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**Acknowledgements**

**Abstract**

This report describes the design and the development of our graduation project internship, which is carried out at Sofrecom Tunisia, the project consists in creating a remote and communicating devices platform to achieve broadband supervision and monitoring and assess the quality of service “QoS” of fixed network access.

With our solution, the user could manage connected probes and create broadband tests configuration before running them in the probes, also he could manage statistics configuration with attractive charts for testing results. Users could create customized alerts configuration to simplify broadband supervision. The project also helps network supervisors to get accurate statistics according to a time period and zone area.

**Keywords:**

Probe – Spring boot – Angular – Raspberry Pi – Java – Kafka – Broadband

**General introduction**

With the global spread of the internet nowadays, many mobile and internet services operators appear. In the coming days, connected devices will spread massively worldwide, especially with the appearance of new technologies such as the internet of things, big data, personal area networks (PAN), artificial intelligence (AI). So mobile and internet services operators desire to achieve a better quality of service for their customers. To do so, operators design and develop solutions for broadband monitoring and supervision mainly to massively assess and monitor the quality of service of networks access perceived by customers. Sofrecom Tunisia, subsidiary of Orange Group, attempts to serve this purpose by designing and developing a platform for broadband supervision and monitoring and specific to massively assess the quality of service (QoS) of fixed network access. In this context comes our mission during the graduation project internship.

This report contains four chapters as follows:

The first chapter titled “Project context” will be devoted to the company presentation and setting the project in its general context.

The second chapter “Requirements analysis and specification” will be about the global system analysis to design and develop.

The third chapter “Design of the physical and logical architectures” will be dedicated to present physical and the logical architectures of our solution, also, we will explain the theory behind the broadband monitoring and supervision.

At last but not least, the final chapter “Project achievements” will be about the application achievements. First, we will present the developing environments and technologies and tools, secondly, we will illustrate our application with several interfaces.

Finally, we will close the report with a general conclusion, future work and perspectives will be mentioned at last to illustrate some ideas to improve our solution.

**Chapter 1: Project context**

* 1. **Introduction:**

In the first place, this chapter will be about the host company Sofrecom Tunisia presentation, a consulting and engineering firm specializing in telecommunications. Then, we will talk about the work and the project environments, by putting the light on the project goals and the analysis of the state of the art. Finally, we will present our software development methodology and the modeling language that we are going to use.

* 1. **Host company presentation:**

Sofrecom, a subsidiary of Orange Group, has built up 50 years’ worth of unique know-how in the telecoms operator line of business, making it a world leader in telecom consultancy and engineering. Sofrecom Tunisia is the youngest subsidiary of Sofrecom. Launched in November 2011, Sofrecom Tunisia expands Sofrecom’s presence in North Africa and the Middle East region to meet the growing demand for dedicated solutions and to offer its customers adapted and competitive offers.

* 1. **Project presentation:**
     1. **Problem statement:**

Operators of mobile and internet services have probes, Key Performance Indicators (KPIs), installed in several network elements, but they desire to appreciate the quality perceived by their customers (Quality of Experience, QoE) in order to improve their network performance and reliability.

In order to get accurate informations about the quality of experience we should get the measurements according to zone area and specific periods of time. Also, it is difficult to manage the configuration and QoS/QoE tests running in the widespread probes, which indicates a lack of flexibility. The internet usage is improving fast; therefore we should improve the quality of service measuring as well.

* + 1. **Project objectives:**

This work will be considered as a graduation project to obtain applied computer science diploma from the national engineering school of Sousse (ENISO).

The main project goal is to design and develop a platform for remote and communicating devices, to serve broadband monitoring and supervision. The application should satisfy these needs:

* The creation and interpretation of messages exchanged with terminals and embedded equipment.
* Information exchanges with client applications (northbound interface).
* Management of messages from terminals (southbound interface).
* Sending requests and messages to the terminals.
* On-the-fly supervision of exchanges.
* Management of supervised elements.
* Resolution of message referral rules.
  1. **Critical analysis of the state of the art:**

This step is essential to propose our solution in the relation to those offered by other companies. To do so, we have studied the characteristics and the features of some available apps while we focus on their weak points.

* + 1. **State of the art:**
       1. **Samknows One:**

The SamKnows One is a cloud-based analytics platform that includes a full range of measurement agents for fixed and cellular internet connection with a global test infrastructure. The SamKnows solution stores and visualizes performance data in real-time. This solution is implemented by a UK company “Sam” founded in 2008 by Sam Crawford. SamKnows One has developed a suite of tests as follows:

* Speed tests: including download and upload over TCP and UDP speed tests.
* Latency, loss and jitter: latency, jitter and packet loss over UDP, latency over HTML5.
* DNS resolution:
* Web browsing:
* CDN performance:
* Video streaming:
* Gaming:
* Online storage:
* Voice over IP:
* Traceroute:
* Data usage: