

PCI Express 3.x, 4.0 and 5.0 Update

Training

Let MindShare Bring PCI Express To Life For You

The PCI Express (PCIe) architecture is a high-performance I/O bus used to interconnect peripheral devices in computing and communication platforms.

This MindShare course assumes knowledge of PCIe up to 2.1. This course goes over the higher speeds (8.0GT/s, 16.0GT/s and 32.0GT/s) offered at Gen3, Gen4 and Gen5 along with a short overview of the additional features / capabilities introduced in the 3.x, 4.0 and 5.0 specs.

Course Length: 1 day

Course Outline:

- Overview of PCIe Generations
- Physical Layer Logic (8.0GT/s, 16.0GT/s and 32.0GT/s)
 - 128b/130b Encoding/Decoding
 - Data Precoding for 32.0GT/s
 - Ordered-Set Blocks and Data Blocks
 - Data Streams and Packet Framing
- Physical Layer Electrical (all speeds)
 - Differences Between Speeds
 - 8.0GT/s, 16.0GT/s and 32.0GT/s Equalization
 - 16.0GT/s and 32.0GT/s Lane Margining at Receivers
- Link Initialization and Training (LTSSM)
 - Short overview of Detect, Polling, Configuration, L0 States
 - Recovery (Retraining) State
 - Link Speed Change
 - Tx Equalization Process for 8.0GT/s, 16.0GT/s and 32.0GT/s
- Overview of Features Introduced with PCIe 3.x:
 - L1 Sub-States (L1.0, L1.1 and L1.2)
 - Separate Refclk Independent SSC (SRIS)
 - Downstream Port Containment (DPC) and Enhanced DPC (eDPC)
 - Lightweight Notification (can be used for lightweight cache coherency)
 - Precision Time Measurement (PTM)
 - Device Readiness Status (DRS) and Function Readiness Status (FRS)
- Overview of Features Introduced with PCIe 4.0
 - Support for Retimers
 - Flattening Portal Bridge (FPB)
 - Enhanced Allocation
 - Hierarchy ID Reporting
 - Designated Vendor-Specific Extended Capability (DVSEC)
- Overview of Features Introduced with PCIe 5.0
 - Negotiation for skipping parts or all of Tx Equalization
 - Alternate Protocol Negotiation
 - System Firmware Intermediary Support
 - Link Activation

Required Prerequisites:

Deep understanding of PCIe 1.x and 2.x.

Course Material:

- 1) Downloadable PDF version of the presentation slides
- 2) Optional: [Comprehensive PCI Express 3.1 eLearning course](#)