

Project Proposal

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29th March 2021

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Title

5G QoS Analysis Application

1 Background

The recent developments in 5G technology brings not only a sophisticated radio interface, but also a performant network system architecture. These technical achievements may bring new opportunities and new applications, for example, autonomous vehicles. To determine the influence of radio network conditions on the applications performance, it will be used a system that generates synthetic traffic at different levels and different protocols to collect information, allowing the system to analyze the service quality.

The system architecture is composed by three components:

On Board Unit (OBU) which is a hardware and software probe to be installed on vehicles in order to generate Cooperative, Connected and Automated Mobility (CCAM) traffic and collect performance measurements at different Points of Control and Observation (PCO).

Fixed Side Units (FSU) which is a software agent to be installed on both Portugal and Spain Multi-access/Mobile Edge Computing (MECs), as well as at the Portugal and Spain Intelligent Transport System (ITS) centers. The FSU is used to generate traffic and collect performance measurements on the network side, on both downlink and uplink traffic.

Management System which is a centralized software platform used to manage test plan configuration. It will also be responsible for collecting and processing all performance assessment results obtained during test trials.

1.1 Keywords

OBU; FSU; 5G; Mobile Phone; Mobile Application; Protocols

2 Justification

The development of this project is motivated by the opportunity of developing a mobile application to simulate a simplified OBU in an ordinary mobile phone to complement the Management System by offering more mobility and versatility.

2.1 Objectives

- Implement a mobile app to complement an existing network performance evaluation system, transforming a mobile phone into a simplified form of OBU;
- The application should be able to display and report 4G/5G radio parameters and GPS location;
- The application should be able to receive external test plans, execute them autonomously and report the results for the existing management system.

3 Architecture Overview

3.1 Approach

We intend to make a mobile app capable of making connections to a management system, to receive requests for test sequences, which will then execute and store them in the device database or send them directly to the management system (real time).

There will be three types of tests:

- Real Time
- Delayed
- Programmed

The real time test will collect the necessary information and send it directly to the management system. The delayed tests will collect the necessary information, keep it and once it is finished it will be sent to the management system. The programmed will be like the delayed test except that this will be done without user interference.

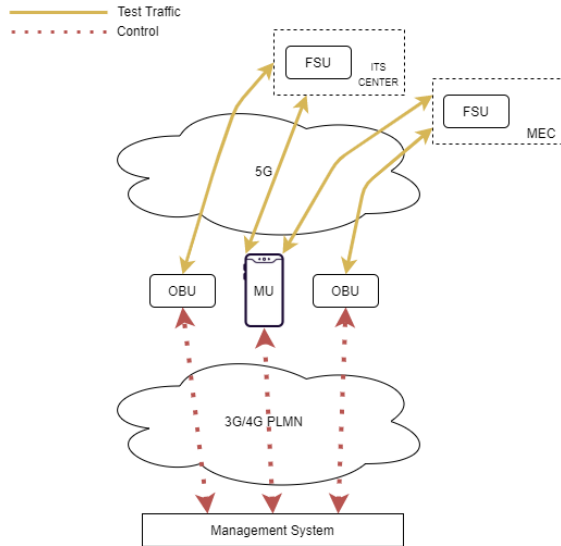


Figure 1 – System Architecture

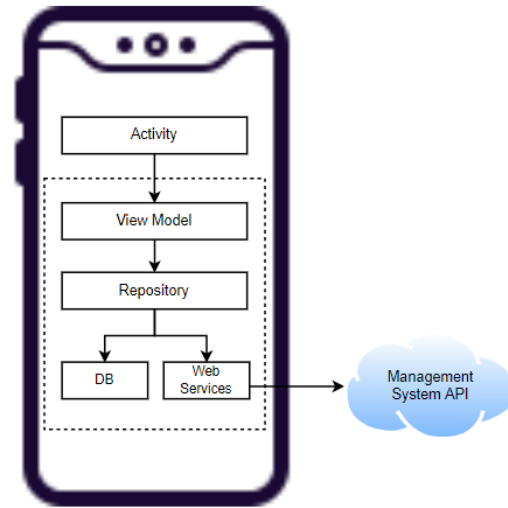


Figure 2- Mobile App Architecture

3.2 Deliverables

With the development of this project, we are committed to deliver a working mobile app, a final report and some statistical tests (included in the final report).

3.3 Constraints and assumptions

- Since both elements of the group work mostly in web applications we foresee slight hardship in the beginning while we don't get the required ambience with the technologies, despite we both have worked on this technology before;
- Since this application requires an empiric knowledge and both of the elements don't have that much experience on this area it will be harder to meet requirements;
- It will be hard to make an accurate deduction of the required efforts for each milestone;
- Since the all pandemic situation has been upon us for a while now and this system is based in telecommunication network tests it might sometimes prove difficult to make tests to our newly developed features since we can't go around making tests.

3.4 Resources

The project is expected to make use of the ISEL given API and take advantage of cellphones hardware and portability.

4 Project Organization

The project will be conducted by Afonso Nobre and Ricardo Silva. The project coordinators will be José Simão and Nuno Cota, of ISEL.

4.1 Major Milestones

- Project Proposal → April 12th
- Definition of functional requirements → April 16th
- Definition of technical requirements → April 16th
- Collection of radio and location parameters → April 26th
- Interface development → May 15th
- Individual presentation → May 24th
- Delayed Tests Implementation → May 26th
- Real Time Tests Implementation → June 7th
- Report (initial version) → June 14th
- Programmed Tests implementation → June 21st
- Final version → June 31st

4.2 Project Plan

Name	Begin Date	End Date	March				April				May				June				July			
			W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
Project Proposal	25/03/2021	12/04/2021																				
Definition of functional requirements	12/04/2021	16/04/2021																				
Definition of technical requirements	12/04/2021	16/04/2021																				
Collection of radio and location parameters	12/01/2021	26/04/2021																				
Interface development	19/04/2021	15/05/2021																				
Individual presentation	24/05/2021	24/05/2021																				
Delayed Tests Implementation	26/04/2021	26/05/2021																				
Real Time Tests Implementation	15/05/2021	07/06/2021																				
Report (initial version)	16/04/2021	14/06/2021																				
Programmed Tests implementation	26/05/2021	21/06/2021																				
Final version	16/04/2021	31/07/2021																				

Figure 3- Project Plan

References

[1] “A Performance Measurement Platform for C-ITS over 5G”, António Serrador , Carlos Mendes , Nuno Datia, Nuno Cota, Nuno Cruz, Ana R. Beire. Not Available