Experiment #4 – Integrated System

Moein Karami,
810198540

I. FREQUENCY MULTIPLIER

$f_{in} * 2^n = f_{ref} / k \rightarrow 1 / T_{in} * 2^n = 1 / (T_{ref} * k) \rightarrow$

$k = T_{in} / (T_{ref} * 2^n)$

A. State Diagram of the Controller:
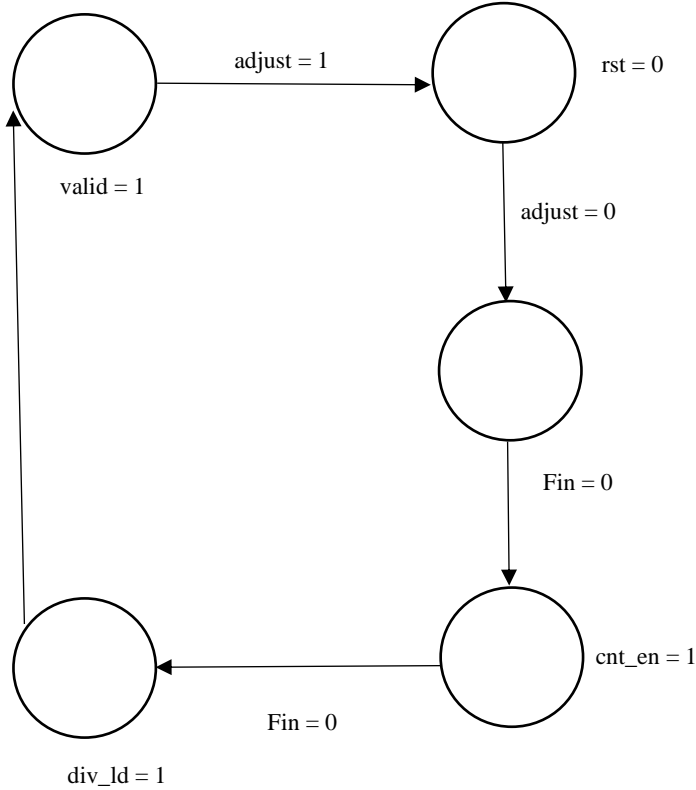
B. Simulate results:

In all of wave forms InFreq = 1MHz
Look at figures 1, 2 and 3.

II. EXPONENTIAL ACCELERATOR

A. Exponential Engine:

1) As you can see in figure 4 if we set
  ◊ x = 0: answer will be 1
  ◊ x = 1: answer will be e ~ 2.718
  ◊ x = 0.5: answer will be $e^{0.5}$ ~ 1.648

