FPGA BASED DESIGN OF A BPSK MODULATOR

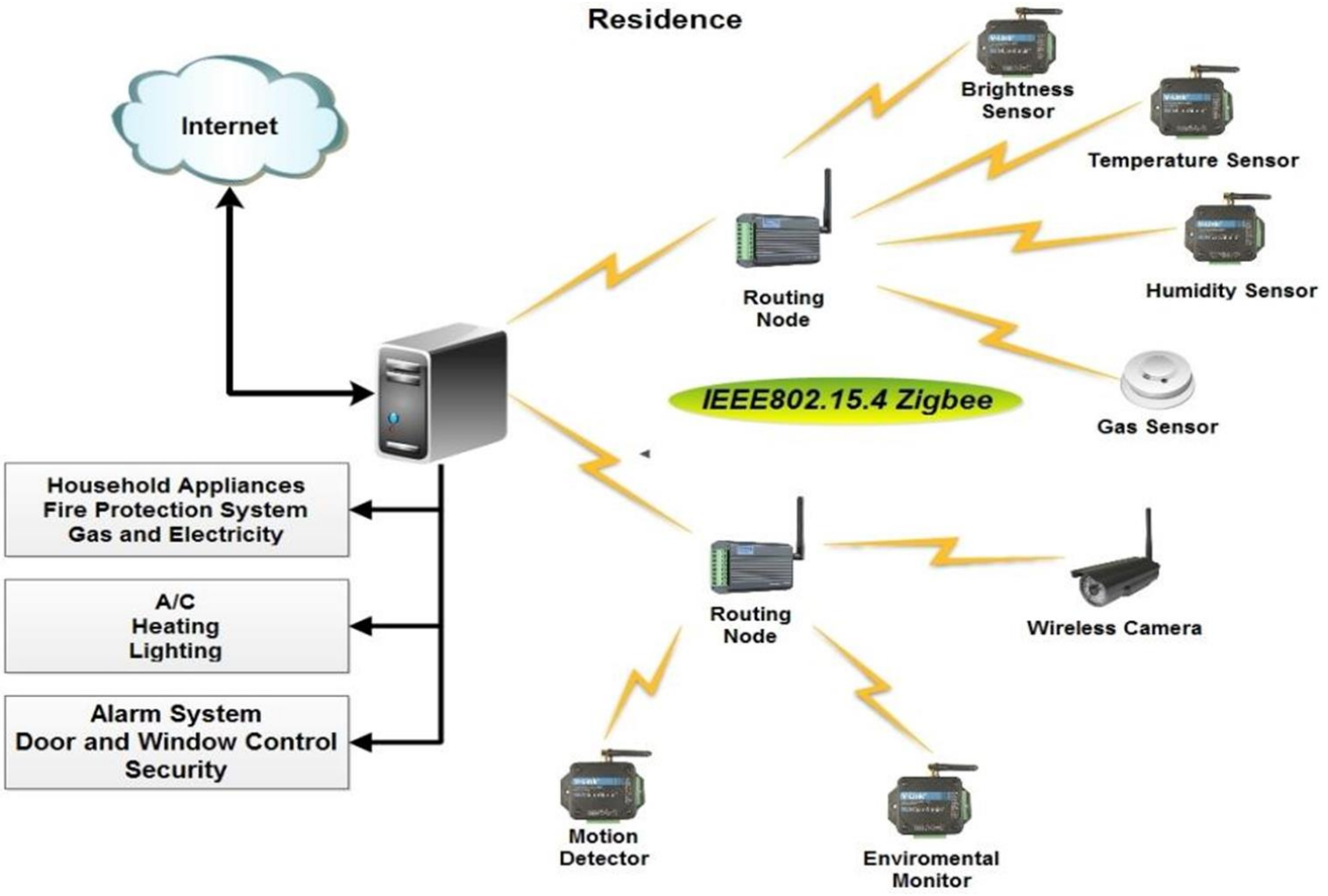
A Modulation in IEEE 802.15.4 Low-Band

By Shiran Ma

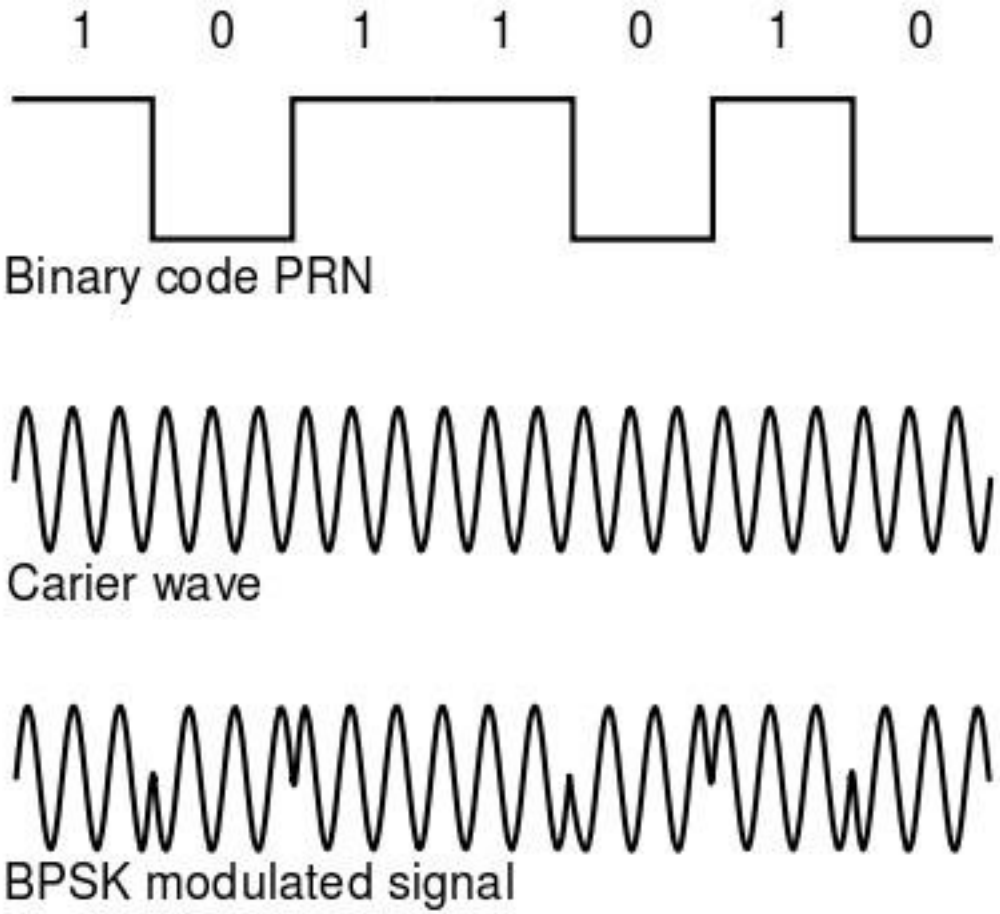
ABOUT IEEE 802.15.4

- IEEE 802.15.4 defines the physical layer (PHY) and medium access control (MAC) sub layer specifications for low-data-rate wireless connectivity with fixed, portable, and moving devices with no battery or very limited battery consumption.
- IEEE 802.15.4 was designed to support two PHY options.
- The 868/915 MHz PHY (also called low-band) is specified for operation in the 868 MHz band in Europe offering one channel with a raw data rate of 20 kb/s and the 915 MHz ISM band in North America offering 10 channels with a raw data rate of 40 kb/s. The low-band uses binary phase shift key (BPSK) modulation.

