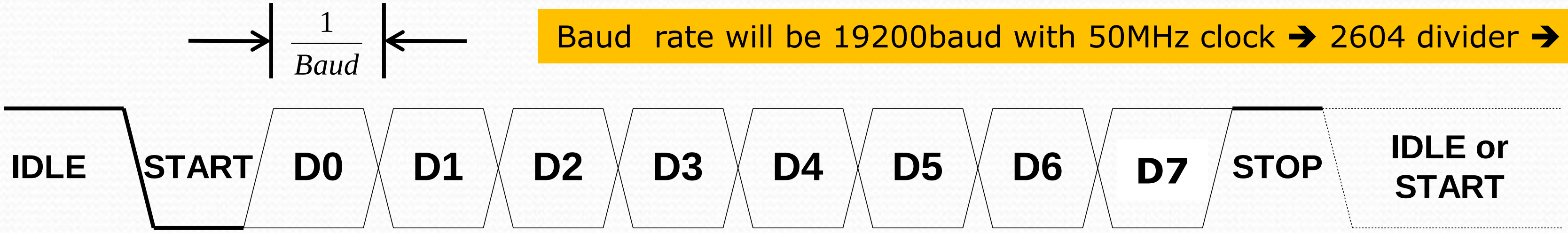
Exercise 12 (UART Transmitter)

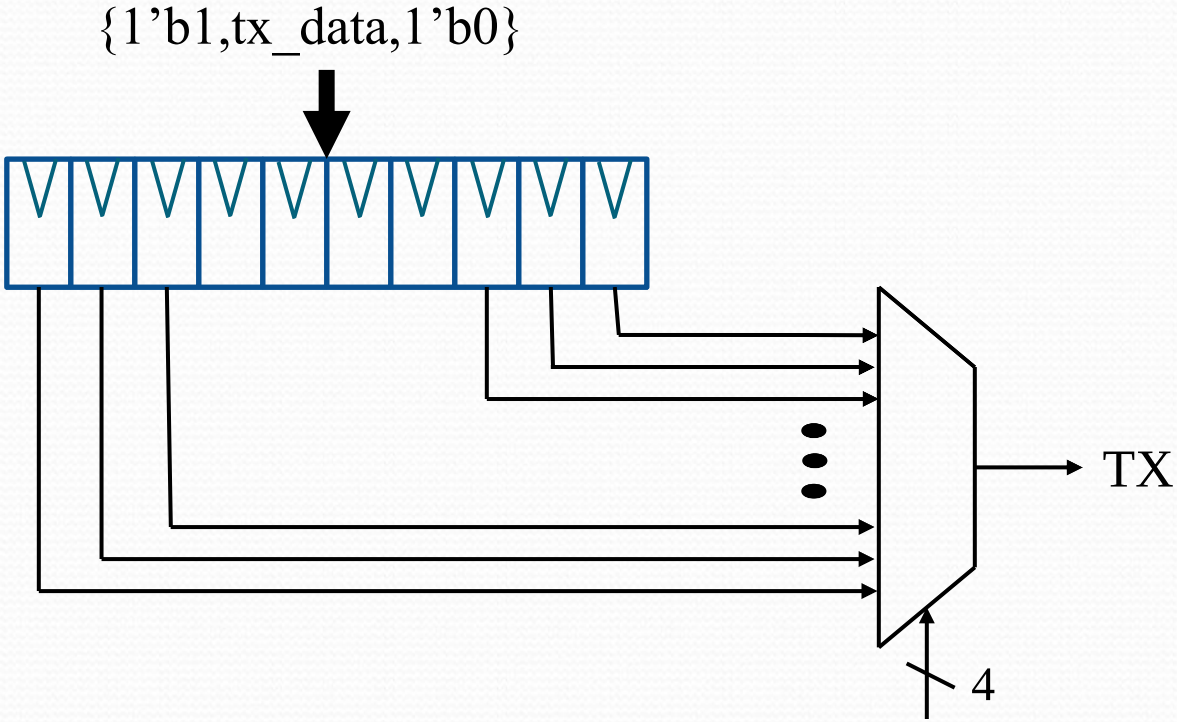
- RS-232 signal phases
  - Idle
  - Start bit
  - Data (8-data for our project)
  - Parity (no parity for our project)
  - Stop bit – channel returns to idle condition
  - Idle or Start next frame

