Networks - EtherNet IP Course - G16 STANDARD

(Version 6.0)

PLEASE NOTE: This course uses G16 Standard along with Hirschmann Octopus 2 switches.

Course No.	GCCE 8033 (LMS: 26359)
Duration	2 days
Pre-Requisites	• Familiarity with Windows based computers.

Objectives   Upon successful completion of this course, participants will be able to:

- Understand the history and evolution of EtherNet/IP.
- Understand Ethernet I/O usage in a GM IECN
- Recognize Execution Design Strategies
    - Location of Documents and Templates
    - Complete Device Communication Detail Listing (DCDL)
    - Logical and Physical design process.
- Recognize Execution Deployment
    - How to configure Hirschmann Octopus II switch.
    - Locate Global Ethernet eTools.
    - GM Ethernet Switch Utility eTool.
    - Octobatch eTool.
- Apply Wireshark ethernet troubleshooting tool.
- Apply basic network troubleshooting techniques.
- Understand the Remote Networking Monitoring (RMON) tool.
- Understand the Network Node Management (NNM) software.

Course Outline

The goal of this course is to familiarize participants with GM's application of EtherNet/IP networks. The participant will learn the evolution of EtherNet/IP, the difference between managed and unmanaged switches, understand execution design strategies and deployment, how to configure a Hirschmann Octopus switch, how to use Wireshark, how to troubleshoot networks, and how to use network management software.

Module	Content	Delivery Method	Time (Hours)
1 - Module 1: EtherNet/IP History and Evolution	- Know the history of the Ethernet. - Recognize common network terminology. - Understand LANs, WANs, and VLANs. - Compare OSI and ARPANET reference models. - Understand the basics terminology of Ethernet. - Recognize common Ethernet components. - Know the types of switches used on Ethernet networks. - Recognize the IEE organization. - Describe assigning of MAC and IP addresses on an Ethernet network. - Understand Ethernet Frames. - Learn the information contained in an IP Packet. - Recognize the terms Unicast, Broadcast, and Multicast messaging. - Understand the use of Addressing Resolution Protocol (ARP) - Describe the Ethernet communication protocol path for messaging and real time I/O. - Recognize the reference model for a TCP/IP- based system. - Understand the differences between a managed and an unmanaged switch.	Lecture Exercises	3 0.5

| 2 – Ethernet I/O | • Cost effective Ethernet I/O that uses embedded switch technology.
• That embedded switch technology enables linear (or ring) topology Ethernet I/O network segments.
• GM has selected ODVA's EtherNet/IP DLR (Device Level Ring) embedded switch technology specification for Ethernet I/O networking.
• Ethernet I/O requires lots of additional IP addresses.
• Maintaining moderate size networks requires routing EtherNet/IP traffic.
• The new Octopus II switch supports (static) connected routing to Ethernet I/O networks.
• The new Octopus II switch has an "only Auto-negotiate full duplex behavior" feature.
• The new Octopus II switch and Ethernet I/O networks will require a new DCDL documentation format.
• Octopus II switches have a new GM e-tool. The new e-tool will be implementing numerous switch configuration changes. | Lecture | 2.0 |
| 3 – Wireshark | • Describe Wireshark EtherNet management software.
• Start a capture.
• Packets on the network.
• Stop a capture.
• Save a file.
• Mirror a port.
• Find more help.
• Collect network data and traffic on a Hirschmann Octopus switch.
• Apply Port Mirroring setting to collect network data and traffic on a specific port of a Hirschmann Octopus switch. | Lecture
Exercises | 1.25
1.25 |

4 – Execution Design Strategies	• The student will understand the five tasks performed on the set up process for EtherNet/IP IECN Project. • The student will learn the process to completing the Device Communication Detail Listing (DCDL). • The student will recognize the Document and Template Locations. • The student will understand the tasks used in EtherNet/IP IECN Design and Approval Processes. • The student will learn the EtherNet/IP IECN Logical Design process. • The student will learn the EtherNet/IP IECN Physical Design process. • The student will understand the EtherNet/IP Network Design Approval Process. • The student will recognize the Design and Uplink Approval Process Flow Charts.	Lecture Exercises	0.5 0.25
5 – IECN (Industrial Ethernet Control Network)Security	• TBD	Lecture	0.75
6 – Execution Deployment	• The students will configure IP addresses of a workstation. • The student will locate the Global EtherNet eTools. • The student will identify basic features of the Hirschmann Switch. • The student will identify the software's used to configure a Hirschmann Octopus Switch. • The student will understand the use of the Switch Configuration eTool. • The student will configure a Hirschmann Octopus Switch. • The student will recognize the Octobatch eTool.	Lecture Exercises	1.0 1.0
7 - Troubleshooting	• Identify common network problems. • Troubleshoot common network problems.	Lecture Exercises	0.75 1.25

8 – Network Management Software	• The student will recognize the Remote Network Monitoring (RMON) Software Tool. • The student will identify the Network Management Software Tool. • The student will identify the Network Node Manager (NNM) Tool.	Lecture	0.5
9 – Certification	• Certification Test	Test	2.0

Demonstration/Activity/Exercise

Listed below is a summary of the instructor demonstrations, lecture hands-on activities, and student exercises for the course. For instructor preparation purposes, unique equipment and software required for completing a particular item is shown in the right column.

Module	Item (student exercises are noted in bold)	Unique Equipment & Software required
Module 1 History of EtherNet/IP	NIC card IPv4 settings/ Hirschmann Hi-Discovery	Students to configure NIC IPv4 settings./ Students to open Hi-Discovery tool and configure switch IP address.
Module 3 Wireshark	Collecting data in Wireshark. Collecting data in Wireshark using Port Mirroring.	Exercises introduce the use of Wireshark to collect data on Ethernet networks.
Module 4 Execution Design	DCDL for Octo II	Students to open DCDL for Octo II template and note fields to be populated.
Module 6 Execution Deployment	G16 GM Switch Configuration eTool	Students use the G16/Octopus 2 Configuration eTool.
Module 7 Troubleshooting	Troubleshooting module	Students as a group identify and repair up to four problems in the G16 Trainer.