

Munich, 5th March 2003

DATE 2003

Focus on Business and Industry, Exhibition Theatre

Platform-based Design & Fast Prototyping

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Dynamic Verification Team

DATE 2003



Today's Topics

- Platform-based design
- PrimeXsys Wireless Platform
 - PWP @ ST
- ST Verification Strategy
 - Fast Prototyping
- PWP on Aptix
 - Objectives
- Conclusions



Platform-based Design

- ❑ Platform-based Design is quite popular nowadays
 - ❑ several pros:
 - quick start (consistent starting point, ready to go)
 - Reuse
 - Design customisation, hooks for add-ons
 - Configurations
 - Early SW development
 - ❑ some cons:
 - somebody has to come up with the platform first, which includes:
 - All necessary blocks
 - Documentation
 - Scripts
 - Etc.

Today's Topics

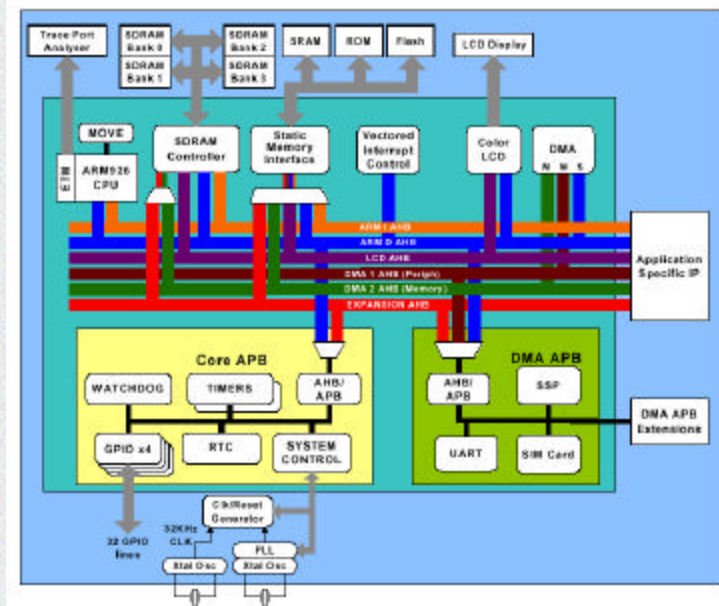
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PrimeXsys Wireless Platform

MAIN Characteristics:

- ARM 926 EJS
- Multi Layer AHB
- ~250 K gates + ARM
- ARM Peripherals



- ARM's PWP is no different:
 - It is meant for platform-based design
 - It is becoming very popular

PWP @ ST

- We anticipated that different design teams throughout the Company might want to use PWP.
- Therefore, we started ahead of time to put together the Verification Environment to help better and quicker verification

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ST Verification Strategy

- Our recommended Verification Strategy, amongst several things, calls for:
 - A solid and consistent Verification Environment (generically referred to as testbenches) => Verification Plan
 - Emulation => HW debugging, low level SW development
 - Fast Prototyping => Real-time speed, application level SW development

PWP & Fast Prototyping

- PWP does not come with any specific support for HW Emulation/Prototyping
- Setting up such platforms for PWP is a
 - Necessary,
 - Long,
 - Non trivial task
- We decided to enhance the original verification environment by adding specific Emulation/Fast Prototyping views very early, before any design team requested it.

Objectives

- As per our methodology, mapping to Aptix boxes was only the last step
- We had three main objectives
 - Map the PWP as it comes from ARM
 - Run some Application SW
 - Come up with some neat demo
- Later on, we added a fourth goal:
 - Booting an OS

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The PWP

- PWP components we dealt with are:
 - The Processor sub-system which:
 - Is based on the ARM 926EJS
 - Can come in a number of different configurations
 - The AMBA sub-system
 - 6 AHB buses
 - Memories:
 - SRAMs, SDRAMs
 - Peripheral Interfaces:
 - UART, SIM Card, LCD, GPI Os, ...

