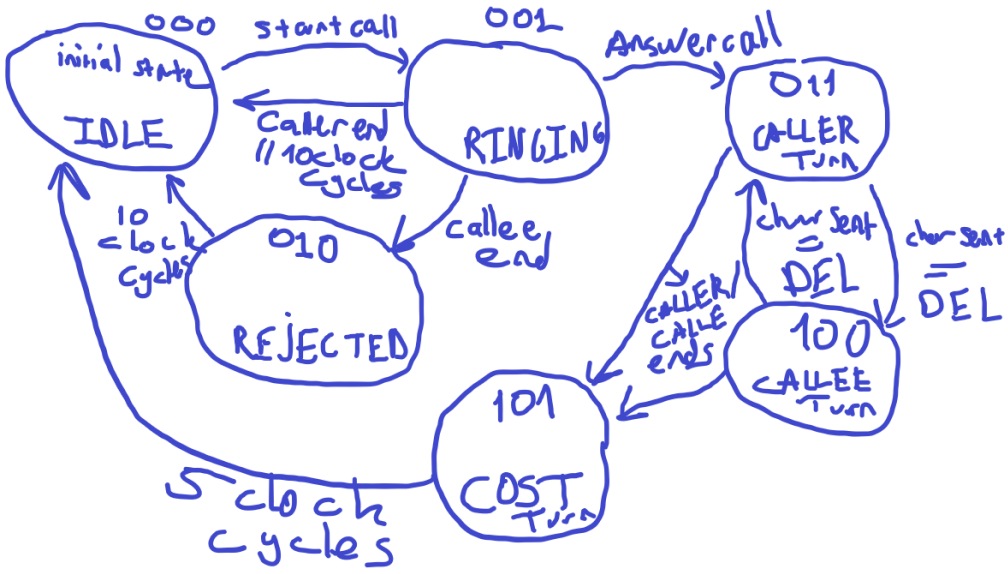
Tuğcan Barbin 25168 CS303 Term Project Report

1-) I sketched up a state machine for my project;



As we can understand from sketches, I have 6 states as follows,

IF RESET == 1 THEN WE GO TO idle STATE WHICH IS INITIAL STATE.

1-1-) idle (Initial state)

At this state statusMsg is “IDLE “, and sentMsg is full of space.

If startcall, next state is ringing.

1-2-) ringing

At this state statusMsg is “RINGING ” and sentMsg is full of space.

If none of the input(answercall or endcall) is taken, after 10 clock cycles next state is idle

If answercall is 1, then conversation starts and next state is callersturn .

If endCallCaller is 1, then next state is idle again.

If endCallCallee is 1, then we rejected. So, next state is rejected.

1-3-) rejected

At this state statusMsg is “REJECTED” and sentMsg is full of space.

After 10 clock cycles we return to idle state.

1-4-) callersturn

At this state statusMsg is “CALLER ”

And sentMsg is updated when the sendCharCaller is 1, if charSent is between 32 and 127 then it is a valid input. If input is not valid then the sentMsg is not updated.

If sentChar is DEL then next state is calleesturn and the sentMsg is reseted.

If endCallCaller or endCallCalle is 1 then next state is costturn state.

1-5-) calleesturn

At this state statusMsg is “CALLEE ”

And sentMsg is updated when the sendCharCallee is 1, if charSent is between 32 and 127 then it is a valid input. If input is not valid then the sentMsg is not updated.

If sentChar is DEL then next state is calleesturn and the sentMsg is reseted.

If endCallCaller or endCallCalle is 1 then next state is costturn state.

