L1 Controller Software Implementation for the Indigenous 5G Testbed

A THESIS

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THESIS CERTIFICATE

This is to certify that the thesis entitled **"L1 Controller Software Implementation for the Indigenous 5G Testbed"** submitted by **B. Kanish** to the Indian Institute of Technology, Madras for the award of the degree of **B.Tech, M.Tech (Dual Degree)** is a bona fide record of research work carried out by him under my supervision. The contents of this thesis, in full or in parts, have not been submitted to any other Institute or University for the award of any degree or diploma.

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The work presented in this thesis is in close collaboration with members of the system simulation team and the hardware team of the 5G Testbed Project. The L1 controller software code was developed mainly by Annirudh V and Milind. The hw_testing module containing the end to end 5G simulation platform was mainly developed by Prof. Radhakrishna Ganti, Annirudh V, Milind and Aashrith V. The hardware for the L1 controller is developed by Pavan Kumar and Bhavya Deepika. The FAPI GUI config message generator for L1 controller was developed by Vishnu P. My work in collaboration with Rohit comprised of writing the L1 Controller code on the hw_testing MATLAB platform for the purpose of testing and verification of the functionality of the L1 Controller Software Code. My work also involved generating user configurations using the FAPI GUI Config generator for the purpose of timing analysis and optimization of the L1 Controller hardware.

ABSTRACT

5G technology promises to bring in a wave of technological advances in the near future. This thesis is a documentation of the L1 Controller Software developed at the Indigenous 5G Testbed. The L1 controller is an integral part in the physical layer of the NR gNB. The L1 Controller acts as an interface between the L2/L3 Layers and the PHY Layer modules in the TX and RX hardware chain. This thesis presents a framework of the functionalities of the L1 Controller. This thesis also presents the software and hardware implementations, the input generation, output testing procedure and optimization of the functionalities of the L1 Controller.

Regarding thesis details

This work performed at the Indigenous 5G Testbed at IIT Madras is confidential. The original document with complete details is with Prof. Radhakrishna Ganti and can be made available on request.