

Internship Report

Submitted to: Arti Kashyap

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Project: 5gRAN_CICD_Testing

Company: Radisys India Pvt Ltd

Manager: Nagendra Verma (Chief Architect)

Mentor: Bharti Vaidya (Technical Specialist)

Duration: 6 Months (*10th Jan to 10th July*)

Working Position: Intern

1. Company Information:

Radisys Corporation is an American technology company located in Oregon, United States that makes technology used by telecommunications companies in mobile networks. Founded in 1987 by former employees of Intel, the company went public in 1995. The company's products are used in mobile network applications such as small cell radio access networks, wireless core network elements and policy management equipment; conferencing, and media services including voice, video and data. It has two branches located in India at Bengaluru and Gurugram.

2. Technology & Tools Used:

1. **5G:** Fifth-generation wireless (5G) is the latest iteration of cellular technology, engineered to greatly increase the speed and responsiveness of wireless networks. A 5G Base Station uses New

Radio (NR) technology and is referred to as a gNodeB. The gNodeB is connected to Core Network by NGAP Interface and connected to UE (Mobile/Device) by Air Interface. Two gNodeB are connected by Xn Interface.



2. **ROBOT Framework:** Robot Framework is a generic test automation framework for acceptance testing and acceptance test-driven development. It is a keyword-driven testing framework that uses tabular test data syntax. Test cases for different Interfaces and features were written using this and were then automated using RAFT.
3. **RAFT:** RAFT is a tool developed in Radisys which is being used to Automate the testing part. We need to keep Test case's Robot file in a particular folder and its validation file in other and then need to run a particular command on that server which will trigger the test case and we can see output on the screen and get respective log path which contains console logs & pcap files.
4. **Wireshark:** Wireshark is a free and open-source packet analyzer. It is used for network troubleshooting, analysis, software and communications protocol development, and education. While running a test case, packets were captured and finally stored in a pcap file and that was converted to json file using RAFT which contained parameters which we need to test. RAFT uses this file to declare if a test case passes or fails.

3. Internship Description:

I worked as an Intern at Gurugram office of Radisys. While working as an intern, I was involved in the CI_CD testing of gNodeB Software on X86 PAL Setup. In the initial two weeks, I was introduced to 5G architecture, signal flow, CICD_Testing setup requirements and RAFT Automation which was being used for Automating the testing part. For some next weeks I have done some Hands-on on test Setup by running some test cases on my local machine and analyzing the results. We had a tool called **Jenkins** which used to run all the current test cases in overnight (10 pm to till completion) and publish the report showing total passed and failed test cases. Every morning I used to analyze the failed test cases, find the issue and report it. After two months I started importing test cases from other Suites to our one by first executing them in my local machine and once that is passed, I add it in the existing list. With more practice I also learned how to create new test cases for some particular features and also how to add their validation. Around 30-35 new test cases were added to the Suite in my span of 6 months.

4. Feature & Interfaces Covered:

I added test cases for various features and Interfaces, some of them are mentioned below,

1. Single & Multiple UE attach/detach with Core Network & gNodeB.
2. Re-establishment of UE if it got disconnected from gNodeB.
3. Resuming UE connection when it moved to idle state.
4. Changing Dynamic configuration of UE.
5. Adding Multi-PDU to single/Multiple UE.
6. Testing failure scenarios (NGAP, F1AP, MAX_UE, Re-establishment failures).
7. End to End call testing.

5. Overall Experience:

It was my first-time work in any organization and it was a very nice experience for me. My mentor was very supporting and always helped me to clear doubts. I was able to learn basics of 5G very early and starting working on actual testing within two weeks. I worked in a team of four and everyone was helpful and supporting. I was able to learn some new concepts of telecommunication and use them in my daily work. This Internship me taught team-work, time management and also enhanced my communication skills. It was a great learning experience for me and I am sure it will help me in future also.