PWP (cont'd)

- For the processor sub-system we used:
 - ARM 926EJS:
 - no silicon is available as of yet
 - a “macro” (mapped netlist) provided by a dedicated ST team, according to ARM recommended flow
 - The following default configuration:
 - 32K Data + 32K Instruction Caches
 - 32K Data + 32K Instruction TCM
 - No ETM9

PWP on Aptix: Objective #1

- Eventually the whole thing was successfully mapped to Aptix:
 - 250 K gates (+ ARM, + Memories)
 - 4 FPGA modules (2 x V2000 + 2 x V3200)
 - Running at 8 MHz
 - With JTAG connected debugger
 - Passing ARM test suite

PWP on Aptix: Objective #2 and #3

According to our methodology, Fast Prototyping is mainly for SW development

In lack of specific requests and to go beyond basic functionality tests:

- we wrote a simple SW application to exercise
 - critical HW blocks (including the CPU)
 - simple physical peripherals ...[see appendix]
- ... which proved to be a a good starting point for a neat demo:
 - APM 2002
 - EDS 2003
 - DesignCon 2003

PWP on Aptix Objective #4

- Next goal came as a natural extension:
 - Booting an OS
- While thinking of the most appropriate, we were approached by our first “customer” who had :
 - His own configuration
 - His own customisation of certain blocks
 - His own added blocks
 - A specific OS
 - His own (tight!) schedule

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Conclusion

- The task (PWP mapping) proved indeed as difficult as expected
- As to the *We* we would have never been able to meet the deadline had we not started ahead of time
- The approach proved to be competitive with similar “home made” solutions based on custom boards

