FlexRay Communication Controller

The FlexRay Communication Controller behavioral model developed using SystemC. The Implementation is as per the current FlexRay Communication System Protocol Version 2.1. Along with the SystemC behavioral model, a high-level test bench and test case description document available. The test environment is developed using System C, which is self-checking test environment through the user provided stimulus file. The below depicted Figure 1 gives an overview of the FlexRay modules and test bench module implemented using system C

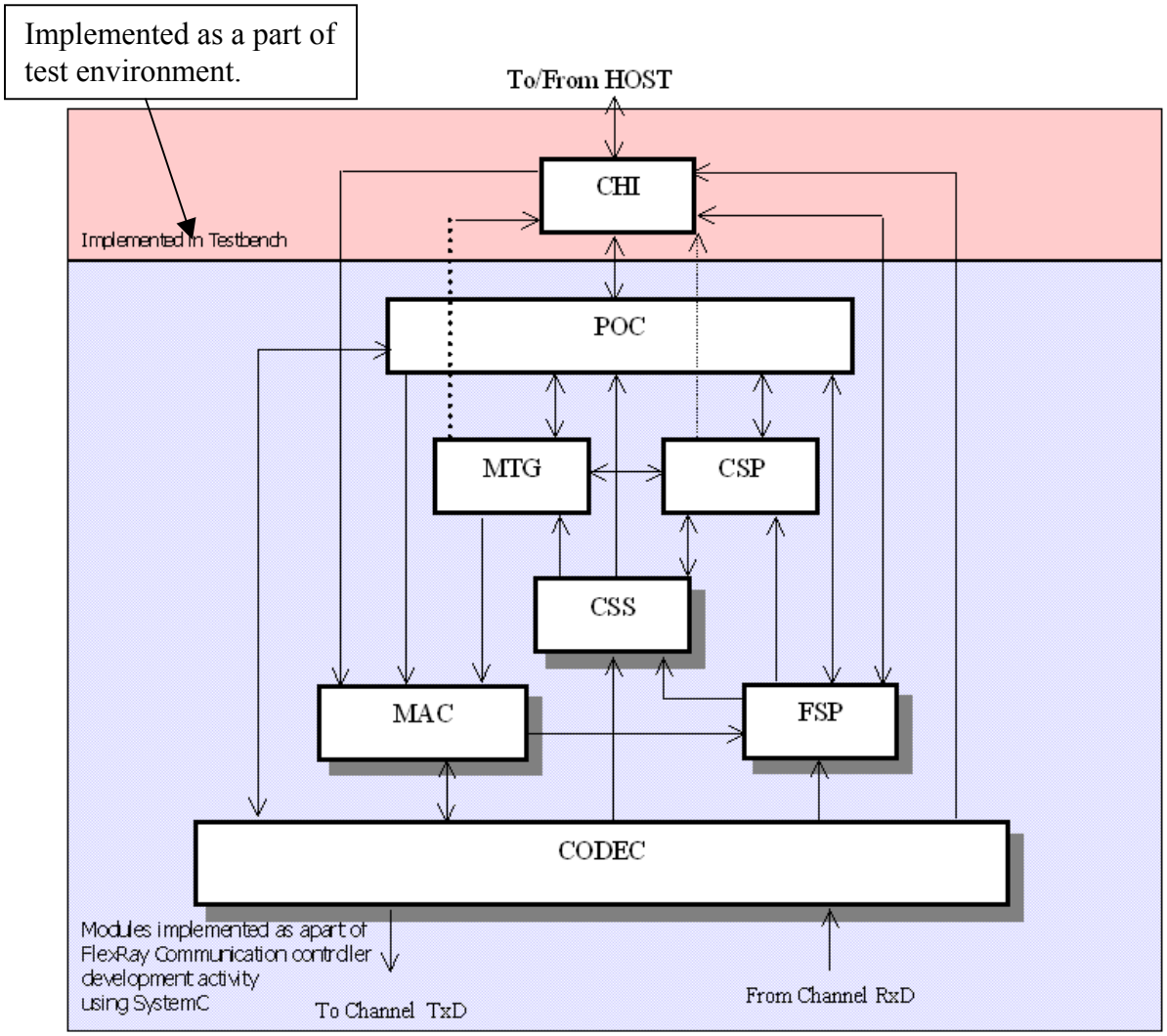

Figure 1: FlexRay Communication Controller

Features implemented and tested:

- Compliant to FlexRay Communication System Protocol Specification Ver 2.1.
- Developed the node with both Channel A and B.
- Data rate of 5 Mbps is achieved.
- Support of Wakeup functionality.
- Implemented Communication Cycle with Static, Dynamic, Symbol and NIT segments.
- Implemented Clock synchronization of Global and Local Clock at the node.
- Supports Static deterministic data transmission (static segment).
- Supports Dynamic event triggered data transmission (Dynamic segment).
- Support of re-integration and system start-up/shut down with acceptable timing and fault-tolerance characteristics.
- Implemented fault tolerant algorithm mechanism to calculate the rate correction and offset correction.
- Fast error detection and signaling.
- Collision-free bus access.
- Guaranteed message latency.
- Integration test bench for 3 nodes FlexRay cluster example is available.

