RTL Freeze - Report

UART-CAN-Bridge

Group Members :

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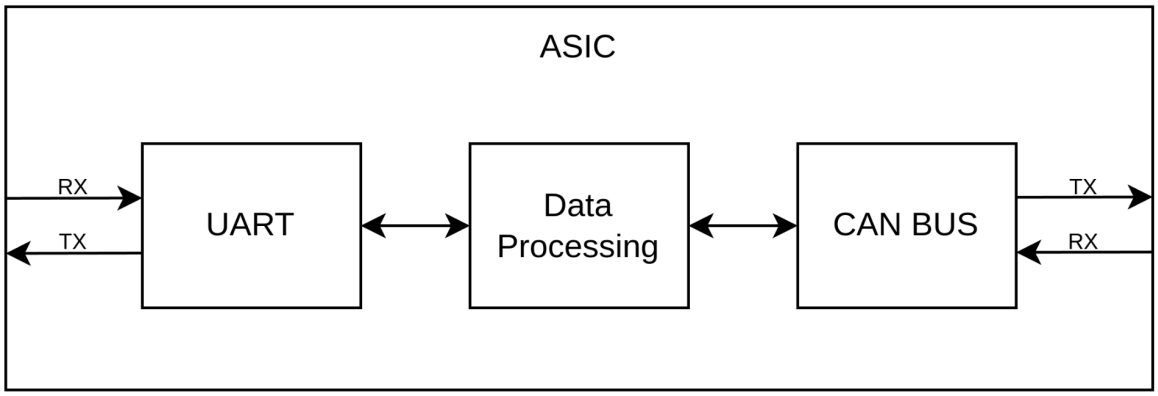
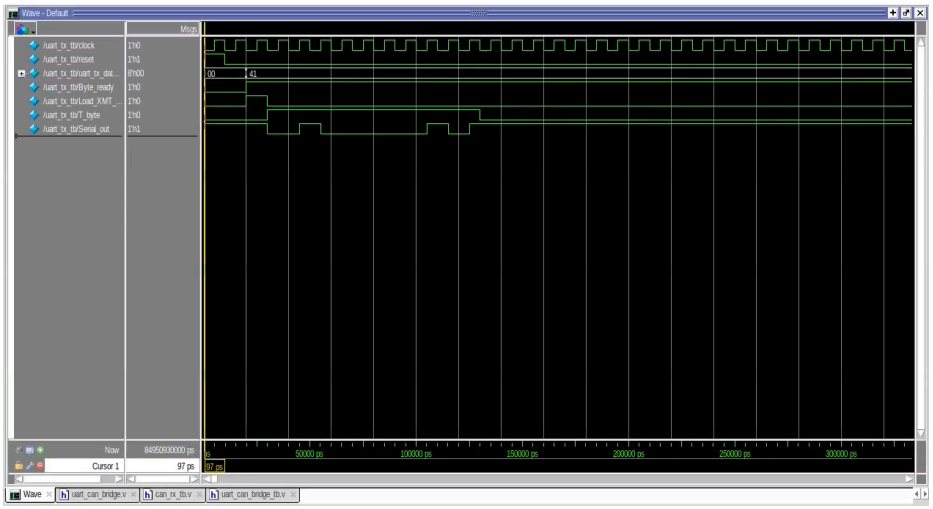


1.Introduction

The Idea of the ASIC is to receive 8 bytes of UART Data, process it into a CAN frame and transmit it via the CAN protocol. Similarly, receive a single CAN frame , process it and transmit 8 bytes of UART data. For this ASIC, five modules and a separate testbench for each has been developed.

