**Project Specification Document**

Ericsson - iPerf3

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**1. Project Vision and Objectives**

**1.1 Project Scope and Vision**

Ericsson is one of the biggest providers of radio infrastructure on all technologies; GSM (Global System for Mobile Communications), WCDMA(Wideband Code Division Multiple Access ) and LTE (Long Time Evolution). When you are making a call, watching a YouTube clip or accessing the internet from your mobile phone, chances are you are being served by at least some component of Ericsson’s product portfolio. Today, Ericsson provides Radio Access Networks of all kinds to billions of people. iPerf is a tool that sends traffic to another iPerf entity and evaluates network characteristics such as throughput and latency. It is available as open source as well as executable binaries on several platforms.

The purpose of this project is to develop an Android app that performs network evaluation with the open source tool iPerf3, and put iPerf3 in a framework that stores results from iPerf measurements together with information fetched from Android environment.

**1.2 Project Goals and Objectives**

|  |  |
| --- | --- |
| **#** | **Goal or Objective** |
| 1 | Develop the application for Android platform. |
| 2 | Make the application available in small increments based on user stories provided by the sponsor. |
| 3 | Make the system easy to support – provide good documentation, configuration/build files, administrator’s manual |
| 4 | Make the system very easy to use – little to no training required |
| 5 | Build and deliver a functional prototype by mid-semester |
| 6 | Have fun working on the project |

**2. Project Planning**

**2.1 Project Lifecycle**

The team will use an agile approach with a focus on getting a working prototype of Android Application which based on the network measurement tools - iPerf3 with a simple UI. The prototype should be finished and demonstrate to our sponsors and classmate by midterm. After the first demonstration, our team will focus on functions that have less priority such as Ping and FTP connection functions.

**2.2 Project Setup**

|  |  |
| --- | --- |
| **#** | **Decision Description** |
| 1 | Android Studio will be the IDE |
| 2 | Access to the Swedish server through coneye.myqnapcloud.com. |
| 3 | Access to the iPerf3 server through port 5201 which is the standard port for iPerf3. |
| 4 | Code will be stored and maintained at <https://github.com/dommarks/Iperf3ericsson> |
|  |  |

**2.3 Stakeholders**

|  |  |
| --- | --- |
| **Stakeholder** | **Role** |
| Ericsson | Company that will use the final product for bandwidth testing |
| Oskar Myrberg | Mentor |
| Anders Olsson | Mentor |
| Dean Knudson | Instructor |
| Dominic Marks | Team member |
| Qianwen Yan | Team member |
| Scott Weninger | Team member |
| Weikang Yang | Team member |

**2.4 Project Resources**

|  |  |
| --- | --- |
| **Resource** | **Resource Description** |
| iPerf Server | Server used to capture data to measure bandwidth |
| Capstone Team | Our team of students who will be the primary developers of the project. |
| Oskar Myrberg/Anders Olsson | Our mentors |
| Android Studio | The IDE (integrated development environment) we will use to develop the app |
| MS Project | Used for the project planning document |
| Eclipse IDE | THe new IDE that is used to develop the project. |
| Google Doc/MS Word | Used to create sprint and weekly reports |
| Coding Standard | Default Capstone Coding standard |

**2.5 Assumptions**

|  |  |
| --- | --- |
| **#** | **Assumption** |
| A1 | Team will have sufficient time to complete tasks each week |
| A2 | The team will have heavy support from our mentors to guide us as the project progresses |
| A3 | Java will be the programming language used |
|  |  |

**3. Project Tracking**

**3.1 Tracking**

|  |  |  |
| --- | --- | --- |
| **Information** | **Description** | **Link** |
| Bug Tracking | Bug tracking will be done with Trac. | https://csprojects.cs.ndsu.nodak.edu/csci445/2015/spring/csci445s15ericsson/trac |
| Weekly Report | The report produced weekly | https://github.com/dommarks/Iperf3ericsson |
| Source Control | Git repository | https://github.com/dommarks/Iperf3ericsson |

