ELEC 391
Demo #2

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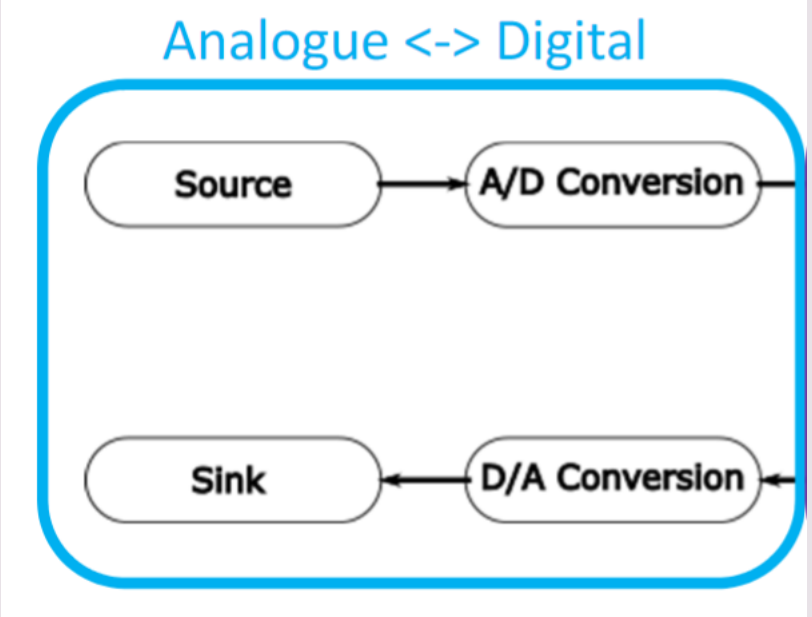
Comparison

Criterion	Simulink Perf.	FPGA Perf.
Message Transmission (bit rate)	20,000	20,000
Transmission Reliability (bit error probability)	10^{-3}	0
Processing Delay	25ms	0
Channel Bandwidth	20,000	20,000
(other criteria relevant to your requirements)		