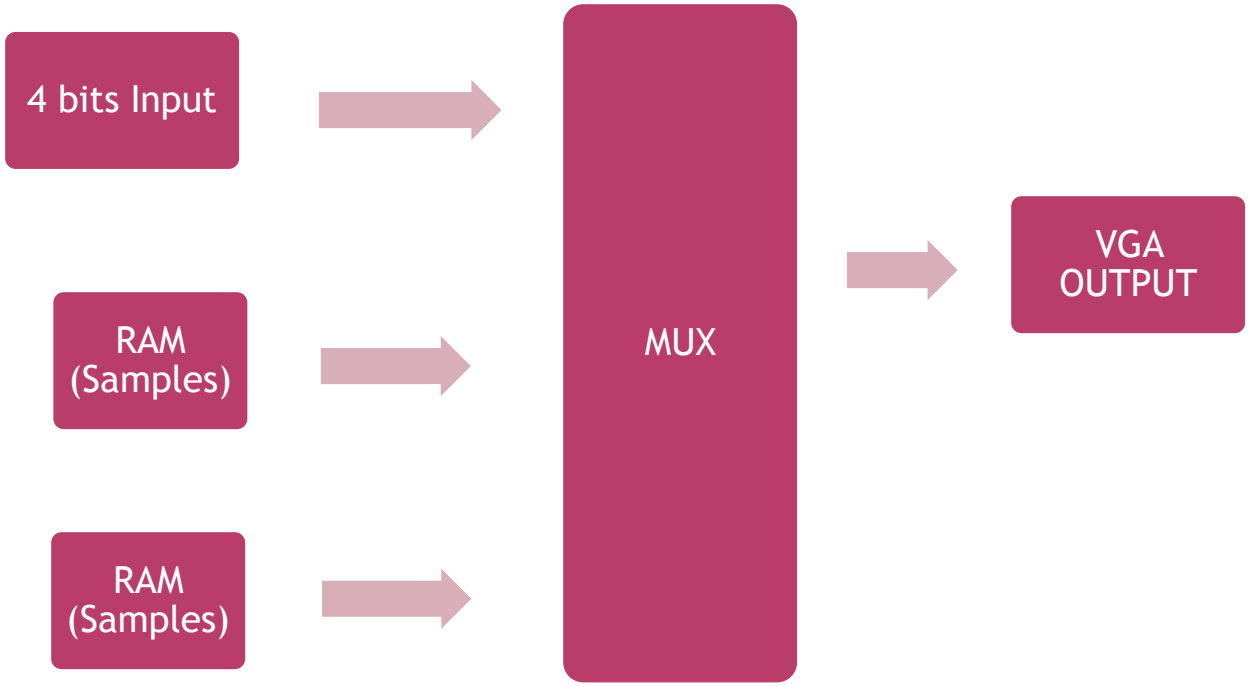
AN EXAMPLE


Residence
Internet
Brightness Sensor
Temperature Sensor
Humidity Sensor
Routing Node
IEEE802.15.4 Zigbee
Gas Sensor
Household Appliances
Fire Protection System
Gas and Electricity
A/C
Heating
Lighting
Alarm System
Door and Window Control
Security
Routing Node
Wireless Camera
Motion Detector
Enviromental Monitor