**3.2 Communication Plan**

**Regularly Scheduled Meetings**

|  |  |  |
| --- | --- | --- |
| **Meeting Type** | **Frequency/Schedule** | **Who Attends** |
| Meeting With Mentor | Weekly, Monday 8:00am | Project team and mentor |
| Team Meeting | Weekly | Project team |
| Short Meeting | Weekly in class | Project team |
| Sprint Planning Meeting | Start of each sprint | Project team and mentor |
| Sprint Retrospective Meeting | End of each sprint | Project team |

**Information To Be Shared Within Our Group**

|  |  |  |  |
| --- | --- | --- | --- |
| **Who?** | **What Information?** | **When?** | **How?** |
| Project team | Task assignments | Weekly | Team meetings, listing in MS Project file. |
| Project team | idea collaboration | Multiple times per week | meetings/ email/ phone |
| Project team | Any decision that is made regarding the project | Whenever they occur | meetings/email/phone |

**Information Needed From Other Groups**

|  |  |  |  |
| --- | --- | --- | --- |
| **Who?** | **What Information?** | **When?** | **How?** |
| Mentor | Requirement changes | Whenever change is made | Conference call or meeting with mentor. |
| Mentor | Feedback on progress | End of each week | Meeting/email |

**3.3 Deliverables**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Deliverable** | **Delivery Time** | |
| **Interim** | **Final** |
| 1 | Prototype Code/demo and Design | X | X |
| 2 | Build/Configuration Files | X | X |
| 3 | Regression Tests | ▢ | X |
| 4 | Project Documentation | ▢ | X |
| 5 | Requirements Document | X | X |

**3.4 Project Metrics**

|  |  |  |
| --- | --- | --- |
| **Metric** | **Frequency** | **Location** |
| Estimated User Story Points | Per User Story at the start of each sprint | MS Project Plan |
| Estimated User Story Points | Per Sprint at the start of each sprint | MS Project Plan |
| Actual User Story Points | Per Sprint at the end of each sprint | MS Project Plan |
| Estimated Effort | Per task | MS Project Plan |
| Actual Effort | At end of each task | MS Project Plan |
| Maintenance Effort | As occurring | MS Project Plan |
| Estimated Size | Per task requiring code | MS Project Plan |
| Actual Size | At completion of task requiring code | MS Project Plan |

**4.  Requirements**

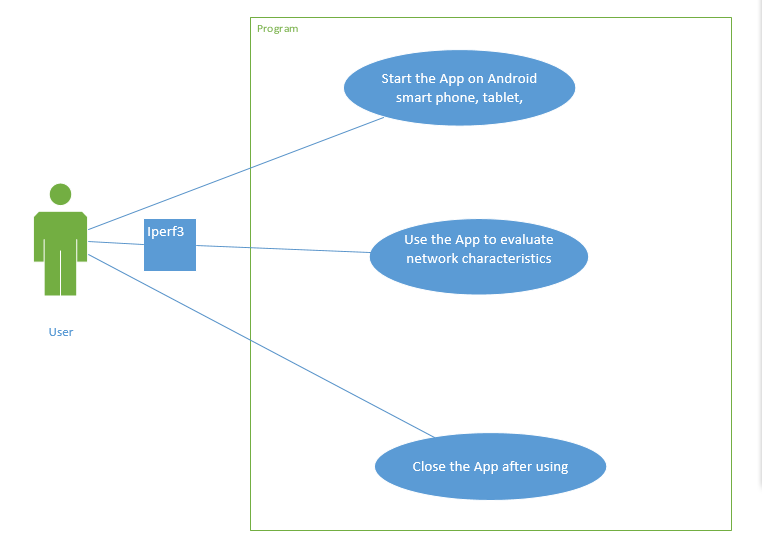
**4.1   Overall Description**

The purpose of this project is to develop an Android app that performs network evaluation with the open source tool iPerf3, and put iPerf3 in a framework that stores results from iPerf measurements together with information fetched from Android environment. Meanwhile, the team will provide a clear UI design which user can understand easily and access to it to test the network

characteristics.

