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# ETHERNET SWITCH - UNMANAGED

## DIVISION 27 – COMMUNICATIONS

27 20 00 Data Communications

27 21 29 Data Communications Switches and Hubs

### Notes to Specifier:

1. Where several alternative parameters or specifications exist, or where, the specifier has the option of inserting text, such choices are presented in **[bold text]**.
2. Explanatory notes and comments are presented in **colored** text.

## PART 1 GENERAL

### 1.01 SUMMARY

- A. *Section includes a 10-Port managed Ethernet network switch, allowing Ethernet devices to communicate with one another and capable of extensive device configuration based on assignable user roles.*
- B. *Product - 10-Port Industrial PoE managed switch with eight 10/100BASE-TX PoE injector ports and two 10/100/1000BASE-TX uplink ports*
- C. *Related Requirements*
  1. **[Insert relevant related requirements]**

### 1.02 REFERENCES

- A. *Abbreviations*
  1. CLI - Command Line Interface
  2. COS - Class of Service
  3. DiffServ - Differentiated Services
  4. DSCP - Differentiated Services Code Points
  5. GARP - Generic Registration Protocol
  6. GMRP - GARP Multicast Registration Protocol
  7. GUI - Graphical User Interface
  8. GVRP - VLAN Registration Protocol
  9. IGMP - Internet Group Management Protocol
  10. MIB - Management Information Base
  11. MTBF - Mean Time Between Failures
  12. PD - Powered Device
  13. PoE - Power over Ethernet
  14. PSE - Power Sourcing Equipment
  15. QoS - Quality of Service
  16. RSTP - Rapid Spanning Tree Protocol
  17. SMTP - Simple Mail Transfer Protocol
  18. SNMP - Simple Network Management Protocol
  19. SSH - Secure Shell
  20. VLAN - Virtual Local Area Network
  21. VID - VLAN Identifier
  22. VoIP - Voice over IP
- B. *Reference Standards*
  1. IEEE 802.3 Ethernet Standards
    - a. IEEE 802.3i - 10BASE-T

- b. IEEE 802.3u - 100BASE-TX
- c. IEEE 802.3ab - 1000BASE-TX
- d. IEEE 802.3ad LACP
- e. IEEE 802.3af Power over Ethernet
- f. IEEE 802.at LLDP PoE Plus
- g. IEEE 802.3x Flow Control and Back-Pressure
- h. IEEE 802.1ab LLDP
- i. IEEE 802.1D-2004 Rapid Spanning Tree Protocol (RSTP)
- j. IEEE 802.1p Class of Service
- k. IEEE 802.1Q Virtual LAN's
- l. IEEE 802.1x Port Based Network Access Control
- 2. Emissions
  - a. FCC Part 15 Subpart B, Class A limit
  - b. Canadian EMC Requirement ICES-003
  - c. European Standard EN55022
  - d. CISPR 22
- 3. Immunity - European Standard EN55024
  - a. IEC61000-4-2/EN61000-4-2: ESD
  - b. IEC61000-4-3/EN61000-4-3: RF
  - c. IEC61000-4-4/EN61000-4-4: Fast Transient/Burst
  - d. IEC61000-4-5/EN61000-4-5: Surge
  - e. IEC61000-4-6/EN61000-4-6: Conducted Disturbance
  - f. IEC61000-4-8/EN61000-4-8: Magnetic Field
  - g. IEC61000-4-11/EN61000-4-11: DIPS and Voltage Variations
- 4. Safety
  - a. IEC 60950/EN60950
  - b. CSA C22.2 No. 60950/UL60950 Third Edition
- 5. ROHS - European Standard: 2002/95/EC Directive (RoHS)

### **1.03 SUBMITTALS**

- A. *Product Data*
  - 1. Manufacturer's printed or electronic data sheets
  - 2. Manufacturer's installation and operation manuals
  - 3. Warranty Documentation

### **1.04 QUALIFICATIONS**

- A. *Manufacturer of system shall have a minimum of three years' experience of successful installation of systems equivalent in function to the system proposed herein.*
- B. *Installation contractor shall be authorized to install service and maintain the system by the system manufacturer.*

### **1.05 WARRANTY**

- A. *Manufacturer shall support a minimum limited warranty of five years.*

END OF SECTION

## PART 2 PRODUCTS

### 2.01 SOFTWARE

- A. *Manufacturer:* Comtrol Corporation  
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- B. *Model:* 7510