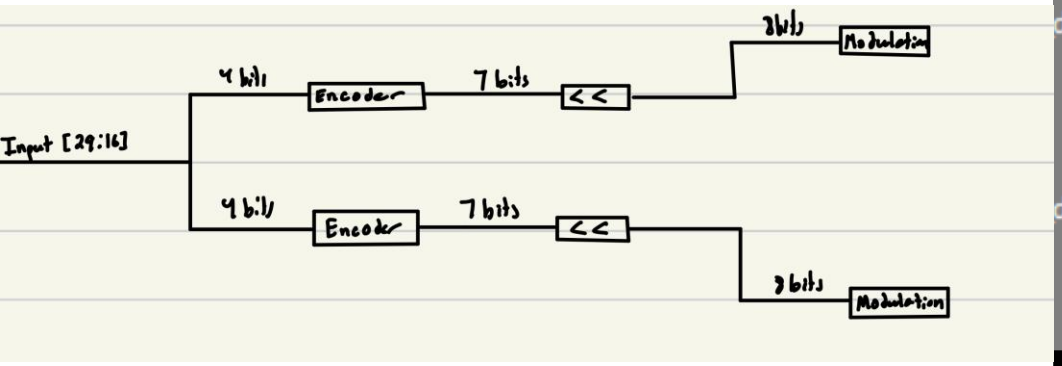
A/D & D/A Conversion

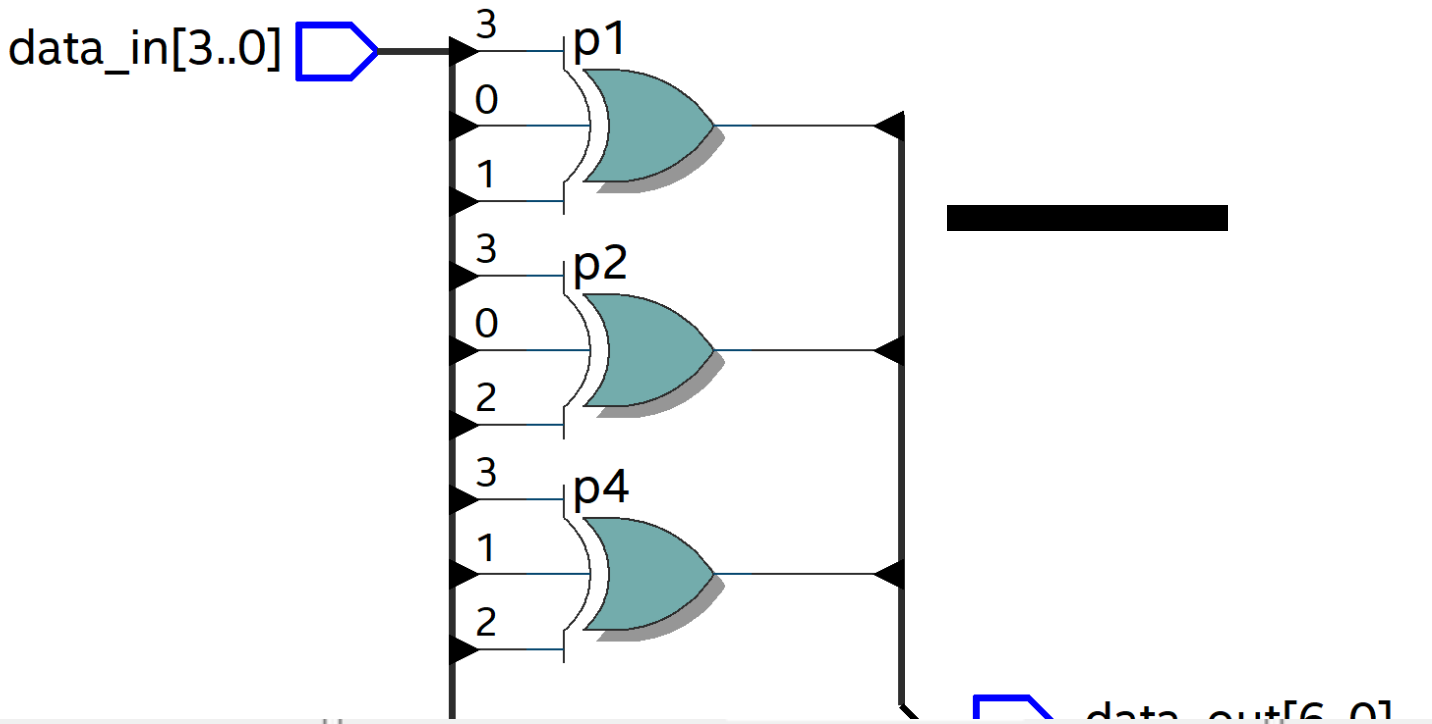
- Audio signal is inputted from the source. It is then sampled, quantized and encoded into a digital format.
- The digital format is then converted for transmission

