

1.1 Why Internship

An internship is an educational experience in an environment providing field application of a student's theoretical classroom learning. Internships are arranged for students who wish to undertake a study involving both academic and applied experience and agree to receive the number of credits commensurate with the scope of the project. It may be done on a full or part-time basis during a regular semester, inter-session, summer term or combination of terms. It may be conducted concurrently with other academic coursework. An internship is planned by the student, in cooperation with a faculty supervisor and site/field supervisor^[1].

Internships are available in a wide range of specialized and general fields. With which the opportunity to "test the waters" before entering into any permanent commitment giving both the ability to explore their options fully tasted. The valuable experience gained by both parties can not only improve but extend their individual reach and potential. Businesses gain the benefit of expanding their staff, obtaining financial benefits and gaining access to talents they may otherwise not have discovered while individuals gain valuable employment experience, a diverse range of skills and abilities and even long-term earning opportunities^[2]. An internship can have many benefits, such as:

- Application of classroom learning to the workplace.
- Exploration of career options.
- A chance to try out one's interests, values, and abilities in a work setting.
- Development and enhancement of professional skills.
- An increase of one's self-confidence as a student and worker.
- An opportunity to practice job search skills and expand one's network of professional contacts.
- Relevant work experience to add to one's resume to demonstrate interest and commitment to a field.
- Academic credit.
- A chance to earn money to help pay for educational expenses.
- An opportunity for leadership and/or character development.

In brief internships can be an excellent way for individuals and employers to find just the right match, successfully.

1.2 Intern in 6th Semester

All of us know the importance of internship in a student life, but the reason of this period in 6th Semester that means 3rd Year 2nd Semester is a kind of new thinking for university students. Again, the 6 months long period is also significant while the students need to go to the class and can fully devoted to the intern life and gain experiences. From the organizations' point of view this intern period is also new so that we are treated just like permanent employees. Again, we also taste the charm of corporate world in an early stage by which we can easily find our lacking and can recover it. Next is about Career opportunity, as after the intern period we are getting 1 more year in graduation we can easily boost our quality as per industry oriented and also find a path of turning our Career on our interested way.

1.3 Objectives

The objective of the internship course is to facilitate reflection on experiences obtained in the internship and to enhance understanding of academic material by application in the internship setting. Internships will provide students the opportunity to test their interest in a particular career before permanent commitments are made^[3].

Apart from that it is more important because:

- Internship students will develop skills and techniques directly applicable to their careers.
- Internships will provide students the opportunity to develop attitudes conducive to effective interpersonal relationships.
- Internships will provide students with an in-depth knowledge of the formal functional activities of a participating organization.
- Internship programs will enhance advancement possibilities of graduates.

1.4 Scopes & Thoughts

Internship is the only scope to build own Career with own interest. Here, there are lots of scopes to have timeliness, maintaining rules, formal and professional attitude. Most importantly the knowledge of gaining the difference between the theory based education and implementing based learning. There are also significant in the erudition process. Another scope is to get closed to the corporate people with their culture, motivations, leaderships, ways of work etc.

On the other hand, there is a chance to recover thyself with communal world like meeting with them, sharing with them, following them. A student's idea, thinking, strategy all are changed with the respective organizations' behaviour. These inter relationships between the students and organizations craft the bridge between them and in future helps to find out skilful employees to work on with them.

2.1 About Onecall Solutions Limited

Onecall Solutions Limited (OSL), child concern of **Windmill Group** which is pioneer in call centre solution provider in Bangladesh. This is actually a value added reseller and integrator of unified business communications solutions for contact centre automation, enterprise IP telephony, and enterprise messaging, exclusively deploying UC products. In a concise way, the reader can go through the following table^[4].

OSL At A Glance	
Company Name	Onecall Solutions Limited
Legal Form	Limited Company
Location	Dhaka, Bangladesh
Established	2007
Organization Model	Matrix
Full-Time Employees	25
Technology Provide	Value added provider, reseller and integrator of Unified Communications Solutions for Contact Center
Reputation	Has a very good reputation as a tireless contributor into the development of Unified Communication and Contact Centre Solutions in Bangladesh.

