Web Based Office Management System for PABX Division Sri Lanka Telecom PLC

A dissertation submitted for the Degree of Master of Information Technology

U.S.Pandula.

University of Colombo School of Computing

2018

Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

Student Name: U.S.Pandula

Registration Number: 2015/MIT/036

Index Number: 15550367

_____

Signature: Date:

This is to certify that this thesis is based on the work of

Mr./Ms. U.S.Pandula

Under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

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Supervisor Name:

_____

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Abstract

Sri Lanka Telecom PLC is leader in providing telecommunication services to the country. They are responsibility to provide world class telecommunication services to the people of Sri Lanka. Since this field is competitive, it is important to satisfy existing customers and gather more customers towards new services. When satisfying customers, it is important to provide high class customer service to them. To provide excellent services to the customer it is very important to upgrade their systems up to date and informative.

When considering PABX division, they are providing total PABX solutions to the whole country. In this section main issue is their existing manual procedures are involves more paper works and it was time consuming. Customers need to wait long time to get done work from PABX division.

This proposed software system is a web based system that provides a user friendly graphical user interface with informative dashboard. Users provide ability to transfer all day to day valuable information to the system and facilitate register new PABX requests, assign technical officers for site surveys and installations, create bill of quantities and proposals, sending completed proposals to relevant provincial sales managers, updating payment details, completing work orders and generating vital management reports. This system has integrated with email service for better communication.

The system was developed using PHP (PHP Hypertext Processor) open source server side scripting language. The MYSQL server has chosen as a platform for the database. Apache web server uses to run the system. Rational Unified Process (RUP) was identified as the most suitable development methodology. Additionally System was developed on top of the “SB-Admin” bootstrap template and “protostrap” online form designer has used for form designing.

At the end of development process, the web based office management system was tested by the senior management of the PABX section at various levels. Test results were confirmed with client requirements. Finally system successfully handed over to the client to enhance their business process as well as to help the PABX division to become a leading intercom provider in Sri Lanka.

Acknowledgement

First of all I would like to express my gratitude and thankful to the academic staff of University of Colombo School of Computing (UCSC) for giving us valuable post graduate degree programme and providing us a good guidance continuously.

Special thank must go to my project supervisor Dr. Laxhman Jayarathne for his assistance, guidance and monitoring through the completion of the project.

I must thanks staff of PABX division, Sri Lanka Telecom PLC, for giving me a great support and guidance to complete this project.

Finally I am grateful for my wife, my parents, family members and friends for their constant encouragement without which this assignment would not have been possible.

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List of Acronyms

BOQ - Bill of Quantities

CO - Central Office

JAD - Joint Application Development

OOD - Object oriented design

PSM - Provincial sales manager

PABX - Private Automated branch exchange

RAD - Rapid Application Development

RUP - Rational Unified Process

SME - Small and Medium Enterprises

SRS - Software Requirement Specification

SLT - Sri Lanka Telecom

TTO - Telecommunication Technical Officer

Chapter 1 Introduction

1.1 About Sri Lanka Telecom

As a national telecommunication Service provider, SLT place top priority to improving digital literacy and strives to bridge the digital divide across the country. When planning for network and infrastructure Expansion, SLT looked to improve accessibility of broadband and Information and communication Technologies in the country. SLT vision: “All Sri Lankans seamlessly connected with world class information, communication and entertainment services.”

SLT customer base is more than six million and includes multinational companies, large and small businesses, public sector, retail trade and domestic customers. The corporate clients of the company include colombo stock exchange listed companies and almost all connected public sector Institutions.

SLT has been recognized by leading companies and SMEs in Sri Lanka as the best and most reliable ICT solutions provider. When SLT has decided to focus on small and medium-sized businesses, It felt need to improve and extend communications while strengthening customer relationships.

PABX division is a branch attached to Sri Lanka Telecom PLC. They are installing PABX systems to the island wide customers. Most of them are SME and government institutions.

1.2 Motivation

Currently PABX division is carrying their operations in a manual way with lot of heavy paper works. This manual system will be very inefficient and time wasted when providing good services to their customers as well as the office work. The following problems have been occurred in the existing manual system.

- Currently they are maintaining every record in separate excel work books.

- It is very difficult to trace records in a given situation. Also they face lot of problem when multiple officers editing the workbook simultaneously. Only one officer can work on one excel sheet at a given time.

- Report generation is manual processes, it need to refer all excel work books and extract records one by one and it's a time consume process.
- Provincial sales managers are complaining that they not aware about the status of the PABX installation (Whether it's pending or completed) because there is no proper notification mechanism.
- When customer equipment is faulty difficult trace whether the items are under the warranty period or not.

  To overcome the above-mentioned problems, the Web based Office management system is appeared. This will minimize the time and costs that must be spend for the operations of the company. In addition, it can improve the efficiency and productivity of their services, so that they may also offer a better and more reliable service to their customers.

1.3 Scope

When decided to develop a system, the scope is an important fact to take into account. The scope of this project will be as follows.

- Add, remove edit system users.
- User authentication.
- Register New / Existing PABX installation requests and generates reference number.
- Search, modify and delete customer data, installation records other relevant data.
- Monitor estimation process and trace status of the request.
- Prepare BOQs for the estimates.
- Sending completed proposals to the sales team.
- Maintain and handling Customer Payments/credit approval records.
- Trace the states of the approved project (Pending installation, ongoing installation or completed installation)
- Manage PABX repair process.

- Integrate with E-mail facilities to send notifications to the relevant parities for better communication.
- Generating Necessary reports (Monthly sales revenue, Number of installation for particular time period, Number of sales done under credit basis, Pending and completed installations etc..)

1.4 Objectives of the system

The main objective of this system is to provide an adequate mechanism for managing the daily activities of the company which is done manually at the moment and to increase their productivity and efficiency through this mechanism. Here are the objectives of the system.

- Developed fully functioned web based office management system to access by the authorized parties of the Office.
- Reduce unnecessary work load to the employees.
- Increase sales revenue by proper monitoring the process.
- Maintaining customer database and provide better customer service.
- Provide facilities to optimize the utilization of available resources.

1.5 Structure of the thesis

This provides the overall knowledge about the Web based office management System. Thesis structure as follows;

Background

Here give essential background information with a survey of existing similar systems.

Analysis and Design

This chapter explains the requirement gathering techniques, functional nonfunctional requirements Methodology for proposed system and use case diagrams of the proposed system.

Implementation

This chapter explains the hardware software requirements, development tools which is used for system, code features and reused existing codes of the system.

Evaluation and Testing

This chapter includes techniques of testing, details of software testing, high level test plan of the system.

Conclusion and Future Work

This chapter summarizes the work done, discusses its findings and contributions, points out limitations of the current work, and also future enhancements.

Chapter 2 Background

2.1 Introduction

PABX section currently all the operations are done manually. There was no proper mechanism to store data and analysis them systematically.

Information is much worth if it does serve a purpose. Now people survey how businesses use information to improve the company's operations and learn how to manage various information systems so that they best serve the needs of managers, staff and customers. For effective use of information we need to know how to create systems for finding and storing data and learn about computer databases, networks, computer security, and lots more.

Our aim was to build strong web based system to handle daily operations and use of the stored data efficiently, effectively and gain high profit for the organization.

2.2 Business process

Currently PABX division handling manual process, for the literature review the process conducted by the company can be described. For marketing purpose the whole country is divided in to four main regions and fifteen sub sales provinces. Every province they have nominated a provincial sales manager (PSM).

Region	PSM Area
Metro	Metro central I (MC I) Metro central II (MC II) Metro North (MN) Metro South (MS)
Region I	Central province (CP) North West province (NWP) Western province North (WPN) North central province (NCP)

Region II	Sabaragamuwa Province (SAB) UVA Province (UVA) Southern Province (SP) Western province south (WPS)
Region III	Northern Province (NP) Eastern Province (EP) North East central (NEC)

Table 2-1 PSM regions

Generally Provincial sales manager is getting PABX system requirements from the customer and send above requirements to the PABX section. PABX requirements can be categorising as follows;

a. New PABX Installation with wiring
b. New PABX installation without wiring
c. Existing PABX relocation
d. Expanding number of extensions
e. PABX system and related peripherals repair

After receiving the request it is register under appropriate category.

1. Customer care officer is register the customer request

   They are maintaining excel workbook to store customer information. Below figure shows their manual Excel workbook structure. They call this worksheet as “project monitoring database 2017”.

PABX Project Monitoring Database								
Received Date	Ref No	Relevent PSM area	Estimated by	Customer Name	Address	description of the request	CO Lines	Ext Lines

Figure 2.1 Project monitoring database

2. Engineer will assign received request to relevant technical officer (TTO) currently three (03) technical officers are working at the PABX division.
3. Relevant TTO will done the survey and prepare BOQ, Estimate and Proposal.
4. Completed proposal will send to relevant Provincial Sales Manager (PSM)

Following data recorded for future reference and reports.

a. Total amount with/without tax
b. Proposal sent date
c. Wiring done by SLT PLC or Other Party
d. Number of CO Lines/Ext Lines
e. Proposed System Brand and Model

5. Sending Payment confirmation

   Payment can be categorize in to four types

   a. Full Payment
   b. Partial Payment
   c. No payment (Credit approval)
   d. Subsidized (Monthly commitment basis)

6. Each and every customer is identified by unique Agreement number. This number is need to generate for New PABX customers.(Who approved the new PABX Proposals)

   eg: for Agreement Number:-PABX/UVA/0001.

7. Some customers are already having an agreement number. Because they are already PABX customers but they need to do some modification to the system such as expanding renovation, shifting etc.

   After receiving payments they are maintaining another excel work book to record and monitor installation status. They call this work sheet as “New project status”. Below figure 2.2 shows their project status monitoring Excel workbook structure.

#	Receipt / Credit Approval Received Date	Payment Status	PSM Area	PABX No	Customer Name	Work	Type of work	Status	Remarks	Relevant TTO

Figure 2.2 Project status monitoring sheet

8. After approving the PABX work need to assign installation to relevant technical officer.
9. Technical officer will commence the installation and update its status.

10. After completing the project Technical officer will Singed the acceptance certificate, Monthly rental, from the customer and update project status and send acknowledgement to relevant PSM’s and other officers
11. Finally officer will update following records.
    a. Installation Completed date
    b. Serial Numbers of the PABX System.
    c. Installed Peripheral quantities.
    d. Ownership of the system (SLT PLC, Fenton’s, Metropolitan, Apogee international, etc)
    e. Termination date of the agreement.
    f. Other relevant useful data.

They are recorded all completed data into the customer database below figure shows their excel based customer database.

Agreement No.	Customer Name & Address	Direct Lines	Ext. Lines	Date of Installation	System Type	Service Type (System only/System with wiring)	Rental Charges (Rs)	Pilot No

Figure 2.3 Customer database

In monthly they are conducting PSM meeting to discuss about the progress of the projects. Below Figure are showing the currently using report format used to their meeting presentations.

PABX Progress Report for 01/01/2017 to 01/04/2017				
PSM Area	No. of Request sent in 2017	Completed Proposals	Approved Proposals	Total Completed Installations
Total				

Figure 2.4 Progress summary presentation side

2.3 Review of similar systems

A number of software based rapprochements have been taken to reduce the complexities encounter in paper based office management. Those efforts can be categorized into

- Desktop based office management Software
- Cloud based office management Software

In [1], authors have carried out feasibility analysis on paperless office management. They show that how office management software can save financial resources, increase efficiency and productivity, save office space and easiness in documentation and information retrieving Process. According to their feasibility analysis, when introducing office management software to a particular work face, the most difficult challenge is to convince the employees to change their habit of dealing with legacy workflow. So when developing this software, we paid more attention to accessibility and acceptability from end user's perspective.

In [2] authors have introduced a desktop based office procedure system calls 'Domino' for modeling and monitoring structured office process in organizations. DOMINO is a system for the specification and automation of cooperative office management. The application can control processes which are specified in application oriented language. The various actions in such process is assigned to a user role. At run-time, these roles are assigned to persons by using an organizational database. The main drawback in the system is, the application cannot be accessed from anywhere since it is a desktop based office management application. And their system is lack of integration with other third party tools. For an example messages sent from the 'Domino' application are treated separately from ordinary electronic mail. So the end user has to switch tools manually to send an e-mail message concerning an office procedure.

Authors of [3] have described an experimental Office Information System designed to allow multi-computer experiments in distribution and sharing of control within an office environment. The rationale behind their distributed office management application is that office information systems need to aid tightly coupled communities of users thus the communal computing systems is motivated. Using the Alto/Dorado machines, and the Cedar database and programming environment, they have devised a system which allows the flexible manipulation of electronic forms on the display screen of users and helps to coordinate and control the flow of forms between user workstations. Also the system facilitate

distributed schedulers, dispatchers, office observer workstations, alerters, a data dictionary synthesizer, change agents, and on-line office modeling, simulation and design facilities. The main disadvantage of their system is the heavy reliance upon the database for information and communication. A bottleneck can occur when accessing data because all users, dispatchers, and observers are required to periodically examine various tuple sets such as the status relation in the database.

Because of aforementioned limitations on desktop based office management systems, research community has move towards web based office management system modeling.

In [4], authors have introduced web based office management system which uses PHP and MySQL as underline technology. The systems was able to provide efficiency of the office management, reduces the waste of resources, and gets rid of the nuisance manual operation. However their web based system has some performance issues in online communication and user's personalized printing function.

In [5], authors have introduced Web-based ERP system which is developed for attacking business problems and managing real-world supply chain problems. The system implementation includes a bridge between business process management and production scheduling. Authors have presented the web based ERP system capabilities through an illustrating case study on one of the system’s implementations, revealing a hands-on view to the system implementation benefits.

In [6], authors have studied the office management and ERP systems as well as the future extensions using 23 separate organizations. According to their result, one of a major problem in existing office management systems are lack of web accessibility, lack of modularity and lack of extending enterprise operation capabilities.

So, when analyzing the literature it is clear , web based office management systems can provides significant advantages over the legacy document based office management or desktop based office management systems, as the system is distributed through interoperable, cross-platform and highly pluggable Web-service components. Further, accessibility of web based office management systems has been improved by recent advances in telecommunications and network technology that favor creation of virtual private network (VPN) structures which unite different enterprise entities like office, warehouses an all.

Chapter 3 Analysis and Design

3.1 Analysis

Requirement analysis is playing major role in software development life cycle. The analysis phase is the beginning of the life cycle of the project.The analysis phase consists in dividing the deliverable products in the charter of high level project into more detailed business requirements. The analysis phase also is part of the project where we identify the general orientation which the project will take through the creation of the project strategy documents. [7]

3.1.1 Fact gathering techniques

Fact gathering is the most critical part of the analysis phase. There are some other activities also having in this phase. Those are to create a requirement management plan of the needs to define how the requirements will be documented, communicated, followed and modified throughout the life cycle of the project. In this project facts were gathered by using following techniques.

1. Observation of the working environment
2. Interviews
3. Questionnaires
4. Sampling of existing documents, forms and databases

Sampling of existing documents, forms and databases gives us a good idea about their requirement and what is actually they are doing. We have selected some sampling documents such as customer data registration, bill of quantity, customer acceptance, estimates and proposals.

Interviews are used to get information from management and system users. In this we have conducted face to face interviews with the people and record their responses. It becomes more advantageous for this project.

Existing process has monitored and understands the complex areas of the system since the current system is a manual system. Further we gain more information about the request registration, estimate preparing, proposal sending and required reports, etc. through these observations.

3.2 Functional requirements

Functional requirements these are statements of services the system should provide, how the system should react to particular inputs, and how the system should behave in particular situations. In some cases, the functional requirements may also explicitly state what the system should not do. [8]

3.2.1 User management module

- Users can log into the system securely by validating username and password.
- System has provided facilitate to create, edit, view, delete new user.
- System has provided facilitate to assign user privileges based on the user level.
- System has provided facilitate to change password function.
- User can be logout from the system.

3.2.2 PABX request registration module

When new request received, system allows users to insert customer name, date, contact details, type of the request, Number of extension lines, number of direct lines, peripherals, required system make, model, provincial sales area based on the PABX Customer data form.

- There are 2 types of requests
    a. New PABX System request.
    b. Other Requests such as repair, renovation and expansion
- If request received for new PABX requirement, system allows users to insert records under new category.
- For existing customers, users able to search them from their pilot telephone number or unique customer agreement number.

- If request received for system or peripherals repairs, system provide facility to verify that above items provided by SLT via previously recorded serial numbers.
- For other requests system users can search customer PABX system details and verify that required service can be afford or not with the existing system.
- System allows the user to cancel the request based on the customer consent.

3.2.3 Survey task assign module

- Based on the registered requests system allow top level users to assign task to technical users.
- Users able to view status of the project.

3.2.4 Estimation and Proposal generation module

- After done the site surveys technical officers can prepare BOQ and Estimates.
- Based on the estimate system provide service to generate proposals.
- Those proposals can be email to the Provincial sales managers.

3.2.5 Payment handling module

- System users can trace the proposal via the reference number.
- There are 4 types of payment confirmations

1. Full Payment
2. Partial Payment
3. Credit Approval
4. Subsidized Meeting Minutes.

- When customer accepted the proposal they can make full payment to nearest teleshop and faxed the receipt to the PABX division.
- If customers willing to pay after the service provided, PSM has sent credit approval via relevant DGM approval.

- If customer liked to commitment based payment, PSM has sent a subsidized meeting minutes with relevant GM approval to the PABX division.
- System can insert these four types of payments, payment confirmation date, amount, commitment period, credit approved DGM, and Subsidized approved GM and relevant PSM area.

3.2.6 Installations task assign module

- After updating payment details, top users able to assign installation task to technical staff.
- After commencing the installation users can update the status of the installation.
- After completing the installation users can closed the installation works order and update the status of the job.

3.2.7 Job closing module

- After updating work order stats as completed, users can be able to update records of the installation.
- Such as service provided date, System make, model, in service capacity, installed capacity, monthly rental, serial numbers of the installed instruments, etc.

3.2.8 Report Generation Module

- System has facilitated to generate daily, monthly reports for
    - ✓ Project status
    - ✓ Revenue,
    - ✓ Credit jobs
    - ✓ Project progress

3.3 Nonfunctional requirements

Non-functional requirements these are constraints on the services or functions offered by the system. They include timing constraints, constraints on the development process, and constraints imposed by standards. Non-functional requirements often apply to the system as a whole, rather than individual system features or services. [8]

- **Reliability**

Reliability is the ability of a system to perform its required functions under stated conditions for a specific period of time.
There are two things need to be consider.
Availability - is the system available for service when requested by end-users.
Failure rate - how often does the system fail to deliver the service as expected by end-users.

- **Performance**

Performance requirements concern the speed of operation of a system.
Types of performance requirements:
Response requirements - How quickly the system reacts to a user input
Availability requirements -is the system available for service when requested by end-users

- **Security**

Security requirements are included in a system to ensure:
Unauthorized access to the system and its data is not allowed
Ensure the integrity of the system from accidental or malicious damage

- **Usability**

Usability is the ease, with which a user can learn to operate, prepare inputs for, and interpret Outputs of system or component

3.4 System design

Software design is a process to transform user requirements into some suitable form, which helps the programmer in software coding and implementation. Software design is the first step in SDLC (Software Design Life Cycle), which moves the concentration from problem domain to solution domain. It tries to specify how to fulfill the requirements mentioned in SRS. [9]

System designers can use various approaches of system design. Such as modern structured design, information engineering, prototyping, JAD, RAD and object-oriented design. Object-oriented designing is the widely used approach in modern software designing.
The work carried out in a project can beeasily re-used that in the other approaches.
Moreover, coding will be easier to write, easier to understand and will comprise less errors.

3.4.1 Methodology for the proposed system

Rational unified processed (RUP) used as a framework and the Object Oriented Designing (OOD) concepts has been used as an approach throughout system development life cycle. The RUP is based on a few fundamental ideas, such as the phases of development and the components, which define who, what, when, and how development will take place. [10]

The requirements were change time to time so iterative methodology has used for the development. Rational unified process has identified as the most suitable methodology for the analysis and design approach.

There are number of modules in the proposed system. Each module has developed incrementally and iteratively.

RUP lifecycle has 4 main phases namely Inception, Elaboration, Construction and Transition.

Inception Phase
The basic idea and structure of the project is determined.

Elaboration Phase
In This Phase analyze the requirements and necessary architecture of the system.

Construction Phase

In this phase finish development based on the baseline architecture

Transition Phase

In this phase product is finally released and delivered to customers [10]

Overall RUP process is shown in below figure 3.1.

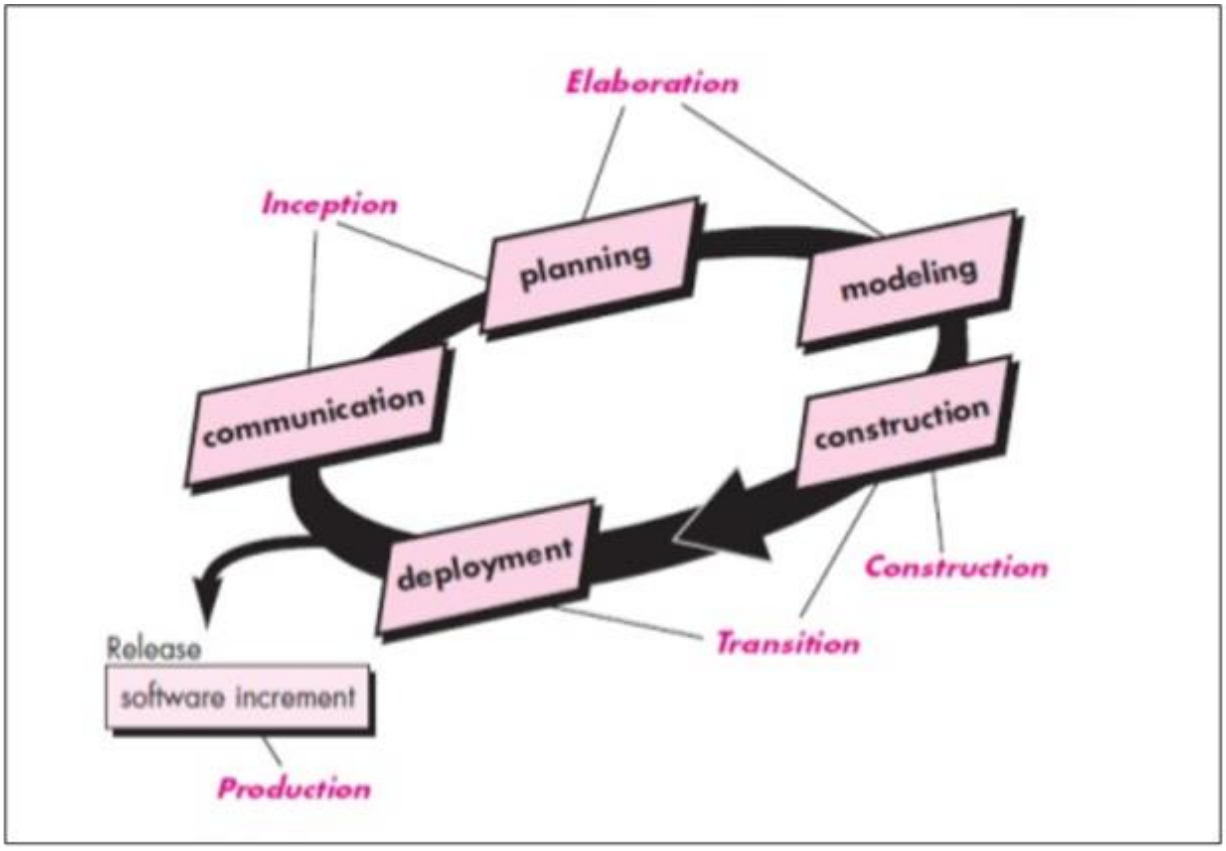

Figure 3.1 Rational Unified Process

3.4.2 Use case diagram for proposed system

After the requirement analysis phase, a use case diagram has drawn to identify the actors and functionality of the system. These diagrams are useful in modeling the context of the system.