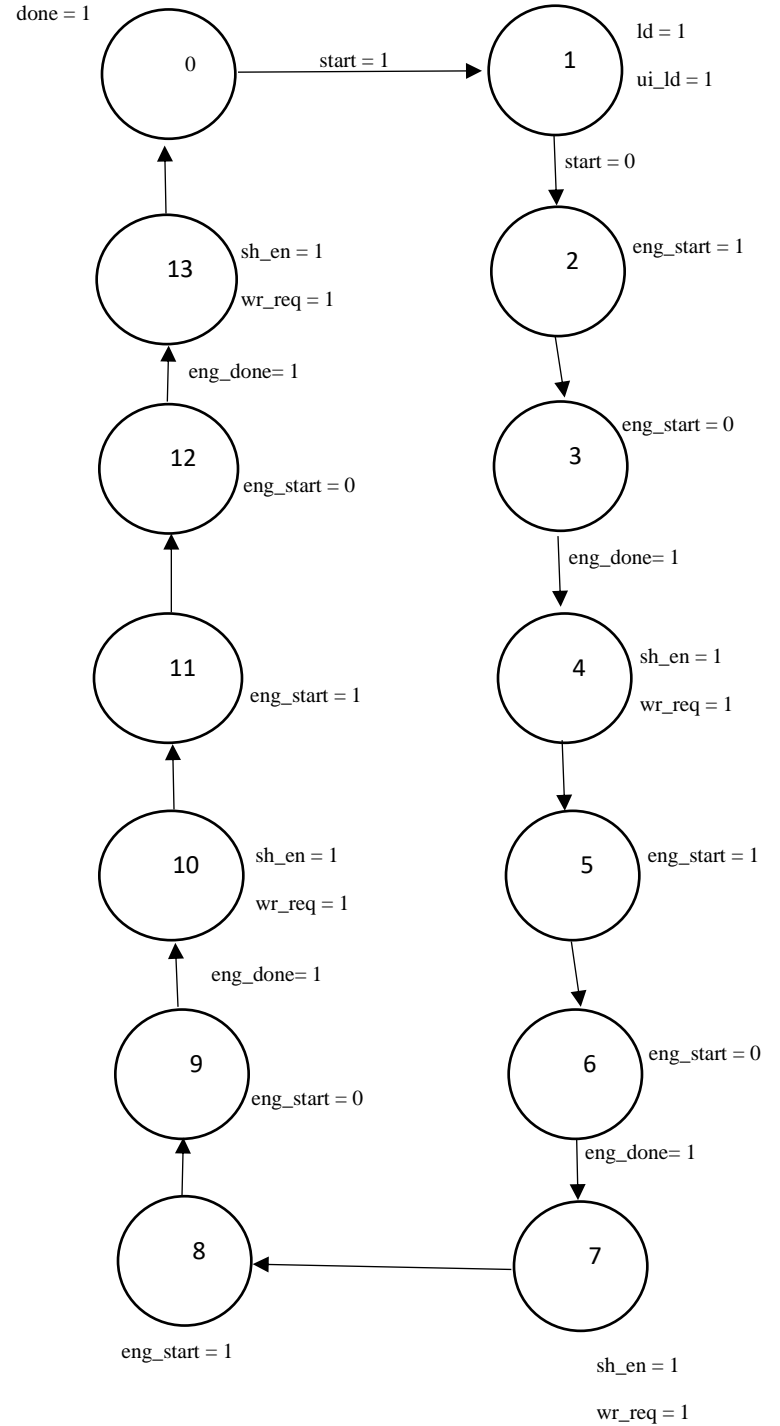2) As you can see in figure 4 maximum frequency of this accelerator is equal to 135.01MHz.