2.1.1 Location

Onecall Solution Limited is placed at Banani, Dhaka. To specify the exact location and contact address^[4] is given below:

House No. 53, Road 4, Block C, Banani,

Dhaka – 1213, Bangladesh

Telephone: +88 02 8831598

FAX No: +88-02-9891253

Email: info@onecallbd.com

Web: www.onecallbd.com

As this is the child concern of **Windmill Group** and all the decisions and procedures are come from there so the location^[4] of this group office is:

House: # 90 **Road:** # 5 **Block:** F, Banani
Dhaka-1213, Bangladesh
PSTN: +88 02 9893773, +88 02 9892949, +88 02 8835379
Fax: +88 02 9891253
GSM: +88 01713190002
Email: info@windmillbd.com

2.1.2 Management

OSL which is tagged with the group of **Windmill** has a top management with all the CEO or CTO from each concern followed by MD and Chairman. Again, there is a board of Directors for business purpose. Here, a list of the management mainly focused on **Onecall Solutions Limited**.

Managing Director: Mosharraf Hossain
Chairman: Bushra Rahman
Managerial Finance: Md. Shariful Islam
CEO (OSL): Shakil Jowad Rahim
Admin & HR: Abeda Sultana
Manager (NOC): Jakir Hossain Maruf
Manager (BD): Ahsan Kabir
PR: Nilufar Azad

2.1.3 Background of OSL

Onecall Solutions Limited is one of the leading contact Centre solution providers in Bangladesh. It was established in 2007. Onecall is headquartered in Dhaka, Bangladesh, with 25 employees dedicated to the sales, implementation, development, and support. This company holding the 28% contact centre market shares in Bangladesh. It is also a value added reseller and integrator of unified business communications solutions for contact centre automation, enterprise IP telephony and enterprise messaging, exclusively deploying Unified Communication

(UC) products. It has proven domain knowledge in different areas. This company has been the elite partner of global market leader 'Interactive Intelligence Inc.' And 'Globitel' and Drishti Soft. Today, Onecall Research and Development Team has invented their own contact centre solution "**oneXchange**" in the field of Communications Applications with all interaction channels- Voice, Chat, E-Mail, SMS and Fax. Onecall already has implemented large number of Contact Centres in Bangladesh and working with lots of other up-coming projects. Now, Onecall is the partner of Digium, Sangoma & Xorcom for IP telephony products and also the partner of Plantronics, Accutone & MicroTel for the best quality headsets for contact center industry. Onecall provides also design, implementation, and support services. Onecall brings together strong domain experience in areas of telecommunication and technology, banking and finance, retail and wholesale management, hospitality management and travel , healthcare and life science etc along with our well proven technological capabilities.

2.1.4 Partners

Onecall has become one of the fastest growing companies in the field of contact centre technology. In the last few years Onecall established a strong position in the market. Because of the super flexible products enriched with catchy and latest features Onecall achieved and successfully maintained the customers' satisfaction. The local market is strongly dominated by Onecall and now it has started the onward march of conquering to the international market. In the last few years the company has increased its profit levels very high with its world class solutions and innovative marketing strategy^[4]. So, their partners are:



Fig: 2.1 Partners of OneCall Solutions Limited

2.2 Organ-gram

The Organ-gram that is followed in the office is given below:

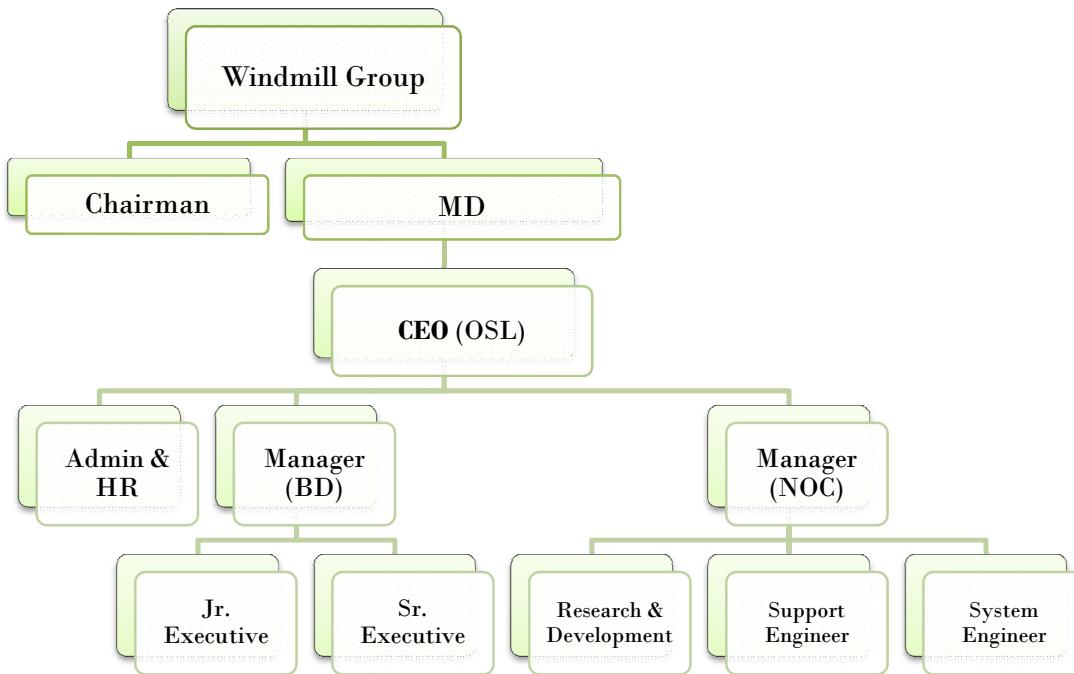


Fig: 2.2 Organ-gram of OneCall Solutions Limited

2.3 Group Office & Other Concerns

The winning team, Windmill Group has been operating in Bangladesh business environment for the last eight years. Since its inception Windmill Group has been endeavouring to impart quality and affordable services. The relationship that Windmill has developed with the leading business houses, Industrial Undertakings, NGOs, Industrialists, Entrepreneurs is unparalleled. In an era of increasing global competition, Windmill Group is moving faster and at the same time discovering new paths to walk in and is always looking to make substantial contributions to national development and to mankind. Over the years Windmill Group has been evolved from an event management company to a multi dimensional group of companies providing proactive pragmatic solutions. Our ultimate vision is to exceed

the expectations of our clients, with unparalleled service, exemplary attention to detail and seamless program execution.

There are 8 child concern of the Windmill group where each concerns are independent in their business but followed by some common rules and regulations.

So, the sister concerns of **Onecall Solutions Limited** are:

- Windmill Advertising Limited (WAL)
- Color Marker Limited
- Windmill Infotech Limited (WIL)
- Coral Blue Resort
- Grass Root Communications
- Moo's Barn
- Windmill Education Service Limited (WESL)

2.4 Clients

In-depth technical expertise, mature process management model and pragmatic delivery orientation approach help the company achieve flexibility and meet tight scheduling demands^[4]. Onecall delivers high impact solutions that best fit its client's unique business needs.



Fig: 2.3 Client List of Onecall Solutions Limited

It offers services such as:

- ✓ All-in-one contact/Call Centre Solution
- ✓ IP-PBX Solutions
- ✓ SMS Gateway

- ✓ Conference Bridging
- ✓ Performance & Workforce Management System
- ✓ Enterprise IP Telephony & VOIP Products
- ✓ Exclusively Deploy UC Product & Others

2.5 Products

Onecall offers Communications Technologies for the Contact Centre Solutions, next-generation Enterprise, Conference Bridging. Onecall's all-in-one call centre solutions that give you enhance customer satisfaction level, high contact centre uptime and high revenue per customer efficient management of workforce. By offering all level of contact centre solution this company actually wants to serve this industry in big scale^[4].

OneXchange is a breakthrough innovation by Onecall in the field of Communications Applications (Telephony and Conferencing, Unified Communications, Contact Centre) for building carrier-grade Communications. This product has been designed holistically to integrate all-in-one capabilities catering to Customer Interaction Management for Contact Centres and Enterprises. A high-end technology solution that is scalable and extensible to any contact centre requirement, offers absolute functionality beyond your expectations. By driving performance across your contact centre and delivering a superior customer experience, **oneXchange** gives you a competitive edge over others.