**4.2   Users and Roles**

|  |  |
| --- | --- |
| **User** | **Description** |
| User | A regular user who is the primary operator of the system. |
| Admin | A user who also has the ability to make any changes of the system. |
|  |  |

**4.3   Use Case Diagrams**

**4.4   User Stories (Requirements)**

**User Story Points Benchmark --** All team members agree that creating a clear UI for use in this system would be worth 5 points. All team members have had previous experience designing UI for their other class.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **Added During** | **Description** | **Status** | **Story**  **Points** |
| 100 | Onset | As a user, I want the iPerf3 conversation to be able to gather bandwidth strength so I can see differences between networks. | **C** | **8** |
| 200 | Onset | As a user, I want the App to be able to run on an Android phone, because it is only available on iPhone currently. | **C** | **3** |
| 300 | Onset | As a user, I want a clear UI to use while running the App, so it's easy to understand the information displayed. | **C** | **5** |
| 400 | Onset | As a user I want to be able to view data in real time, because this will give me a better sense of how the network is performing. | **T** | **45** |
| 500 | Onset | As a user I want to be able to have my information reported to a database each time I use the app, because this will give the information a secondary purpose to be used for mapping out strengths of a network. | **C** | **45** |
| 600 | Onset | As a user, I want the App to display a graph of the information being gathered and calculated, because this makes it easy for me to understand the current situation. The graph should show time elapsed and signal/bandwidth strength.  **Acceptance Criteria:** 1. The user must have connection to a network  2. The user must begin the test  3. The data must be accurate and calculated to fit the graph | **C** | **13** |
| 700 | Sprint 2 | As a user, I want the app to be able to have regular Get and Put functionality for connecting towards a regular FTP Server. | **C** | **21** |

**4.5 User Story Acceptance Criteria**

|  |  |  |
| --- | --- | --- |
| **ID** | **Description** | **Verification** |
| 201 | We shall write code in Java in order to be compatible with Android environment. | The App should be able to run on an Android device successfully. |
| 202 | A user may not run multiple iPerf tests in the same time | The App will test to see if there are multiple iPerf commands running in the same time |
| 203 | Set up two computers running on iPerf3. | The local iPerf3 machines should be used to be able to do verification of the application and test the different parts of iPerf3. An iPerf3 server in Sweden will also be provided. |

|  |  |  |
| --- | --- | --- |
| 310 | A user can easily understand the UI design. | The UI should be designed as simple as possible. We will use a graph to show time elapsed and signal/bandwidth strength. And we will add two buttons, one for start test, another one for settings. |
| 510 | All the information should be stored in a database. | The information stored in database can be used for future retrieval. We will try to use DBUnit to ensure data is being added to our database. |
| 520 | Report completed runs to a server | Build functionality to send a number of reports to a server in csv format. |
| 610 | Build a GUI  **Acceptance Criteria:** 1. The user must have connection to a network  2. The user must begin the test  3. The data must be accurate and calculated to fit the graph | Build a graphical user interface that triggers iPerf3 with a number of characteristics as well as some pre and post actions. |
| 710 | FTP Get and Put | Build functionality for connecting towards a regular FTP Server. |

**4.6 Constraints and Limitations**

|  |  |
| --- | --- |
| **Constraint** | **ID** |
| The app will not be designed with capabilities for multiple languages. | n/a |
| The running system is not required to be compatible with Windows or Mac OSs. | 200 |
| The mentors can’t be contacted in person because of the company location. | n/a |

**5. Design**

**5.1 Introduction**

The process for connecting an iPerf server and testing it can be broken into the following main parts: the iPerf source, results, and database management system. The main parts of the system would have to be the iPerf3 source, the results, and the database management system. The app is meant to record important and relevant network values like: network speed, network type (4G/3G/WiFi), and certain phone qualities. Some phone qualities would be the carrier(Verizon, AT&T), phone type(Nexus, Samsung),and serial number.

