

## Comprehensive USB 3.0

### Training

#### Let MindShare Bring USB 3.0 to Life for You

The third generation of USB increases transfer rates to 5.0Gbits/s (SuperSpeed) and includes backward compatibility with all earlier USB 1.1/2.0 Low Speed, Full Speed, and High Speed peripherals and hubs. USB 3.0 SuperSpeed protocol also brings significant enhancements in the areas of device and system power conservation, error handling, and data flow control.

SuperSpeed bus instances replace the USB broadcast bus model with directed (unicast) packets. Dual-simplex signaling enables asynchronous device notifications and simplifies link partner communication used in link flow control, packet acknowledgement and retry, and power management transitions.

#### Who Should Attend?

This in-depth course is designed with the hardware or software engineer in mind. The course includes practical examples of USB 3.0 transactions, device enumeration, error conditions, etc.

**Course Length:** 3 Days

#### Course Outline:

- Introduction To USB 3.0
  - Motivation For USB 3.0
  - USB 2.0 Review
  - USB 3.0 Overview
- SuperSpeed End-To-End Protocols (Protocol Layer)
  - Introduction To Protocol Layer Packets
  - IN and OUT Transaction Protocols
  - Transfer Types (Characteristics & Examples)
    - Bulk Transfer Protocols
    - Interrupt Transfer Protocols
    - Isochronous Transfer Protocols
    - Control Transfer Protocols
- SuperSpeed Port-To-Port Protocols (Link-Level Protocols)
  - Link Traffic
    - Link Commands
    - Ordered Sets And K Symbols
    - Low Frequency Periodic Signaling (LFPS)
  - Link & Physical Layer Hardware
    - Transmitter Link Layer
    - Transmitter Physical Layer
    - Receiver Physical Layer
    - Receiver Link Layer
  - Link Header Packet Flow Control
  - Link Error Handling
- SuperSpeed Link Power Management
  - Link Power Management
  - Suspend And Resume
  - Platform Power Management Issues
- USB 3.0 Hubs
  - Hub Upstream/Downstream Port Attachment
  - Hub Functional Operation
  - Deferred Transactions

- USB 3.0 Reset, Initialization, and Configuration
  - SuperSpeed Reset Events
  - SuperSpeed Link Training and LTSSM
    - LTSSM Overview
    - Link Training Sequence
    - Other LTSSM States
  - USB Enumeration and Configuration
  - USB 3.0 Hub Configuration
- SuperSpeed Physical Layer Electrical
- Introduction to eXtensible Host Controller Interface (xHCI)

**Recommended Prerequisites:**

Background in USB 2.0 protocol is very helpful.

**Course materials:**

Students will be provided with an electronic (PDF) version of the presentation used in class



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