2.5.1 OneXchange IP-PBX

An IP-PBX is a customer premises business phone system that manages telephones throughout the enterprise and acts as a gateway to both voice and data networks. This IP-PBX solution allows you to place calls using a network instead of standard telephone infrastructure. OneXchange IP PBX offers:

- Call routing and queuing
- User count
- Directed marketing messages

- DNC Management & Reporting
- IVR
- Conferencing and Ring Group
- Voicemail & Call Transferring

2.5.2 OneXchange Call Centre Solution

It is an application with extremely rich features which facilitates a compatible user experience across all interaction channels. It offers:

- Email Management
- CTI
- Screen pop from CRM
- Complete control from media i.e transfer / conference
- IVR
- Voice mail options based on contact centre status/load
- Chat

2.5.3 OneXchange SMS Gateway

A SMS gateway is a portal that allows users to send SMS to people as well as an international gateway for users with roaming capability, allowing SMS communication away from the home network. It offers:

- Send SMS to single & SMS broadcasting to group of mobile
- Forward SMS, SMS auto reply formatted
- Incoming SMS
- International gateway for users roaming
- SMS Gateway connects SMS centres (SMSC)

2.5.4 Drishti (Ameyo) Contact Centre

Contact Centre or the customers' first touch point plays a powerful role in making or breaking enterprise-customer relationships. Customer loyalty and a company's brand image are directly related to the way the contact centre serves its customers.

Drishti creates Contact Centre Software with complete functionality for inbound, outbound and blended campaigns. The all-inclusive solutions for contact centres are ideal for different business processes such as customer support, telemarketing and sales, collections, technical support, marketing research and helpdesk^[5]. The key benefits of this product are:

- Innovative technology for easy integration with existing applications, high uptime and faster development of customized applications.
- Host of features such as Skill based routing, Dynamic Call Pacing, High AMD rates, Multiple Campaign Management, Call Compliance, lead management, Quality Monitoring, Reporting and Analytics.
- High Scalability from tens to thousand of seats without heavy investment into telephony equipment and hardware.
- Easy to use GUI based interface that simplifies call routing & treatment, reporting, recording and administration.

Armed with capabilities, such as the Predictive Dialer, ACD (Automatic Call Distributor), IVR (Interactive Voice Response), IP-PBX, Voice Logger, Quality Monitoring, CTI, CRM and Reporting, the solution is ideal for international campaigns for customer support, telemarketing and sales, collections, technical support, marketing research, helpdesk and other processes across various verticals such as BPO, communications, financial services and technology.

2.5.5 Plantronics (VoIP Headset)

- Transmit performance. Noise-cancelling microphone filters out background sounds for heightened speech clarity.
- Robust audio: as enterprises adopt UC and VoIP, they want to take advantage of wideband telephony to deliver natural-sounding audio and decrease listening errors and repetition^[6].
- Flexible design: adjustable boom angle, capsule angle (front-to-back and up-and-down), and microphone-to-mouth distance maximize voice quality.
- Choice of models: Choose the stereo design to block out background noise or the monaural design to have the ability to confer with colleagues.

- World-class customer service: Enjoy the incomparable service and support you would expect from the world's premier headset supplier.

2.5.6 Xorcom (VoIP Hardware)

- USB channel bank for Asterisk
- Supports FXS, FXO, BRI, PRI and R2
- Native Asterisk - no extra software or hardware required*
- Input/output ports for connecting peripheral devices
- From eight ports to hundreds of ports
- Telecom connection option
- Power drive for ISDN phones^[8]

2.5.7 Sangoma (VoIP Card)

- One T1/E1 port with optimum PCI or PCI-Express interface for high performance voice and data applications.
- Support for Asterisk®, FreeSwitch™, and Yate as well as other Open Source and proprietary PBX, Switch, IVR, and VoIP gateway applications.
- All of Sangoma's AFT products use the same base PCI interface card. Fully compatible with all commercially available motherboards—proper PCI-standard interrupts sharing without manual tuning.
- Dimensions: 2U Form factor: 120 mm x 55 mm for use in restricted chassis. Includes high-quality, tested RJ45 cables and short 2U mounting clips for installation in 2U rack-mount servers.
- Includes high-quality, tested RJ45 cables and short 2U mounting clips for installation in 2U rack-mount servers.
- Intelligent hardware: Downloadable FPGA programming with multiple operating modes. Add new features related to voice and/or data when they become available^[7].

