

# 40 Gbit/s transceiver design

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Ever wondered why the internet seems to get slower instead of faster? You're not the only one! The problem lies in the fact that the amount of data on the internet keeps rising and everything you do consumes more bandwidth than ever before. Nowadays everyone wants to stream HDTV and have video conversations with 1080p webcams. All this data has to travel through the core routers, which now typically operate at speeds below 10Gb/s per lane. In this research we will try to realize operation above 40 Gb/s available per lane. To achieve such high bandwidths over a backplane inevitably seems to require electrical adjustment of the channel and different modulation formats. The adjusting is accomplished at the transmitter side by the use of a feedforward equalizer which will enhance the higher frequencies and attenuate the lower frequencies leading to a seemingly flat channel. Despite these techniques it is still hard to achieve sufficient bandwidth to operate a simple on off modulation. To overcome this problem the use of an easily implementable on chip modulation scheme has been adopted. After careful exploration a special partial response modulation scheme called duobinary was chosen. One of the many advantages of this modulation scheme is the use of an asynchronous decoder at the receiver side. The research summarized in this poster consists of creating a transmitter with equalization and a duobinary receiver in the same transceiver chip. The transmitter equalization is realised by means of an on chip feedforward analog implementation of a finite input response filter, implementing the tap weights by use of variable gain amplifiers and transmission line delay elements. The receiver consists of a low noise input buffer followed by an asynchronous duobinary decoder. A duobinary signal is a 3 level signal, the decoder consists of 2 comparators at the input of an XOR gate to determine whether the input signal is in the middle or at one of the two extremes, if the signal is at the middle level the resulting data is a one, otherwise we received a zero.