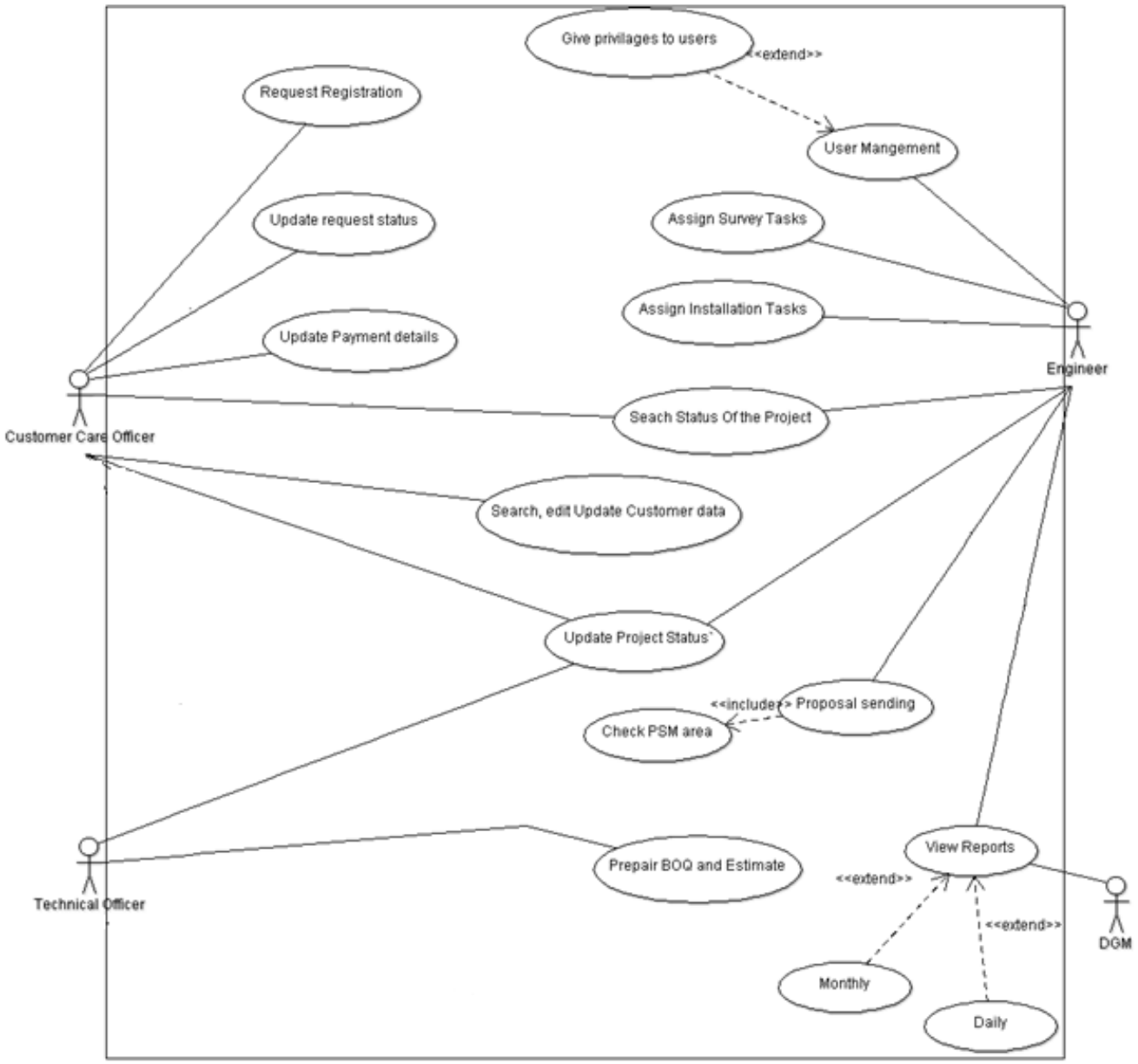

Figure 3.2 Use case diagram

3.4.3 Class diagram

Class diagram describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes called class diagram.

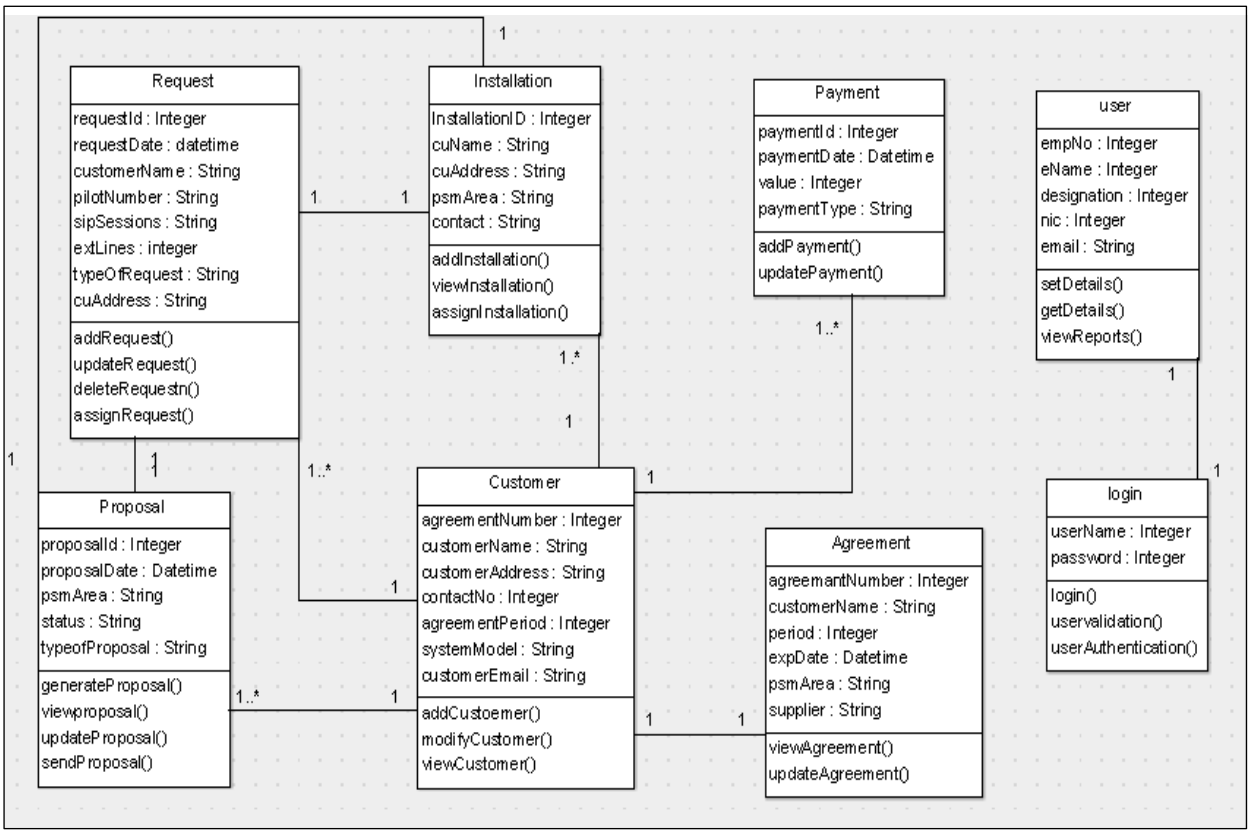

Figure 3.3 Class diagram

3.4.6 Database Design

Database is a main component of the information system. Database design represents full detailed view of the database. Well planned database improves data integrity, performance and reduce redundancy.

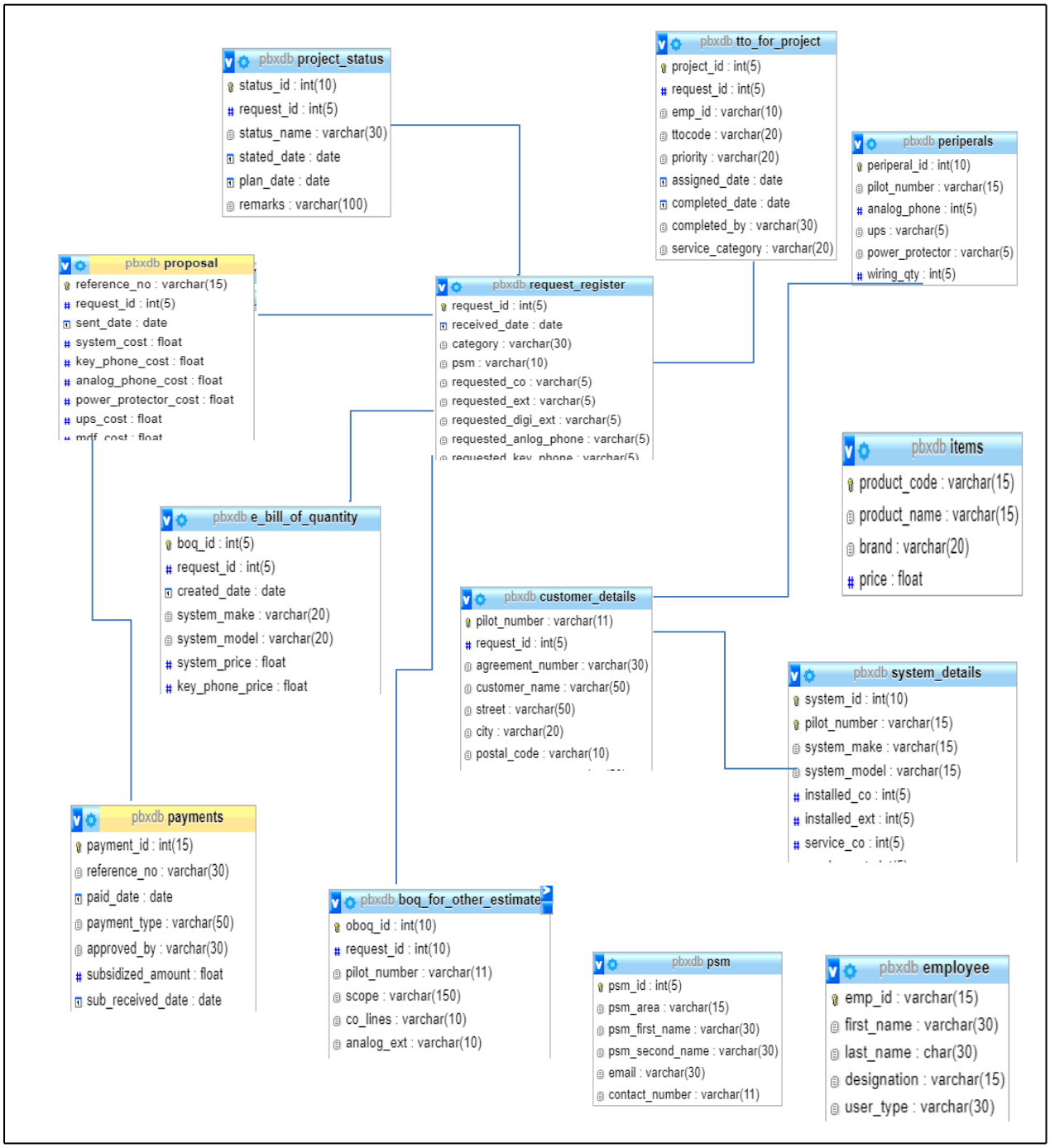

Figure 3.4 Database design

3.4.7 Activity Diagram

In figure 3.5 shows activity diagram for the request registration to proposal sending,

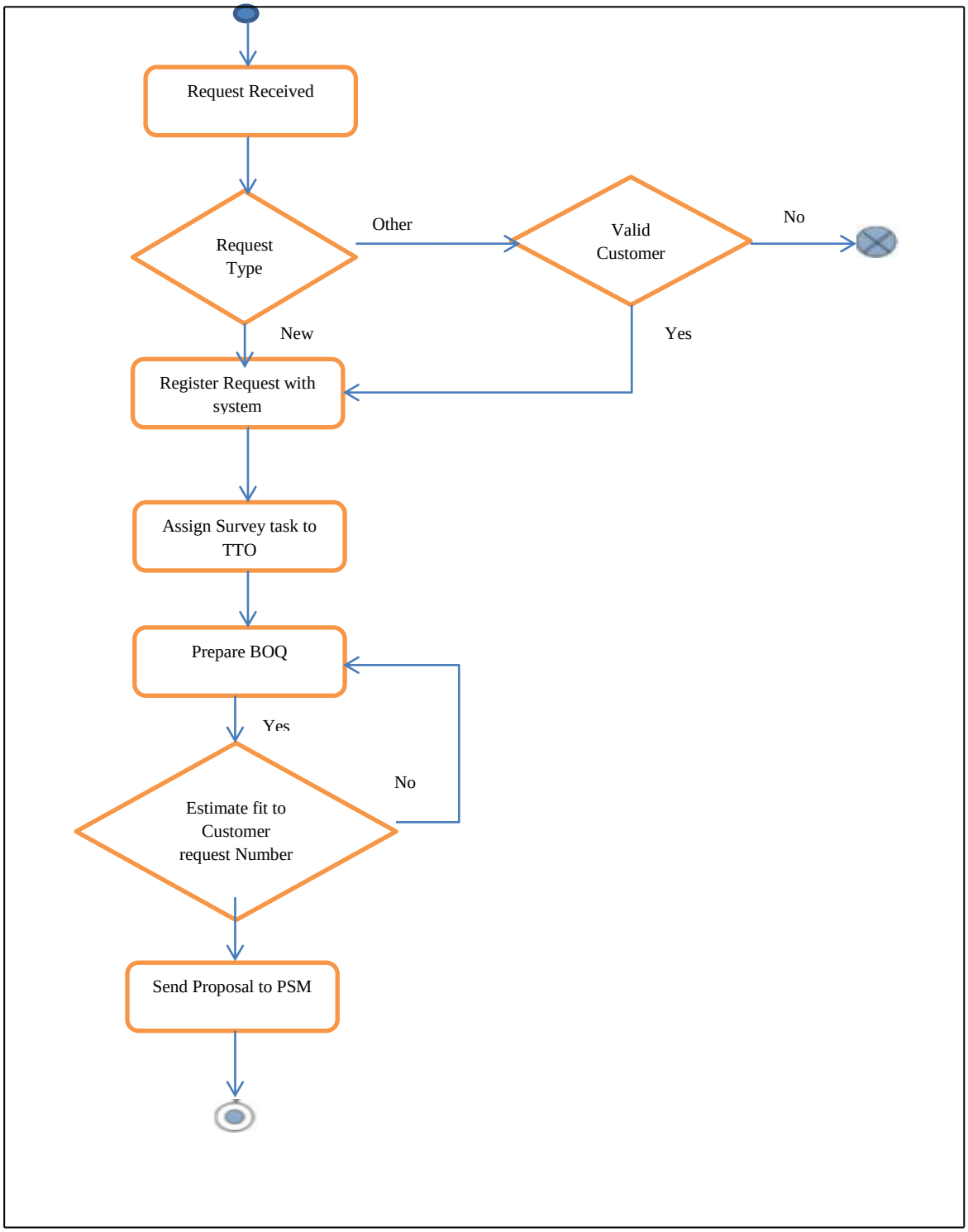

Figure 3.5 Activity diagram up to proposal sending

Chapter 4 Implementation

4.1 Introduction

In this phase the software is developed according to the detailed design based on the client. Implementation phase is a very long phase in the software development life cycle. The main goal of this phase is to turn the detailed design into an executable format effectively. When the coding system, the use of comments is a very important thing to consider, because if we want to rework and modify the code, it is easy to maintain it. PHP language has been selected as a programming language for develop this web based office management system.

4.2 Hardware and software Requirements

4.2.1 Hardware Requirements

- 1 TB Hard Disk
- 4GB RAM
- Printer
- Intel Core i5 Processor 2.50 GHz

4.2.2 Software Requirements

- Windows 10
- Apache web server 2.5
- PHP 5.6
- MySQL 5.7
- Notepad ++
- Protostrap Online form designer

4.3 Development Tools

WAMP server 3.0.6 was used as a development environment. WampServer is a Windows web development environment. It allows us to create web applications with Apache2, PHP and a MySQL database. Besides, PhpMyAdmin allows us to easily manage our databases. Notepad ++ used for coding the system.

4.4 PHP Language

PHP programming language is a server-side HTML embedded scripting language. The PHP language is executed on the server side. So the execution of the scripts is done on the server where the web-site is hosted. Embedded HTML means that we can use PHP statements within an HTML code. PHP files are returned to the browser in HTML format. [11]

4.5 Current Network Setup

Until get proper approval for upload system to the intranet site, system was deployed in the server installed at PABX office premises. Internal PC's are properly networked and around ten Personal computers and one printer is connected to the network. Office network is connected to the internet by SLT broadband connection.

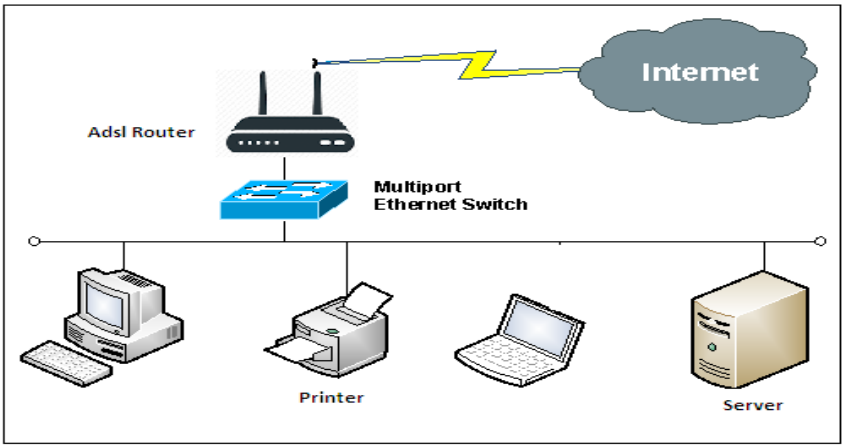

Figure 4.1 Network setup

4.6 User Interfaces

4.6.1 User Login Interface

This interface is for all users to log into the system. Only authorized users can access the system. If the invalid user log into the system error messages are popup. Following figure 4.2 shows login interface of the system

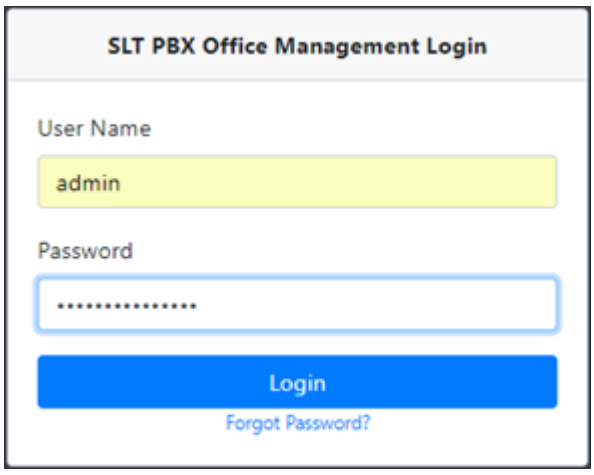

Figure 4.2 User login interface

4.6.2 Password reset

If user forgot his/her password following form helps to send password reset request to the system administrator.

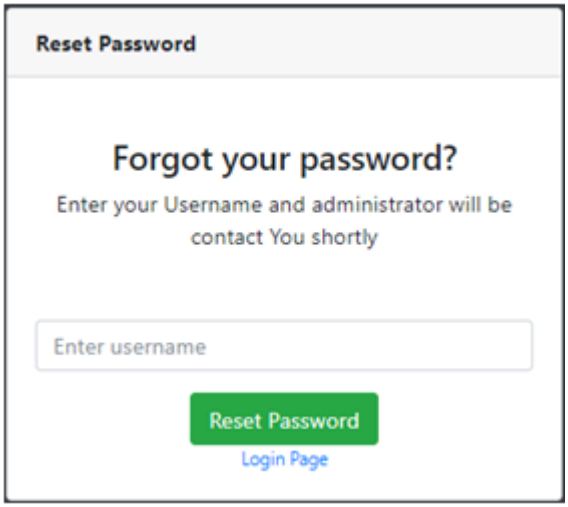

Figure 4.3 Password reset request form

4.6.3 Index page / Dashboard

Figure 4.4 represent the dashboard page of the system. After successfully login, users are direct to this page. In these interface users two bar charts shows that Registered PABX request and approved PABX request with respect to relevant PSM areas. Also table represent the ongoing PABX installations. Every interface is designed with left side navigation bar.

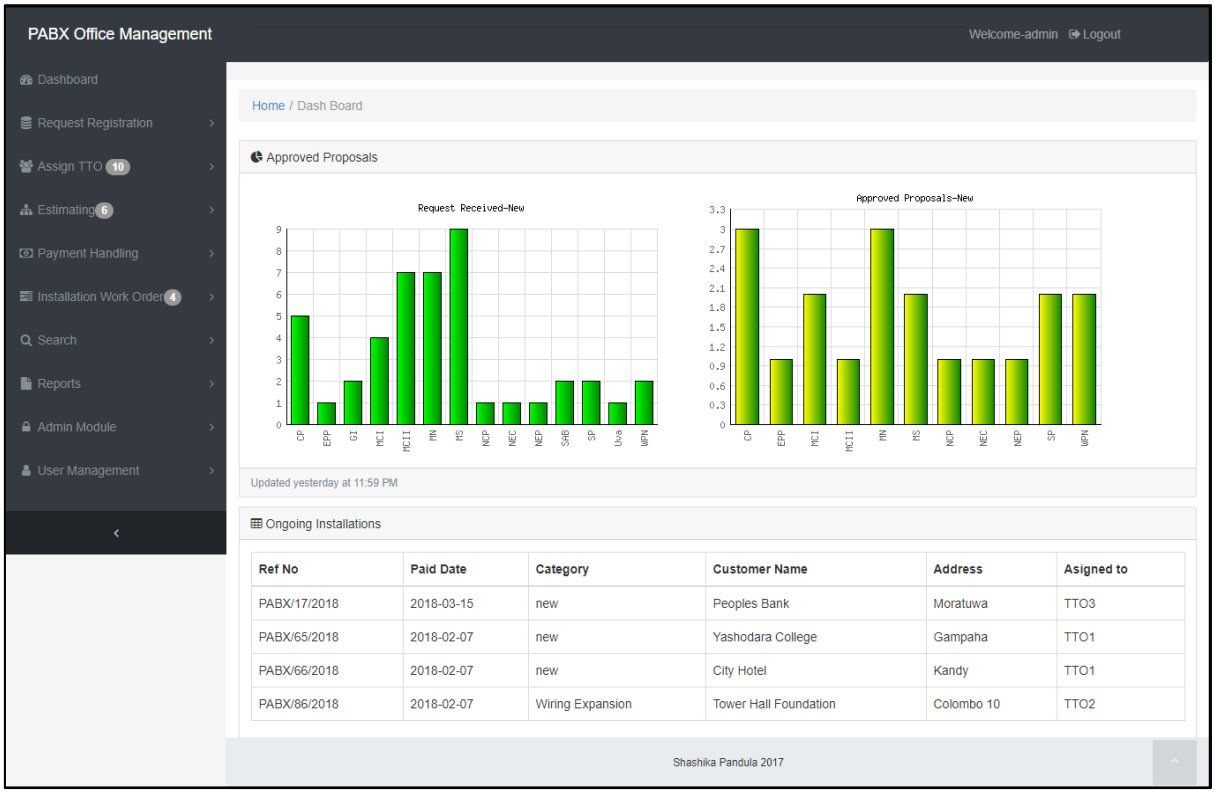

Figure 4.4 System dashboard

4.6.4 New request registration interface

Figure 4.5 represent the new PABX request registration interface. Which is allows users to enter new PABX request details and registering the request.

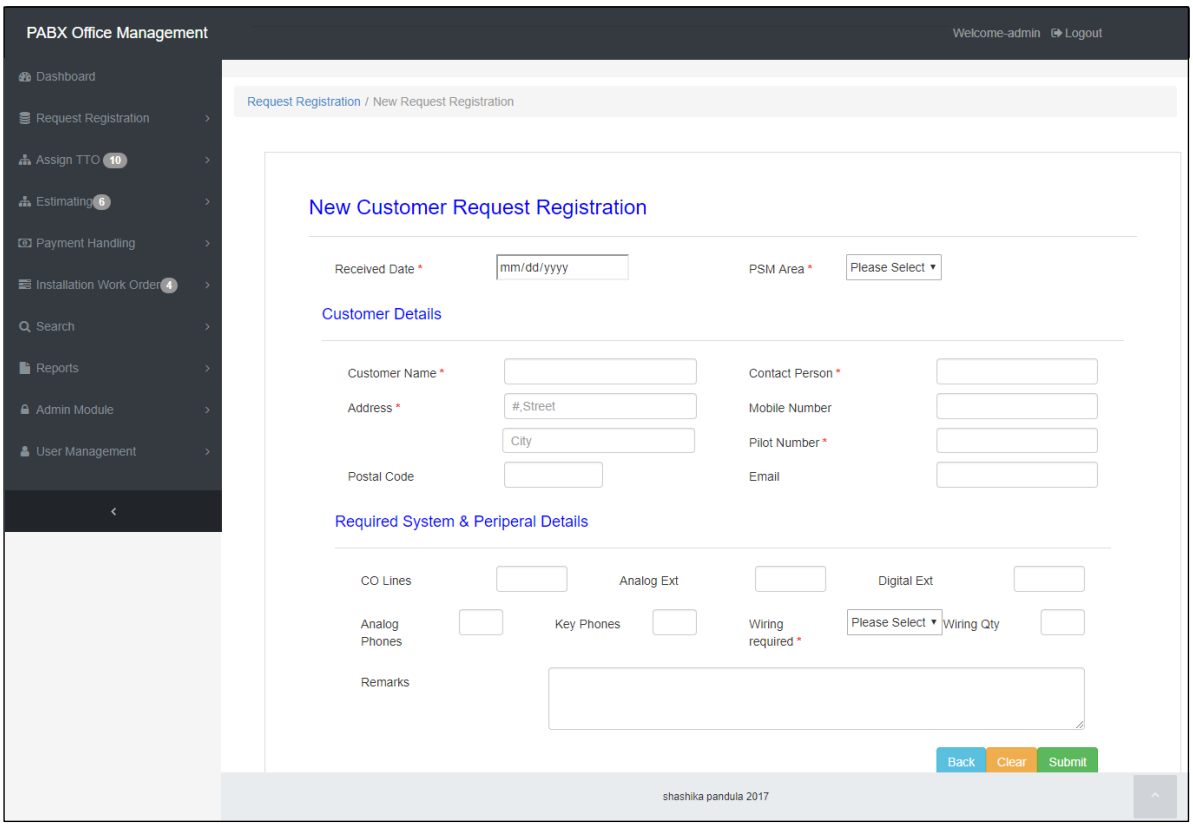

Figure 4.5 New request registration interface

4.6.5 Customer search interface for register other requests

Figure 4.6 represent the customer search form for register other PABX requests. For register Other PABX request customer need to be existing customer.