Baud rate will be 19200baud with 50MHz clock ➔ 2604 divider ➔ 12-bit

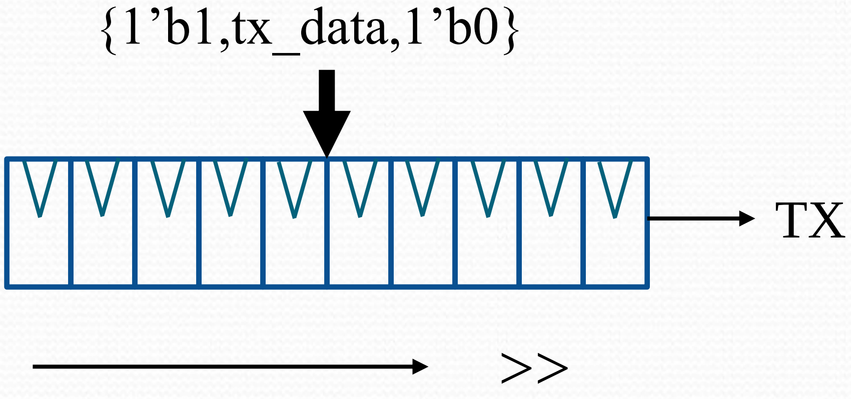


- Transmitter sits idle till told to transmit. Then will shift out a 9-bit (start bit appended) register at the baud rate interval.

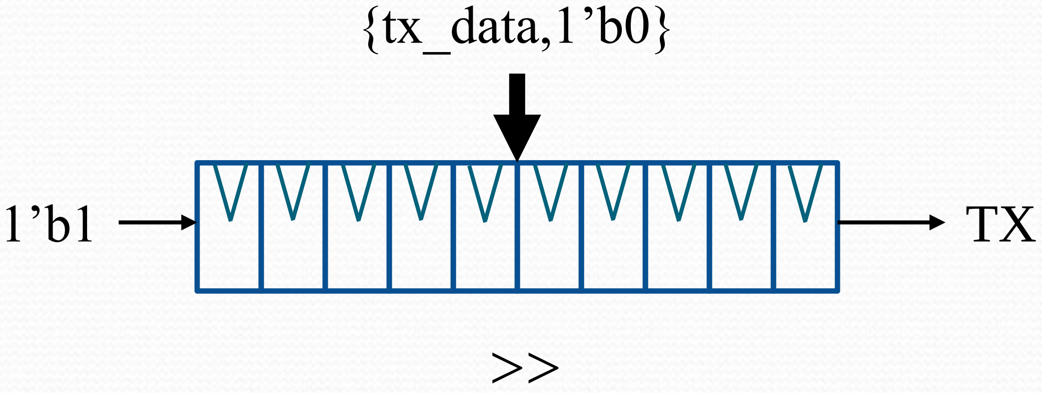
Exercise 12 (UART Transmitter)



Exercise 12 (UART Transmitter)