B. Exponential Accelerator Wrapper:

1) Exponential Accelerator Wrapper Controller State diagram:
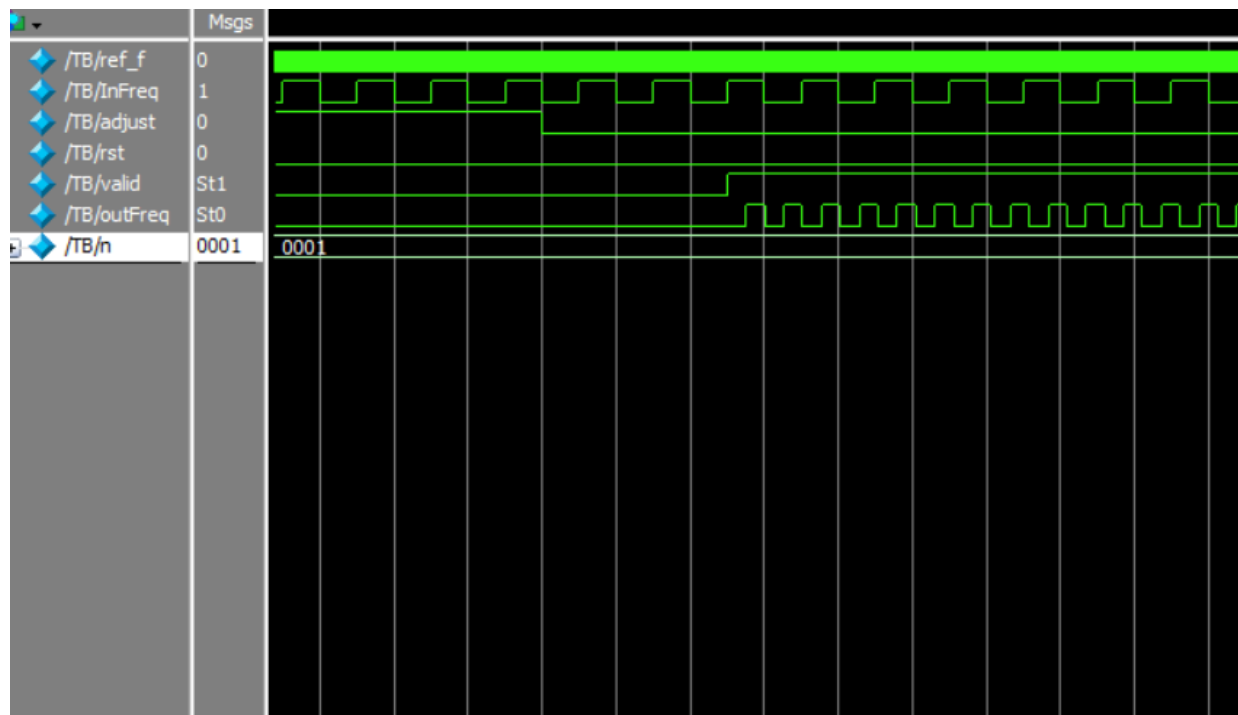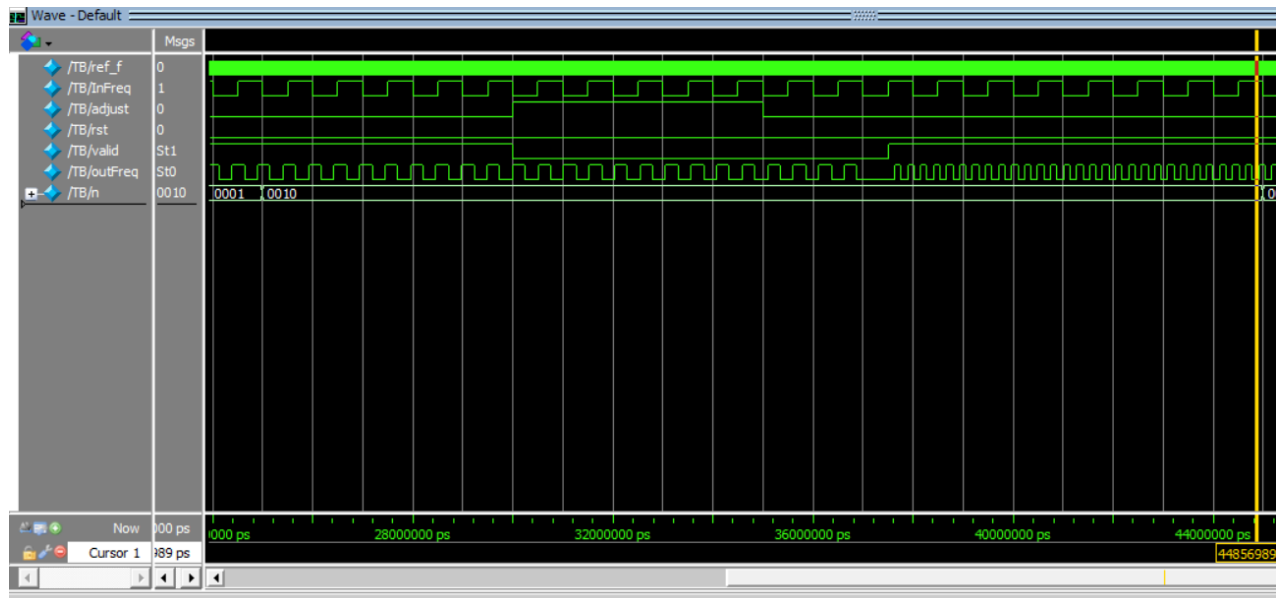
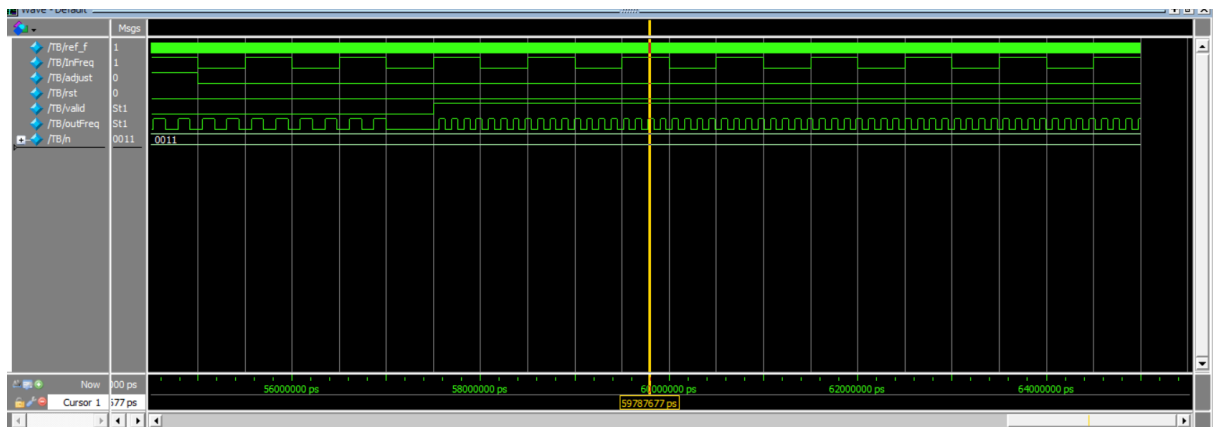Fig. 1   n=1, outFreq frequency = 2MHz