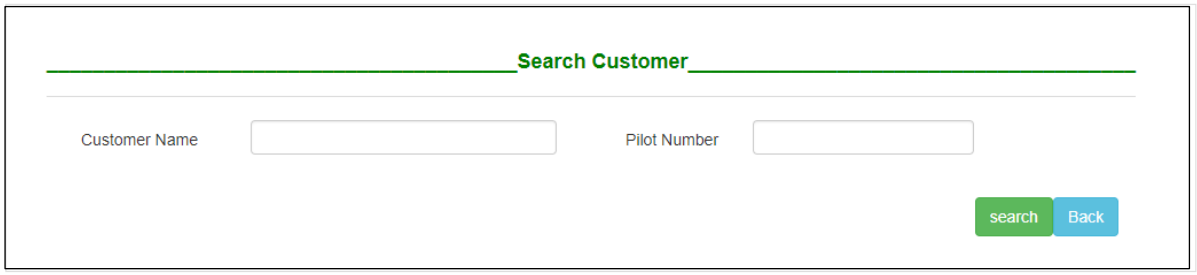

Figure 4.6 Customer search form

4.6.6 Existing customer details displaying interface

Figure 4.7 represent existing customer details displaying interface. Then user can register other estimates by clicking “register other estimate” button. Other estimate registering interface same as new request registering interface.

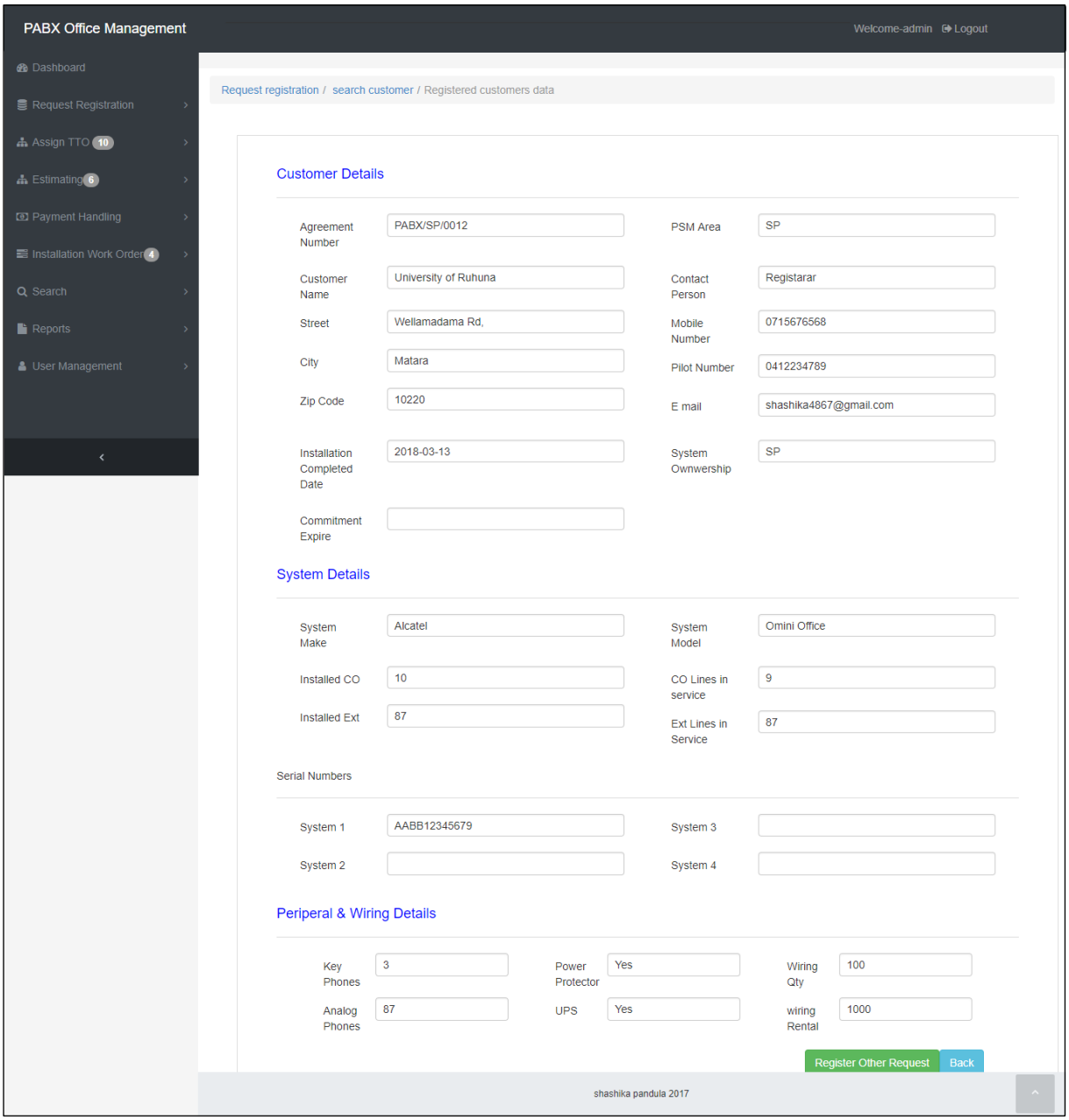

Figure 4.7 Existing customer data displaying interface

4.6.7 Technical officer assignment interface

Figure 4.8 represents the technical officer assignment interface for estimates. After registering the New or Other PABX request relevant request is display in this interface. This interface is same as the technical officer assignment for PABX installations.

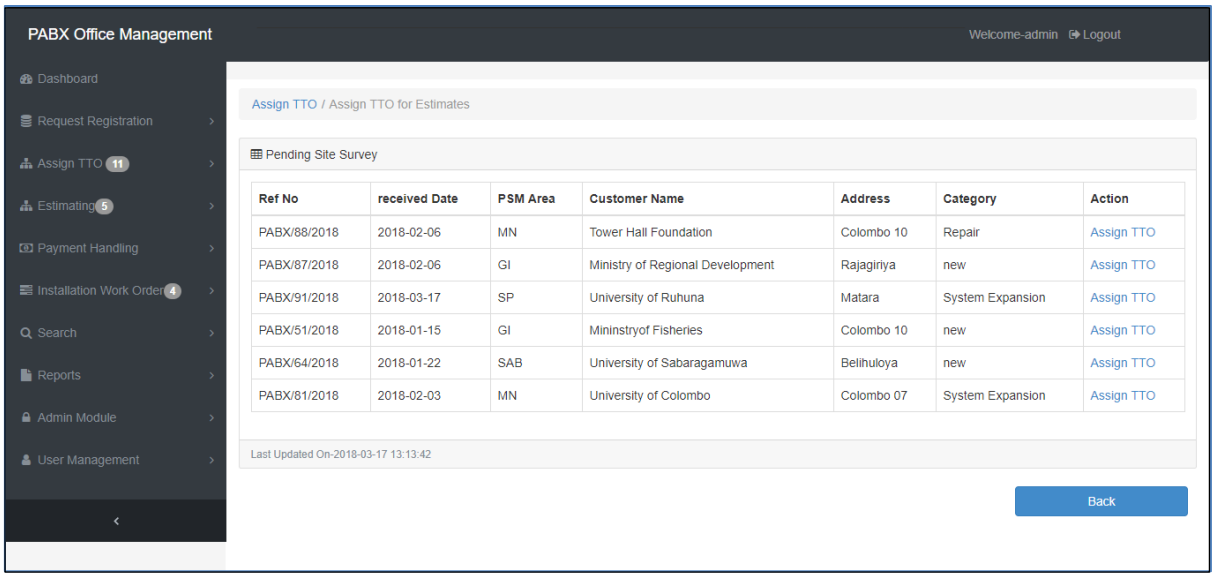

Figure 4.8 Technical officer assignment interface

4.6.8 Registered request edit / delete interface

Figure 4.9 represent the registered request edit / delete interface. This helps to edit request details or delete the request.

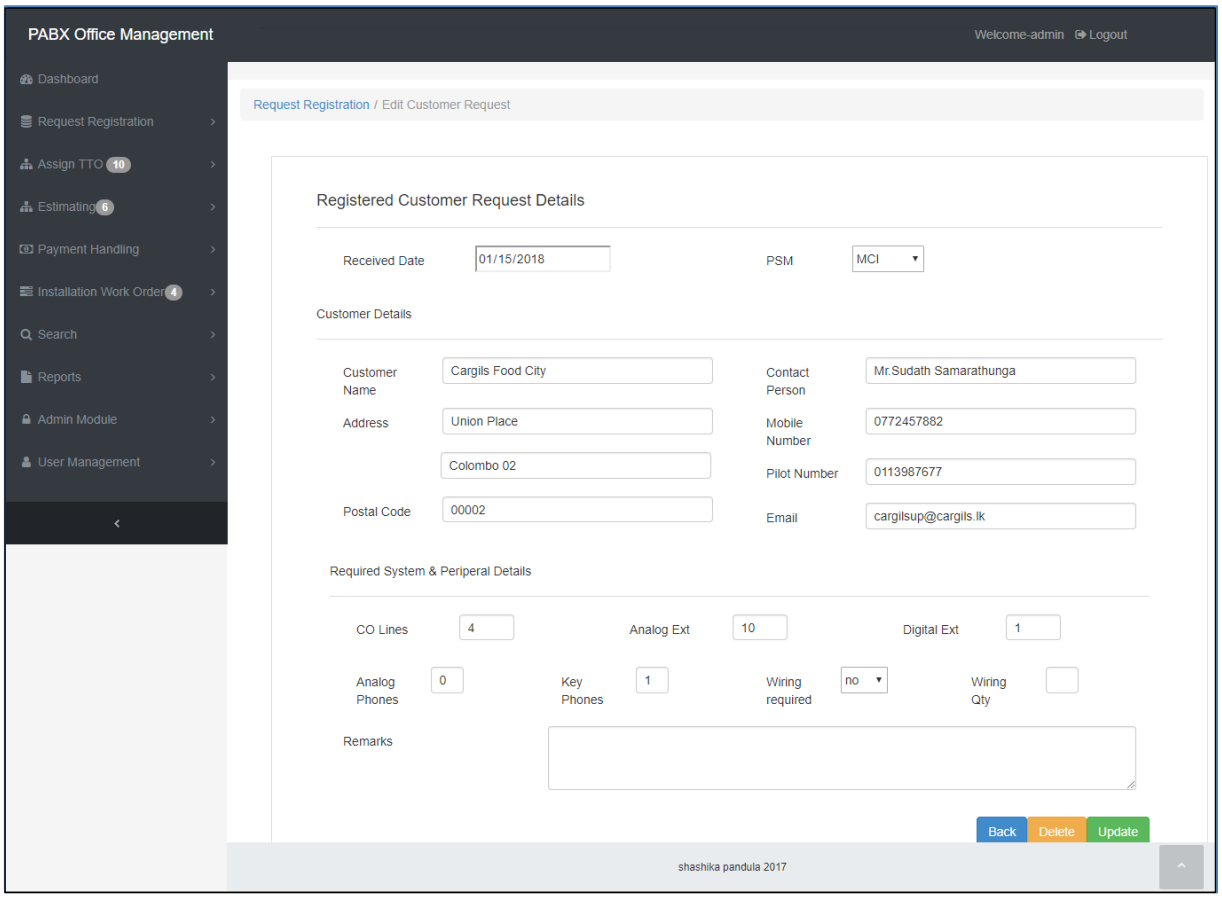

Figure 4.9 Registered request edit / delete interface

4.6.9 View assigned estimates for prepare BOQ interface

Figure 4.10 represent the assigned estimates view interface.

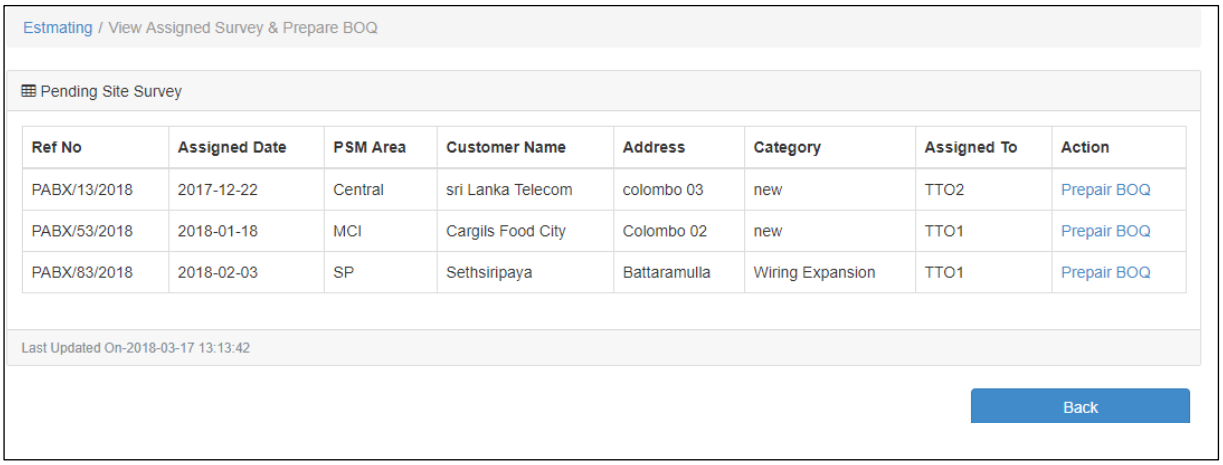

Figure 4.10 view assigned estimates interface

4.6.10 BOQ preparation interface

Figure 4.11 represent the BOQ preparation interface. In this interface technical officers can enter site survey details to the system. Customer and request details are automatically loaded to this interface.

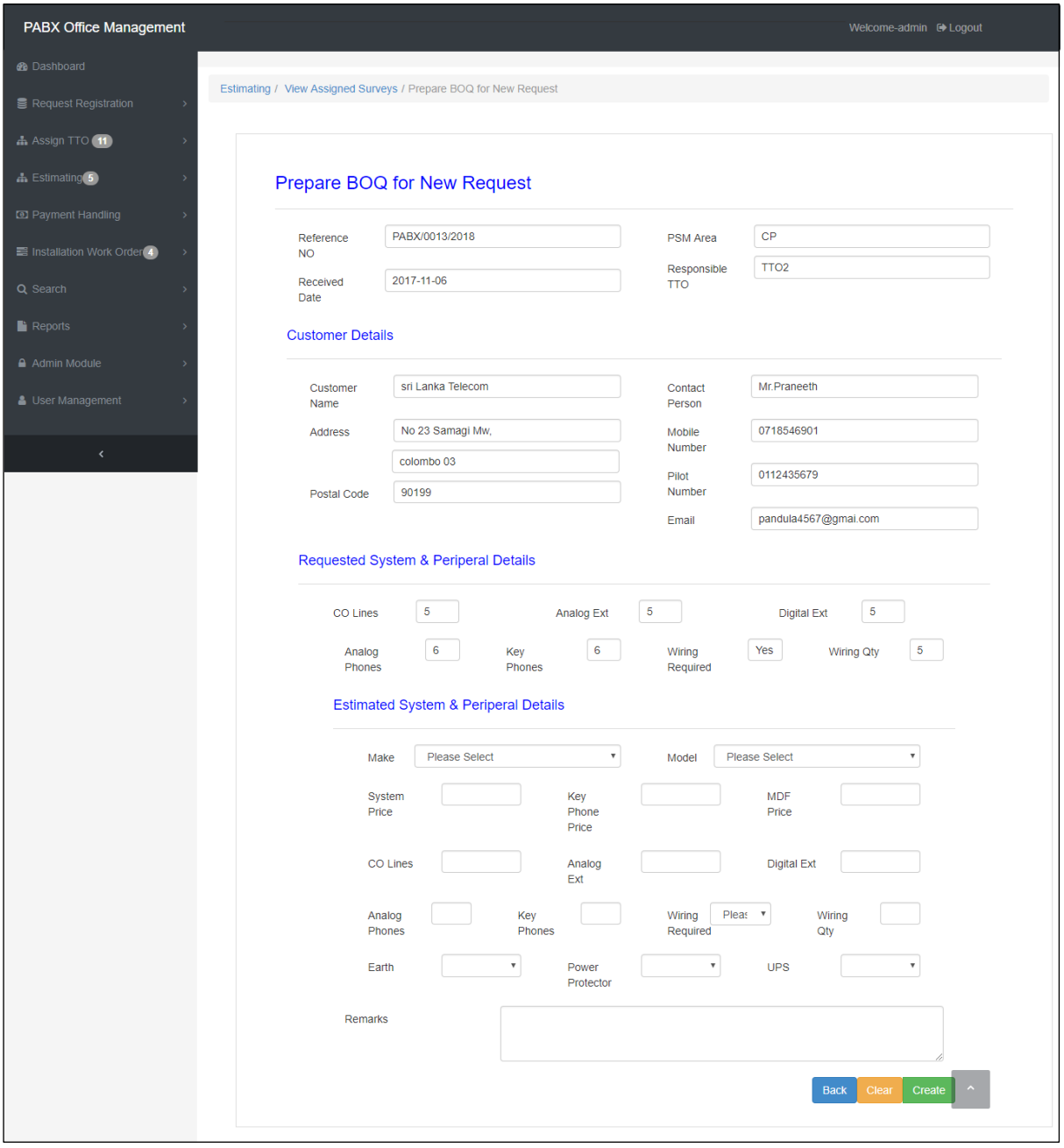

Figure 4.11 BOQ preparation interface

4.6.11 Proposal search interface

Figure 4.12 represent the proposal search interface for add or update customer payments. Proposals can be search by proposal reference number or customer pilot number.

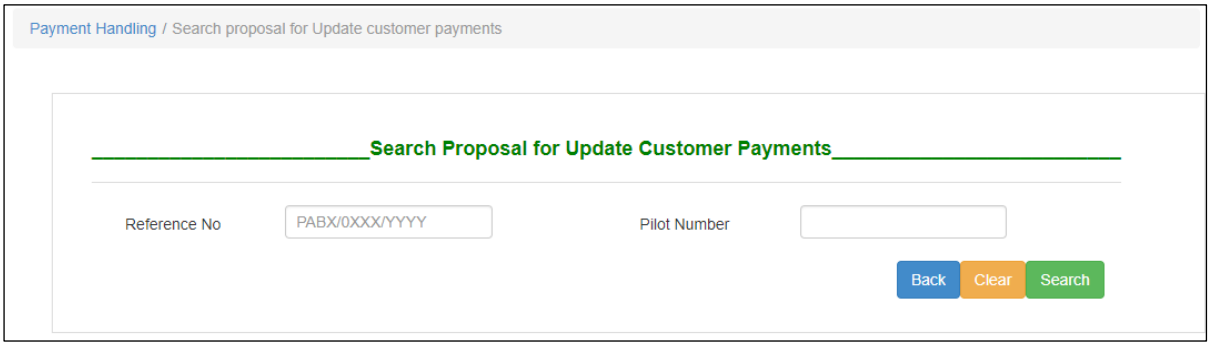

Figure 4.12 Proposal search interface

4.6.12 Proposal search result interface

Figure 4.13 represents the proposal search result interface.

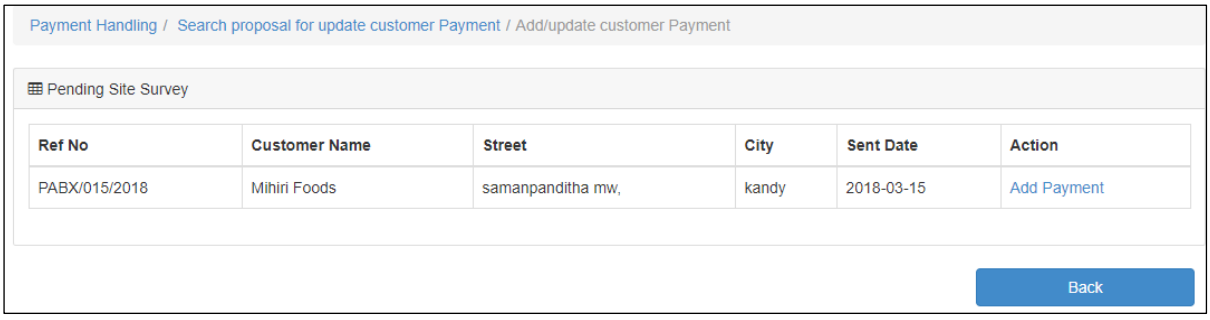

Figure 4.13 proposal search result interface

4.6.13 Payment update interface

Figure 4.14 represents the payment update interface. In this interface user can update payment method and paid amount. Also provide facility to update payments of annual maintenance rentals.

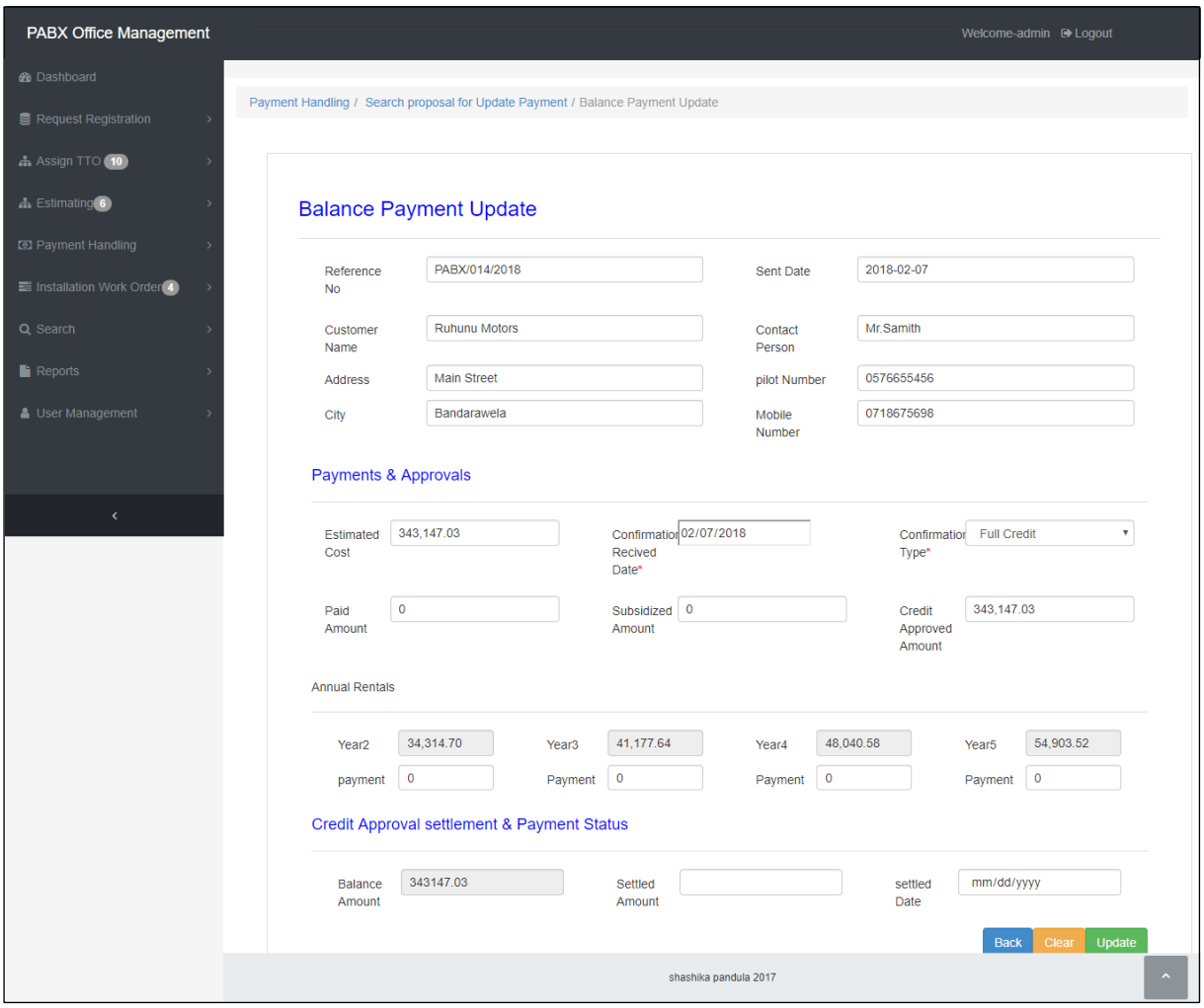

Figure 4.14 Payment update interface

4.6.14 View assigned work orders interface

Figure 4.15 represent the view assigned work order interface. After the assignment of technical officer for installation relevant technical officers can view assigned work order to them. This interface also helps to close the work order after the installation.