### 2.02 DESCRIPTION

- A. *General* - The Ethernet Switch ("Switch") shall be a 10-Port managed device, eight of which are 10/100BASE-TX RJ45 ports, capable of PoE injection; and two of which are Gigabit Ethernet capable uplink ports, supporting 10/100/1000BASE-TX twisted pair transmission.
1. The Switch shall have a 32 Gbps internal switching fabric, with Store and Forward switch technology.
  2. The Switch shall support at least 8000 MAC addresses in its internal memory.
  3. The Switch shall provide a relay contact output with minimum rating of 1A @ 24 VDC indicating a pre-defined alarm condition in the switch of the following types:
    - a. System event
    - b. Port event
    - c. PoE event
  4. The Switch shall support an MTBF of greater than 37 years.
- B. *Power over Ethernet (PoE)*
1. The eight PoE ports shall be capable of 3 powering modes, as follows:
    - a. IEEE 802.3af, sourcing 44 - 57 VDC
    - b. IEEE 802.3at, sourcing 50 - 57 VDC
    - c. Force - unclassified with user settable power limit
  2. The Switch shall allow the user to selectively enable or disable PoE on each of the eight ports and to program a time schedule for toggling the port between enable and disable.
  3. The Switch shall support a total PoE power consumption of 200 watts, under all input voltage ranges specified by the manufacturer.
  4. The Switch shall have an ongoing dynamic re-negotiation function of the IEEE 802.3at LLDP, dynamically reallocating power to the Powered Devices (PDs).
  5. The Switch shall implement the 1 event and Link Layer Discovery Protocol (LLDP) PoE into the system for efficient power budget negotiation between Power Sourcing Equipment (PSE) and PDs.
- C. *Quality of Service (QoS)* - The Switch shall fully support QoS in accordance with IEEE 802.1p for optimization of video and voice over the network.
1. Each port shall support up to four priority queues.
  2. The Switch shall be capable of processing IEEE 802.1p Class of Service (COS) tags.
  3. The Switch shall provide the ability to map queue settings to DSCP values to be used in IP packets processed by other Layer 3 switches and IP routers.

- D. *Virtual LANs (VLANs)*
  - 1. The Switch shall be fully compliant with IEEE 802.1Q.
  - 2. VLAN information shall be propagated to switches via GVRP VALN registration protocol.
  - 3. The Switch shall allow for up to 64 VLANs.
  - 4. The Switch shall allow for 4 VLAN trunk groups, with up to 6 ports assignable per trunk.
  - 5. Switch ports shall be configurable to allow either all packets or only VLAN tagged packets.
  - 6. Switch ports shall be configurable for ingress filtering to allow only packets tagged with the VLAN identifier (VID) for which the port has been configured.
- E. *Security*
  - 1. Port mirroring - The Switch shall support mirroring to allow online traffic monitoring on multiple selected ports.
  - 2. Port security
    - a. Switch ports shall be configurable for port security, allowing up to 100 MAC addresses and VID, if applicable, to be learned by the switch for permitted access.
    - b. 802.1x Port-based network access control
      - 1) The Switch shall support configuration of each port for access to the network based on authentication from a RADIUS server.
      - 2) Switch ports which are enabled for 802.1x shall be configurable for
        - a) number of client requests
        - b) whether single or multiple clients can access a single port
        - c) timeout period of the authentication request.
      - 3) The Switch shall have available an 802.1x port status page to view the current configuration settings.
  - 3. IP security - The switch shall allow specific IP addresses to be authorized for management access via a web browser or Telnet.
- F. *Multicast* - The Switch shall support IGMP to enable multicasting and specifically supporting the following:
  - 1. IGMP snooping V1, V2, and V3, which may be enabled on specific VLANs
  - 2. IGMP query V1 and V2
  - 3. Options for forwarding unknown multicast traffic to Query ports or all ports or no ports (discard)
  - 4. GMRP configuration on a per port basis
- G. *Redundancy* - The Switch shall support the following redundancy methods:
  - 1. Spanning Tree Protocol
  - 2. Rapid Spanning Tree Protocol (RSTP)
    - a. Allow RSTP parameters to be configured on a per-port basis
    - b. Provide a RSTP status page to allow viewing of current configuration.
  - 3. Redundant ring
    - a. Allow for two redundant ring types
      - 1) Super Ring
      - 2) Rapid Super Ring with less than msec recovery time
    - b. Support Rapid Dual Homing, permitting a maximum of seven multiple rings for redundancy.

