

# **EECE 690/890**

## **Digital Radio Hardware Design**

### **Team 2**

### **Assignment 1**

**Due 9/24/98**

#### **Introduction**

This is the first of a series of assignments designed to guide you through the tasks needed to complete the PLC/ADPCM design. Specific tasks are detailed below for each team member so that each person has a well-defined job and deliverables (material to be turned in by the due date). However, the tasks are also interdependent, so you need to work together.

The members on team 2 have not been given a specific responsibility at this point. However, doing so at this time is crucial to meet design deadlines for fabrication (divide and conquer). If we split the PLD/ADPCM into two parts, RX-PLD/ADPCM (receiver signal path) and TX-PLD/ADPCM (transmitter signal path) we will be able to accomplish this task. The PLD/ADPCM part of the cordless phone is highly integrated with all other parts. For this reason it is very important that members of team 2 work closely with other teams in the company, specially team 3.

Attached to this assignment is an additional page giving a preview of future tasks that will need to be completed before the PDR. You are encouraged to work ahead if you can. This will ease your workload when things like test stack up in other classes in the coming weeks.

#### **RX-PLD/ADPCM Design Tasks**

You should perform the following tasks:

- Familiarize yourself with the MAX+PLUS II software (RA295)
  - How to layout a schematic or use VHDL.
  - How to compile a design.
  - How to simulate a design.
  - How to make a symbol and use it in a design.
  - How to select a specific chip.
  - How to program a MAX series on the Altera designer board.
- Download the data sheet for both MAX7128 (Altera) and OKI M7560 and familiarize yourself with them.
- Design a 4-bit (nibble) serial/parallel converter (shift register).

- Create a spec summary sheet for the OKI M7560.
  - Operating voltages.
  - Needed clocks.
  - Input and output signals.
  - Other control signals.
  - Work with the TX-PLD/ADPCM design group.

Your deliverables are listed below:

- A preliminary block diagram of the RX-PLD/ADPCM.
  - All signals defined and labeled.
- For your 4-bit shift register design.
  - A complete schematic with pin assignments. (If you are using VHDL, put the symbol in a schematic)
  - A simulation output.
- Your spec summary sheet for the OKI M7560.
- Send a email messages to your company members (radioa-l or radiob-l). Specifying inputs and outputs needed. This includes operation voltages and power consumption.

### **TX-PLD/ADPCM Design Tasks**

You should perform the following tasks:

- Familiarize yourself with the MAXPLUS2 software (RA295)
  - How to layout a schematic or use VHDL.
  - How to compile a design.
  - How to simulate a design.
  - How to make a symbol and use it in a design.
  - How to select a specific chip.
  - How to program a MAX series.
- Download the data sheet for both MAX7128 (Altera) and OKI M7560 and familiarize yourself with them.
- Design a 4-bit (nibble) parallel/serial converter .
- Create a spec summary for the OKI M7560.
  - Operating voltages.
  - Needed clocks.

- Input and output signals.
- Other control signals.
- Work with the RX-PLD/ADPCM design group.

Your deliverables are listed below:

- A preliminary block diagram of the TX-PLD/ADPCM.
  - All signals defined and labeled.
- For your 8-bit parallel load shift register design.
  - A complete schematic with pin assignments.
  - A simulation output.
- Your spec summary sheet for the OKI M7560.
- Send a email messages to your company members (radioa-l or radiob-l). Specifying inputs and outputs needed. This includes operation voltages and power consumption.

## **Team 2 Future Assignments**

The following gives an overview of the tasks remaining after task1. These will be broken down into assignments like task 1, with recommended subtasks and deliverables. We will also have periodic “mini-design” in which your team will meet with the instructors. In these informal reviews, you will need to explain your design decisions, and we will try to find “holes” in the design that need to be addressed.

### **RX-PLD/ADPCM**

- Design of the bit-sync circuit.
- Design of the receiver queue.
- Design of the frame-sync circuit.
- Design of the PLD/micro-controller interface.
- Design of the PLD/ADPCM interface.
- Design of the other control circuit.
- Draw a final block diagram.
- Draw a final schematic.
- Generate parts lists for ordering components.
- Work on layout floor-planning with team 4 (Best placement of parts on board)
- Do test planning and add test points to block diagram and schematic.

### **TX-PLD/ADPCM**

- Design of the Transmitter queue.
- Design of the transmitter sequencer
- Design of the pre-pattern (for sync and id)
- Design of the PLD/micro-controller interface.
- Design of the PLD/ADPCM interface.
- Design of the other control circuit.
- Draw a final block diagram.
- Draw a final schematic.
- Generate parts lists for ordering components.
- Work on layout floor-planning with team 4 (Best placement of parts on board)
- Do test planning and add test points to block diagram and schematic