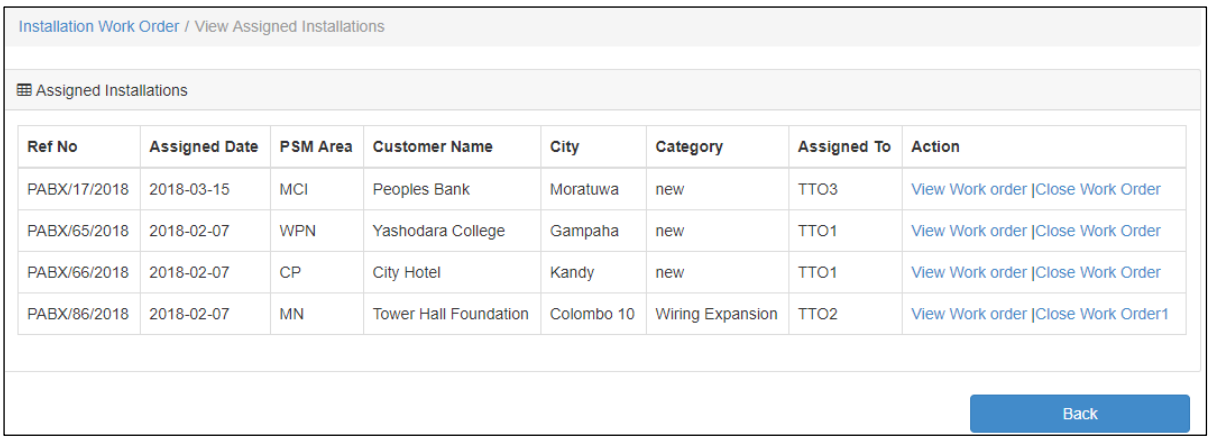

Figure 4.15 Work order view / close interface

4.6.15 work orders closing interface

Figure 4.16 represent the work order closing interface. In this interface users can add installed system details, installation completed dates, peripheral and wiring details etc.

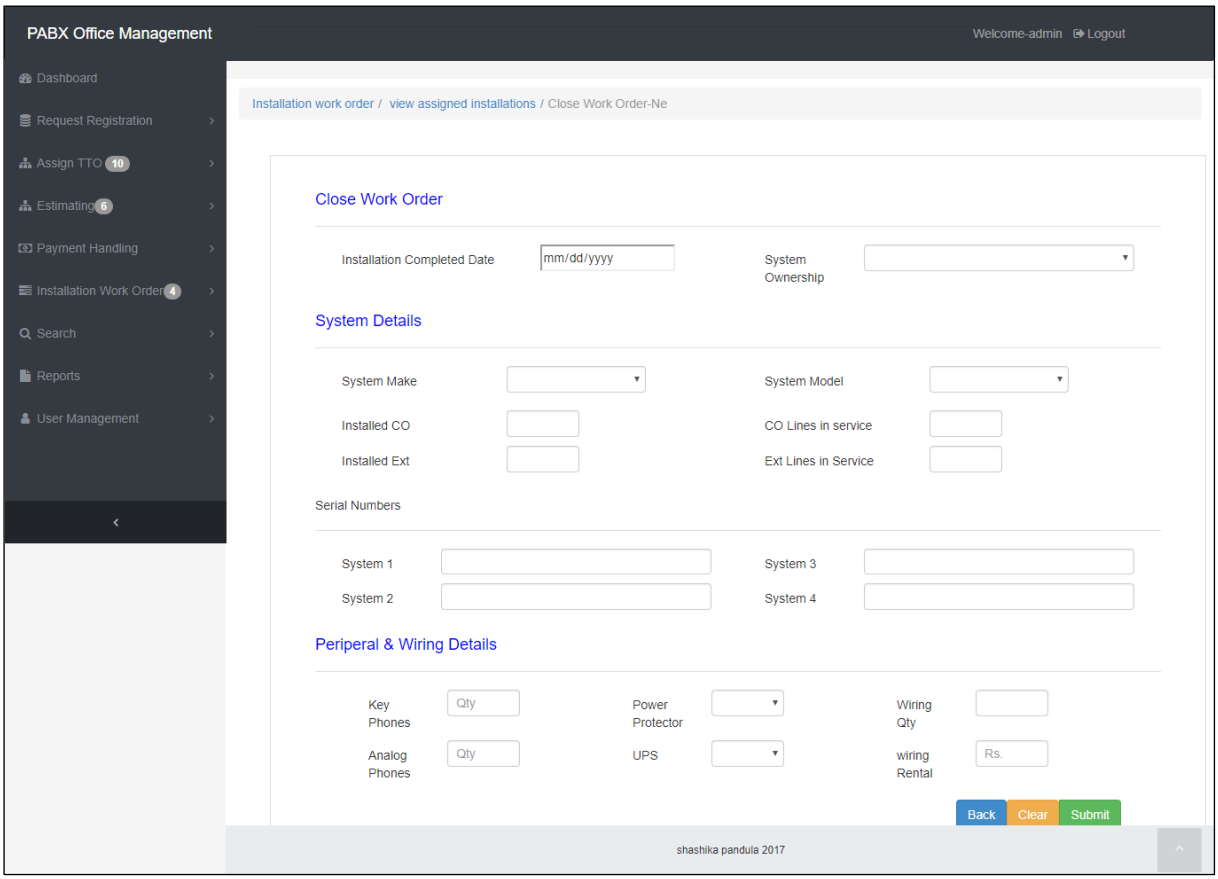

Figure 4.16 Work order closing interface

4.6.16 User accounts creation interface

Figure 4.17 represent the user account creation interface. This module is enabling only for the administrator. This interface helps to create new user accounts for system access.

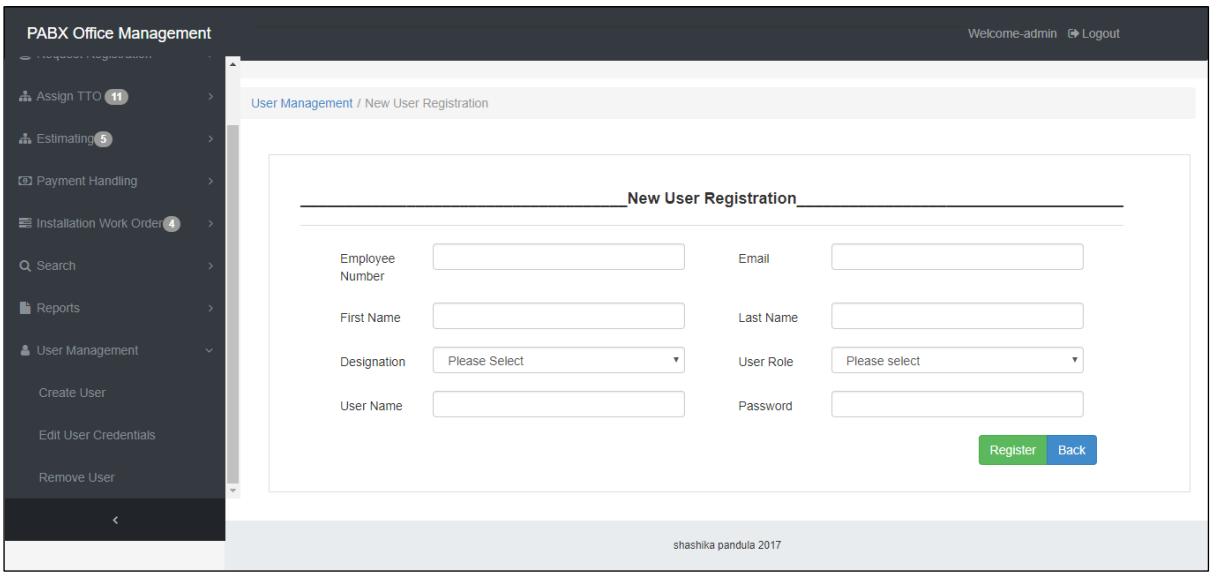

Figure 4.17 User account creation interface

4.6.17 Password changing interface

Figure 4.18 represent the password reset interface. After login to the system users can change their password.

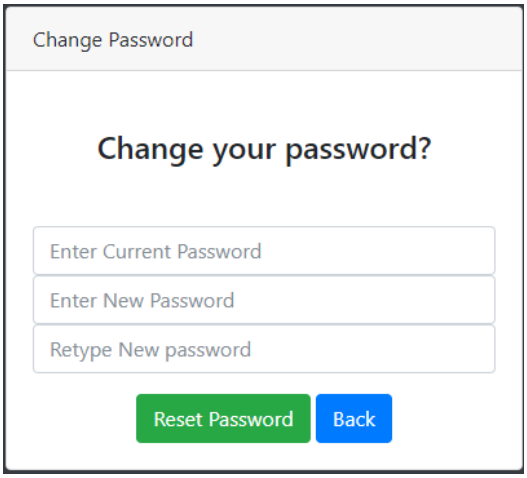

Figure 4.18 User password changing interface

4.7 System development template and form designer

"SB-Admin" used as template for design this system. This template is a free downloadable template and uses the default bootstrap 4 styles along with a many powerful plugins to create powerful framework. [12]

"Protostrap" online form designer has used for creating forms. Protostrap online form builder intuitive drag and drop provides the tools to easily drag and drop an amazing form in short minutes. It widgets include tabs, panels and multi-column containers. [13]

4.8 Code Features

4.8.1 Data Validation

Data validation is a very important and critical part of the implementation process. Because users can enter unwanted values for the system, so that accuracy of the data can be loosed. The main purpose of data validation is to ensure the input value is in the correct format.

Following java script used to enter numbers only in some important fields like entering pilot telephone numbers and other normal number fields.

```
function isNumber(evt) {
        evt = (evt) ? evt : window.event;
        var charCode = (evt.which) ? evt.which : evt.keyCode;
        if ( (charCode > 31 && charCode < 48) || charCode > 57) {
            return false;
        }
        return true;
    }
```

4.8.2 Reusing existing codes and libraries

Some codes were found in the Internet and used for this project. Excerpt codes have been customized and well tested. The following codes and libraries are extracted from the websites.

PHPmailer class used for handling email functions of this system and following code used to send emails to respective parties. [14]

```
require 'email_PHP_mailer-master\phpmailer\PHPMailerAutoload.php';
$mail = new PHPMailer;
$mail->isSMTP(); // Set mailer to use SMTP
$mail->SMTPOptions = array(
'ssl' => array(
'verify_peer' => false,
'verify_peer_name' => false,
'allow_self_signed' => true ) );
$mail->Host = "smtp.gmail.com"; // Specify main and backup SMTP servers
$mail->SMTPAuth = true; // Enable SMTP authentication
$mail->Username = "pabx.slt.plc@gmail.com";// SMTP username
$mail->Password = "##################";   // SMTP password
$mail->SMTPSecure = "tls";   // Enable TLS encryption, `ssl` also accepted
$mail->Port = 587;// TCP port to connect to
$mail->From = "pabx.slt.plc@gmail.com";
$mail->FromName = "SLT PABX";
$mail->addAddress("THEIR_EMAIL_ADDRESS", "THEIR_NAME");     // Add a recipient
$mail->addAddress($psmemail, "");     // Add a recipient
$mail->isHTML(true);  // Set email format to HTML
$mail->Subject = 'New PABX Proposal!';
$mail->Body    = $message;
```

Phpgraphlib class used to create graphs in the dashboard page. Following code segment create bar graph for number of approved pabx projects relevant to the PSM areas. [15]

```
<?php
include_once("config.php");
include_once("phpgraphlib/phpgraphlib.php");
$graph=new PHPGraphLib(500,300);
$dataArray=array();
$result = mysqli_query($mysqli,"SELECT psm, COUNT(*) AS 'count' FROM request_register,project_status
where request_register.request_id=project_status.request_id and category='new' and status_name in
('installation_completed','ongoing_installation','pending_installation') GROUP BY psm");
if ($result)
    {
        while ($row = mysqli_fetch_assoc($result))
            {
                $salesgroup=$row["psm"];
                $count=$row["count"];
                $dataArray[$salesgroup]=$count; //add to data areray
            }
    }
//configure graph
$graph->addData($dataArray);
$graph->setTitle("Approved Proposals-New");
$graph->setGradient("yellow", "green");
$graph->setBarOutlineColor("black");
$graph->createGraph();
?>
```

Chapter 5 Evaluation and Testing

5.1 Introduction

After the system implementation it should be evaluate. After the evaluations we can identify opportunities, limitations and drawbacks of the implemented system. Software testing is an activity to check whether the actual results match the user's expectations and satisfies the specified requirements or not. In other words Software testing is a validation and verification process. Verification and validation is a life cycle process.

Validation:-Are we building the right product?

Verification:-Are we building the product right?

5.2 Techniques of software testing.

5.2.1 Black Box Testing

The technique of test without any knowledge of the inner workings of the application is called black box test. The tester is unaware of the architecture of the system and has no access to the source code.The tester interacts with the user interface of the system by providing inputs by examining the outputs without knowing how and where inputs are worked. [16]

5.2.2 White Box Testing

The white box test is the detailed study of the internal logicand the structure of the code. The white box test is also called glass test or test open box test. To perform white box test on an application, a tester needs to know the inner workings of the code. [16]

5.3 Types of testing

5.3.1 Unit Testing

Unit testing is a level of software testing where individual components of software is tested. The purpose is to validate that each unit of the software performs as designed. A unit is the smallest testable part of any software. It usually has one or a few inputs and usually a single output. [17]

Under this phase, mainly test main modules of the office management system such as:

- Login module
- Admin module
- Request registration module
- Survey module
- Technical officer assignment module
- Estimating module
- Payment module
- Work order module
- Search module
- Report generation module

5.3.2 Integration Testing

Integration testing is a level of software testing where individual components are combined and tested as a group. The purpose of this level of testing is to expose faults in the interaction between integrated units. Test drivers and test stubs are used to support in Integration Testing. [17]

After the unit test over, modules are integrated one by one till all the modules are integrated, to check the compatibility.

5.3.3 System Testing

System testing is a level of software testing where complete and integrated software is tested. System testing is done with full system implementation and environment. The purpose of this test is to assess the system's compliance with the specified requirements. It falls under the class of black box testing. [17]

5.3.4 Acceptance Testing

Acceptance testing is a level of software testing where a system is tested for acceptability of the user. The purpose of this test is to evaluate the system's compliance with the business requirements and assess product meets the requirements and works as the customer expected. It falls under the class of black box testing. [17]

Software system checks with the users and check whether system's compliance with the business requirements.

5.4 Test Plan and Test Cases

A test plan is a document describing the scope and activities of the test. This is the basis for formally testing any software / product in a project. The creation of a test case is the most important part of the test procedure. After the creation of the test plan, the test creation is completed. Normally, the test cases include the description of the test Cases, the expected output and the status. [17]

Table 5.1-5.3 shows some test cases in the system. Other test cases are presented in appendix D.

Test Case 1- Login to the system				
Test Number	Test Data	Purpose	Result Obtained	Result
1	Enter valid username and password and click login button	login to the index page	Work as expected	Ok
2	Valid user name and wrong password and click login button	Error message popup	Work as expected	Ok
3	Wrong user name and valid password and click login button	Error message popup	Work as expected	Ok
4	Wrong user name & wrong password and click login button	Error message popup	Work as expected	Ok
5	Click forget password link	Load password reset form	Work as expected	Ok
6	Click logout button	Close the session and redirect to login page	Work as expected	Ok

Table 5-1 Test case for login to the system

Test Case 2- User account management				
Test Number	Test Data	Purpose	Result Obtained	Result
1	Click user management menu item	Load user management page	Work as expected	Ok
2	Enter new user credentials and click create	Display message “successfully created”	Work as expected	Ok
3	Enter new user credential insufficiently and click create	Display error message	Work as expected	Ok
4	Click delete users and click submit	Display confirmation message	Work as expected	Ok

5	Click reset password	Display confirmation message	Work as expected	Ok
6	Click view users	Display created users list	Work as expected	Ok

Table 5-2 Test case for user account management

Test Case 03- New PABX request registration				
Test Number	Test Data	Purpose	Result Obtained	Result
1	Click New request Registration Menu item	Load new request registration form	Work as expected	Ok
2	Enter all required field with new pilot number and click submit	Display message "Successfully registered"	Work as expected	Ok
3	Enter all required field with existing pilot number and click submit	Display error message "Pilot number exist"	Work as expected	Ok
4	Not filled all required fields and click submit	Display error message "fields required"	Work as expected	Ok

Table 5-3 Test case for other PABX request registration

5.5 User Evaluation

Normally, the evaluation of the user is performed by selecting different users of the system. In this system, the engineer has been considered as a System Administrator and other users have taken as normal users with different privileges. The questionnaire for the evaluation of the user has been handed over to the target population and the results have been summarized. Following figure 5.1 shows user evaluation questionnaire form.

User Evaluation Questioner						
User Role:- Administrator				Name:- Praneeth.		
#	**Evaluating Item**	**Very good**	**Good**	**Average**	**Poor**	**Very poor**
1	Dashboard		✓			
2	Usability	✓				
3	Functionality		✓			
4	Colour scheme		✓			
5	System Navigation	✓				
6	Interfaces		✓			
7	Easy of learning	✓				
8	Response time	✓				
9	Searching facility	✓				
10	Report generation		✓			
11	Overall reaction	✓				
	Comments	—				

Figure 5.1 User evaluation form

5.6 Summarized result of the user evaluation

An overall feedback of the users are plotted in bar chart for analysis the results. Some users were given suggestions to improve the functionality of the system. Some of the suggestions were added to the system and some were keep for future enhancement. Following figure 5.2 shows summarized user evaluation.

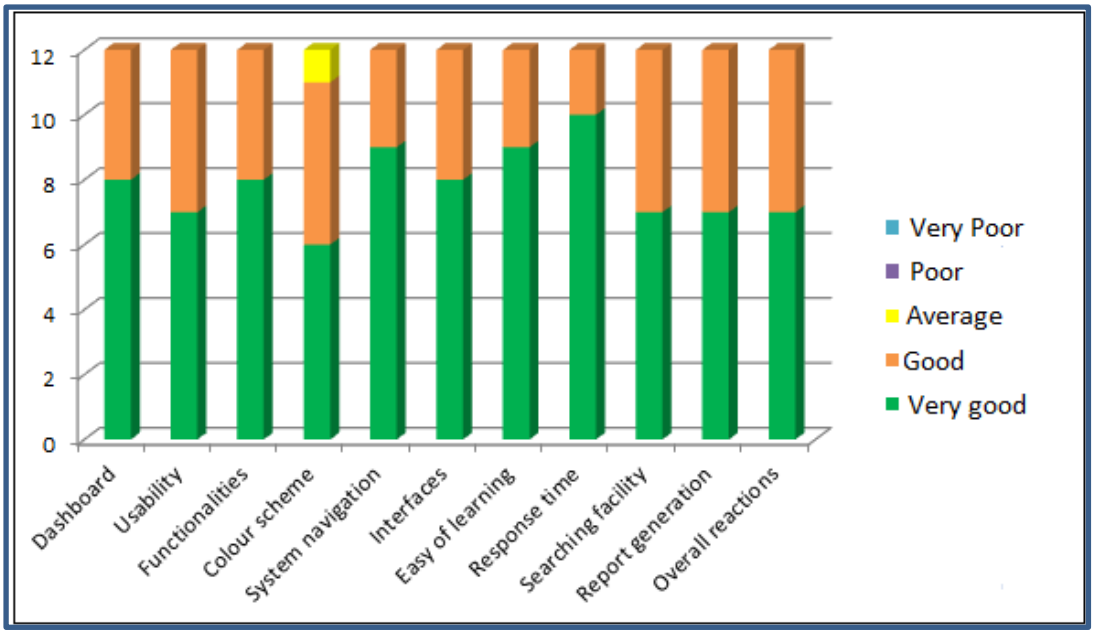

Figure 5.2 Summary of the evaluation

By analyzing the user's feedback we can assure that more than 99% of the system users are happy about the new system. They gave very good comment to most of the features of the system. Most users gave "very good" feedback for the system learning ability and the system response time. Many of them were comment that they are really happy about the new report generation facility and frustrated about the old manual processes. Final outcome of the user evaluation was very successful in the given time.

Chapter 6 Conclusion

6.1 Introduction

Sri Lanka Telecom PLC is world recognized Telco operator in Sri Lanka. PABX division is attached to the Sri Lanka Telecom PLC and Provide PABX needs for the customers. They need to enhance their business with new technology. Earlier they faced many problems with manual system and heavy paper works. But currently they are carrying out their day to day activities effectively. Staff is also works in very happy and joyful mood. Earlier they faced many difficulties for new PABX request registration, estimation, proposal sending and report generation works.

They have to spend lot of time to handle this inefficient manual process. Only one user can work on excel sheet in a given time. This system can use every user simultaneously. Now proposals can directly email to the provincial sales managers. So this helps to reduce heavy paper usage of the company. Quick report generation mechanism helps management to take decisions quickly.

Each identified functional and non-functional requirements were successfully completed in implement phase. Further client was satisfied about my system finally.

6.2 Critical evaluation of the system

Web based office management System is proposed to streamline day to office work by providing user friendly environment for users to facilitate the process in an efficient manner. System expected to provide an efficient and effective service to the users while maintaining a proper management process throughout an automated system. The project began with detail domain analysis through formal sessions and techniques such as interviews, analysis of existing documents, site visits and prototyping.

The requirement gathering and analyzing process helps to understand problem domain more clearly. The key features of the problem domains were poor record maintaining process; limited simultaneous user access and more repetitive work in excel based data storing system. Since the whole set of requirements were congregate around small set of people prototyping

became more appropriate in giving an early experience to the user community and, capture and validate requirements.

This system is complete job management process, since registering the new or other PABX request users can view the each stage and check what happen to the request.

Summary of the system workflows is as follows,

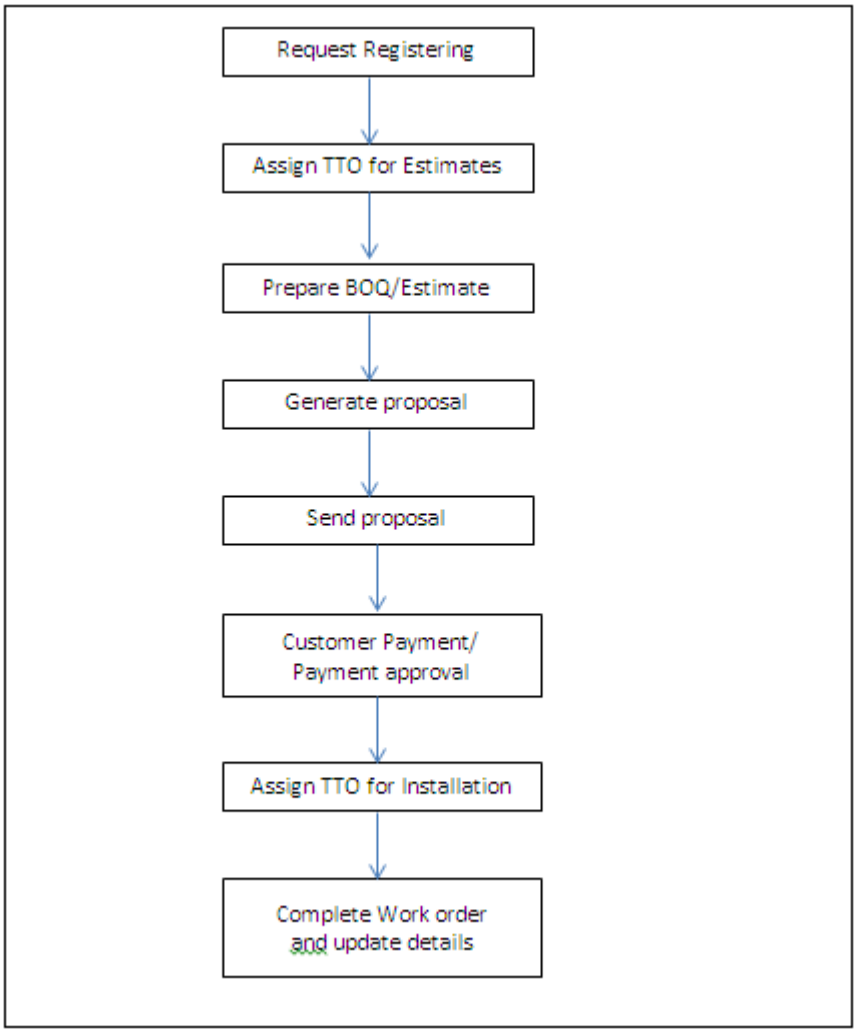

Figure 6.1 System work flow

Whole system is designed to align above work flow which shown in figure 6.1. For every task there is a respective user, and multiple users can access the system simultaneously. As the reputed organization taking accurate managerial decisions is key success for the organization. With this new system report generation task is very easy; it is helpful to get quick managerial decisions.

