



## **FPQ1 - MPC8XX implementation**

**This course covers PowerQUICC devices, such as MPC885**

### **Objectives**

- The course details PowerPC core low level programming.
- It clarifies the operation of bus controller state machines GPCM and UPMs, including SDRAM interface.
- Time Division Multiplexed frame processing is explained.
- A generic interrupt handler supporting nesting is provided.
- The Ethernet controller is described in detail, particularly the auto-negotiation sequence.
- Debug capabilities and real time trace requirements are studied.

*A lot of programming examples have been developed by ACSYS to explain the boot sequence and the operation of complex peripherals, such as FEC and SCC.*

*-They have been developed with Diab Data compiler and are executed under Lauterbach debugger.*

*A more detailed course description is available on request at [info@ac6-training.com](mailto:info@ac6-training.com)*

### **Prerequisites and related courses**

- Experience of a 32-bit processor or DSP is mandatory.
- The following courses could be of interest:
  - Ethernet and switching, reference [N1](#)
  - USB Full Speed High Speed and USB On-The-Go, reference [IP2](#)

### **Plan**

#### **INTRODUCTION TO MPC8XX**

- MPC8XX block diagram : the PowerPC core, the SIU and the CPM modules
- The 3 registers families : GPRs, SPRs, and memory-mapped
- The 860 derivatives features : 85X, 86X, 87X and 88X
- Performance estimation

#### **PowerPC CORE ARCHITECTURE**

- RCPU pipeline, history buffer, isync instruction
- Execution units
- Cache basics
- Load/store architecture
- Sync and eieio instructions

**PowerPC CORE PROGRAMMING**

- User registers
- Branch instructions
- Integer load / store instructions
- Integer arithmetic
- The EABI
- Code and data sections
- Cache related instruction
- Exception management at core level : handler table, priority
- MMU basics
- Tablewalk through the descriptor tables description
- TLB entry software loading

**THE SYSTEM INTERFACE UNIT**

- The interrupt controller
- MPC8XX hardware configuration at reset : sampling of the configuration word
- Clock synthesizer

**THE EXTERNAL BUS INTERFACE**

- Dynamic bus sizing, connection of 8 and 16-bit peripherals
- Single data read and write timing diagrams
- Burst read and write timing diagrams
- Shared resource control
- Bus error, retry

**THE MEMORY CONTROLLER**

- Address decoding through BR/OR registers
- GPCM timing parameters explanation
- SDRAM basics
- Connection of an SDRAM, UPM initialization

**CPM BASICS**

- Synchronization between RCPU and CP through the Command Register
- DPRAM organization
- The CPM Interrupt Controller
- CPM general purpose timers
- IDMA channels
- General purpose IO : pin configuration

**THE SERIAL INTERFACE**

- ISDN basics
- NMSI vs TDM
- SIRAM initialization to support ISDN frames
- Transmit and Receive clock selection from the bank of clocks
- Buffer Descriptor rings allocation
- Buffer chaining
- Transmit and receive interrupts

**THE SERIAL MANAGEMENT CONTROLLERS**

- Supported protocols : transparent, UART and auxiliary ISDN channel
- SMC in UART mode
- SMC restrictions compared to SCC
- Initialization sequence : registers, Parameter RAM, Buffer Descriptors

## **THE SERIAL COMMUNICATION CONTROLLERS**

- The DPLLs : clock recovery
- UART on SCC
- HDLC on SCC
- Ethernet on SCC : 7-wire interface with the transceiver
- Hash table restrictions
- External CAM connection

## **THE SPI CONTROLLER**

- SPI protocol
- Clock polarity and phase selection
- Transmit and receive sequences

## **THE I2C CONTROLLER**

- I2C basics
- Upload of SDRAM parameters located in a DIMM serial EEPROM
- Read and Write sequences

## **THE USB CONTROLLER**

- USB protocol basics
- MPC885 USB controller features
- Hardware interface
- Architecture
- Programming model
- Read and Write sequences
- Initialization sequence

## **THE FAST ETHERNET CONTROLLER**

- CPM independence
- MII pinout
- 7-wire vs MII transceiver connection
- Buffer descriptor description
- Initialization sequence

## **THE MULTI CHANNEL CONTROLLER**

- Logic channel vs time slot
- The time slot assignment tables
- Logic channel processing
- Interrupt queues
- Parameterizing the interface to the framer

## **THE SECURITY ENGINE**

- Encryption basics
- SEC features
- Memory mapping and programming interface

- Crypto channel management
- Master/Slave interface module description
- Initialization sequence

## THE DEBUG PORT

- BDM features : watchpoints and breakpoint
- Programming interface
- BDM restrictions
- Real time trace solution

## Renseignements pratiques

**Durée : 5 jours**  
**Prix : 2100 € HT**



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