BPSK MODULATION



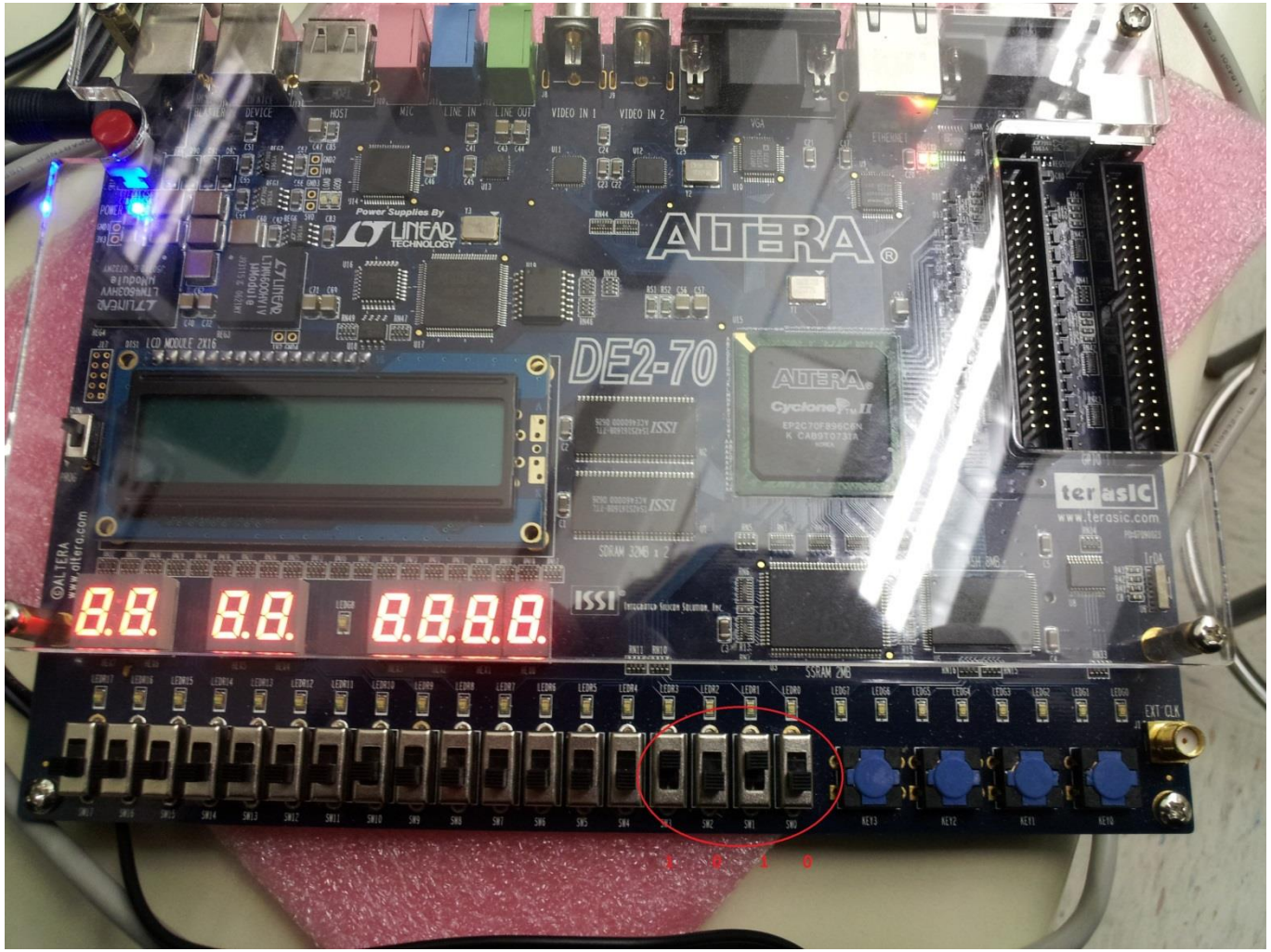
BLOCK DIAGRAM



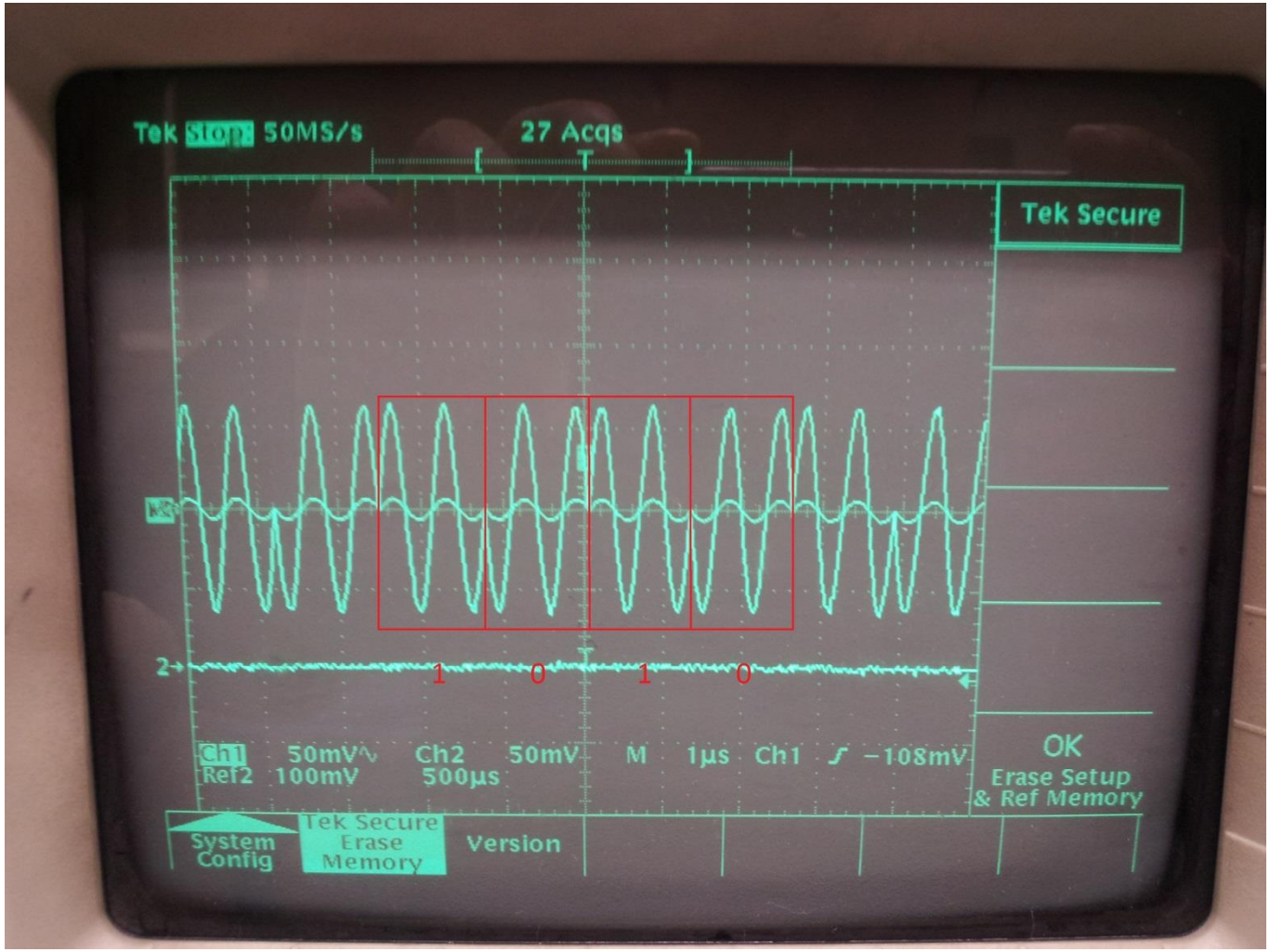
MY WORK

- This project is to implement BPSK modulation on to FPGA.
- Using switch 0 ~~3 as the 4 bit length input, a modulated analog signal should be seen on the oscilloscope.
- By using the concept of FPGA experiment #8, I built up samples for modulated signal of “1” & “0”, thus the final result is build up by different samples’ combination.

RESULT


ALTERA
DE2-70
terasIC
www.terasic.com
LCD MODULE 2X16
Power Supplies By
LINEAR TECHNOLOGY
VIDEO IN 1
VIDEO IN 2
LINE IN
LINE OUT
MIC
HOST
EXT CLK

RESULT


Tek Stop: 50MS/s
27 Acqs
Tek Secure
1
0
1
0
Ch1 50mV
Ref2 100mV
Ch2 50mV
500µs
M 1µs Ch1 ∫ −108mV
OK
Erase Setup
& Ref Memory
System Config
Tek Secure Erase Memory
Version