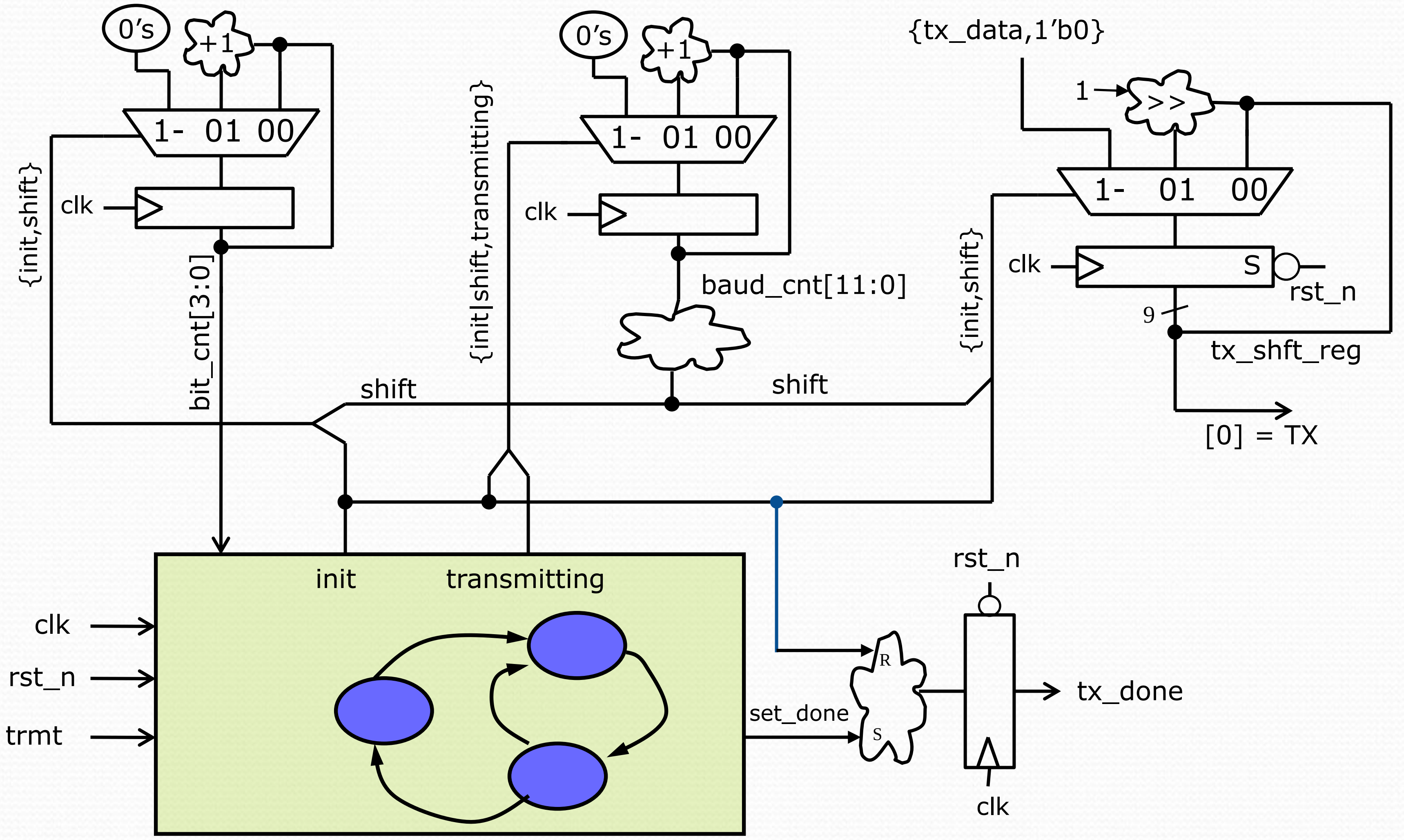


A simple shift reg is heart of the machine

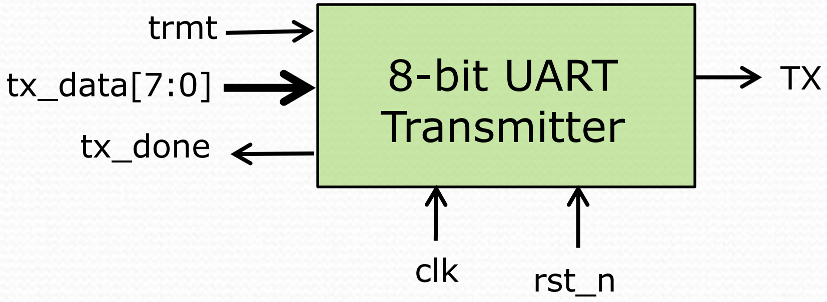


Does not even have to be 10-bits, can get away with 9.

Possible Topology of UART_tx



Exercise 12 (UART Transmitter):



Signal:	Dir:	Description
clk,rst_n	in	50MHz system clock & active low reset
TX	out	Serial data output
trmt	in	Asserted for 1 clock to initiate transmission
tx_data[7:0]	in	Byte to transmit
tx_done	out	Asserted when byte is done transmitting. Stays high till next byte transmitted.

- HW3 Problem 3 involves making a UART transmitter (***UART_tx.sv***). You are to start that design during this exercise.

- Make a simple test bench for it. Just instantiate your transmitter and send a few bytes. Verify correct functionality (including baud rate) by looking at the waveforms.

- In Ex13 we will make ***UART_rx***. Once we have both a transmitter and a receiver making a self checking testbench becomes trivial.

- Submit as much as you have done to the dropbox for Ex12. Wednesday we will look at UART receiver, and we have through Friday to finish transmitter/receiver.