6.3 Problems encountered

Most of the problems arise when design the system because of the requirement not fixed. They changed time to time because different users follow different manual processes for the same activity. Also some users are not willing to move systematic solution. More time has spent with training sessions to convince some users.

6.4 Future enhancements

This system was developed within a time constraint and current functionalities which client has followed by now. Following are the some of the future enhancement of the system

- Launch system to the Sri Lanka Telecom Intranet Page and allow access all PSM in the county.
- Allow PSM's to register their requests and monitor progress of the project.
- Introduce PABX fault reporting facility
- Improve reports and analyse using analytical tool.

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Appendices

Appendix A System Documentation

This documentation consists of a set of steps to show, how to install this web based office Management System. These steps explain about the hardware and software environment which needs to be installed. When installing the system, this documentation can be followed.

Bellow table list minimum hardware and software requirements of the system.

Hardware requirements

Hardware	Minimum requirement
Processor	Intel Core i5 Processor 2.50 GHz
Memory	2 GB RAM
Hard disc	1TB Capacity
Display	17 inch 1024 X 768 resolution monitor
Internet	1Mbps speed ADSL connection
Printer	Inkjet Printer or LaserJet Printer

Table A-1 Hardware requirement

Software requirements

Software	Minimum requirement
Operating system	Windows 8 or 10
WAMP	WAMP version 3.0.3 or Separate Installation of Apache 2.4.4 / MySQL 5.5.32 / PHP 5.4.16 / phpMyAdmin 4.0.4
Web browser	Firefox (Version 57.0.3) or Google chrome (version 63.0.3239)
Email server	Microsoft exchange or gmail

Table A-2 Software requirement

1st Step

Installing WAMP

- Download and install WAMP for Windows (refer Table A.2 for the Minimum Version) from http://www.wampserver.com/en. Give installation path to C:\wamp of the computer.

Installing Web Browsers

- Install Browsers (refer Table A.2 for the Version and Recommended Browsers).

2nd Step

Files Extraction

- Open the CD and copy the system_files folder and paste it to the directory path "C:\wamp\pbx_office_mgt"

3rd Step

Database Installation

- Open the web browser and type the URL http://localhost/phpmyadmin/ and enter Username and Password (if you set username and password).
- Create empty database by providing name as "**pbxdb**" and navigate to the "**Import**" tab and click "**choose file**" button. Then browse the CD and select the "**pbxdb.sql**" file by opening Database folder.
- Then Press "**GO**" button located in the bottom of the page.

Final Step (Launching System)

- Verify the wamp is running, go to the "C:\wamp\" and open the control panel and verify whether Apache, PHP, MySQL, is running.

- Open the installed web browser and type the URL http://localhost/pabx_office_mgt/system_files/login.html and press “Enter” button to access the system.
- Please refer Appendix-B User Documentation to get the idea about how to operate the system.

Appendix B User Manual

Login to the system

Open the web browser that configured in the installation. Type the URL http://localhost:8081/pabx_office_mgt/system_files/login.html and navigate. Then users navigate to the Login page that is under figure B.1. To access the system, user have to login to the system with valid credentials. Then it directs user to the index page which is under figure B.2.

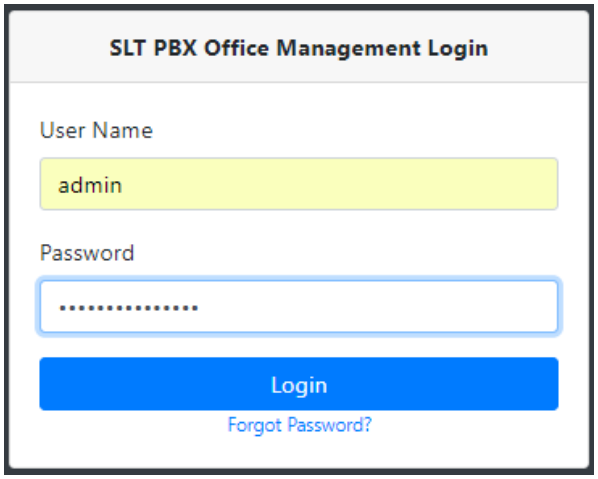


Figure B.1 System Login Page

In index page (figure B.2**)**, dash board, navigation menu and relevant user information showed to the logged user. Navigation menu items different to the user type.in this we are logged as admin so all menu items shown to the user.

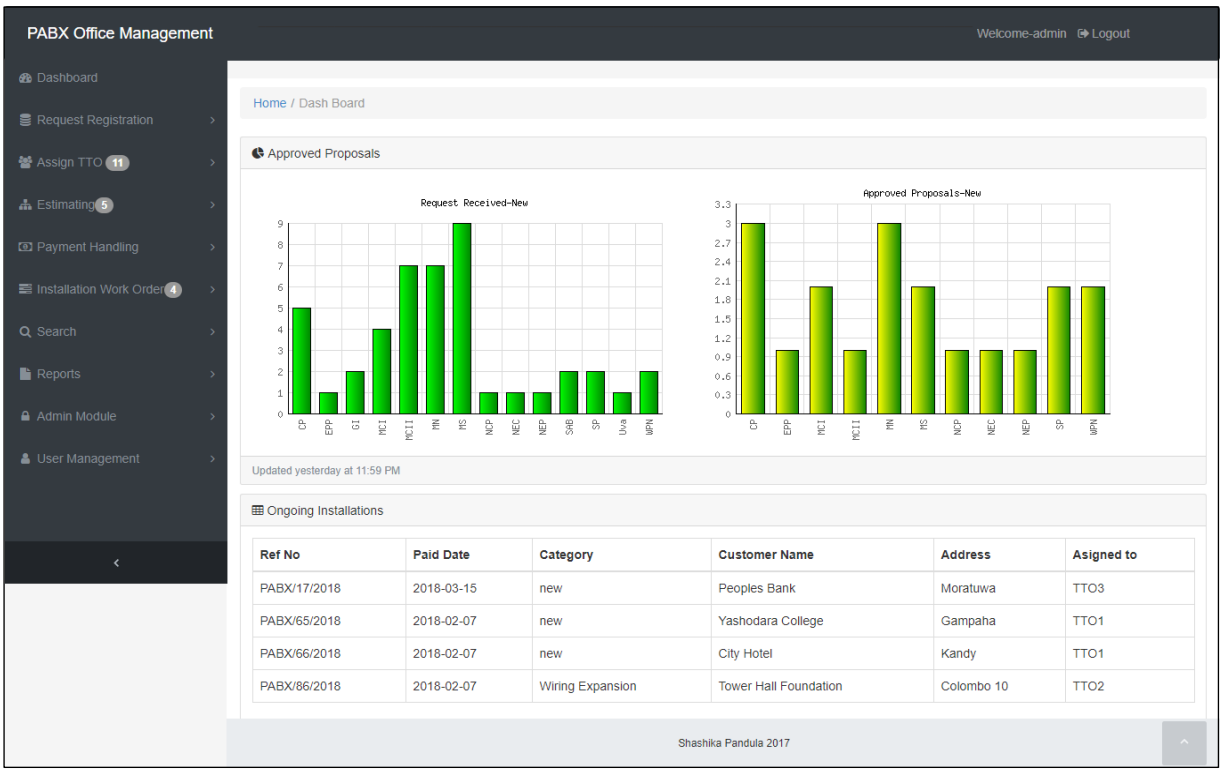


Figure B.2 Dashboard Page

Forgot password

If user forgot their password user can click forgot password link in login form. Then they will redirect to password change request form page that is under figure B.1.

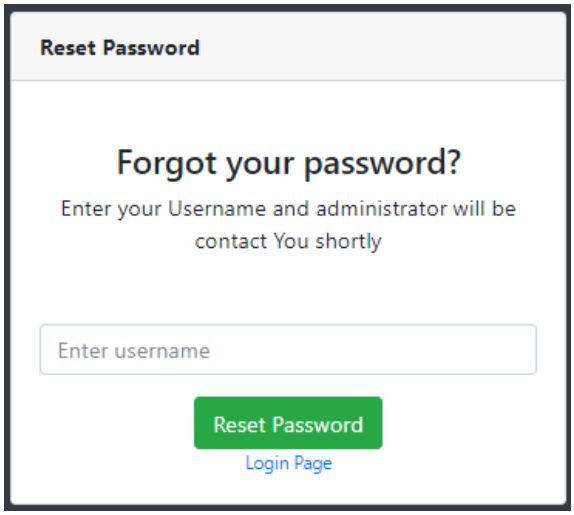


Figure B.3 Password reset request form

Navigation Between pages

After login to the system, navigation menu used to navigate between pages which is mentioned under figure B.4. Also currently active page is shown in the breadcrumb.

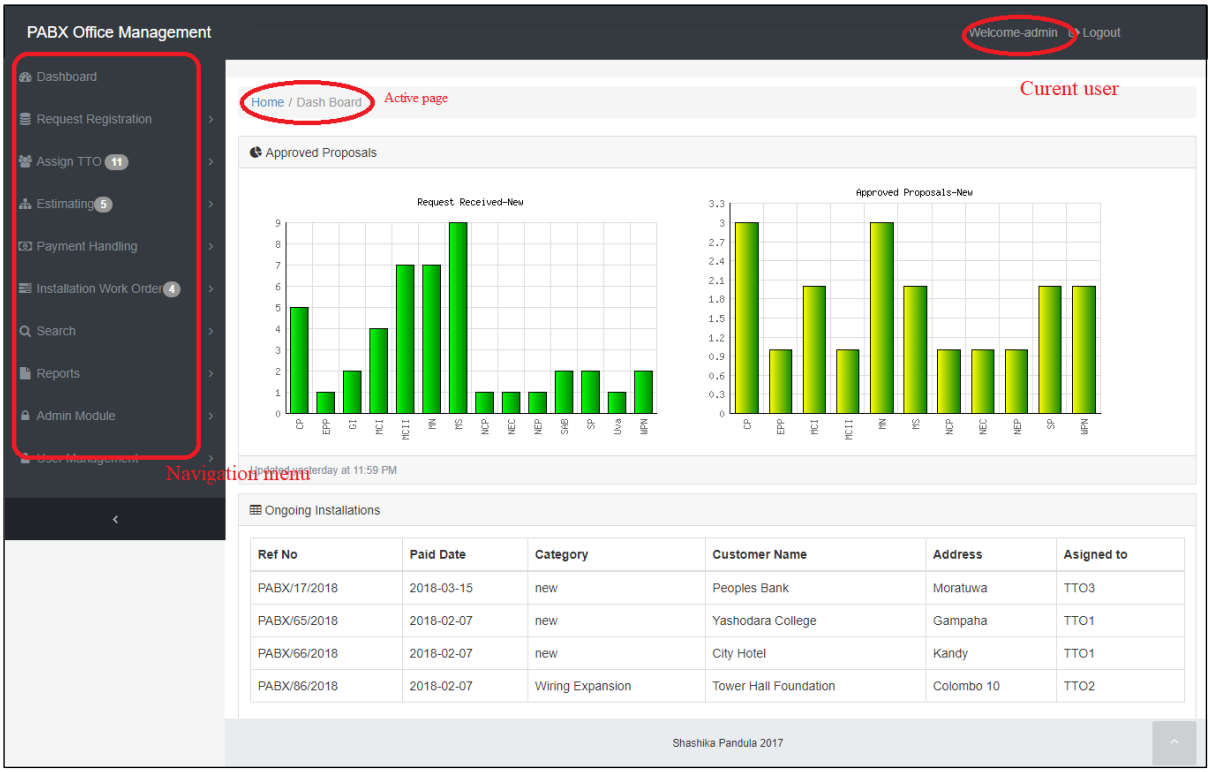


Figure B.4 Navigation menu and currently active page

Logout from the system

Logout link can be found on the top right hand corner of the figure B.2. After clicking this link in pop up widow showed in figure B.5, user can successfully logout from the system and it will direct user back to the Login Page.

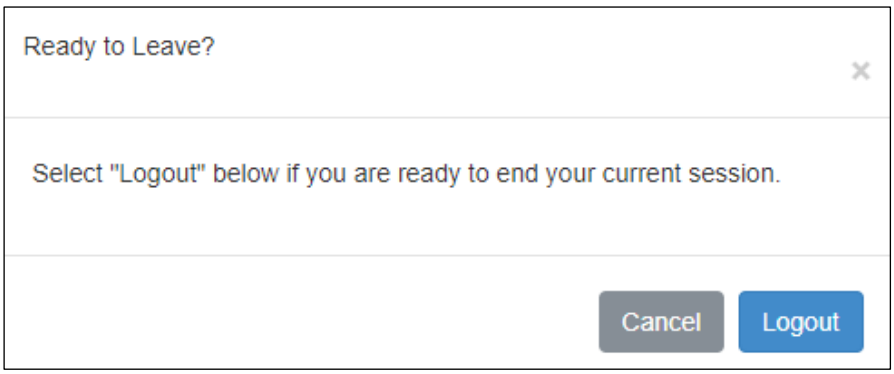


Figure B.5. Logout confirmation window

New user registration

After click Admin module→create user

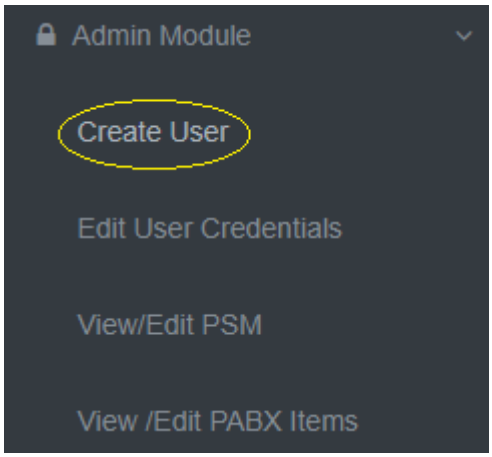


Figure B.6 Navigation to create user

User creation form is loaded as showed in figure B.7. After fill all required data and click register button, new user is created and username and password emailed to the relevant users mail box.

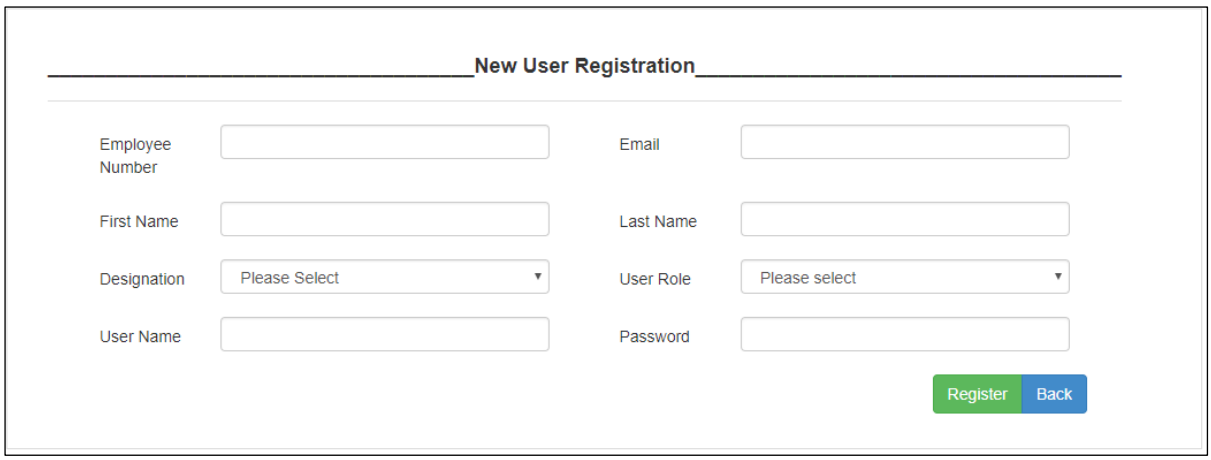


Figure B.7 New user registration form

Request registration

As represent in figure B.8, request registration menu there are 3 menu items.

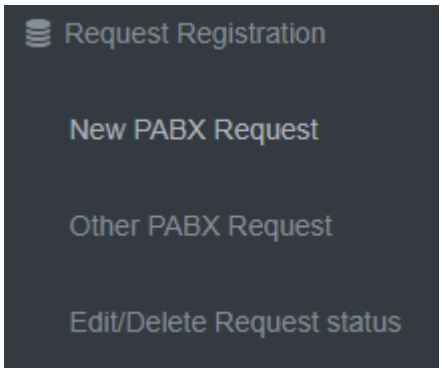


Figure B.8 Request registration menu

New PABX request registration

After click Request registration→New PBX request

New request registration form is loaded to the screen as showed in figure B.9. This form allowed navigating previously visited page. Also have clear button to clear all filled form data fields. After fill all requested data click submit button to add new request details to the system.

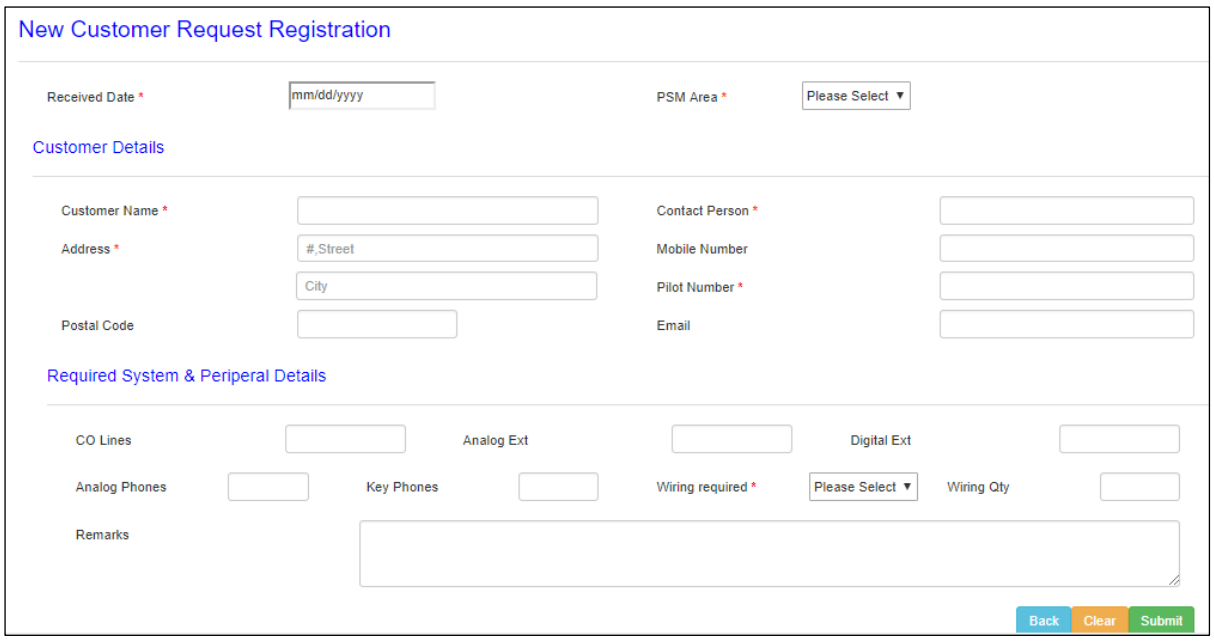


Figure B.9 New PABX request registration form

Other PABX request register

In order to register wiring expansions, system expansions and repairs, first user need search particular request belongs to existing customer.

By click Request Register → Other PABX request

User directed to the customer search form showed in figure B.10.

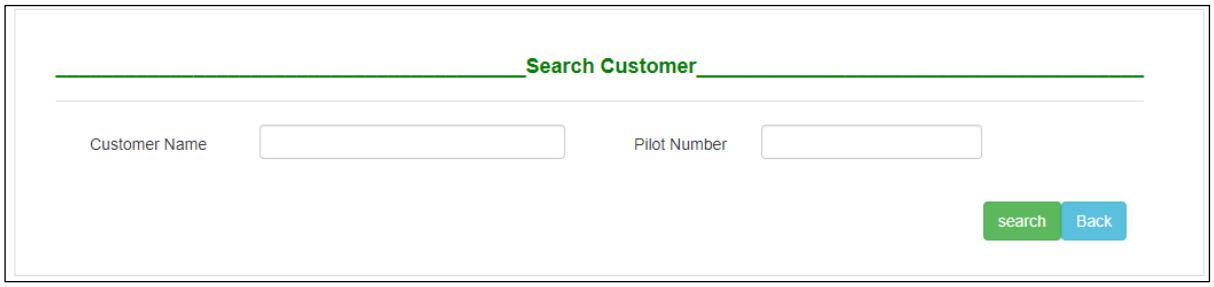


Figure B.10 Customer search form

Customer can search either customer name or pilot number. If matching customers found from the search criteria results are displayed in tabulated form as showed in figure B.11.

Figure B.11 Search customers result page

By click “view customer Details” link as showed in figure B.11, Customer details form is loaded and relevant data is displayed as showed in figure B.12.

