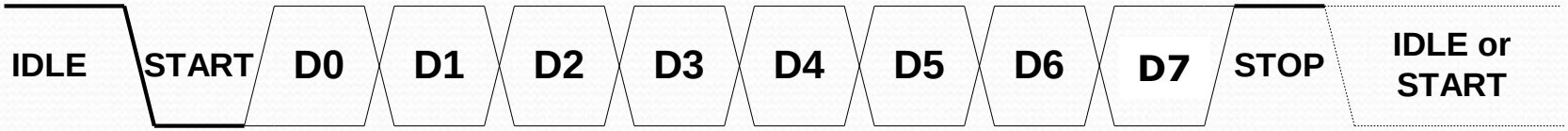
Exercise 11 (UART Transmitter)(HW3 Prob3):

- 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

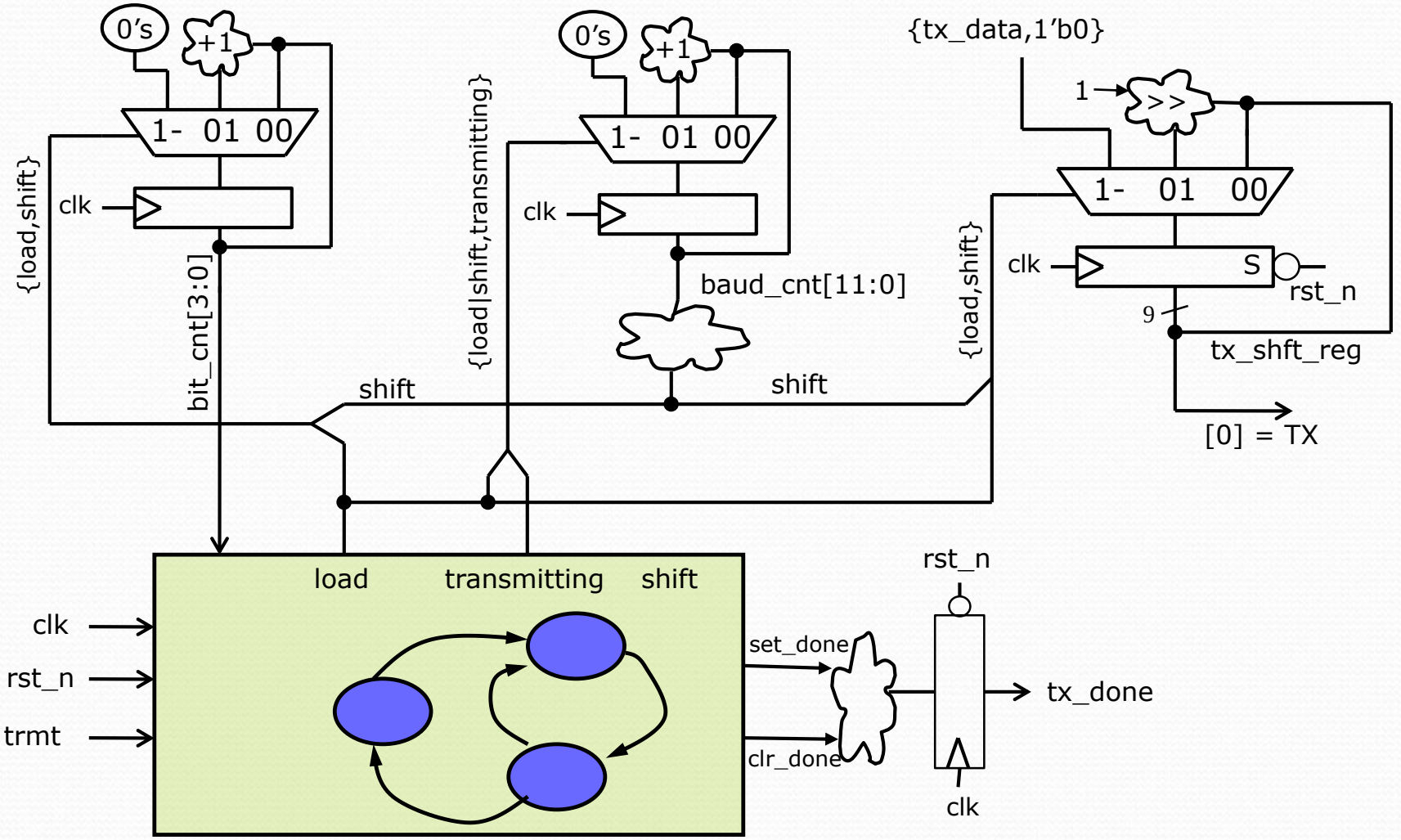
$\frac{1}{Baud}$

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



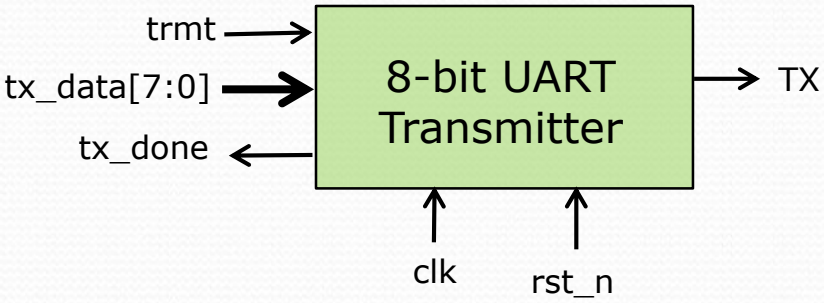
- Transmitter sits idle till told to transmit. Then will shift out a 9-bit (start bit appended) register at the baud rate interval.

Possible Topology of UART_tx



Look at Lecture05_mid from 41:17 ➔ 49:00 for description

Exercise 11 (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.
- Submit ***UART_tx.sv*** and ***UART_tx_tb.sv*** to the dropbox for Exercise11.