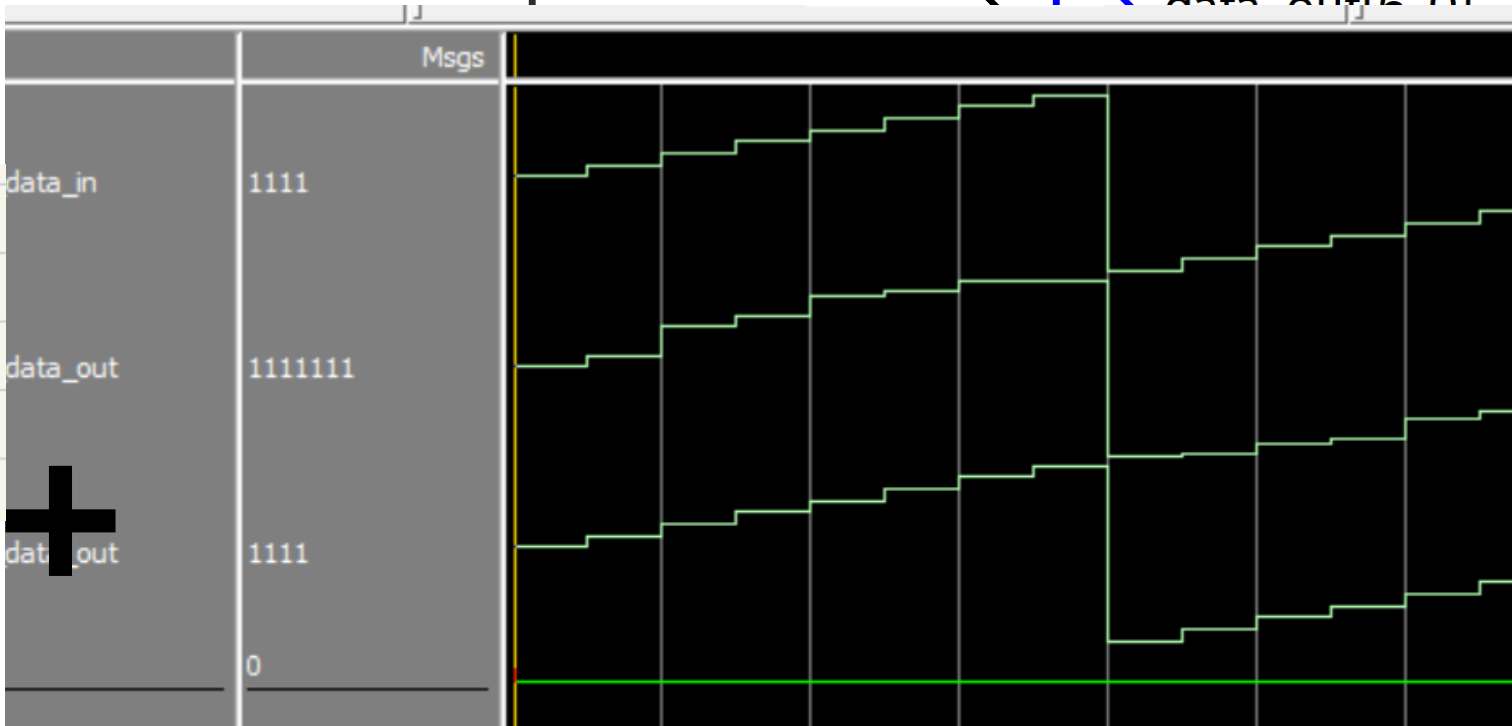


Error Encoding & Decoding

– Receives 4 bits of data and outputs 7-bit of Hamming encoded word