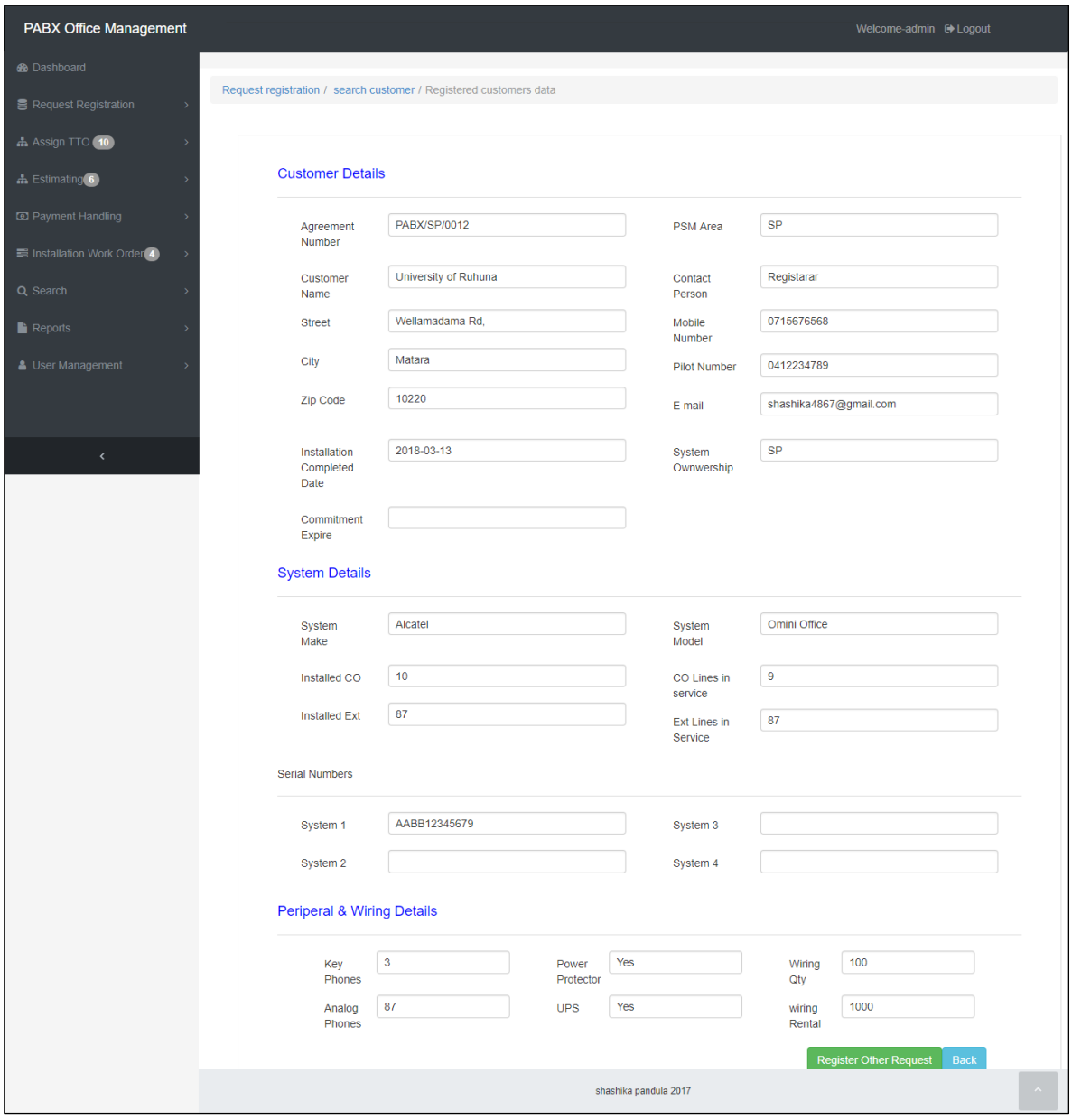


Figure B.12 Customer details form

By clicking “Register other Request” button as showed in figure B.12, Other request registration form is loaded. It is showed in figure B.13

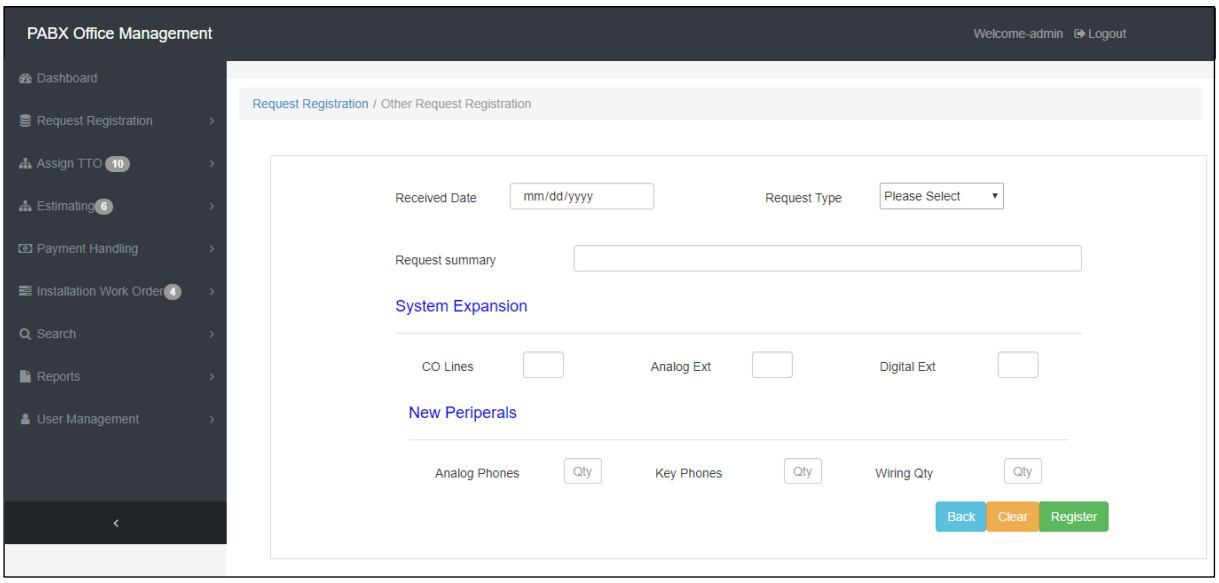


Figure B.13 Other request registration form

After fill all required fields and click register button to add other request details to the system.

Edit/delete registered request

If user need to edit or delete customer request, Request edit / delete form can be get by

By click Request Register → Other PABX request

User directed to the customer search form showed in figure B.14.

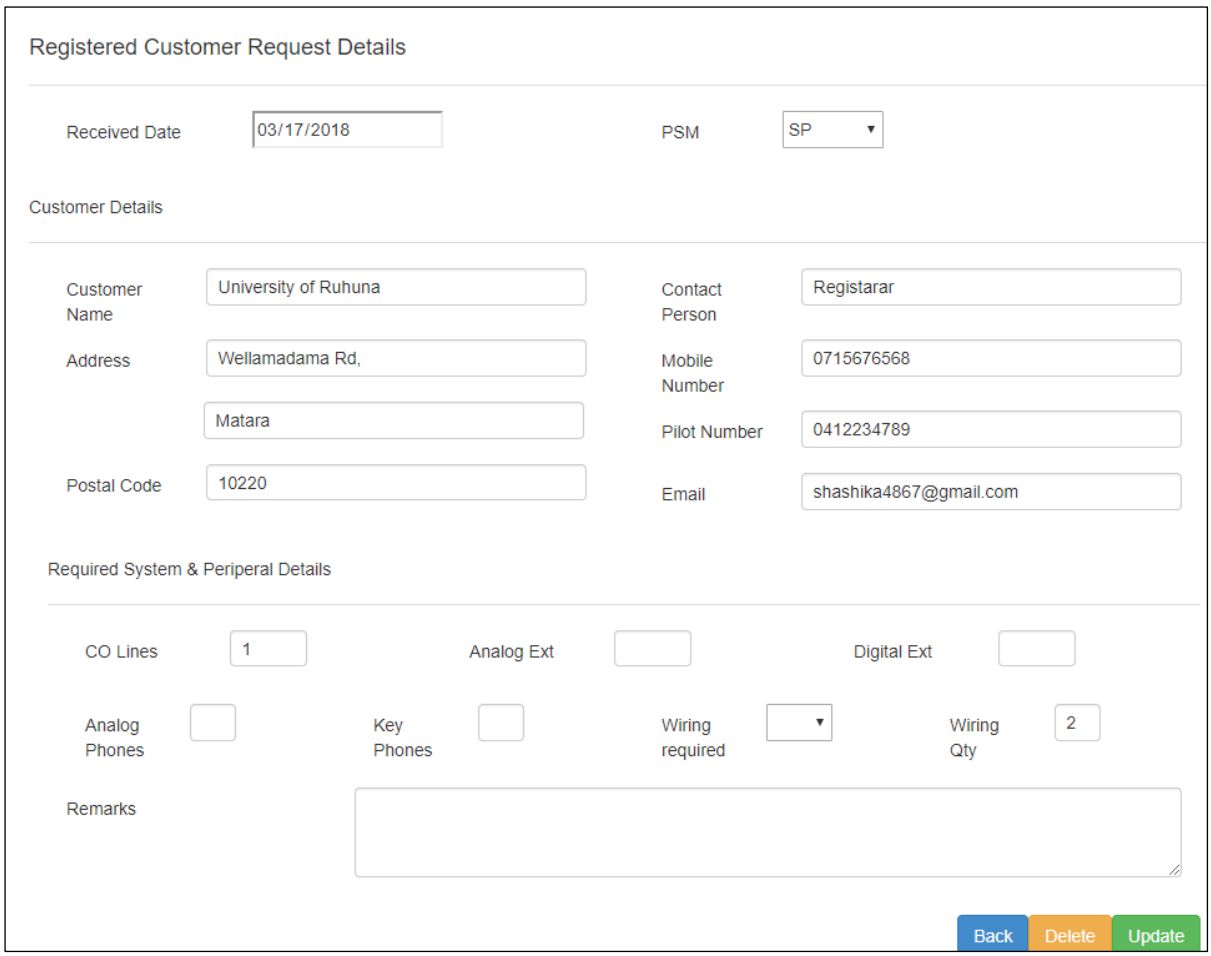


Figure B.14 Edit / Delete registered request

Assigning technical officers

As represent in figure B.15 technical officer assign menu has 2 menu items.

Figure B.15 TTO assign menu

Assign Technical officers for estimates

After request registered (New or Other) technical officers can assign to the project by navigating

Assign TTO→ Assign TTO for site Estimates

Then register request list is displayed as showed in figure B.16.

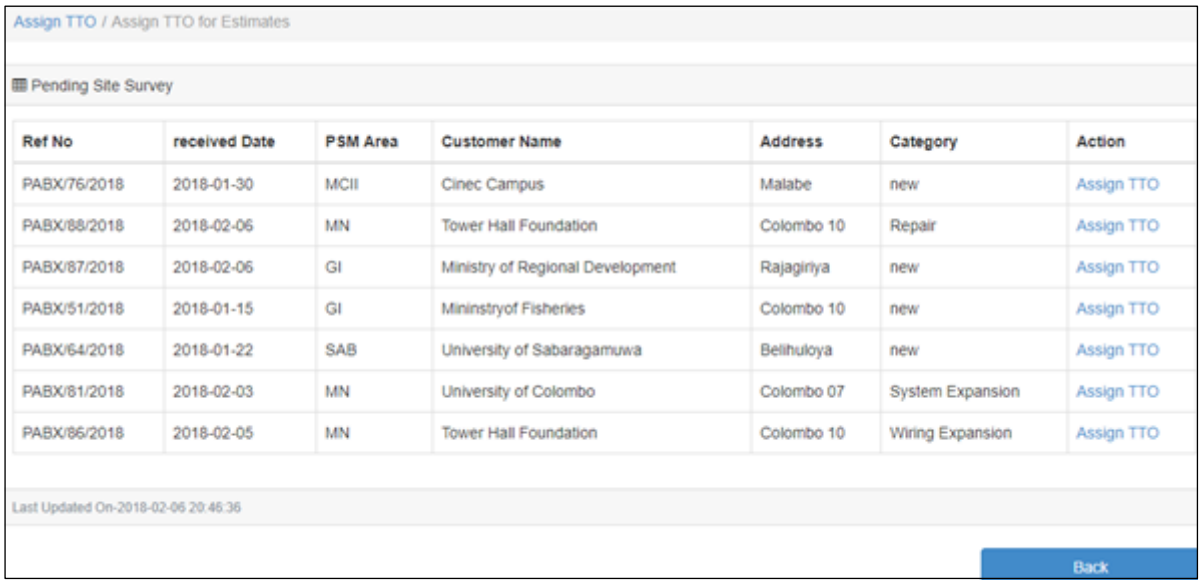


Figure B.16 Registered New PABX and Other PABX Requests

After click “Assign TTO” from above form technical assigning form is loaded.

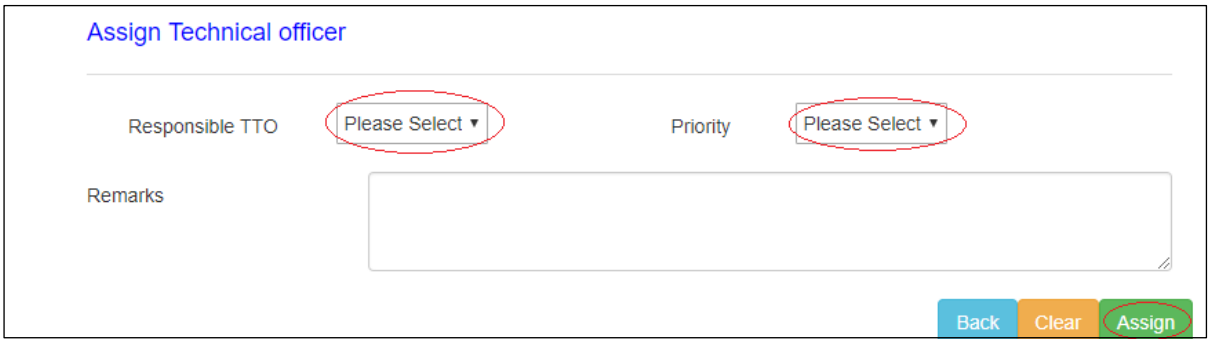


Figure B.17 Assign Technical for site survey

After selecting responsible technical officer and project click assign button to add details to the system.

Estimating menu

As represent in figure B.18, estimating menu has 3 menu items.

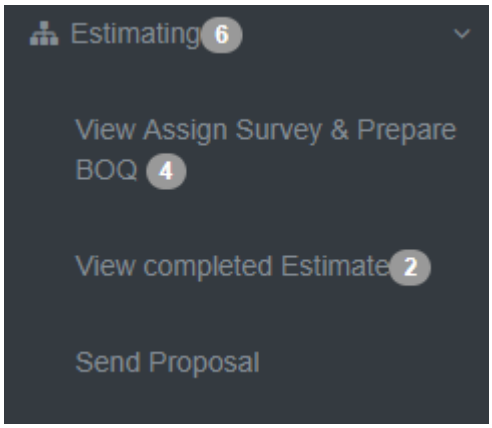


Figure B.18 Estimating menu

View assigned surveys and prepare BOQ

Technical officers want know that what project is assigned to them for site survey. So this module provides facility to view assigned survey and prepare BOQ according to the received request.

Estimating → View Assigned Survey and Prepare BOQ

Above path is direct to the assigned survey list as showed in figure B.19.

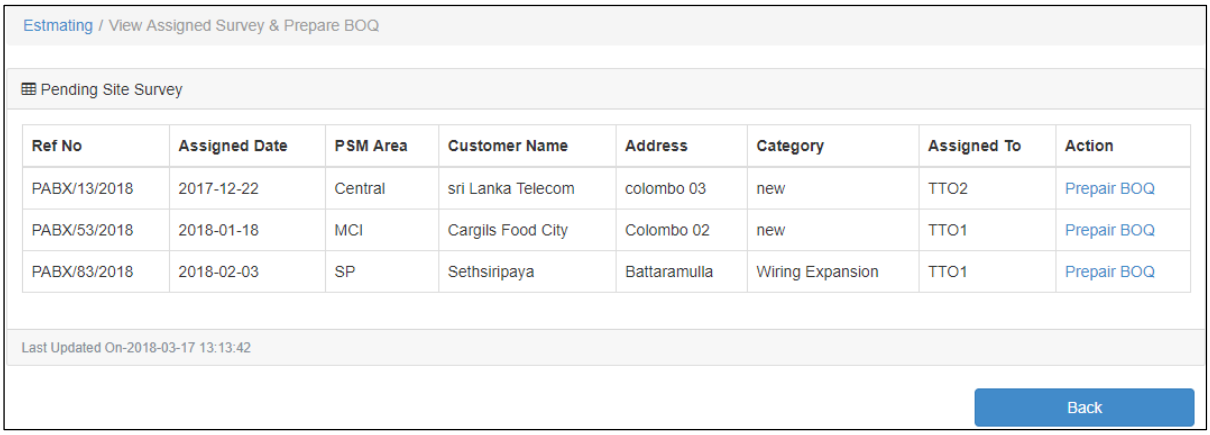


Figure B.19 View assigned site surveys

For prepare BOQ user need to click “Prepare BOQ” link. Then it redirected to BOQ preparation form.

Technical officer can enter estimated data in to the BOQ preparation form and click create button to insert records to the system.

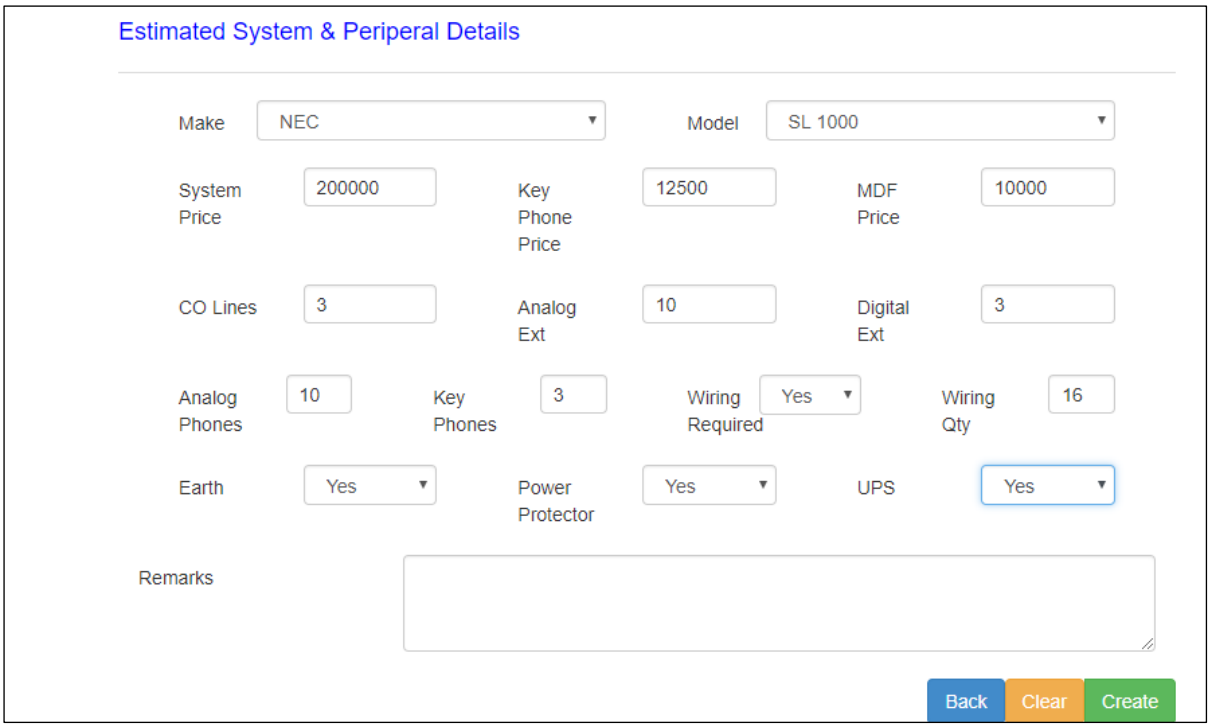


Figure B.20 Prepare BOQ

Generate proposal and Send to PSM

After completing the BOQ preparation admin can view created proposal for the customer request. New request and other requests generate two different kinds of proposals. For view proposals;

Estimating → View Completed Estimates

Then below completed estimate list form will appear.

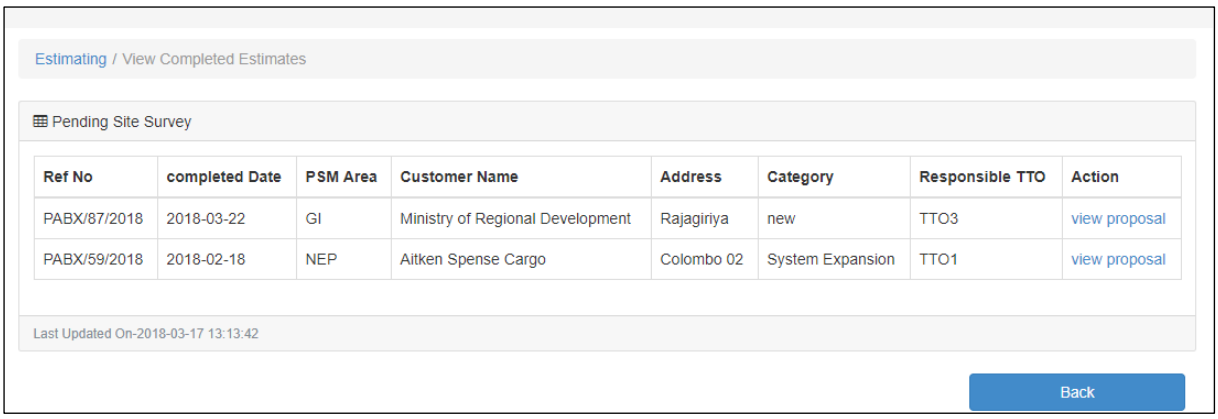


Figure B.21 Completed estimates

- To view proposal, click “view proposal” link.
- If Proposal related to the New PABX request, New PABX proposal will be loaded.
- If Proposal related to the Other PABX request, Other PABX proposal will be loaded.

Buttons related to the Proposal

- Figure B-18 shows the buttons in new and other proposals.
- To get print out of the proposal click “Print Proposal” button.
- If Proposal needs to change, click “Edit” button then estimate form loaded with current data.
- If Proposal is matching to the customer request, click “Send to PSM” button to send completed Proposal to the relevant PSM.
- Then email send to the relevant PSM

Figure B.22 Buttons in New and other PABX proposals

Payment Menu

As represent in figure B.23, payment handling menu there are one menu item.

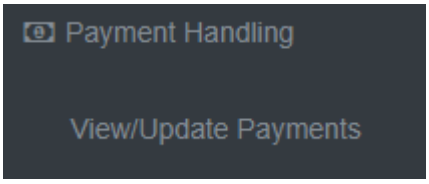


Figure B.23 Payment handling module

Update Customer Payments

For update customer payments, first search relevant customer proposal from below search form.

Payment Handling → View/Update customer payments

Then following search form will loaded to the main screen. (Figure B.24)

Search Criteria

- Enter Reference No of the proposal which can be finding on the payment receipt.
  Eg :- "PABX/0010/2018" or
- Enter Customer Pilot number
  Eg :- "0112021344"
- Then click search button, if result found it will displayed on the table as shown in figure B.25 and figure B.26.

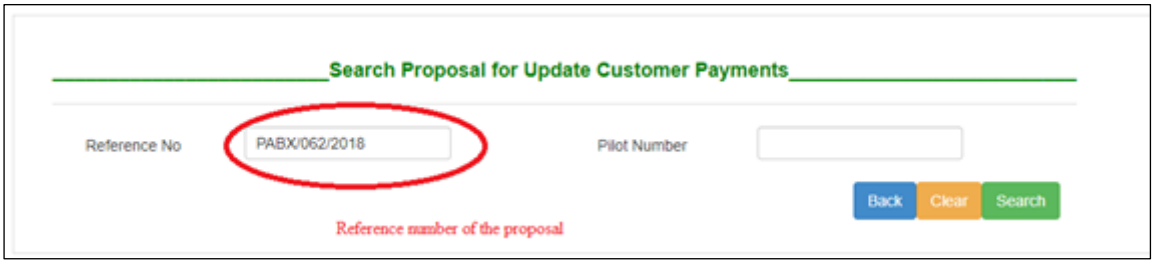


Figure B.24 Search customer proposal

- If payment related to fresh payment below search result table will loaded.(Figure B.25)

Figure B.25 Search result table for add payment

- Click “Add Payment” link to load payment add form.
- Loaded payment update form shown in figure B.26.
- After fill all relevant fields click “Add Payment” button to submit payment details to the system.

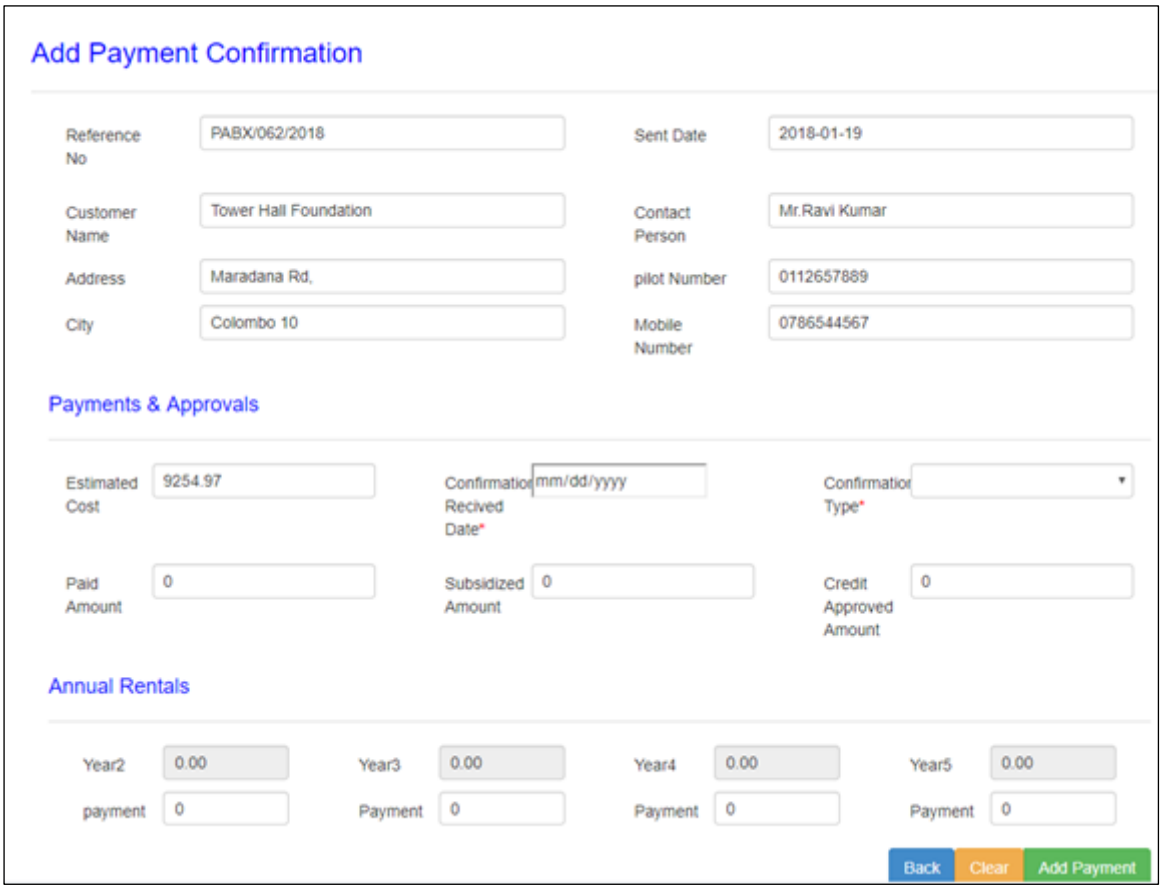


Figure B.26 Payment confirmation add form

- If payment related to balance payment below search result table will loaded.(figure B.27)

Figure B.27 Search table results for update balance payment

- Click “Update Payment” link to load add payment form.
- Loaded payment update form shown in figure B.28.
- After fill all relevant fields click “Update Payment” button to update payment details of the previous payment.