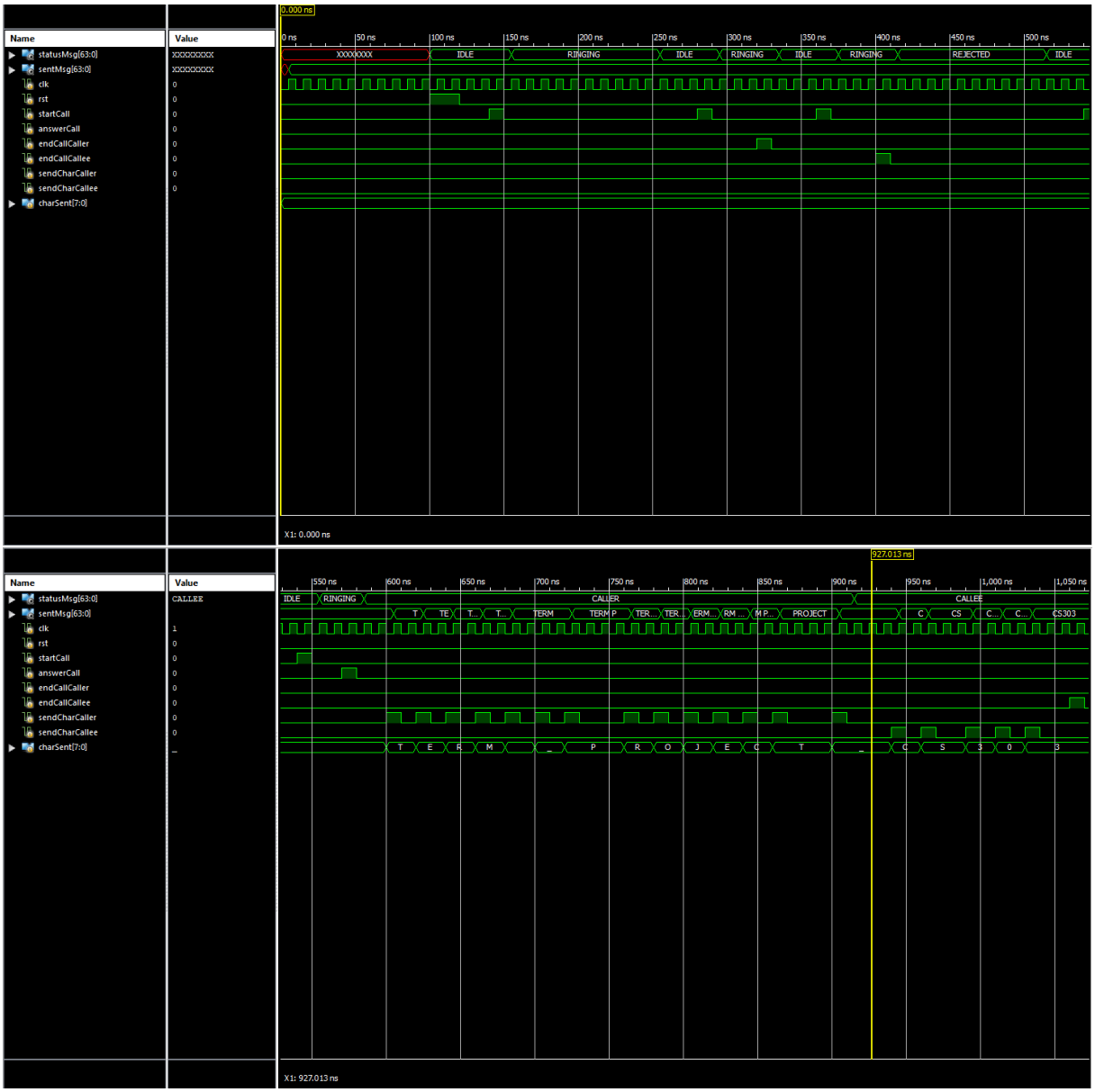
1-6-) costturn

sentMsg is updated as cost which represents the kuruş that we spent for send messages.

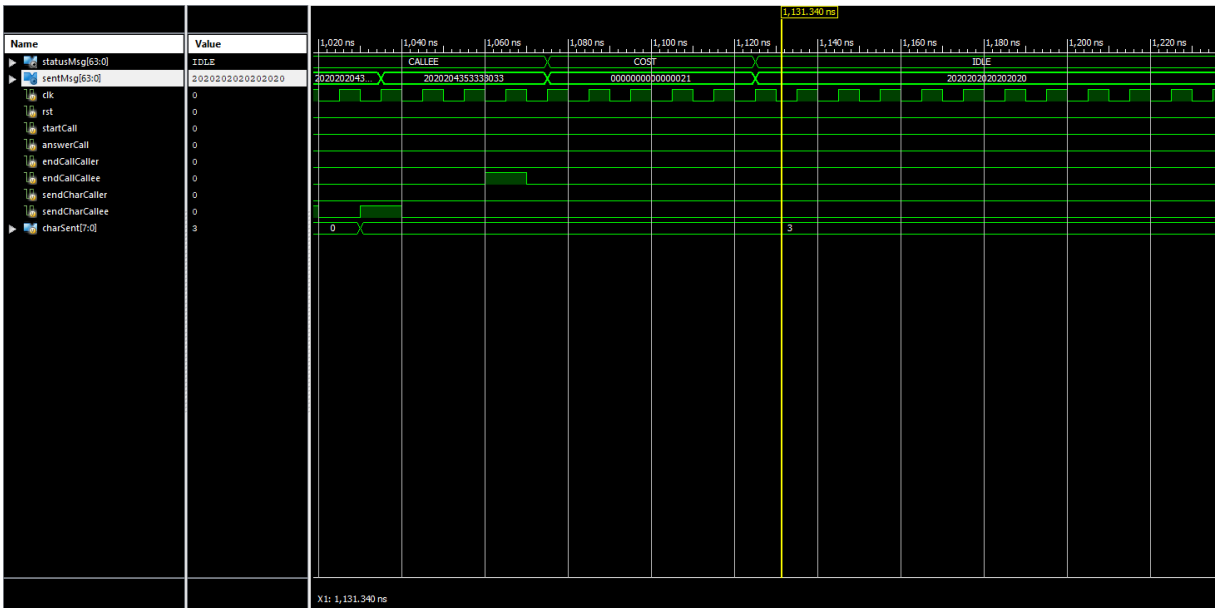
It will stay in costturn for 5 clock cycles and then next state is idle