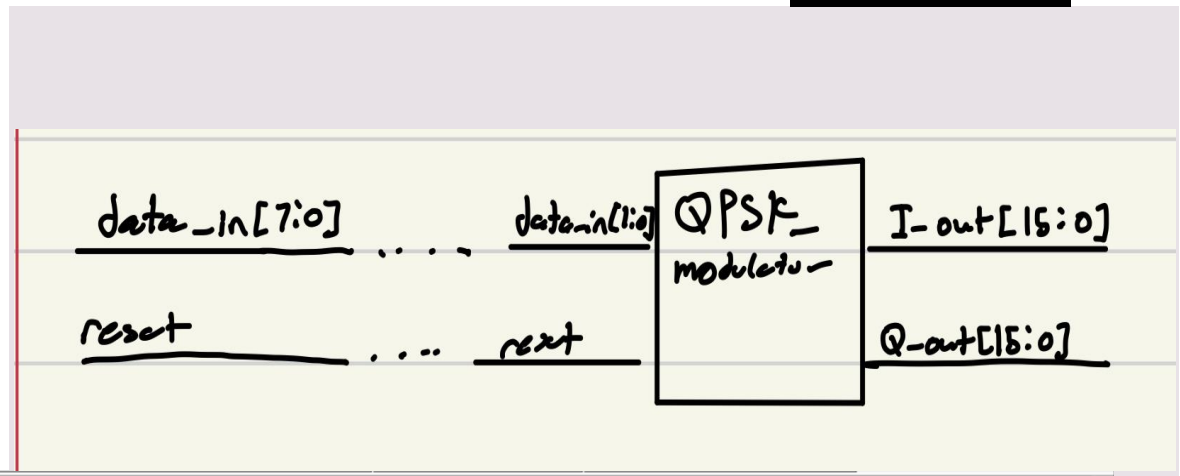


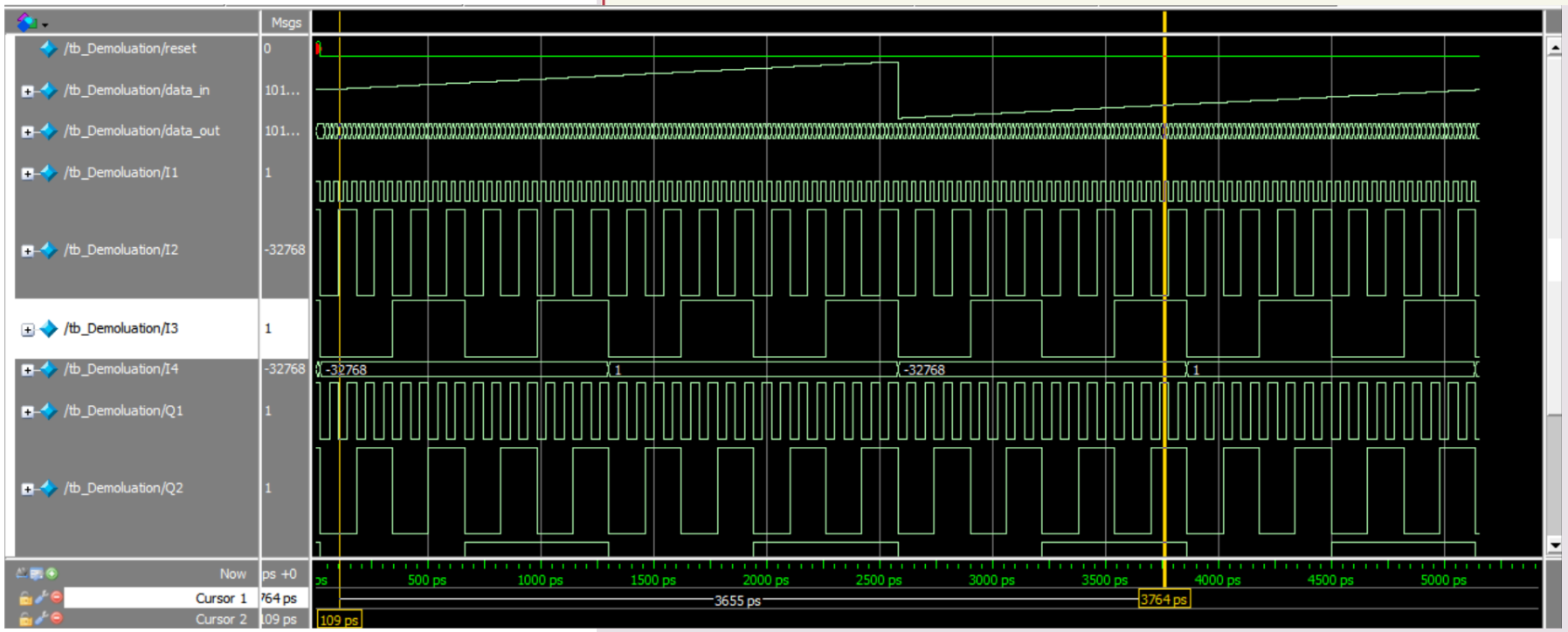




Modulation/Demodulation

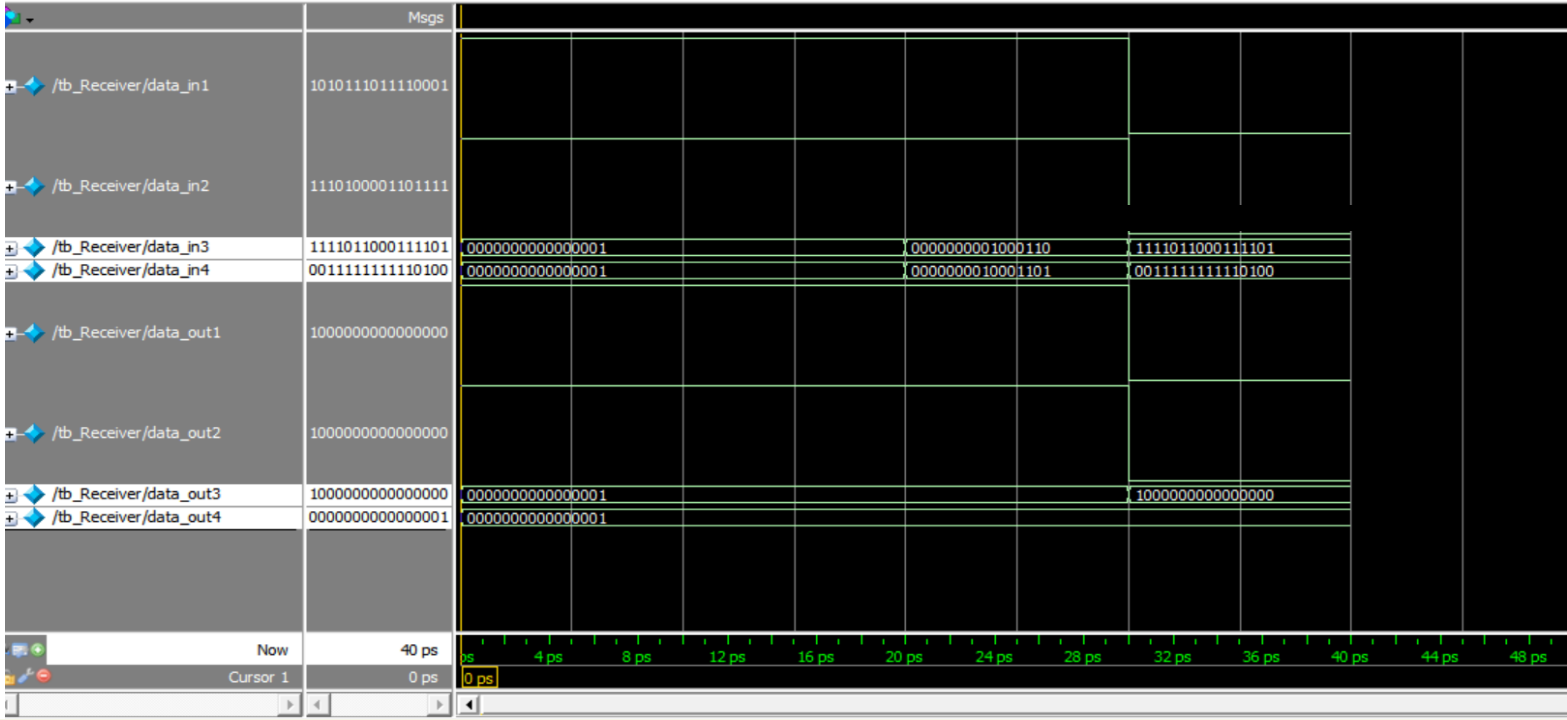
– Implements a QPSK modulation scheme where each 2-bit data input is outputted as a 16-bit In-Phase and Quadrature output