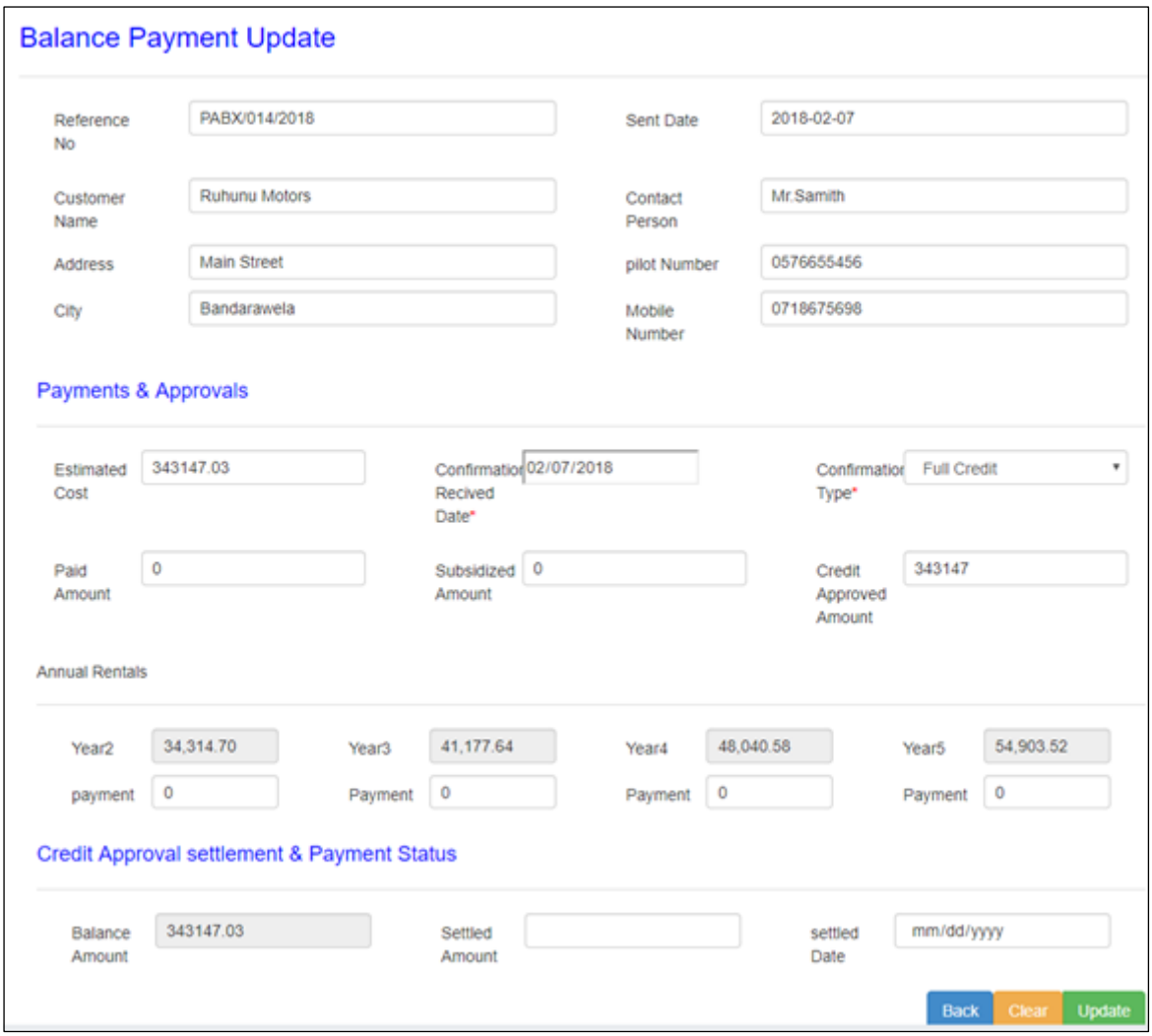


Figure B.28 Balance payment update form

Assign Technical officers for installation

- After add payment confirmation Technical officers assign to the installation by following path;
- Assign TTO → assign TTO for installation
- Then payment approved customer list is loaded as Figure B.29.

Ref No	Paid Date	PSM Area	Customer Name	Address	Category	Action
PABX/14/2018	2018-02-07	Central	Ruhunu Motors	Bandarawela	new	Assign TTO
PABX/55/2018	2018-02-04	SP	Sethsiripaya	Battaramulla	Repair	Assign TTO
PABX/72/2018	2018-02-04	NCP	Coconut Control Board	Kurunegala	new	Assign TTO
PABX/84/2018	2018-02-04	MN	Solution City	Colombo 07	new	Assign TTO
PABX/85/2018	2018-02-04	MCI	Kangaroo Cabs	Colombo 03	new	Assign TTO

Figure B.29 Payment approved customer list

- Click “Assign TTO” link to load, Technical officer assign form.(figure B.30)
- Select relevant Technical officer and Job priority from the drop down menu.
- Click assign TTO button for assign technical officers for installations.
- Available TTO’s are
    - TTO 1
    - TTO 2
    - TTO 3
- Available Job priorities are
    - High
    - Medium
    - Low

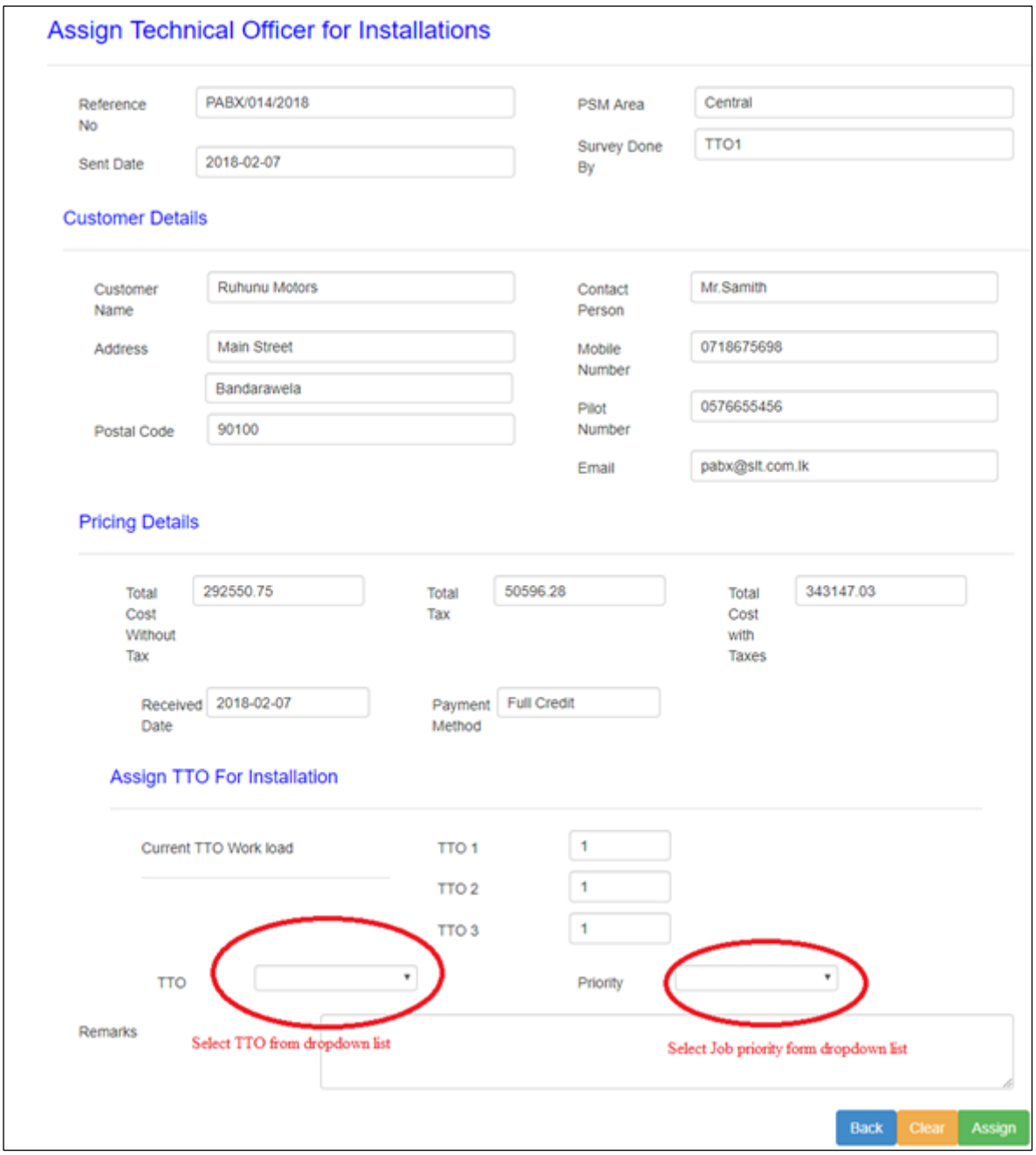


Figure B.30 Technical officer assign form for installations

Installation works order

As represent in figure B.31, installation work order menu has one menu item.

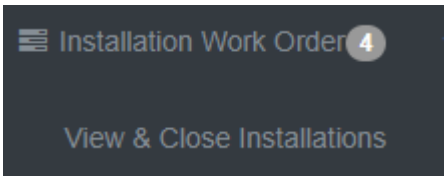


Figure B.31 installation work order menu

View assigned installations and close work order

- To view assigned installations

  Installation Work Order →View and close Installations
- Then assigned installation list will display as shown in figure B.26.

Ref No	Assigned Date	PSM Area	Customer Name	City	Category	Assigned To	Action
PABX/17/2018	2018-03-15	MCI	Peoples Bank	Moratuwa	new	TTO3	View Work order |Close Work Order
PABX/65/2018	2018-02-07	WPN	Yashodara College	Gampaha	new	TTO1	View Work order |Close Work Order
PABX/66/2018	2018-02-07	CP	City Hotel	Kandy	new	TTO1	View Work order |Close Work Order
PABX/86/2018	2018-02-07	MN	Tower Hall Foundation	Colombo 10	Wiring Expansion	TTO2	View Work order |Close Work Order1

Figure B.32 Assigned Installation for TTO's

- Click “View Work Order” link (Figure B.32) to navigate assigned work order window as shown in figure B.33.

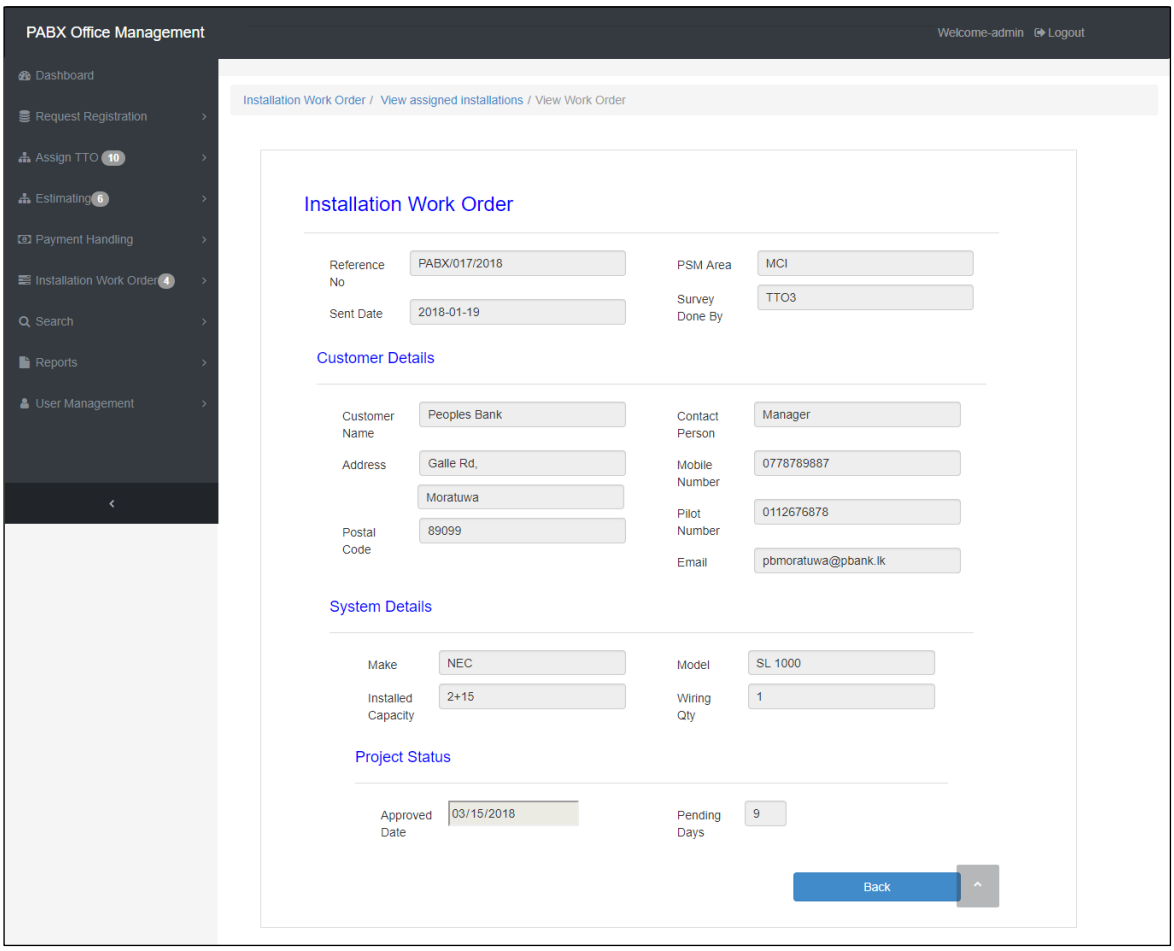


Figure B.33 Installation Work order

- Click “close work order” link as shown in figure B.32 to load work order close form.
- If Work order is related to the new project, following work order close form loaded as shown in figure B.34

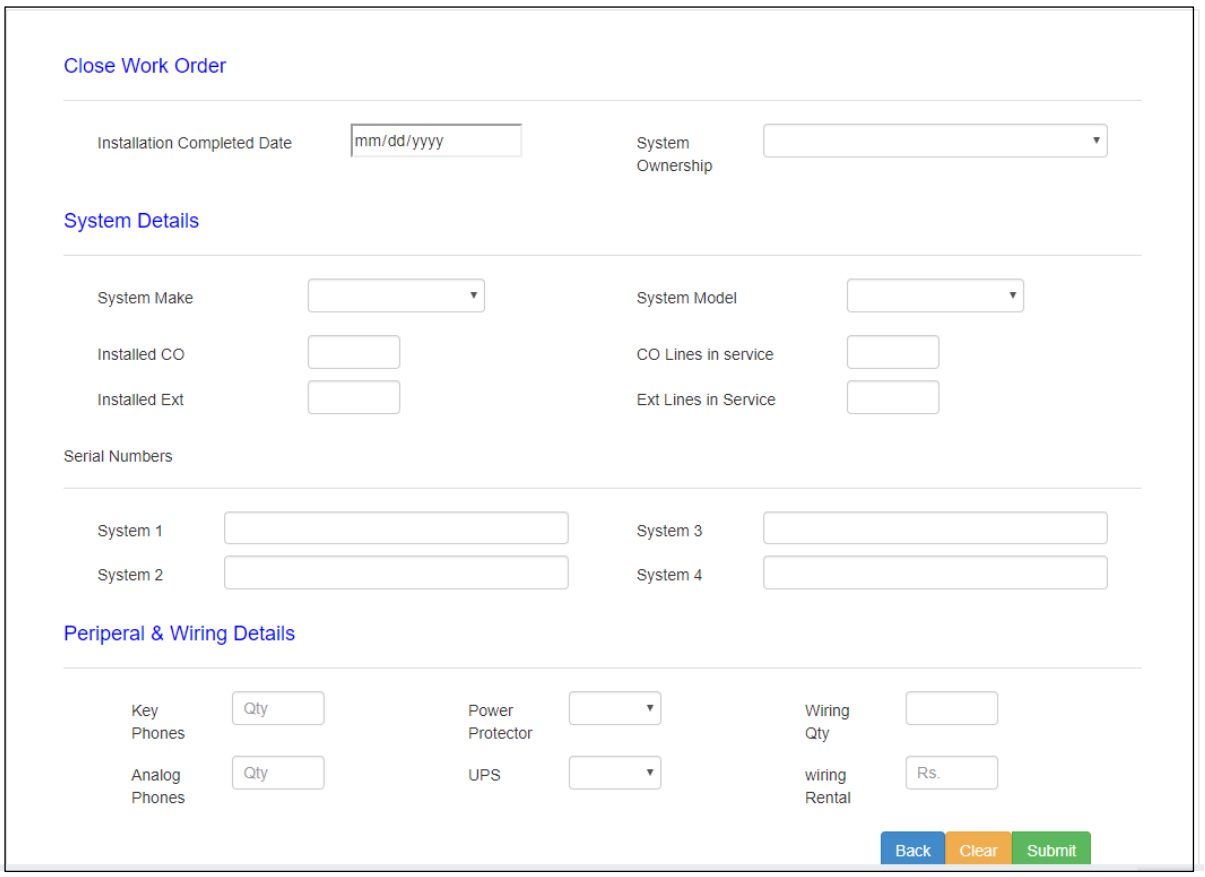


Figure B.34 Work order close form

- Fill all required fields related to installation and click submit button to add records to the system.
- If work order related to “other category” following form (figure B.35) will be loaded. when click “close work order” link in figure B.32.

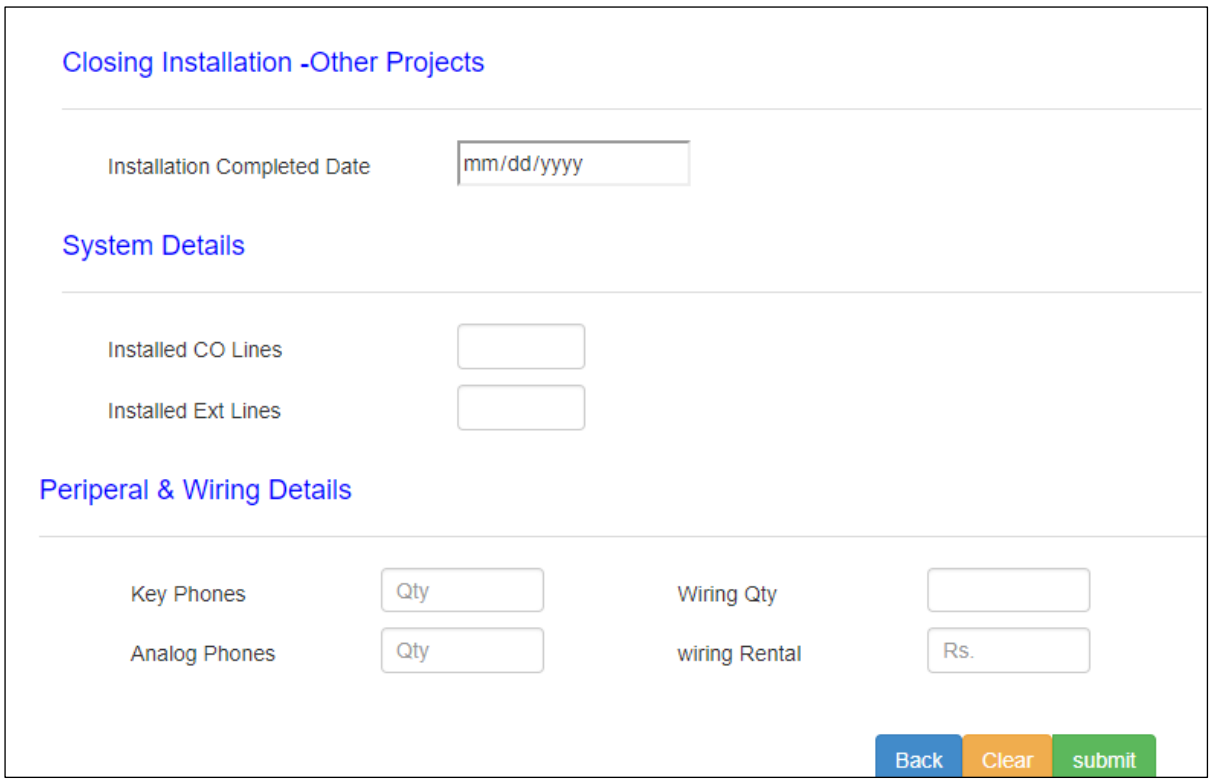


Figure B.35 Installation Closing Form -Other Projects

Search Menu

As shown in figure B.36 search menu has two menu items.

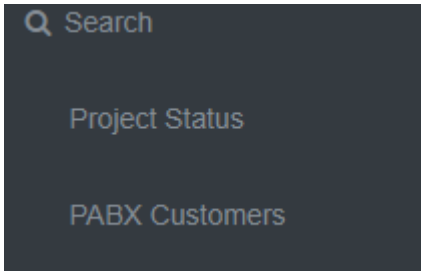


Figure B.36 Search menu

Project status search

- Navigate to project status search

  Search →project status

  Then following search form will be loaded,

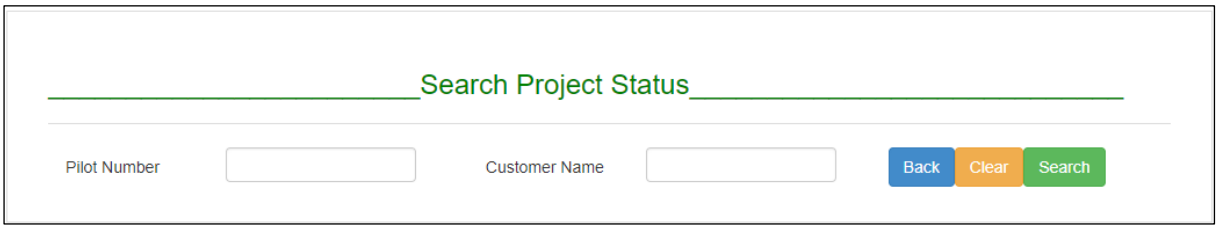


Figure B.37 Project status search form

Then you can search the project status by customer pilot number or customer name.

Eg- search result for “ruhuna”

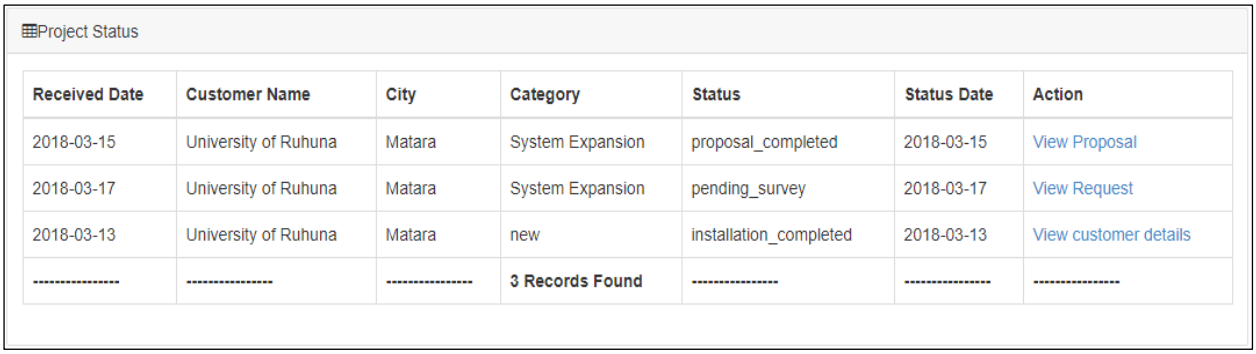


Figure B.38 Project status search results

Search customer

- Navigate to customer search

  Search →customer

  Then following form will be loaded.

Figure B.39 Search customer

You can search customer either customer name or agreement number. Search results are as represent in figure B.40.

Eg-“Tower Hall”

Figure B.40 Customer search results

To view the detail view of the customer click “View details” link

PABX Reports

System allows generate various types of reports. As represent in figure B.41, report menu has 6 menu items.