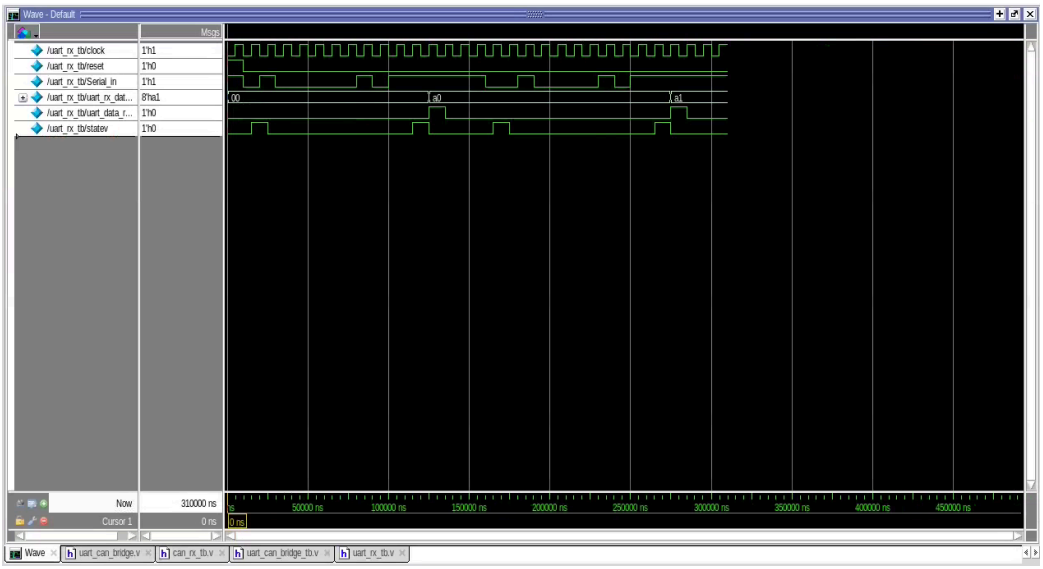
2.UART_TX

This module is used from homework “Verilog Design Practice”. This module is used to transmit the data stored in the uart_tx_data_bus, using the UART protocol. This module is tested using uart_tx_tb.v testbench. The output result of this testbench is given below.



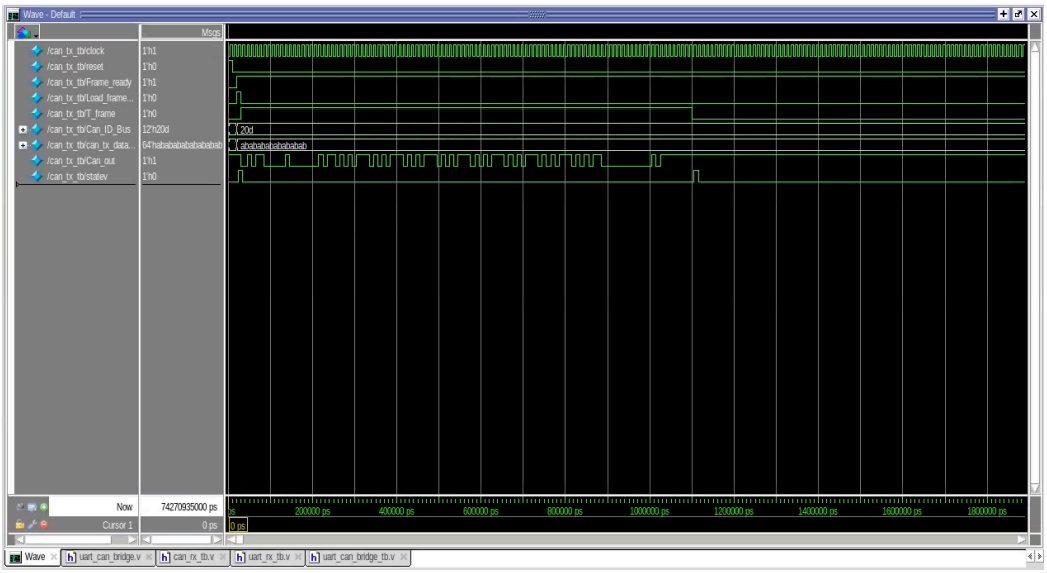
3.UART_RX

This module is used to receive the UART data and store it in the uart_rx_data_bus. This module is tested using uart_rx_tb.v testbench. The output result of this testbench is given below.