3.1 Departments Overview

Onecall Solutions Limited strictly followed a formal rule for maintaining departments with their individual workflow. In this case, here there are some departments which are given below:

- a) Admin & HR
- b) Accounts
- c) Network Operation Centre (NOC)
- d) Business Development (BD)
- e) Research & Development (R&D)
- f) Software Development

To related with this departments, first of all in the Admin and HR there is CEO (Chief Executive Officer), one Admin who also take care of the HR branch and also co-ordinate with the office staffs. The main role of this department is to ensure the implementation of rules and regulation and also keep the store and their estimate.

Secondly, as same the Accounts department leading with an Accountant as it's not such a big organization. To include, it's also one of the most important department as no issues or logistic supports will be supplied without the clearance from this department.

Next, the NOC team which is the core of the organization without which no implementation or client delivery will be possible. Here, there are also three sub divisions, they are: Support Team, System Engineer Team, Network Engineer Team but all they share their works and helping hands for completion a project. The main motto of this team is to implement the project in time and give the support for future problem and others.

The business development team leads with making projects and to talk with clients. They take the projects; deal with the clients, making team, project and team building, co-ordinate with other departments so that the project can be completed. Again, for next delivery or to satisfy the clients they work hard and soul.

Next come to the R&D team, though it is newly formed and now also doing researching on new and robust platform. But sometimes this team work behind live projects with the NOC team. In addition, sometime this team also perform the tasks of NOC team and provide them with new solutions for customer delivery.

Finally, the Software development team which is formed by some executive and junior programmers who dedicatedly work for new UI design, Extra feature adding, fulfil the client's demands etc. Though this team is very much little in the number of employees but this team also does immense support to the total organization.

3.2 Working Environment & Protocols

It is really difficult to describe the rules and regulations of an organization in short space. But here a short enlisted form of rules and regulations are described which are generally followed by the employees frequently. However, as a fresher, that is also very much difficult to an intern.

3.2.1 Rules and Regulations

For the time issue, it is strictly followed the Late Present (LP), that is counted if someone present at the office after 9:15 AM. Again, s/he present at the office after 11:00 AM s/he is thought to be absent for that day. However, if s/he forgot to sign before 9:15 AM though s/he was present before that time also considered as LP. In the very beginning of my internee life I faced this LP and became very much careful for the next times. In addition, if the number of LP is 3 for one employee it is punished to deduct salary of one day from his gross salary.

Another main issue is the weekly meeting of the company which is held on every Monday in the week and all the employees should be present on that meeting. Here also the same LP system is maintained as the meeting just start at 9:15 AM. But, if here anyone become LP s/he has to pay 500/= BDT for this. Here, the rule is equal for everyone included the CEO and Admin.

In the 1st week of the month, there is a rewarding, that is “Employee of the Month”. It is announced in the general meeting which is decided by the Admin & HR followed by the CEO in respect of the overall performance, punctuality, dedicatees, KPI etc.

3.2.2 Motto of the Organization

Onecall is the premier provider of mission-critical communication solutions, partnering with the most discriminating customers in the world. Its vision is to be a values-based global organization, providing customer-centric solutions to the highest standards of excellence.

The organization will continue to innovate and invest in research and development, and ultimately contribute to the advancement of telecommunications technologies.

With strong expertise in Communication Technology and Contact Center Software and services, Onecall’s workforce consists of top-notch individuals with technology background. Adept in Communication Systems and Enterprise Applications, the teams have experience of building and managing Communications Solutions^[4].

In short the missions of the company are:

- To stay as premier provider of mission-critical communication solutions.
- Partnering with the most discriminating customers in the world.
- Establishing VAS Platform in All Operators

In contrast with their vision we can go with the following key points:

- To be a value-based global organization.
- Providing customer-centric solutions.
- Ensure highest standards of excellence.