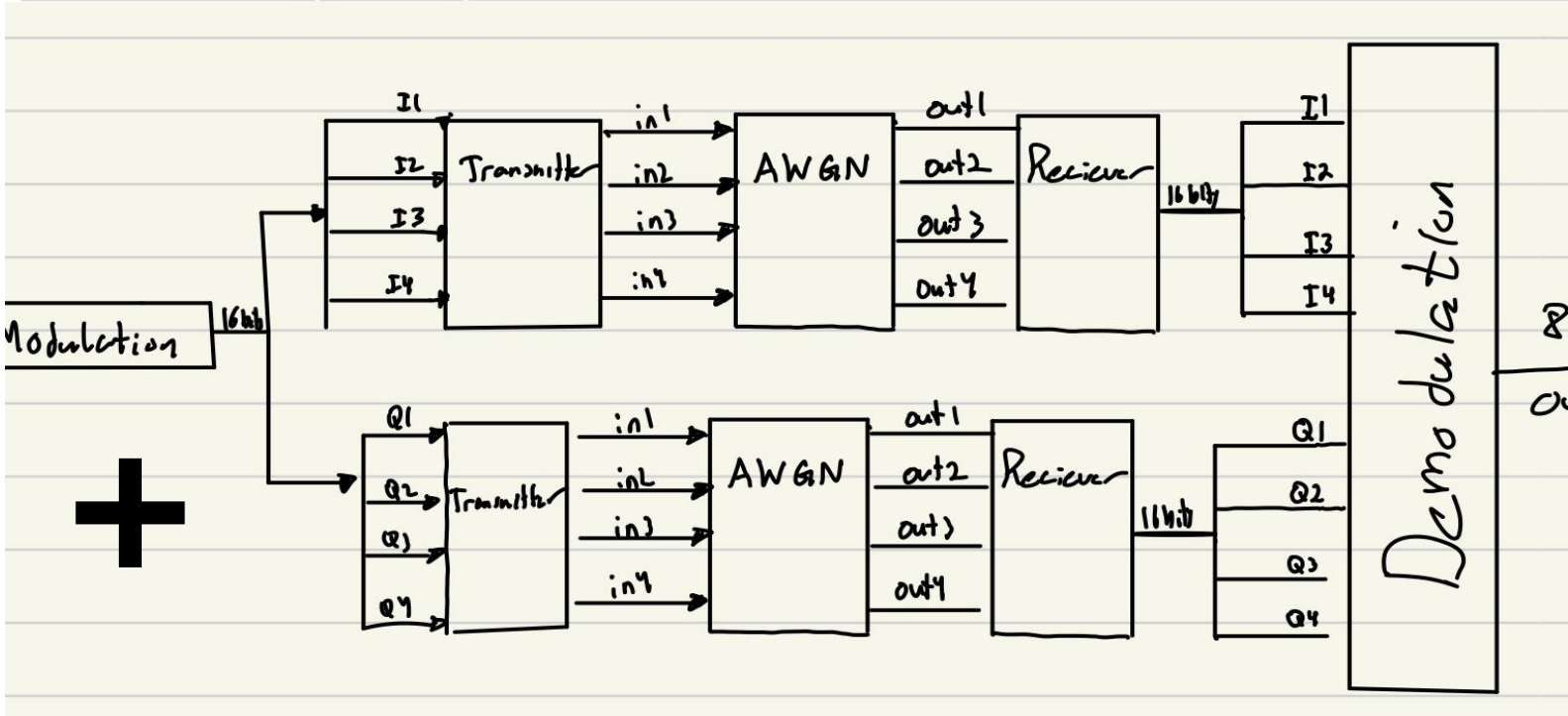




Transmitter/Channel/Receiver

- Complex signal is sent directly to the channel
- There are two channels that go to the demodulation from modulation





Transmitter/Channel/Receiver

- AWGN Channel module takes four data inputs from the transmitter and produces four corresponding data outputs.
- State machine is created to determine the output of the channel using the design of the Gilbert Channel