

# Understanding Serial ATA

**Solution  
Technology**



The “Understanding Serial ATA” course provides students with a comprehensive insight into the operation of the Serial ATA interface. The class examines the evolution of ATA, summarises the operation of the ATA interface and then explores in detail the operation of Serial ATA at all architectural levels. Serial ATA II Extensions are also thoroughly discussed. The class concludes with a study of new application areas in which Serial ATA will be deployed. Protocol analyser traces are used as an aid to understanding.

## **Introduction**

History and evolution of ATA  
Parallel ATA limitations  
Moving to a serial interface  
Serial ATA goals and objectives  
Serial ATA benefits  
Comparison of storage interfaces  
New markets for ATA devices  
**ATA Standards and Architecture**  
ANSI and industry associations  
Parallel ATA standards  
Serial ATA standards  
SATA architectural layering  
Understanding terms and definitions  
Sources of information  
**ATA Technical Overview**  
Parallel bus functions  
The I/O register model  
CHS and LBA addressing  
PIO and DMA data transfer modes  
**Serial ATA Technical Overview**  
SATA architectural model  
Physical layer concepts  
Topology/connectivity  
Power and signal lines  
Link speeds/data rates  
Basic SATA port model  
Physical layer services

## **Serial ATA Technical Overview(cont.)**

Link layer concepts  
Transmission words  
8b/10b encoding concepts  
Primitives  
Framing concepts  
Scrambling  
Transport layer concepts  
Frame Information Structures (FIS)  
FIS types  
Error detection and recovery concepts  
Example analyser trace  
SATA II enhancement summary  
*(end of Day 1)*  
**Physical Layer**  
Cables and connectors  
Electrical signalling  
Spread spectrum clocking  
Interface power states  
Link initialisation  
Speed negotiation  
Out of band signalling  
Elasticity buffering  
**Link Layer**  
Link layer services  
8b/10b encoding  
Primitive signal definitions  
Primitive signal protocols  
Flow control  
Primitive scrambling  
CRC and FIS content scrambling  
Link state diagrams  
Example analyser trace

## **Transport Layer**

Transport layer services  
FIS construction and decomposition  
FIS structure  
FIS types  
Host transport states  
Device transport states  
Example analyser trace  
**Device Command Layer Protocol**  
Power on behaviour  
Device resets  
Diagnostics  
Non-data command protocol  
PIO command protocol  
DMA command protocol  
**Error Handling**  
Physical layer errors  
Link Layer errors  
Transport layer errors  
**Serial ATA II Extensions**  
SATA II objectives  
Physical layer extensions  
Transport layer extensions  
Command layer extensions  
Enclosure services and management  
**Serial ATA in the Enterprise**  
**Future enhancements to Serial ATA**

This in-depth technical class is targeted towards engineers involved in the design, development, integration, deployment and maintenance of Serial ATA storage devices and systems.

Day 1 of the class may be taken by those requiring a broad understanding of Serial ATA technology with less technical depth; this includes technical managers, IT managers and staff, technical writers, technical sales and marketing staff.

**Prerequisites:** Some familiarity with computing and storage concepts.

**Course length:** 2 days