OneXchange is a breakthrough innovation by Onecall in the field of Communications Applications (Telephony and Conferencing, Unified Communications, Contact Centres) for building Career-grade Communications Applications with extremely rich features. Facilitation a consistent user experience

across all interaction channels- Voice, Chat, E-Mail, SMS and Fax, it also offers deployment flexibility with SaaS (Software as a Service) and Premise-based models.

3.2.3 Handling Clients

For any business organization the main key point is how they treat with the clients' and how to manage it properly. In this case, OSL plays a very much important role about their client handling policies. To give a raw concept about the commitments of OSL to client's the reader can go through by these following key points:

- Listening to Customer's feedback to improve our solutions
- Providing exceptional customer service
- Living with the values.
- 'Obliged with corporate social responsibility'

However, with some real life example these explanations will be more referenced and meaningful. Like on the case for "pubali bank" the main reason is to motivate the client is the regular communication, giving proper documentations, highly prioritized client's requirements and so on. On the other hand, if I draw the scenario of "IFIC bank" or some new clients, the skill of good presentation, well specified about product list, well technical documentation etc^[4].

Moreover, there is also another technique for the existing clients also. This is the technique of building personal relationship between the respective executive from the client-end. This relationship helps to work properly and also for giving support if necessary. In addition, these relationships also enhance to the chain of relationship with that some new clients are added in this chain.

3.2.4 Inter-department Relationships

Team spirit is central to an organization's growth. Any company can only be successful as a brand if it is first successful as a team. This company constantly emphasize on customer focus with innovative and quality. Our team's through understanding of the Communication Technology gives our client -community a leading edge in this rapidly changing industry. Masters in their respective fields of

expertise, each one has considerable awareness about communications applications.

With strong expertise in Communication Technology and Contact Center Software and services, Onecall's workforce consists of top-notch individuals with technology background. Adept in Communication Systems and Enterprise Application, teams of this company have experience of building and managing Communication's Solutions.

The major and significant unique is the relationship between the departments. As, the organization is not such large where the tasks are divided significantly, so sometimes employees does non-departmental tasks also. These scenarios will be much clear with some examples.

In a difficult situation, it has been seen that the BD manager is seen to work as a support engineer, where it is to be noted that, the BD manager is also of technical background. Again, we also see to restart the servers or network by the CEO in case of emergency. Same things goes for R&D also. They have also sometimes worked as a part of accounts or completing some formalities of banks. Again, most importantly they also directly communicated with the clients where their main motto is to work behind the frame.

In respect of an organization it is very important to build such kind of relation among its departments that accelerate the work flow of the projects and that show a well formed and bonded organization outside of it. That also enhances the fame of the organization and establishes a role model as a business company.

3.3 Research & Development Team

The R&D team where I was placed is very much new in sense of forming where the core member of this team are we four internees followed by the NOC manager and some short participation of the Software Development team. Though the organization was thinking about to build this team for a long time but for some

extent it was delayed. So while the organization was thinking of getting some internees, the management just use it and engaged us to the R&D team.

The main motto of this team is to give some new solution on basis of customer demand and enhance the performance of the existing solutions. To illustrate, this team mainly focused on developing a platform independent and module based robust solution which will enhance the product quality including brand values.

For this team a consultant also present here, to whom we are liable with the works and researches as well as daily report. Again the important thing for this team is the organization is badly needed some new robust solution with more flexibility to the client's demand. In this case, this department is working with some new technologies which are completely new to our country as well as in the world's recognized company who are working in this platform. These technological findings and details will be described later on chapter 5 and chapter 8B.

3.4 Comparative Analysis of Office Culture

In a brief sense perhaps it is difficult to have a comparative analysis of the office culture. But hardly it's totally depends on the organization's work flow, places of work, styles and so on. In these terms sometimes the management have some decisions which hinder the productivity and quality. Though here is scope of expressing own feelings openly to the meeting but those are seldom implemented.

3.4.1 Mixed up with Office Culture

In the very beginning it was difficult for an intern to embed with the office culture and its rules and regulations. However, with the very friendly environment and supportive team especially with the help of Manager (NOC) it was very easy to cope up with. Again, there are also some hard rules which we felt difficult and strictness in the whole internee life. Among all, with the blend of these rules and regulations I felt very much ease to lead the life here at OSL (Onecall Solutions Limited).

