

Implementing a 16B/20B Encoder/Decoder in a CoolRunner CPLD

Here's an overview of a complete design that you can download from the Web.

by Jennifer Jenkins, Applications Engineer, Xilinx Inc., jennifer.jenkins@xilinx.com

The 8B/10B data transmission scheme has become the standard for high-speed serial links today. This encoding scheme translates byte-wide data of random ones and zeros into a 10-bit serial data stream. The 8B/10B encoding rules create a DC balanced code that provides optimum coding efficiency, clock recovery, error detection, and suitability for ring or point-to-point topologies.

The 16B/20B transmission scheme incorporates the idea of the 8B/10B transmission code by combining two 8B/10B modules side-by-side. With 16B/20B encoding, a 16-bit word can be encoded and transmitted serially as shown in Figure 1.

Main Function

Figure 2 shows the block diagram for each 8B/10B encoding module. The 8B/10B transmission code includes both data and control characters. Parity is monitored in each data byte sent and determines the encoded data. Each byte of

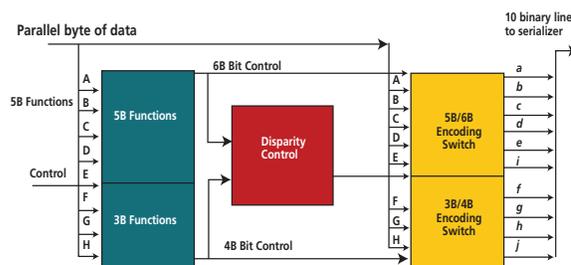


Figure 2 - 8B/10B encoder logic block diagram.

data is broken into 5B/6B and 3B/4B encoding functions. The parallel byte of data to encode [0:7] is referenced A through H, respectively. The data is then transmitted serially with control characters i and j.

CPLD Implementation

The 16B/20B encoder module or 20B/16B decoder module is targeted to a CoolRunner XPLA3 CPLD. CoolRunner CPLDs not only provide the lowest power solution today, but entering a design is simple with the WebPOWERED software tools available. WebPACK™ and WebFITTER™ allow for easy design entry as well as simulation and implementation. The WebPOWERED software tools can be downloaded for free from the Xilinx website, or by going to www.xilinx.com/products/software/webpowered.htm

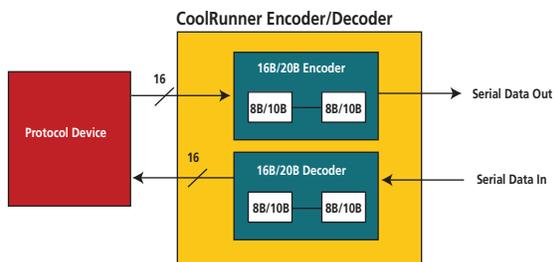


Figure 1 - 16B/20B block diagram.

More Information: For a complete 8B/10B code description and VHDL implementation, look at XAPP336 "Design of a 16B/20B Encoder/Decoder using a CoolRunner CPLD" on the Xilinx website, www.xilinx.com or by contacting Xilinx Technical Support at 1-800-255-7778.