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## USB 2.0

Ref : 002606A

Duration : 3 days

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### OBJECTIVES

- The course details the hardware implementation and describes the tests required to check the compliance of an equipment
- An architectural view of an USB system implementing low speed, full speed and high speed devices is described
- The course focuses on the bus enumeration sequence
- Packet format and USB transactions are taught with the assistance of the Lecroy USB analyser
- The driver organization is explained
- The course details the requirements of the EHCI specification
- HID class device specification is fully covered

### RELATED COURSES

- USB 3.0 bus (004853A)

### PREREQUISITES

- Experience of a digital bus is recommended

**NeoMore****LeCroy**

### Contact

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Course also available  
customized

Next sessions, see : <http://www.mvd-fpga.com/en/formationsCalend.html>

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### TOPICS

#### SYSTEM ARCHITECTURE

- Introduction to USB
- Management of periodic traffics
- Software organization
- Highlighting the differences between transfer, transaction and packet
  - A trace captured by a Lecroy analyser is studied
- Device configuration, standard descriptors and commands

#### ELECTRICAL SPECIFICATION

- Cable and connectors
- Low Speed / Full Speed signalling
- Reset sequence
- High Speed signalling
- Reset sequence, chirp negotiation

#### TRANSFER PROTOCOL

- Low Speed / Full Speed protocol
- Periodic traffics in High Speed systems
- Non periodic traffics in High Speed systems
- Error detection
- Power management

#### BUS CONFIGURATION

- Overview
- Device configuration
  - A trace is studied to understand the initialization sequence by using the ability of the trace viewer to decode standard requests
- Other device classes

### DOCUMENTATION

- Training manuals will be given to attendees during training in print.

#### HUB OPERATION

- Hub architecture
- Split transactions
- The Hub class - Descriptors
- The Hub class – Commands
  - A trace is studied to understand the configuration of a hub by using the ability of the trace viewer to decode hub class requests

#### HOST CONTROLLER OPERATION

- OHCI
- UHCI
- Introduction to EHCI
- Host Controller initialisation
- Port routing and control
- Periodic schedule
- Asynchronous schedule
- Managing Control / Bulk / Interrupt transfer via Queue Heads

#### DEBUGGING A USB APPLICATION

- Compliance checklists
- USB2.0 electrical test specification
- Lecroy analysers
- Jungo WinDriver suite

#### HID CLASS DEVICES

- Objectives of the specification
- Operational model, item parser, report ID
- Descriptors
- Requests
- Report protocol
  - Boot interface descriptors : mouse and keyboard