**5.2 Scope**

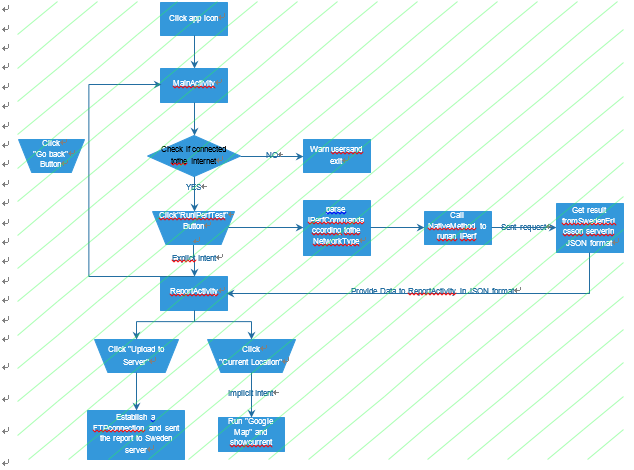
The project should allow users to create and run tests to and iPerf server and see the results. The app will need a functioning Android phone. The app will need database functionality, meaning it will be able to record the results from each test that is ran. The app will need to be connected to some network before a test is ran.

**5.3 High-Level Component Design**

|  |  |
| --- | --- |
| **Component** | **Description** |
| Start Button | This will be a button that allows the user to start a test. |
| GUI | This will allow the user to have a nice, clean display of available options or features. |
| Test Function | Run the necessary tests to check the codes. |
|  |  |

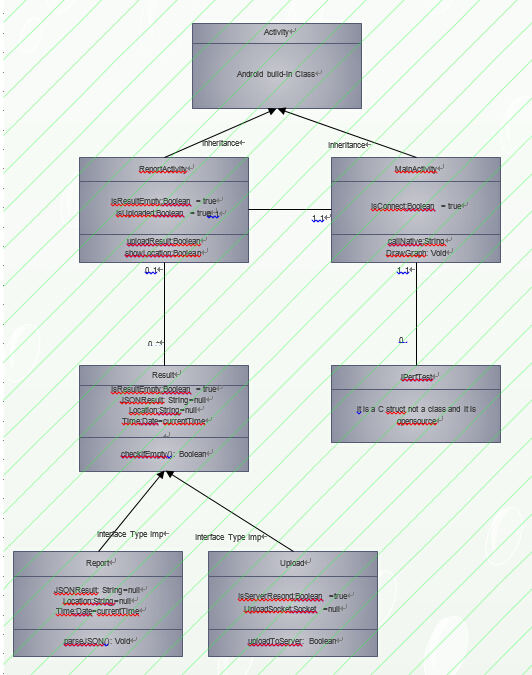
|  |  |
| --- | --- |
| **Component** | **Related Requirements** |
| Start Button | 200 |
| GUI | 300 |
| Test Function | 100 200 500 600 |
|  |  |
|  |  |

**5.4 Activity Diagrams**

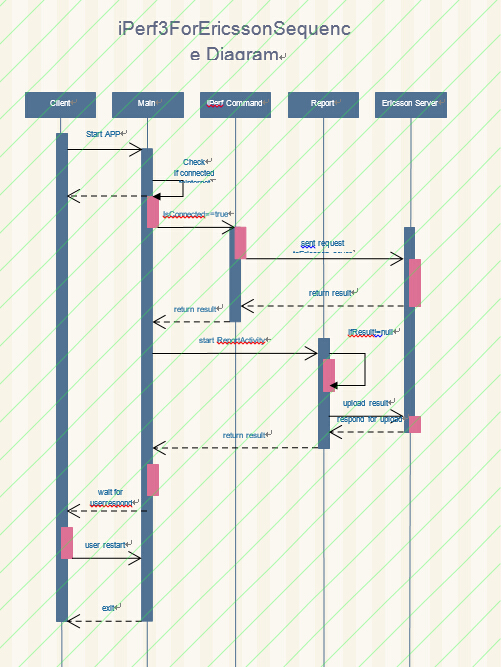


|  |  |
| --- | --- |
|  |  |
|  |  |

**5.5 Class Diagram**



**5.6 Sequence Diagram**



**5.6 Data Architecture**

Information that needs to be stored in a database for future retrieval includes: test results, time, and location. They will be stored by using JSON result string.

