

# ML245: FIBRE CHANNEL OVER ETHERNET ARCHITECTURE & INSTRUMENTATION



ML245 is an introduction to the technical fundamentals of Fibre Channel over Ethernet (FCoE) architecture. It is intended for anyone requiring an introduction to FCoE architecture including: Design Engineers, Field Application Engineers, Test Engineers and Technical Marketing professionals.

## COURSE OBJECTIVE

Students develop a working knowledge of the newly emerging FCoE architecture and behavior through lecture and, when available, protocol analysis exercises.

## COURSE OUTLINE

- Introduction to FCoE
- Ethernet Review
- Fibre Channel Review
- FCoE Architecture
- FCoE Initialization Protocol (FIP)

## ANALYZER & TRACE CAPTURE EXPERIENCE

Every effort will be made to provide experience looking at FCoE through trace captures. However, due to the cutting edge state of the FCoE standard, traces which demonstrate the latest features may not always be available. When available, student's analyze FCoE traces using the latest Finisar Xgig® Trace Viewer and Expert products.

## PREREQUISITES

A working understanding of Fibre Channel Framing and Fibre Channel Fabric concepts is required.

## COURSE LENGTH

2 days.

# ML245

## DETAILED COURSE DESCRIPTION

### INTRODUCTION TO FCOE

This section identifies the basic features of and the premises upon which FCoE is being designed. FCoE specific objects & terminology are defined. Upon completion students are able to:

- Identify the basic features of FCoE.
- Draw a comparison between FCoE and other LAN-based SAN options.
- Identify the factors supporting the creation and promotion of FCoE technology.
- Describe the general concept of FC frame encapsulation.
- Describe the special characteristics required of the Ethernet network for FCoE.
- Identify key design challenges to FCoE.

### ETHERNET REVIEW

This section reviews the basics of the Ethernet protocol with specific emphasis on this technology as the assigned physical & link layer for FCoE. Upon completion students are able to:

- Identify the basic features of Ethernet in terms of discovery & error recovery.
- Identify the parts of an Ethernet header, including the VLAN Qtag.
- List the features required to create “Lossless Ethernet.”
- Describe the Ethernet PAUSE feature.
- Compare & contrast Ethernet PAUSE with Priority-Based Flow Control (PBFC).

### FIBRE CHANNEL REVIEW

This section reviews the basics of the FC-2 and FC-4 layers. FC-specific objects and terminology are identified. Upon completion students are able to:

- Define the roles of the main port types in FC.
- Describe the contents of a FC frame.
- Identify the main steps for logging into a FC Switch.
- List the features of the common FC Classes of Service.
- Describe the concept of FC flow control.
- Define NPIV and explain how it affects the login process.
- Describe the concept of Exchange Management.

### FCOE ARCHITECTURE

This section introduces the architectural concepts and terminology of FCoE. The current combination of vendor proposed features for encapsulation as well as discovery is discussed. The general state of this version is also covered. When available, traces are used to illustrate this version of FCoE. Upon completion students are able to:

- Describe FCoE features & terminology
- Define the role of the FCoE Forwarder (FCF).
- Define the role of the ENode.
- Describe the ports used in FCoE.
- List the functional areas that are still TBD.
- Identify the encapsulation frame layout for FCoE frames.

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### **FCOE INITIALIZATION PROTOCOL (FIP)**

This section introduces the latest concepts pertaining to how FCoE components perform discovery and initialization. The current concepts for a separate FIP frame structure as well as discovery are discussed. When available, traces are used to illustrate the FIP concepts of FCoE. Upon completion students are able to:

- Explain the goals of Discovery and Initialization.
- Identify the contents of the FIP Frame.
- Explain how discovery is performed from an FCF and from an Enode/VN\_port.
- Identify the steps an Enode/VN\_port goes through to join a Fabric with an FCF.
- Explain how the FIP handles the FC Login processes.