Binary Numbers

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There are a variety of schemes to associate binary bits
with numbers.

The association of a binary number with an unsigned integer
is
straightforward. However, one could, by your convention,
have the
binary point anywhere in the binary word rather than at the
right.

Negative numbers are usually represented by the two's
complement
scheme. Here the left hand bit is the sign bit and the
negative of a
number is formed by complementing the bits and adding one.
Ordinary
arithmetic works and one ignores any carry (unless checking
for
overflow).

A number of analog to digital and digital to analog
converters use
offset two's complement which is the same as two's
complement with the
left hand (sign)bit complemented.

Gray codes are often used for shaft encoders, etc. so that
a small
amount of jitter makes a difference of only one number.
However
arithmetic is so difficult with Gray codes, that one
usually converts

gray codes to unsigned integers before doing any addition or
subtraction.

Floating point is a form used to realize a large dynamic range with a
smaller number of bits than would be required with two's complement.

More information on binary number systems is provided by Altera's

Application Note 83.

If clicking on the application note is
unsuccessful then go to

 www.altera.com

and navigate to AN 83.