Router 1x3 Contains with 4 Blocks: FSM, Synchronizer, Register, FIFO

Router 1x3 Overview

This router has 1 input and 3 outputs.

Its job is: receive data, check the destination, and send it to the right output (out of the 3).

It has 4 main blocks:

1. FSM (Finite State Machine)

This is the brain of the router.

Function:

- Controls the flow of data inside the router using states like:

  Idle, Read Header, Write, Error/Reset.

- FSM decides what to do next and moves the router from one step to the next.

2. Synchronizer

Handles timing issues between different clock domains.

Function:

- Ensures smooth and correct data movement when blocks work at different speeds.

- Avoids metastability and data errors.

3. Register

Acts as a temporary holding place for incoming data.

Function:

- Holds the data from the input port until FSM decides the destination.

- Prevents data loss.

4. FIFO Blocks (FIFO_0, FIFO_1, FIFO_2)

Each FIFO is a queue connected to an output port.

- FIFO_0 -> Output Port 0

- FIFO_1 -> Output Port 1

- FIFO_2 -> Output Port 2

Function:

- Stores data for its corresponding output.

- Ensures First-In First-Out data transmission.

- Handles burst traffic and avoids data clash.

How Data Flows in This Router:

1. Input data comes to Register.

2. FSM reads header to know destination (0,1,2).

3. FSM tells Register to send data to correct FIFO.

4. FIFO stores data until output port is ready.

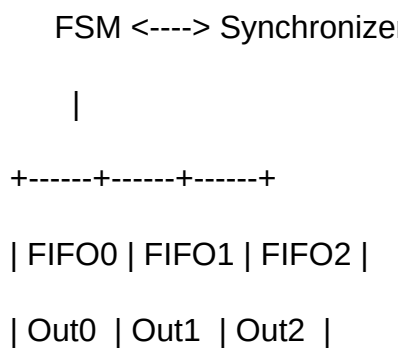
Visual Flow:

Input

|

Register

|


FSM <----> Synchronizer
|
+------+------+------+
| FIFO0 | FIFO1 | FIFO2 |
| Out0 | Out1 | Out2 |