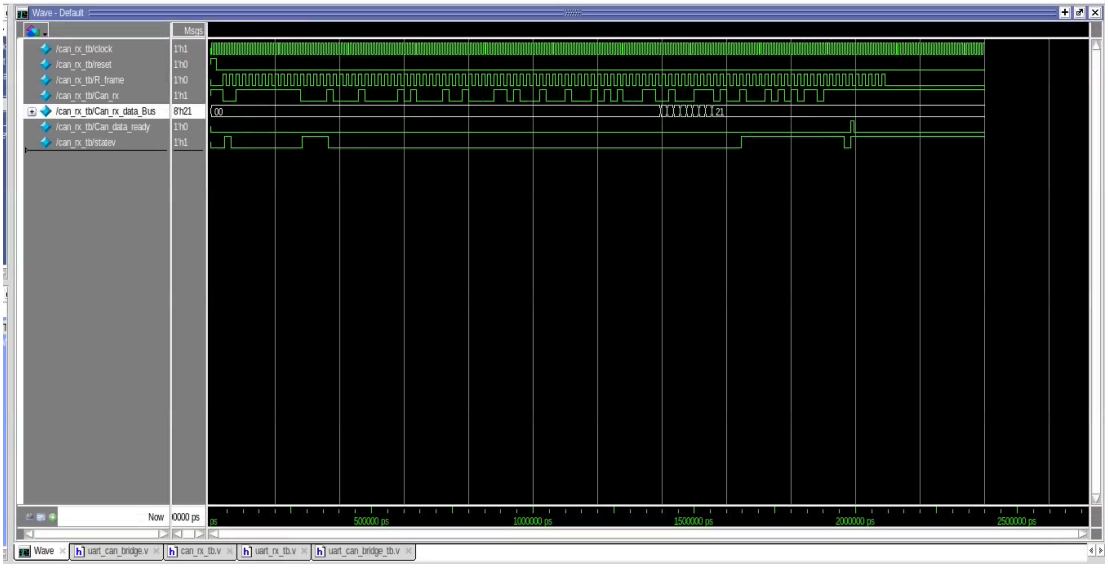
4.CAN_TX

The CAN TX module is implemented in the same way as UART TX to transmit frames of standard can protocol. The CAN frame consists of a header , 8 bytes of data and a trailer. The idea is to construct a header and trailer and append the 8 byte data from UART into the data portion of the CAN frame. This module is tested to send 8 bytes of data using can_tx_tb.v testbench and the output is attached below.



5.CAN_RX

The CAN_RX module is implemented to receive one frame of CAN data and store it in the can_rx_data_bus. This module is also implemented to slice the parts of the can frame. The output of the can_rx_tb.v is attached below.

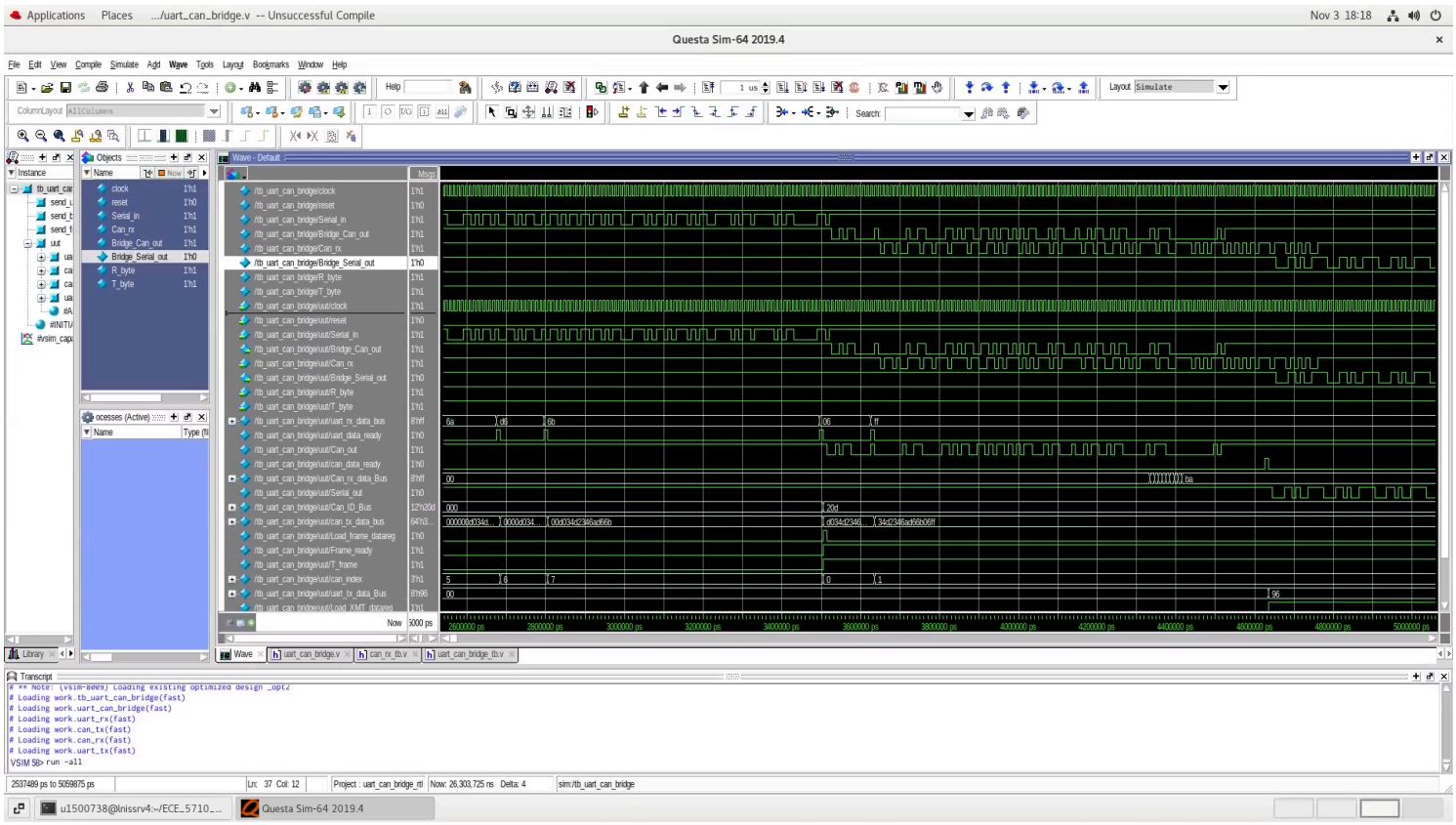


6.UART_CAN_BRIDGE

The UART_CAN_BRIDGE is a top level module which integrates all the modules and routes the data from can_rx to uart_tx and uart_rx to can_tx.

