mirroring, Static FDB, Multicast, Quality of Service (QoS), Virtual Local Area Networks (VLANs), Port Trunking, RMON Configuration, Secure Shell (SSH), Authentication, DHCP Server, DHCP Client, LACP,VLAN's, Automatic DOS & DDOS Quenching, MSTP, Cyber Secure Video (CSV),TOS, COS, DiffServ, Protocol 41, Jumbo Frames(up to 9K),IGMP Snooping, IGMPv3,IP based Bandwidth Management, SNMPv3, GVRP, MAC based Port Security, IP Based Port Security, MAC & IP based Port Security, NEMA TS-2, Configuration Wizards, Authorization, Authentication and Accounting (AAA).The system shall use Store & Forward as its switching method. The switch latency will be 2us or less. The system's transfer rate shall be 148,810pps Fast Ethernet Port, 1,488,100pps Gigabit Ethernet Port, 14,881,000pps 10 Gigabit Ethernet Port - its backplane switch capacity shall be 64 Gbps, it shall provide up to 4094 VLANs, an 16K MAC address table, 8 Security Queues and 8 Priority Queues. The system shall support the following protocols: Simple Network Management Protocol (SNMP) v3.0, Internet Group Management Protocol (IGMP) Snooping, LLDP, Address Resolution Protocol (ARP), Spanning Tree Protocol (STP), Multicast, Rapid Spanning Tree Protocol (RSTP), eRing (proprietary redundant ring protocol), ERPS - Ring Protection Protocol, Simple Network Time Protocol (SNTP). The system shall have an operating temperature of -40°C to +85°C, have an operating humidity of 0 to 97% non-condensing, and have a power consumption of less than 12 Watts Typical - and an MTBF of > 87,000 hours. The system shall provide built in over-current protection. All ports and power inputs are surge protected and the switch is Fanless (Convection Cooled). The system radiated emission shall be compliant with FCC Part 15/EN55022, Class A. Supports IPv4 & IPv6 Protocols

The switch will have a **Limited Lifetime Warranty** and be manufactured in the USA.

The switch must be American Certified Ethernet.