H. *Management*

1. Management utility- The Switch shall be discoverable and configurable by a PC management utility that allows:
  - a. location of the Switch on the network
  - b. opening of the Web GUI for the Switch
  - c. rebooting of the Switch
  - d. loading factory defaults
  - e. changing IP address information
  - f. creating and loading backup configuration files
  - g. upgrade Switch firmware
  - h. generation of log files
2. Interfaces
  - a. The Switch shall provide for out-band management and configuration via an RS-232 serial console port connection.
  - b. The Switch shall provide for in-band management and configuration via web browser or remote Telnet or SSH connection.
  - c. Web Interface - The Switch shall provide for a user Graphical User Interface (GUI) allowing straightforward configuration of key system parameters.
    - 1) The web interface shall be password protected.
    - 2) The web interface shall have provision for a secure HTTPS log in.
    - 3) The web interface shall allow access to a basic group of tasks to include the following:
      - a) Switch settings
      - b) Admin password
      - c) IP configuration
      - d) time setting
      - e) DHCP server configuration
      - f) backup and restore
      - g) firmware upgrade
      - h) factory defaults
      - i) Switch reboot
    - 4) The web interface shall allow direct access to port-related settings, including the following:
      - a) enable/disable port state
      - b) configure port auto-negotiation
      - c) port speed
      - d) duplex communication
      - e) flow control
      - f) rate limit control
      - g) port aggregation settings
      - h) viewing of port status and aggregation
  - d. Command Line Interface (CLI) - The Switch shall provide a command line interface to the Switch's embedded software and allow configuration in one of the following modes:
    - 1) User EXEC mode, allowing basic functionality including ping, telnet, and displaying system commands and running system information
    - 2) Privileged EXEC mode, allowing view of current configuration, reset default, reload switch, show system information, save configuration, and enter the global configuration mode

- 3) Global configuration mode, allowing configuration of all user settable features, to include the following:
  - a) Administrator account setting
  - b) Set a static ARP entry
  - c) Configure time-of-day clock
  - d) Set a command to its defaults
  - e) IEEE 802.1x standard access security control
  - f) End current mode and change to enable mode
  - g) Exit current mode and down to previous mode
  - h) GMRP protocol
  - i) GARP VLAN Registration Protocol
  - j) Set system's network name
  - k) Select an interface to configure and enter an interface configuration mode or VLAN configuration mode
    - l) IP information
    - m) Link Aggregation Control Protocol
    - n) Print command list
    - o) Link Layer Discovery Protocol
    - p) Logging control
    - q) MAC address table
    - r) Negate a command or set its defaults
    - s) Configure Network Time Protocol
    - t) Configure Power over Ethernet
    - u) IEEE1588 Precision Time Protocol
    - v) Quality of Service (QoS)
    - w) Configure redundant ring
    - x) Relay output type information
    - y) Enable a routing process
    - z) SMTP server configuration
    - aa) SNMP server
    - bb) Spanning tree algorithm
    - cc) Trunk group configuration
    - dd) Virtual LAN
    - ee) Warning event selection
    - ff) Specify config files to write to
- 4) Interface configuration mode, allowing configuration of individual port settings
- 5) VLAN configuration mode, allowing configuration of settings for each VLAN

### 3. SNMP

- a. The Switch shall support SNMP v1 and v2c and allow for setting community string parameters.
- b. The Switch shall support SNMP v3, providing for security level, authorization level and password, and encryption.
- c. The Switch shall have an enable function for SNMP traps, allowing for configuration of the SNMP trap server IP, Community name, and trap Version V1 or V2.
- d. The Switch shall support standard SNMP traps and its own private MIBs.

### I. Alarms

1. The Switch shall contain an alarm relay for failure and event notification rated for 1 Amp at 24 VDC.

2. Each switch port shall have an Alarm capability, configured via management software to automatically trigger on connection issues when ports are connected to an auto-negotiation 10/100 full-duplex device.

J. *Indicators*

1. The Switch shall provide visual indication of the following:
  - a. input voltage
  - b. system status
  - c. ring status
  - d. alarm condition
  - e. port link activity
  - f. delivery of power from a PoE port
2. The Switch shall indication of the following via the switch web interface:
  - a. device connected to port full-duplex mode
  - b. collision of frames in half-duplex mode
  - c. port speed

K. *Voltage Input*

1. The Switch shall provide for two redundant DC power inputs via one 6-pin terminal block
2. Power inputs shall be reverse polarity protected
3. Input voltage shall be a minimum of 48VDC to support IEEE 802.3af PD's or 53 VDC if the Switch is to support IEEE 802.3at PDs
4. Input voltage shall be no more than 57VDC

L. *Enclosure*

1. The Switch shall be packaged in industrial-grade aluminum IP31 housing.
2. The Switch shall provide for DIN rail or wall-mount installation

M. *Environmental*

1. The Switch operating temperature range shall be -40° to +70°C when operating within the IEEE 802.3af specification.
2. The Switch operating temperature range shall be -40° to +60°C when operating within the IEEE 802.3at specification.
3. The Switch shall operate in a humidity range of 0 - 90%.

END OF SECTION



**PART 3 EXECUTION**

**3.01 INSTALLERS**

- A. The Installer must demonstrate sufficient network knowledge to the satisfaction of the Owner's representative.

**3.02 STORAGE**

- A. The Switch shall be stored in an environment where temperature is in the range of -40° to +85°C and humidity is 0 - 90%.

**3.03 INSTALLATION**

- A. Before permanent installation of the system, the system shall be tested in a configuration equivalent to the final system.

END OF SECTION