**5.7 Alternative Designs and Design Rationale**

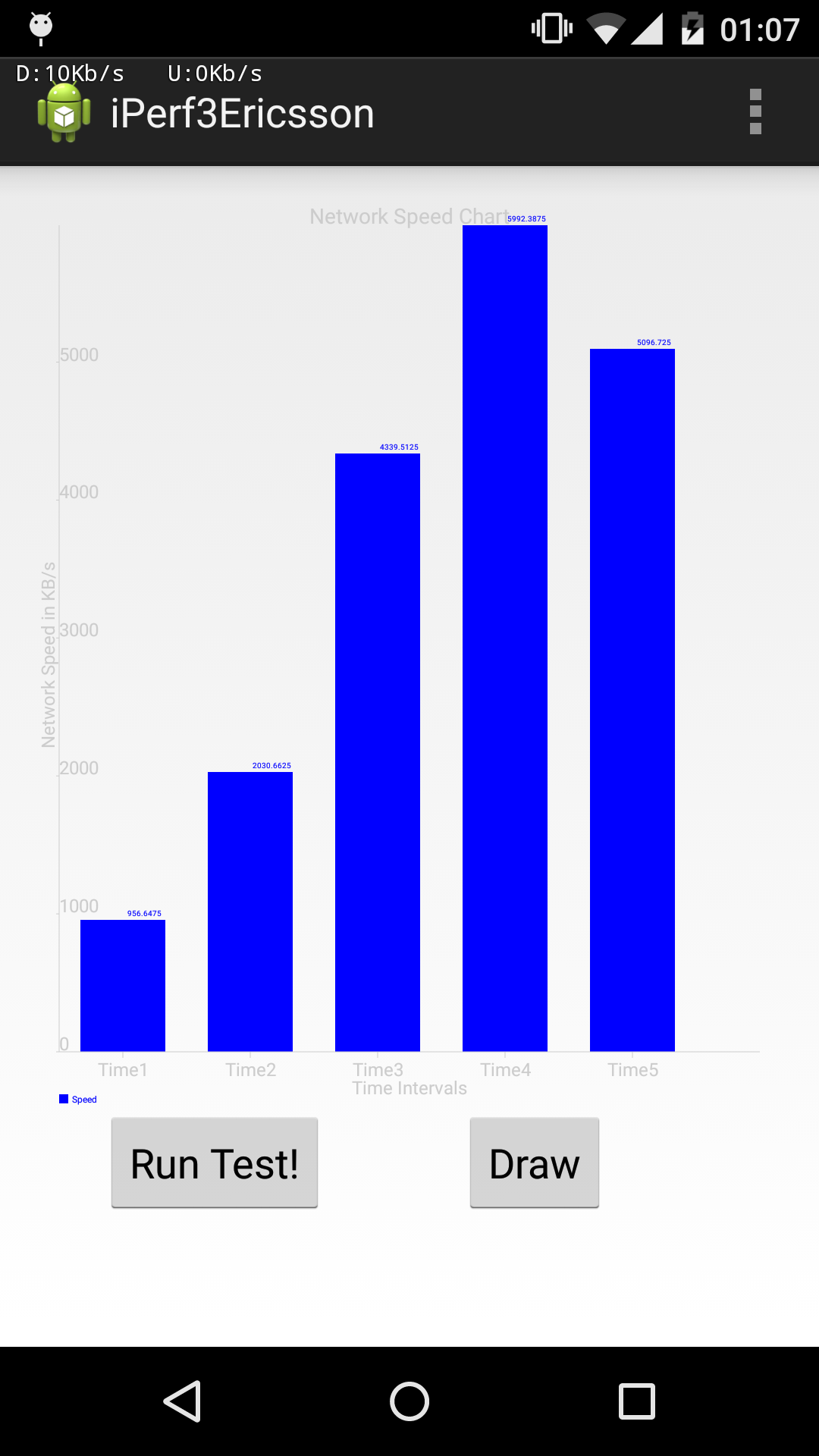
This design was chosen in order to best reflect what our user will need to successfully run a test on an iPerf server. Also, the iPerf3 source is large and many parts of the source needed to be cut down so that we only used what we needed.