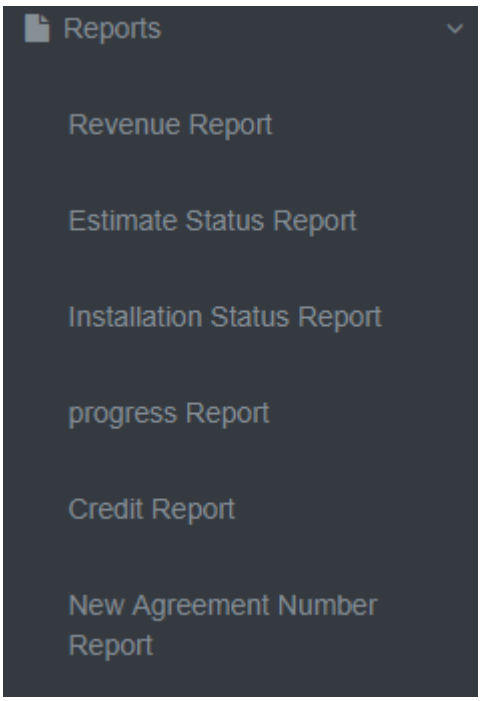


Figure B.41 Reports menu

Searching interface for revenue report as represent in figure B.42

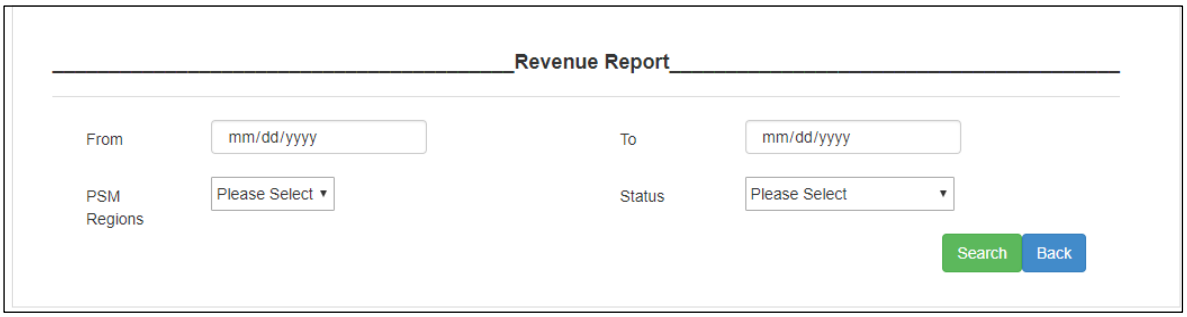


Figure B.42 Revenue report generate

Relevant reports can be generating by giving relevant search criteria. Generated reports are shown in Appendix C.

Appendix C Management Reports and Proposals

New agreement number report

Figure C.1 represents the agreement number report. In this report newly added customers and their agreement numbers are printed with installed dates. This report helps to update customer data to the fault management system. In fault management system customers are uniquely identified by their agreement number. Monthly they are sent this report to the Fault management department. Report can be generating between any given dates.

New Agreement Number Report

PABX Division, Sri Lanka Telecom PLC

New Agreement Numbers from 2018-02-01 to 2018-03-01

Agreement Number	Customer Name	Street	City	PSM Area	Pilot Number	Installed Date
PABX/MN/0008	University of Colombo	Kumarathunga Munidasa Mw,	Colombo 03	MN	0112581835	2018-02-02
PABX/CP/0009	IOC	Main street	Bandarawela	CP	0112456789	2018-02-07
PABX/MCII/0010	Cinec Campus	Chandrika Kumarathunga Rd,	Malabe	MCII	0112345600	2018-02-16
PABX/NEC/0011	Blue Wave Hotel		Arugambey	NEC	0672222314	2018-02-16

Updated 20.03.2018

Figure C.1 New agreement number report

Estimation status report

This report helps to get estimation status of the job. Status can be “pending”, “ongoing” ,“completed” or “all” .Also can select the category of the estimate that is whether “new” or “other”. Figure C.2 and C.3 represents the Estimation status report for all status in new and other categories.

Estimation Status Report

PABX Division, Sri Lanka Telecom PLC

Estimation Status Report for new projects from 2018-01-01 to 2018-03-22

Received Date	Customer Name	City	pilot_number	Category	status_name	status_date
2017-12-19	Mihiri Foods	kandy	0112345684	new	proposal_completed	2018-03-15
2017-12-21	Aitken Spense Cargo	Colombo 02	0112089788	new	installation_completed	2018-01-14
2018-01-30	Cinec Campus	Malabe	0112345600	new	installation_completed	2018-02-16
2018-02-21	University of Colombo	Colombo 03	0112581835	new	installation_completed	2018-02-02
2018-01-03	Toyota Lanka	Wattala	0113456787	new	installation_completed	2018-01-13
2018-01-18	IOC	Bandarawela	0112456789	new	installation_completed	2018-02-07
2018-01-12	Sethsiripaya	Battaramulla	0112567891	new	installation_completed	2018-01-14
2018-02-06	Ministry of Regional Development	Rajagiriya	0112811111	new	pending_proposal	2018-03-22
2018-01-15	Mininstryof Fisheries	Colombo 10	0112000000	new	pending_survey	2018-01-15
2018-03-13	University of Ruhuna	Matara	0412234789	new	installation_completed	2018-03-13
2018-01-15	Cargils Food City	Colombo 02	0113987677	new	ongoing_survey	2018-01-18
2018-01-18	Tower Hall Foundation	Colombo 10	0112657889	new	installation_completed	2018-01-19

Figure C.2 Estimation status report for new projects

Estimation Status Report

PABX Division, Sri Lanka Telecom PLC

Estimation Status Report for other projects from 2018-01-01 to 2018-02-28

Received Date	Customer Name	City	pilot_number	Category	status_name	status_date
2018-02-06	Tower Hall Foundation	Colombo 10	0112657889	Repair	pending_survey	2018-02-06
2018-01-18	Sethsiripaya	Battaramulla	0112567891	Wiring Expansion	installation_completed	2018-01-18
2018-01-18	Aitken Spense Cargo	Colombo 02	0112089788	System Expansion	pending_proposal	2018-02-18
2018-01-19	Tower Hall Foundation	Colombo 10	0112657889	Repair	proposal_completed	2018-01-19
2018-02-03	Aitken Spense Cargo	Colombo 02	0112089788	System Expansion	proposal_completed	2018-02-04
2018-02-03	Sethsiripaya	Battaramulla	0112567891	Wiring Expansion	ongoing_survey	2018-02-03

Figure C.3 Estimation status report for other projects

Project progress report

Progress report can be generate for “new” and “other” projects in PSM area wise. In this report, summarize the whole data in given date period. We can capture the number of registered request, sent proposals, approved proposals and completed installations relevant to

respective PSM area. Figure C.4 and C.5 represents the project progress reports for new and other projects.

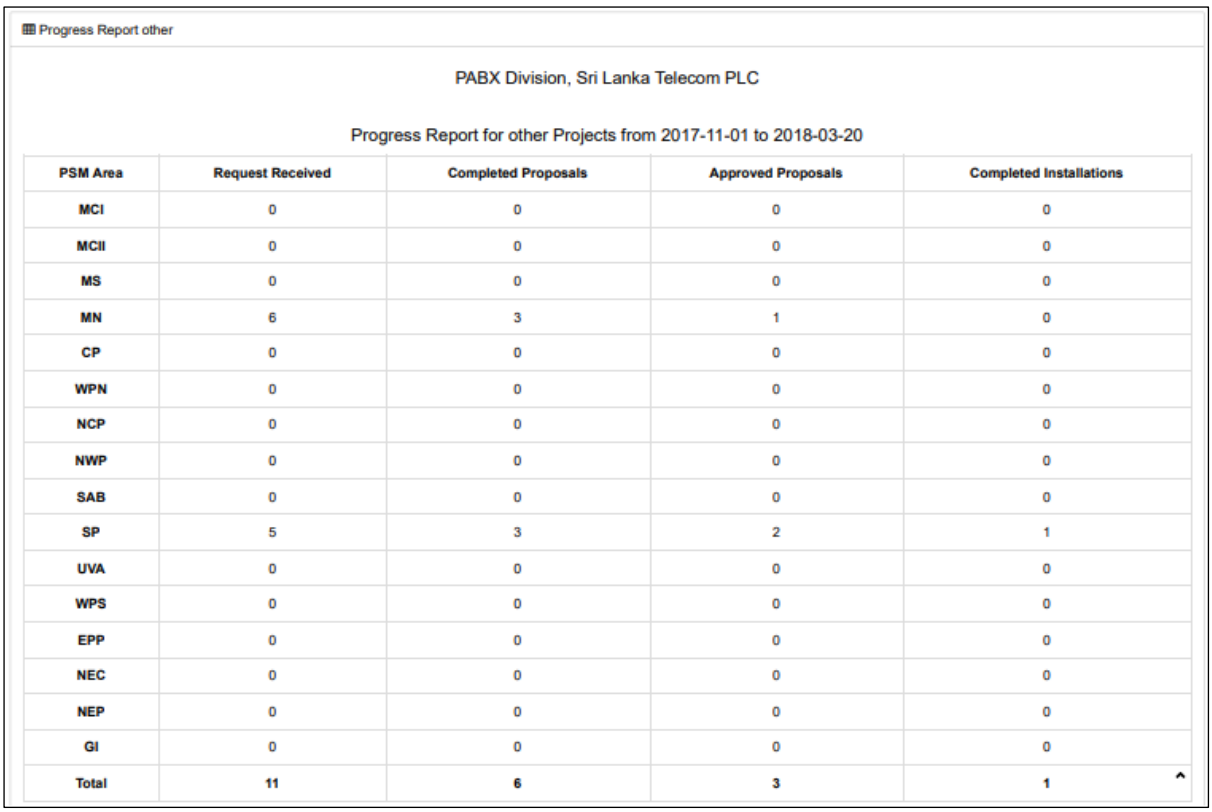
Progress Report-New Projects

PABX Division, Sri Lanka Telecom PLC

Progress Report for new Projects from 2017-11-01 to 2018-03-20

PSM Area	Request Received	Completed Proposals	Approved Proposals	Completed Installations
MCI	3	2	2	0
MCII	1	1	1	1
MS	2	2	2	2
MN	4	4	3	2
CP	4	3	3	1
WPN	2	2	2	1
NCP	1	1	1	0
NWP	0	0	0	0
SAB	2	1	0	0
SP	2	2	2	2
UVA	1	1	0	0
WPS	0	0	0	0
EPP	1	1	1	1
NEC	1	1	1	1
NEP	0	0	0	0
GI	2	0	0	0
Total	26	21	18	11

Figure C.4 Progress report for new projects



Progress Report other

PABX Division, Sri Lanka Telecom PLC

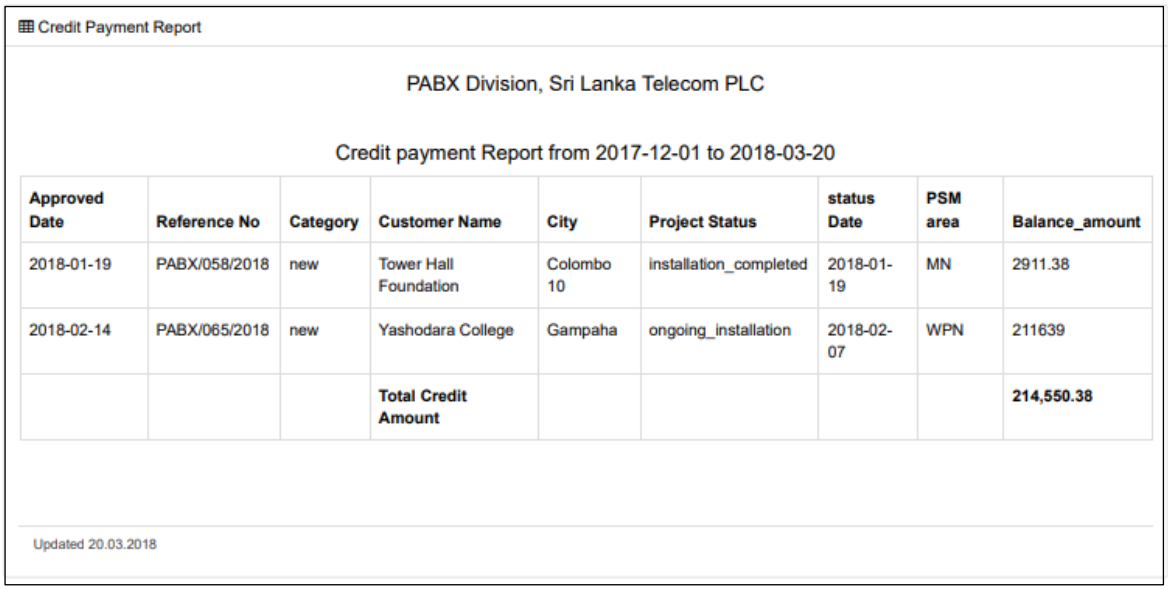
Progress Report for other Projects from 2017-11-01 to 2018-03-20

PSM Area	Request Received	Completed Proposals	Approved Proposals	Completed Installations
MCI	0	0	0	0
MCII	0	0	0	0
MS	0	0	0	0
MN	6	3	1	0
CP	0	0	0	0
WPN	0	0	0	0
NCP	0	0	0	0
NWP	0	0	0	0
SAB	0	0	0	0
SP	5	3	2	1
UVA	0	0	0	0
WPS	0	0	0	0
EPP	0	0	0	0
NEC	0	0	0	0
NEP	0	0	0	0
GI	0	0	0	0
Total	11	6	3	1

Figure C.5 Progress report for new projects

Credit payment report

In this report we can capture the projects which done under credit basis and approved credit amount. Figure C.6 represent the credit report form 01/12/2017 to 28/02/201



Credit Payment Report

PABX Division, Sri Lanka Telecom PLC

Credit payment Report from 2017-12-01 to 2018-03-20

Approved Date	Reference No	Category	Customer Name	City	Project Status	status Date	PSM area	Balance_amount
2018-01-19	PABX/058/2018	new	Tower Hall Foundation	Colombo 10	installation_completed	2018-01-19	MN	2911.38
2018-02-14	PABX/065/2018	new	Yashodara College	Gampaha	ongoing_installation	2018-02-07	WPN	211639
			Total Credit Amount					**214,550.38**

Updated 20.03.2018

Figure C.6 Credit payment report

Revenue report

In this report we can capture the regional wise revenue for the paid PABX jobs. Figure C.7 represent the credit report from 01/01/2018 to 28/02/2018.

Revenue Report

PABX Division, Sri Lanka Telecom PLC

PBX Revenue Report from 2018-01-01 to 2018-02-28

PSM Area	Approved Amount
MCII	311,988.88
MN	1,308,666.62
MS	722,867.38
NCP	449,713.20
NEC	500,000.00
SP	14,134.65
Total Revenue	**2,995,381.85**

Figure C.7 Revenue report

Customer proposals

For every request we can create a proposal based on the BOQ. Figure C.8 and C.9 represent the system created proposals for other and new requests respectively.

Other PABX Proposal

Reference Number	PABX/059/2018
To	Aitken Spense Cargo Union Place Colombo 02 00002
Scope	Wiring of 5 Ext lines,Supply of 5 Analog Phones and 3 key phones
Contact Person	Mrs.Nadeesha
Contact Number	0718675689
Email	spandula@slt.com.lk

Total Cost (Rs.)	31,250.00
Total Tax (Rs.): NBT (2%) + VAT (15%)	5,406.25
Total cost with taxes (Rs.)	36,656.25

Delivery Period	Within 02-03 Weeks from the confirmation
Terms of Payment	The total price of the quotation is payable in advance. Applicable taxes are to be borne by the customer
Validity of the offer	90 days from the date of this letter

Figure C.8 Other PABX proposal

New PABX Proposal

Reference Number	PABX/087/2018
To	Ministry of Regional Development Kotte Rd, Rajagiriya 00008
Scope	Supply & Installation of (3+10).PABX System
Contact Person	Mr.Indika
Contact Number	0789999999
Email	minofrd@gov.lk

Item	Remarks	Qty	Total Cost (Rs.)	NBT (2%)	VAT (15%)	Total Cost with Tax (Rs.)
PABX System & Accessories						
Brand	NEC					
Model	SL 1000					
Installed Capacity		1 Lot	200,000.00	4,000.00	30,600.00	234,600.00
CO Ports		3				
Analog Extensions Ports		10				
Digital Extensions		3				
Operator Consoles	NEC	3 Pcs	37,500.00	750.00	5,737.50	43,987.50
Analog Telephones	Panasonic	10 Pcs	20,500.00	410.00	3,136.50	24,046.50
Power Protector	Orange	1 Pcs	9,500.75	190.02	1,453.61	11,144.38
UPS	Online	1 Pcs	36,500.00	730.00	5,584.50	42,814.50
MDF & Connecting Accessories (With Surge Protection)		1 Lot	10,000.00	200.00	1,530.00	11,730.00
Earth Rod & Connecting Accessories		1 Lot	15,000.00	300.00	2,280.00	17,580.00
Internal Wiring	Yes	16 Lines	64,000.00	1,280.00	9,792.00	75,072.00
Total			**393,000.75**	**7,860.02**	**60,114.11**	**460,974.88**

Terms & Conditions

Delivery Period	Within 02-03 Weeks from the confirmation
Terms of Payment	The total price of the PBX system is payable in advance. Applicable taxes are to be borne by the customer
Validity of the offer	90 days from the date of this letter
Warranty	01 Year from the date of commissioning ; All failures due to manufacturing defects will be rectified free of charge. This does not cover damages as the result of lightning, accident, acts of God, misuse, or abuse.
Preventive Maintenance	SLT will provide preventive maintenance at the rate given in Table 01 below. This service will cover routine inspection and testing, customer response on call, minor configuration changes and adjustments. This charge will be applied to the phone bill of a SLT PLC telephone number designated by the customer. The maintenance service will commenced upon signing of a service agreement by the customer.
Corrective Maintenance (For the internal wiring & Telephone instruments)	Any damaged components or PCBB will be replaced on actual cost basis and such cost will be informed by SLT PLC and shall born by the customer.
Comprehensive Maintenance (For thePABX system & related accessories only)	This agreement will be terminated after the one year period from the date of installation has expired. SLT will be entitled to terminate the system maintenance if the subscriber fails to pay annual subscriptions given in Table 02.
Wiring Network	When using existing wiring network at the customer premises; -02 pair wiring should be installed for Operator console/Digital display phone -Dial tone will be provided up to the MDF. Any fault found at the time of giving the service, will be notified & estimated separately
Other facilities required for the installation	Room provided to install the PABX system should be clean & properly air conditioned (Proper ventilation system). Stable 230 V AC, 50-60 Hz power supply should be provided by the customer.

Table 01 - Comprehensive Maintenance Charges (Without the coverage for damages due to Lightning)

Year (from Date of Service Provided)	Comprehensive Maintenance Charge
1 (Under Warranty)	Free of Charge
2	46,097.49
3	55,316.99
4	64,536.48
5	73,755.98

Figure C.9 PABX proposal for new projects

Appendix D Test Cases

Test Case 04- Register other request				
Test Number	Test Data	Purpose	Result Obtained	Result
1	Click Other request registration menu item	Load Customer Search Form	Work as expected	OK
2	Enter Existing Customer name and click search button	Customer details loaded	Work as expected	OK
3	Enter Existing customer Pilot Number and click search button	Customer details loaded	Work as expected	OK
4	Enter non existing customer name/Pilot number	Display no record found	Work as expected	OK
5	Click other request register button	Load other request register form	Work as expected	OK
6	Enter required customer data and click submit button	Display message “successfully registered”	Work as expected	OK
7	Not filled all required fields and click submit	Display error message "fields required"	Work as expected	Ok

Table D-1 Test case for other PABX request registration

Test Case 05- Assign technical officers for site survey				
Test Number	Test Data	Purpose	Result Obtained	Result
1	Click assign TTO for site survey menu Item	Load unassigned customer request list	Work as expected	Ok
2	Click assign TTO link	Redirect to customer request data form	Work as expected	Ok
3	Select Relevant TTO, Priority for project and Click Submit	Display message “Assigned successfully”	Work as expected	Ok
4	Click submit without selecting relevant TTO and Job priority (compulsory fields)	Display error message "fields required"	Work as expected	Ok

Table D-2 Test case for assign technical officers for site survey

Test Case 06- View assigned survey and prepare BOQ				
Test Number	Test Data	Purpose	Result Obtained	Result
1	Click assigned survey menu	Load assigned surveys list to the relevant TTO	Work as expected	Ok
2	Click prepare BOQ link	Load BOQ creating form	Work as expected	Ok
3	Enter all compulsory estimated data and click submit button	Display message “successfully submitted”	Work as expected	Ok
4	Not filled all compulsory fields and click submit	Display error message "fields required"	Work as expected	Ok

Table D-3 Test case for view assigned survey and prepare BOQ

Test Case 07- View Completed BOQ and Send Proposals				
Test Number	Test Data	Purpose	Result Obtained	Result
01	Click view completed BOQ menu item	Load completed BOQ list	Work as expected	Ok

02	Click view proposal	Load completed proposal	Work as expected	Ok
03	Click edit button	Load editable form	Work as expected	Ok
04	Click update button	Display message “Do you want to update proposal”	Work as expected	Ok
05	Click ok button in message box	Display message “Successfully updated”	Work as expected	Ok
06	Click send proposal	Display message “Do you want to send proposal”	Work as expected	Ok
07	Click ok button in message box	Proposal mail to PSM	Work as expected	Ok

Table D-4 Test case for view completed BOQ and send proposals

Test Case 08- Payment Update				
Test Number	Test Data	Purpose	Result Obtained	Result
01	Click update payments menu item	Load customer search form	Work as expected	Ok
02	Enter Customer name where proposal completed and click search button	Load customer list where proposal sent payment is pending or partially paid	Work as expected	Ok
03	Enter Customer pilot number where proposal completed and click search button	Load respective customer where proposal is sent, payment is pending or	Work as expected	Ok

		partially paid		
04	Enter Customer name which is not registered or proposal not yet send	Display no record found	Work as expected	Ok
05	Enter pilot number which is not registered or proposal not yet send	Display no record found	Work as expected	Ok
06	Enter payments ,payment method and click submit button	Display message “Successfully updated”	Work as expected	Ok

Table D-5 Test case for payment update

Test Case 09- Assign technical officers for installation				
Test Number	Test Data	Purpose	Result Obtained	Result
01	Click assign TTO menu item	Load approved PABX jobs	Work as expected	Ok
02	Click assign TTO link	Redirect to customer request data form	Work as expected	Ok
03	Assign TTO and set priority and click submit	Display message “Successfully assigned”	Work as expected	Ok
04	click submit button without set data	Display error message "fields required"	Work as expected	Ok

Table D-6 Test case for assign technical officers for installation

Test Case 10- View & close work order				
Test Number	Test Data	Purpose	Result Obtained	Result
01	Click view & close menu item	Load assigned jobs to relevant TTO	Work as expected	Ok
02	Click view work order link	Display approved work order	Work as expected	Ok
03	Click close work order link	Load work order closing form with confirmation to close.	Work as expected	Ok
04	Fill all required fields and click close work order button	Display message “Do you need to close work order”	Work as expected	Ok
05	Click ok button in the message	Display message “Work order closed successfully”	Work as expected	Ok
06	Not fill all required fields and click close work order button	Display error message "fields required"	Work as expected	Ok

Table D-7 Test case for view and close work order

Test Case 11- Search project status				
Test Number	Test Data	Purpose	Result Obtained	Result
01	click search project status menu item	Load project status search form	Work as expected	Ok
02	Enter pilot number and click search	To display project status relevant to pilot number	Work as expected	Ok

03	Enter pilot number with less digits	Display error message “check pilot number”	Work as expected	Ok
04	Enter pilot number of non-existing customer	Display no record found	Work as expected	Ok
05	Enter existing customer name	To appear project status relevant to matching customer names	Work as expected	Ok
06	Enter non existing customer name	Display no record found	Work as expected	Ok

Table D-8 Test Case for search project status

Test Case 12- Search PABX customers				
Test Number	Test Data	Purpose	Result Obtained	Result
01	Click search customers menu item	Load customer search form	Work as expected	Ok
02	Enter pilot number and click search	Appear customer details and PABX details relevant to pilot number	Work as expected	Ok
03	Enter pilot number with less digits	Display error message “check pilot number”	Work as expected	Ok
04	Enter pilot number of non-existing customer	Display no record found	Work as expected	Ok
05	Enter existing customer name	To display customer and PABX details relevant to matching name	Work as expected	Ok

06	Enter non existing customer name	Display no record found	Work as expected	Ok

Table D-9 Test case for search PABX customers