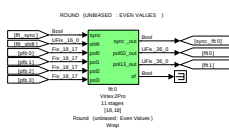
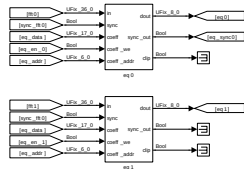


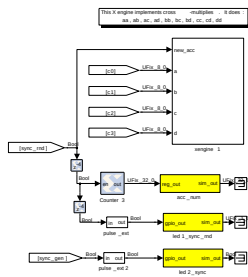
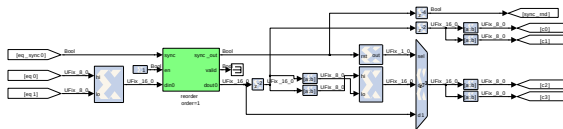
Inputs are fed into the real FFT in a twisted order so that antennas 0,1,2,3 show up on the outputs first and then 4,5,6,7 for the second half. This makes the data order in the x_engine a little more intelligible.



Next, we reduce the bandwidth out of the FFT to 4 bits to save resources. This must be done very carefully to avoid losing too much information. Firstly, this conversion is done using "round" and "saturation" logic to avoid introducing DC offsets, "wrap-around" and other signal quantization effects. Secondly, the "equalizer" allows each frequency channel of the FFT to be scaled by a different number. This allows passbands which are not flat to be flattened digitally to allow for optimal quantization to 4 bits. These coefficients can also be updated dynamically for gain control. Coefficients can be dynamically written into the "equalizer" by specifying the channel ("coeff_addr") and the value of the coefficient ("coeff"), and then using "coeff_en" to write the new coefficient into the equalization table.



Since the real FFT, each data line has actually had spectra for 2 signals multiplexed. Now we have to present these spectra consecutively for cross-multiplication. The reader should be able to see that the spectrum for the first antenna is the same as the spectrum for the second antenna. The spectrum for the next antenna is the same as the spectrum for the first antenna and then the corresponding channel from the next antenna. The micro circuit then presents channel samples for all antennas consecutively, first as "a b c d", and then as "c d a b". We can post sample twice b/c: for 4 data lines, data is only valid 1/2 the time. By post sampling twice with permuted order, we can cut out some circuits in the xargline that follows.



Next, we reduce the blowup due to the FFT to 4 bits to save resources. This must be done in order to avoid losing too much information.

Finally, this conversion is done using "rounding to Even" and saturation logic to avoid introducing DC offsets, "wrapping", and other ugly quantization effects. Secondly, the "equalizer" allows each frequency channel of the FFT to be scaled by a different number. This allows pseudobands which are not flat to be flattened digitally to allow for optimal quantization to 4 bits.

These coefficients can also be updated dynamically for gain control.

Coefficients can be dynamically written into the "equalizer" by specifying the channel ("coeft_addr") and the value of the coefficient ("coeft"), and then using "coeft_en" to write the new coefficient into the equalization table.