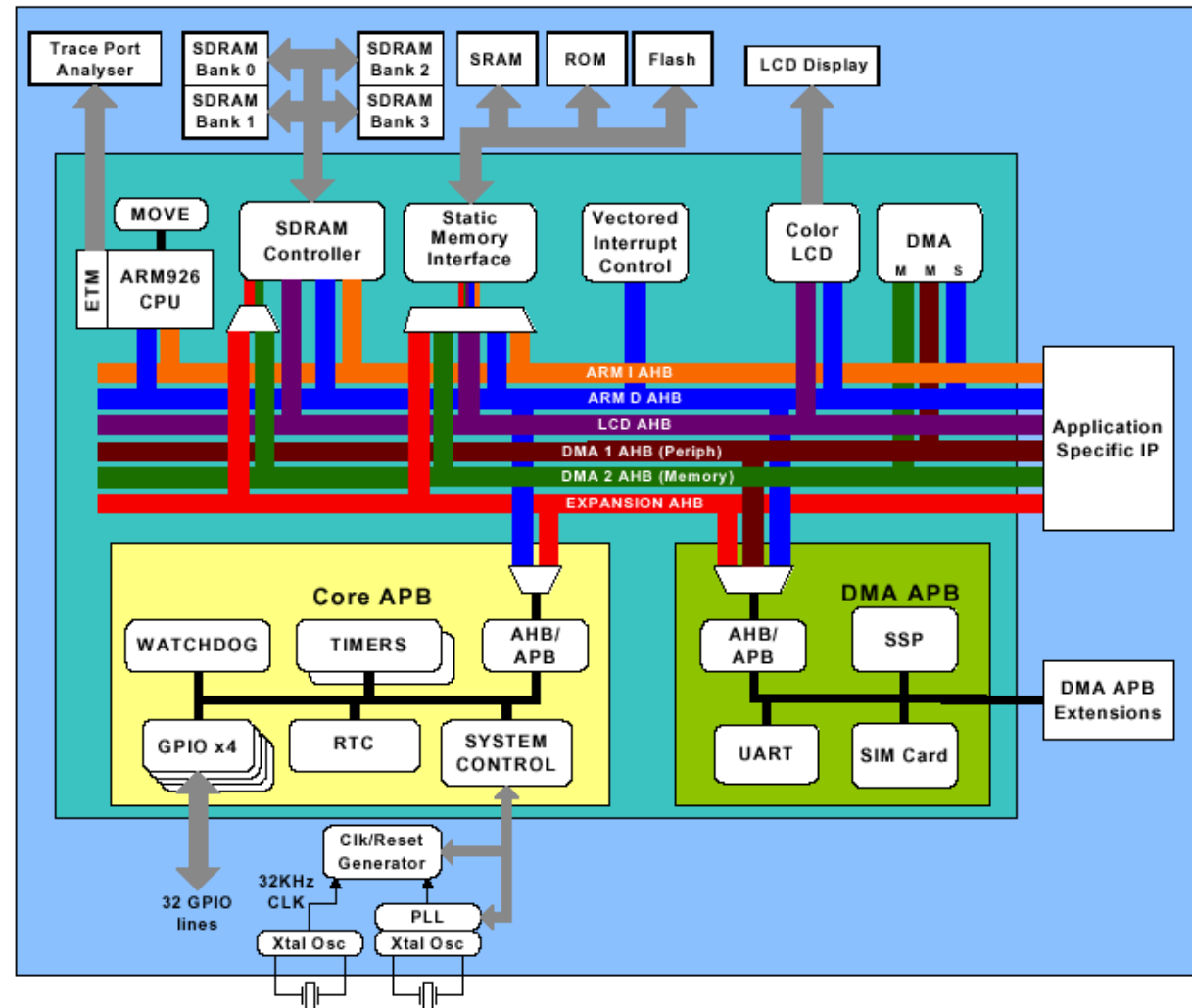
Appendix

- PWP block diagram
- PWP on Aptix
- PWP demo

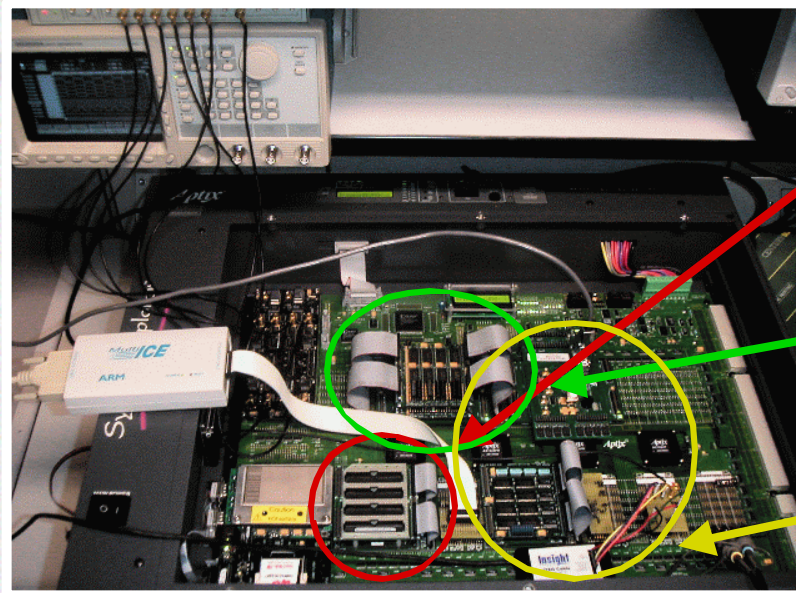
PWP Architecture

- ARM 926
- Multi Layer AHB
- 250 K gates + ARM

“The ARM PrimeXsys Wireless Platform (PWP) has been designed specifically for the wireless market and delivers significant savings in complexity, power consumption and time-to-market for consumer OS, multimedia and voice applications”



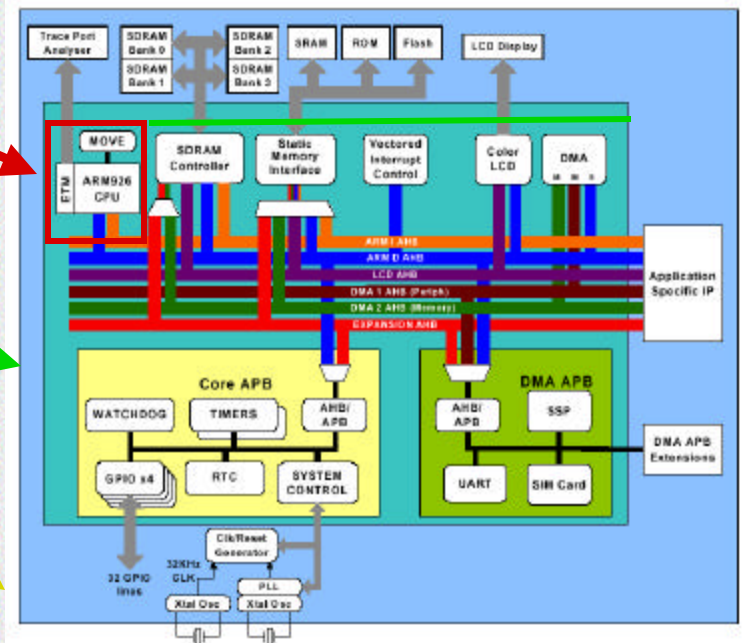
PWP on Aptix



PROCESSOR
SUBSYSTEM

AMBA
SUBSYSTEM

HARDWARE
BLOCKS



- 250 Kgates + ARM + memories
- ARM 926 + Caches + Tightly Coupled Memories
- Multi layer AHB
- External memories (SDRAM & SRAM)
- External HW connections (LCD Display, UART, SIM, MultiICE)

Demos

- ARM Partners Meeting Aug '02
- DesignCon Jan '03
- EDS Jan '03

The demo was intended to show the whole PWP design mapped onto a HW Emulator / Fast Prototyping Platform with application SW executed by the ARM 926 and a debugging environment featured by the Multi-ICE trace port

STEPS:

- Start UART communication
- Start debugging Software
- Send characters via UART
- Play with break-points (debug session)

Demo SW data flow