***** clock cycles is calculated with a counter that counts the posedges of clock

2-) Simulation results showing that your design is working



FOR THE LAST SCREENSHOT I CHANGED THE REPRESENTATION OF SENTMSG FROM ASCII TO HEXADECIMAL TO REPRESENT THE COST OF CONVERSATION



3-) synthesize report

I copied some parts of it that represents I have no warning other than “More than 100% of Device resources are used” and no errors during compilation. Also, the parts that represents the area usage and time.

Total REAL time to Xst completion: 0.00 secs

Total CPU time to Xst completion: 0.16 secs

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* HDL Compilation *

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Compiling verilog file "deneme222.v" in library work

Module <tel> compiled

No errors in compilation

Analysis of file <"tel.prj"> succeeded.

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* HDL Analysis *

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Analyzing top module <tel>.

calleesturn = 3'b100

callersturn = 3'b011

costturn = 3'b101

idle = 3'b000

rejected = 3'b010

ringing = 3'b001

Module <tel> is correct for synthesis.

Unit <tel> synthesized.

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* Final Report *

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Final Results

RTL Top Level Output File Name : tel.ngr

Top Level Output File Name : tel

Output Format : NGC

Optimization Goal : Speed

Keep Hierarchy : No

Design Statistics

IOs : 148

Cell Usage :

BELS : 292

GND : 1

INV : 1

LUT1 : 30

LUT2 : 12

```
#      LUT2_D               : 2
#      LUT3                 : 39
#      LUT3_D               : 1
#      LUT3_L               : 3
#      LUT4                 : 99
#      LUT4_D               : 7
#      LUT4_L               : 32
#      MUXCY                : 31
#      MUXF5                : 1
#      VCC                  : 1
#      XORCY                : 32
# FlipFlops/Latches         : 127
#      FDC                  : 78
#      FDE                  : 32
#      FDP                  : 17
# Clock Buffers             : 1
#      BUFGP                : 1
# IO Buffers                : 147
#      IBUF                 : 15
#      OBUF                 : 132
=========================================================================

Device utilization summary:
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Selected Device : 3s100etq144-4

 Number of Slices:              120  out of    960    12%
 Number of Slice Flip Flops:    127  out of   1920     6%
 Number of 4 input LUTs:        226  out of   1920    11%
 Number of IOs:                 148
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Number of bonded IOBs: 148 out of 108 137% (*)

Number of GCLKs: 1 out of 24 4%

WARNING:Xst:1336 - (*) More than 100% of Device resources are used

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Partition Resource Summary:

No Partitions were found in this design.

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TIMING REPORT

NOTE: THESE TIMING NUMBERS ARE ONLY A SYNTHESIS ESTIMATE.

FOR ACCURATE TIMING INFORMATION PLEASE REFER TO THE TRACE REPORT

GENERATED AFTER PLACE-and-ROUTE.

Clock Information:

Clock Signal	Clock buffer(FF name)	Load
clk	BUFGP	127

Asynchronous Control Signals Information:

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-----------------------------------+------------------------+-------+
Control Signal                     | Buffer(FF name)        | Load  |
-----------------------------------+------------------------+-------+
rst                                | IBUF                   | 95    |
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Timing Summary:
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Speed Grade: -4

   Minimum period: 6.979ns (Maximum Frequency: 143.287MHz)
   Minimum input arrival time before clock: 10.282ns
   Maximum output required time after clock: 4.571ns
   Maximum combinational path delay: No path found

Timing Detail:
   Total                  10.282ns (7.701ns logic, 2.581ns route)
                             (74.9% logic, 25.1% route)

=========================================================================
Timing constraint: Default OFFSET OUT AFTER for Clock 'clk'
  Total number of paths / destination ports: 106 / 106
-------------------------------------------------------------------------
Offset:              4.571ns (Levels of Logic = 1)
  Source:            counter_0 (FF)
  Destination:       counter<0> (PAD)
  Source Clock:      clk rising

  Data Path: counter_0 to counter<0>
                           Gate     Net
    Cell:in->out      fanout   Delay   Delay  Logical Name (Net Name)
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FDC:C->Q 7 0.591 0.708 counter_0 (counter_0)

OBUF:I->O 3.272 counter_0_OBUF (counter<0>)

Total 4.571ns (3.863ns logic, 0.708ns route)

(84.5% logic, 15.5% route)

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Total REAL time to Xst completion: 7.00 secs

Total CPU time to Xst completion: 6.61 secs

Total memory usage is 4513568 kilobytes

Number of errors : 0 (0 filtered)

Number of warnings : 1 (0 filtered)

Number of infos : 49 (0 filtered)