uart_rx to can_tx

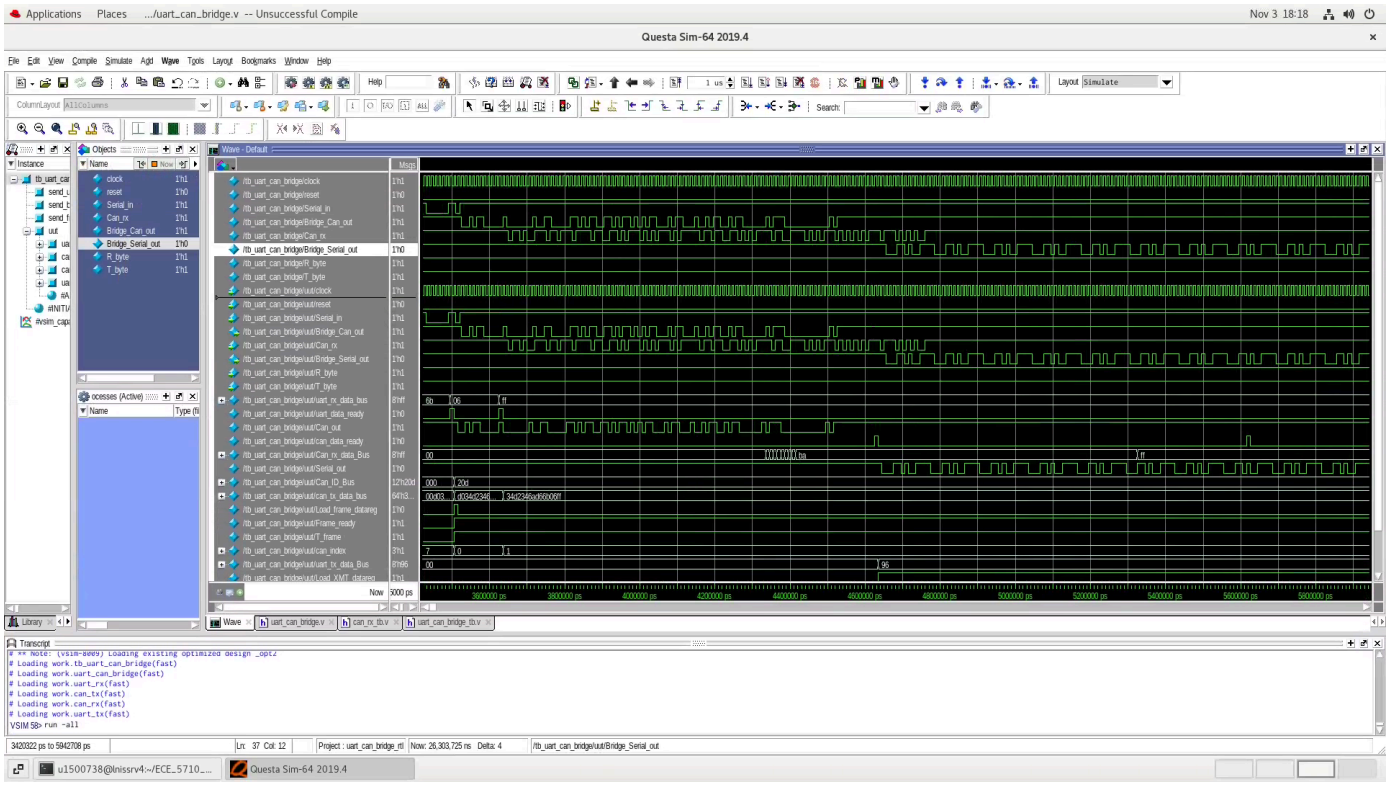
In this part 8 bytes of UART data is collected and appended into the data portion of the can frame. The header and trailer part was kept constant to have the same ID in the header every time. Then, this data is transmitted using the can_tx module.



In the above image, we can see after the successful reception of 8 bytes of UART data, A single CAN frame is transmitted.

can_rx to uart_tx

In this part, whenever a single CAN frame is received, the data portion of the frame is sliced and fed into the uart_tx module.



In the above testbench we can see that after the successful reception of a can frame 8 bytes of UART data is transmitted.