Features not implemented:

- Bus Guardian (optional) and Bus Driver (optional) are not implemented.
- CHI is not developed (interface of CHI is user dependent).

Test Environment:

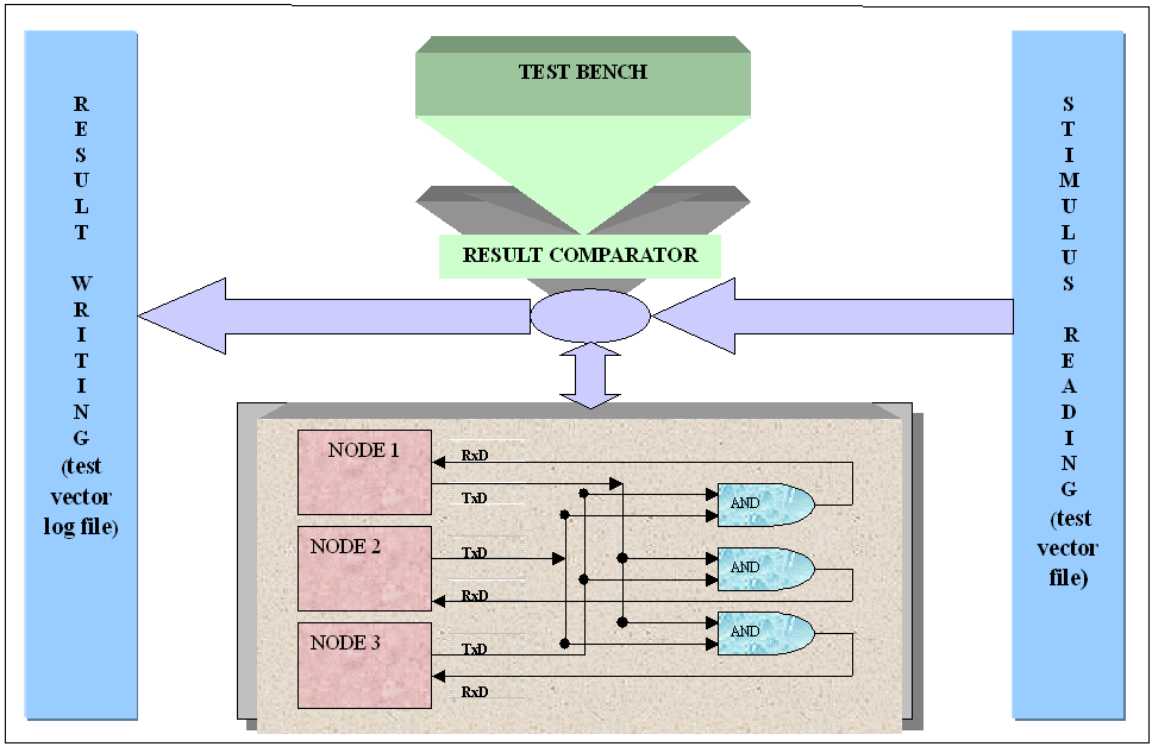

Figure 2: Test Environment of FlexRay Communication Controller

The test environment of the FlexRay Communication Controller is as shown in figure 2. The dual channel connection is implemented using the 3 AND gates. Cluster Verification was done, which has 3 Nodes connected as shown in Figure2. The goal of the cluster Verification is to ensure the correct behavior of the Flex Ray communication protocol on the cluster level. The focus is set on distributed protocol mechanisms, such as clock synchronization, startup and consistent data transmission.

IP Deliverables

- System C behavioral code for FlexRay Communication Controller.
- Design document.
- Test bench for verification of individual module, single node and cluster (2 and 3 nodes)
- Module level verification plan, Test case description document for the modules, Test case description document for cluster verification (single, two, and three nodes)
- Feature Coverage Matrices Documents for Individual modules and Cluster.

Tools used

- Verified the module using Vista and ConvergenceSC
- The functionality of the code was tested using VC++ debugger and the systemC libraries
- The waveforms were observed using the GTK Wave Viewer