Playing Music from your Xilinx Board

Converting a bi-phase encoded bit stream into a format that a dual channel digital to analog converter can recognize

Checkpoint 3

Inputs and Outputs

Note: Your logic block also uses an internal clock

Bi-Phase Encoding

• Bi-phase encoded stream is composed of cells
• Every 2 cells represents 1 data bit

Frames

• 16 bit audio samples sent in frames
• Assume garbage bits are sent between frames

Preambles

• 3 kinds of preambles
• Each has 8 cells
• Each has two representations

What do the different preambles mean?

• The preamble tells you which channel the audio sample is for
• Left and right channels for stereo sound

<table>
<thead>
<tr>
<th>B/PHASE PATTERNS</th>
<th>CHANNEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>LEFT</td>
</tr>
<tr>
<td>Y</td>
<td>RIGHT</td>
</tr>
<tr>
<td>Z</td>
<td>LEFT</td>
</tr>
</tbody>
</table>
How to extract audio samples

A Minor Complication…

How do we make a cell stream from a sampled bi-phase encoded stream?

• 2-3 samples of the same polarity = 1 cell
• 4-5 samples of the same polarity = 2 cells
• 8-9 samples of the same polarity = 3 cells

Outputting to the DAC

• Data is serially sent on the DL and DR data lines
• When the DAC detects a falling edge on the LL or LR control lines, it latches onto the most recent 16 bits received

How to create the LL and LR pulses

AND an inverted clock with a 1 clock cycle wide pulse occurring 1 clock cycle after the last data bit

Wire wrapping

Make sure you pick up 2 capacitor/resistor discrete packs
Extra Credit

• Turned in 2 weeks early  (11/2/01) = 120%
• Turned in 1 week early  (11/9/01) = 110%
• Turned in on time  (11/16/01) = 100%
• Turned in 1 week late (11/23/01) = 50%

Tips

• Start early. Go for some extra credit, but don’t burn yourself out. You should probably spend time in other classes too.
• Simulate all you logic using script files.
• Understand the checkpoint. Read this specification several times. If you need more clarification, please refer to the data sheets or ask me questions.
• USE SCRIPT FILES!!!!!!