**6. User Interface**

**6.1 UI Description**

There is a graph shows the change of internet speed as time goes by. And there are two buttons, one for start test, another one for setting. Customer can start the test by pressing start button, and change some settings by pressing setting button. Meanwhile, all of the data will be loaded into database.

**6.2 UI Mockup**



**7. Test Plan**

**7.1 Test Plan Description**

Testing is an important part in our project which can make sure all of our functions and methods go right.

**7.2 Testing Tools**

|  |  |
| --- | --- |
| Tool | Description / Function |
| Eclipse (Junit) | Test the functions and methods in the code |

**7.3 Test Data**

|  |  |  |
| --- | --- | --- |
| **Data** | **Description** | **Link** |
| Test Scripts | Scripts containing code and tests | https://github.com/dommarks/Iperf3ericsson |

**7.4 Test Types and Frequency**

|  |  |  |
| --- | --- | --- |
| **Type** | **Description** | **Frequency** |
| Integration Test | Integration test of existing code | Whenever we want to check for bugs |
| Regression Test | Run unit tests against all code | Whenever new component is added to the project |
|  |  |  |

**7.5 Test Coverage**

|  |  |
| --- | --- |
| Component | Rationale |
| Test Session | To check workability |
| Map Session | To check workability |
| Graph Session | To check workability |

**7.6 Test Location**

**Test code will be held in a folder within the git repository**

|  |
| --- |
| https://github.com/dommarks/Iperf3ericsson |

**8. Project Closure**

**8.1 Goals / Vision**

Looking back on our original vision statement, this project was a big success. The customer seems very satisfied with the end product and the product meets the needs originally stated in the vision statement.

**8.2 Delivered Solution**

We delivered to Ericssion an application that can test network speed and show the result by using different charts. Meanwhile, it can show the location where start the test. The final product that was delivered is very close to the original planned project, with a few minor changes in design.

**8.3 Remaining Work**

Although the product currently functions as specified in the requirements, there are multiple improvements that Ericssion could make to it. For example, the settings menu can have added functions and the UI also can be improved.

**9. Deliverables**

All of the deliverables can be found in this team’s Git repository or the SVN repository that were set up at the beginning of the semester for this team.

The Git repository is located here:

<https://github.com/dommarks/Iperf3ericsson/tree/master>

The SVN repository is located here:

<https://csprojects.cs.ndsu.nodak.edu/csci445/2015/spring/csci445s15ericsson/svn/>

**9.1 Study Results**

Not applicable

**9.2 Requirements and Design Documents**

The requirements are all specified in this same document. The design of this project is covered in section 5 of this document.

**9.3 Code**

Code can be found in the Git repository.

**9.4 Tests and Test Results**

The test results are visible in the Eclipse environment that was set up for the team. All tests are held in the test directory of the team’s Git repository (also the SVN repository).

**9.5 Build Process Documents**

Not applicable**.**

**9.6 Install Process Documents**

Not applicable.

**9.7 Administrator’s and/or User’s Manual**

The user manual can be found in the Git repository.

**9.8 Postmortem Document**

This is in the documents directory of the Git repository.

**10. Definitions and Acronyms**

|  |  |
| --- | --- |
| Term | Definition |
| mentor | Oskar Myrberg/Anders Olsson |
| instructor | Dean Knudson |
| git | Version control software |

**Glossary**

|  |  |
| --- | --- |
| Term | Definition |
| iPerf | A tool that sends traffic to another iPerf entity and evaluates network characteristics such as throughput and latency. |
| GSM | Global System for Mobile Communications |
| WCDMA | Wideband Code Division Multiple Access |
| LTE | Long Term Evolution |
| IDE | Integrated Development Environment |
| UI | User Interface |