Fig. 2   n = 2, outFreq frequency = 4MHz

Fig. 3   n = 4, outFreq frequency = 8MHz

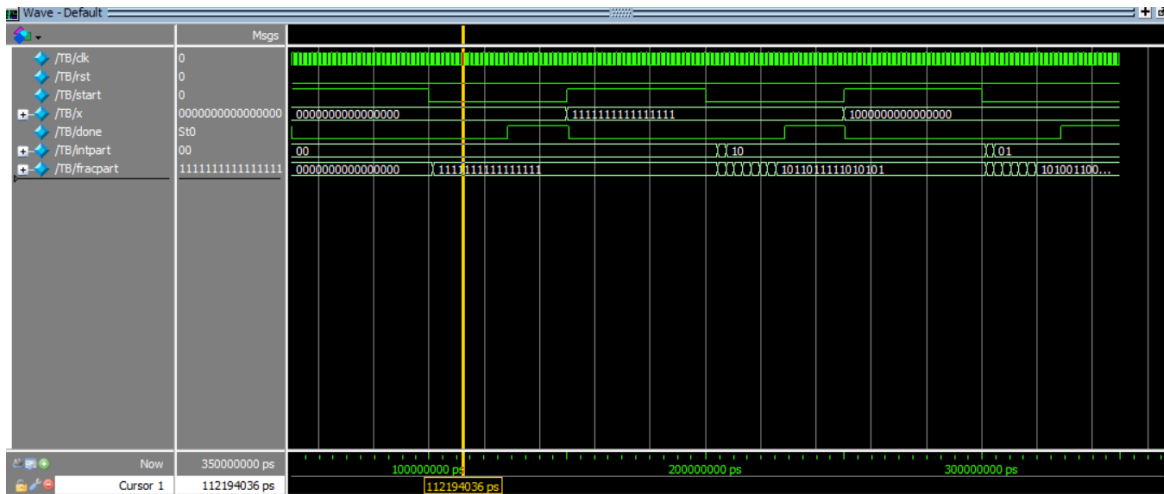Fig. 4   simulate accelerator waveform

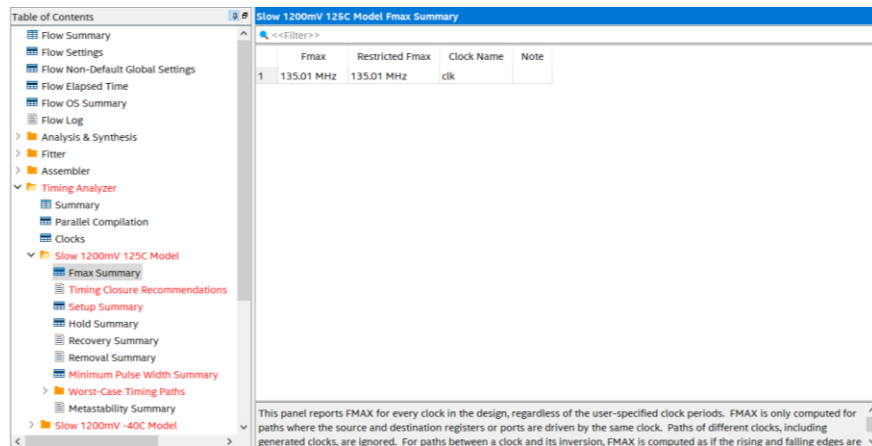Fig. 5 Accelerator maximum frequency

Fig. 6 Wrapper maximum frequency

2) According to figure 6 its maximum frequency = 132.22MH

III. INTEGRATED CIRCUIT

1) MultFactor <= 661 → n <= 5