

Instant integration with Ethernet/IP networks

Utilising the EDS-405A-EIP and EDS-408A-EIP managed Ethernet switches, for plug-and-play operation and monitoring capabilities with Ethernet/IP based networks.

Introduction

Ethernet Industrial Protocol or Ethernet/IP is a communications protocol which is managed by the Open DeviceNet Vendors Associations (ODVA) and is commonly used in the factory automation and oil and gas industries. Ethernet/IP is built on the TCP/IP protocol suite and can communicate over Ethernet based networks. However, many Ethernet switches on the market do not have the recommended requirements for efficient communication and lack the ability to interface with Ethernet/IP based SCADA monitoring systems. This document highlights the benefits that an Ethernet/IP enabled switch network can bring to Ethernet/IP network installations.

Ethernet/IP Requirements

Ethernet/IP based PLC manufacturers often provide guidelines to support the network design process and provide a framework for identifying the considerations that are critical to specific applications. A summary of the Ethernet switch general requirements for Ethernet/IP support can be found in Figure 1.

Required Features	Recommended Features
<ul style="list-style-type: none"><input type="checkbox"/> Full-duplex switching<input type="checkbox"/> IGMP Snooping<input type="checkbox"/> Port Mirroring	<ul style="list-style-type: none"><input type="checkbox"/> 10/100Mbps Auto-negotiation<input type="checkbox"/> Manually configurable speed/duplex<input type="checkbox"/> IGMP Query<input type="checkbox"/> VLAN<input type="checkbox"/> SNMP for switch management

Figure 1.

Full-duplex switching

Ethernet/IP is designed to be a real-time communications protocol (or a near to real-time as possible with non-deterministic TCP/IP based networks), this is required in industrial based networks as precise time control and monitoring is critical in many systems. Full-Duplex switching is required as opposed to Half-duplex operation as it greatly reduces the amount of data collisions in an Ethernet network. Full-duplex communication uses independent transmit and receive circuits and therefore simultaneous two-way communication and “near” real-time communication is possible.

IGMP Snooping

Multicast messages are used to send point-to-multi-point messages in an Ethernet/IP network, multicast messages cannot be forwarded efficiently in a switched network unless routers, layer 3 switches or managed switches with IGMP Snooping support are used. A managed switch with IGMP Snooping will inspect Multicast packets and only forward them to the appropriate ports, if IGMP Snooping is not used then the Multicast packet will be forwarded to all ports, thereby reducing the efficiency on the network.

Port Mirroring

This feature will allow the traffic from any port to be duplicated on a spare port for network troubleshooting and diagnostics, increasing industrial network maintainability.

10/100Mbps Auto negotiation

The bandwidth requirement will depend on the application; it is recommended that 10Mbps or 100Mbps data rates are used. Auto negotiation is a useful feature which will automatically choose the switching speed of each port to match its associated node.

Manually configurable speed/duplex

Some switches allow the user to configure a set speed and duplex mode of operation for each port. This is beneficial to the bandwidth control, as by limiting less bandwidth demanding ports the overall bandwidth budget can be optimised.

IGMP Query

In a network where multicast traffic is being controlled by switches with IGMP Snooping, there must be at least one switch which can generate a periodic IGMP Query to all devices, this is to determine which devices are members of which multicast groups.

VLAN

A Virtual Local Area Network or a VLAN is a switched network which is separated into segments by the use of logical groups rather than the more conventional physical geographical groups. Switches that support VLAN allow the user to define a logical addressing scheme that will identify where data can be sent and reduces unnecessary network traffic and delay time.

SNMP for switch management

Simple Network Management Protocol or SNMP is used to for remote management, configuration and diagnostics of network infrastructure products.

Ethernet/IP enabled switches

Switches which support the required features of Ethernet/IP will be able to provide an efficient communication platform for the protocol. The benefit of Ethernet/IP enabled switches is that they have been pre-configured for plug-and-play operation, greatly reducing the setup time and effort.

The EDS-405A-EIP and the EDS-408A-EIP are Ethernet/IP enabled. There are pre-configured versions of the existing EDS-405A/408A standard models with additional support for custom faceplate for FactoryTalk® SCADA software packages. Table 1 is a comparison between the EDS-405A/408A-EIP Series and the existing EDS-405A/408A Series.

	EDS-405A/408A (standard models)	EDS-405A/408A-EIP
Hardware	Identical hardware	
Firmware Version	V3.0: EIP and Standard models use separate firmware V3.1: EIP and Standard models will share the same firmware	
Firmware Function	Standard	Default enabled <ul style="list-style-type: none"> • IGMP snooping • Ethernet/IP
FactoryTalk® View Graphics	N/A	Yes
FactoryTalk® View Faceplate	N/A	Yes

Table 1

All EDS-405A/408A models have passed the ODVA certification process, which provides industry with the vendor-independent assurance that products built to the ODVA specifications comply with the ODVA specifications.

Integration with FactoryTalk® View software allows users to view device information, monitor the status of the switching port and configure port settings as well as having a customer image representation of the switch. Figure 2 shows an example of the FactoryTalk® View customer faceplate which would be visible on a monitor or Human Machine Interface (HMI) of a SCADA system.

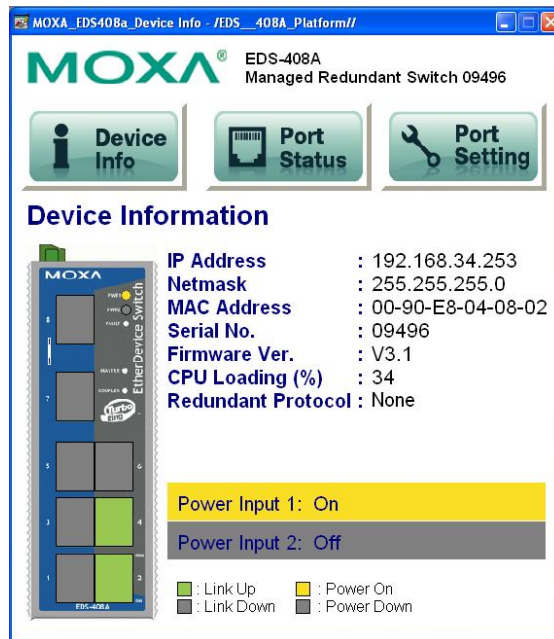


Figure 2.

The EDS-405A-EIP and EDS-408A-EIP



- 5 or 8 ports 10/100BaseTX managed Ethernet Switches
- Ethernet/IP enabled
- Rugged Design
- -40 to 75°C operating temperature
- DIN-Rail Mounting
- 12-45 VDC internal power supply
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches), and RSTP/STP for network redundancy
- IPv6 Ready
- 5 Year warranty

Conclusion

Ethernet/IP supported switches are available in various levels of compatibility. For efficient communication it is important to select a switch which can provide all of the features recommended by the manufacturer of the PLC being used in a system. The EDS-405A/408A-EIP Series takes integration one step further with pre-configured firmware to reduce setup time and effective software visibility and compatibility with SCADA software packages.