Strict Timeliness, which was always the buzzing point at every morning while we go for the office and with this punctuality we can consider it as a by-product of the company. Moreover, with this timeliness it was possible to have a short meeting everyday with the employees personally. Again, this also builds up the inter-relationship between the employees.

Daily and Weekly meeting, is a very effective to keep the employees up to date and remain them in track. To elaborate, with this meeting we can easily go through our work progress and can get the feedback with them. But sometimes it lessens the productivity, because long time meeting may hamper concentration of works.

3.4.2 Entertainments & Refreshments

In a software industry, entertainment is a key role to keep the employees active all day long with a high productive quality. For this, OSL with its helpful HR tries hard and soul. To make it happen they sometimes arrange some picnics, local training, inter-concern communication, sports day, in-house presentations etc.

Again, the same things happen for daily refreshments are also there. In this instance, having a cup of tea together in the tea-room or have some gossiping in the common rooms are also open. To specify, here the authority seldom implies about the strictness to the employees while s/he is on refreshment. This positive attitude helps the employees to work more sincerely.

3.4.3 Escalating Motivation & Capability

Among all the most significant is the organization, OSL always gives employees' own hidden talent as a great praise. The top management always encourage employees with their creative tasks or sometimes also be a part of those noble tasks. Again, it sometimes arranges some workshop which not only helps the employees to work more efficiently in the office but also helps to increase employees' own potentiality. For example the workshop on "Microsoft Excel training" program keeps a key role.

On the other hand, any problem and suggestions are gladly accepted by the authority with the opinion of all the employees where there is no chance of hampering project works or client's dealings. For this the plans for going out for a dinner or going to the Cineplex for movie is very much significant.

3.5 Internee Life Cycle

There were very much eagerness for me is the Internship Program. As, we the BIT 1st batch students doing our internship in a very early stage of graduation and no other batches before us did that, so in a sense we have no guardian. In these circumstances our honourable teachers arrange some workshop and presentation with different software organization among which we had to choose 2 or 3 organization with our interested areas. The then I selected OSL as it's motto, scope and other surroundings.

3.5.1 Getting Started

With starting my intern life at first, I dropped my CV to the company via our respected teachers and then I along with my three friends am called to the office for a formal interview. At that time it was really an exciting moment to face it while must maintaining our brand values of IIT. There, we faced a formal interview and know our area of work. In addition, we were also informed with some company rules and regulations. Finally, we needed a confirmation from the group office Windmill with the joining letter.

3.5.2 Recruiting Policies

3.5.2.1 Preparation & Pre-requisition

In the interview session we were requested to have some homework about the organization and its' work area. For this, we were provided some books related with core networking, asterisks, FreeSWITCH, call centre solutions, VoIP etc. It is true

that before entering here I have no idea about the call centre solutions and VoIP technologies. So, I needed a hard work with these and also reading those books but honestly speaking that there was a very few topics that I can caught the then time. But, now-a-days I have a confidence to work on these platforms and configure with these technologies.

3.5.2.2 Being Recruit

As the organization is a child concern of Windmill, so all the recruiting policies are directly related with the group office. At first, there was a call for viva to the respective concern. There, the line managers including with some expertise and consultants present in the board. Sometimes, the CEO directly engaged with the board. From there we got the preliminary selection and then for the salary and other facilities the HR is concerned and takes steps with those. At the end, there also need another viva in the Windmill head office with all clearance and other issues. After that, a joining letter is on the hand. Though as we are internee, we also go through these processes but that was not much rigorous.

3.5.3 Entering Corporate World

After joining, in the 1st step the employee is provided his/her own email id which is provided from the company with their domain name. Then an ID card which is machine readable and laptop is also given. If the employee comes with regular process like not as internee or staffs they are also provided with business card and a bank account as a gift from the office. Though we are not permanent employee but we are also provided with a bank account, to specify salary account.

3.6 First Day at Office

From the childhood we are very much familiar with these types of writings named, first day at school, college etc. But here as a student while not completed the

graduation and only at a stage of 3rd year student entering to an intern life is quiet exhilarating. So, I also never forget the 1st day at my office.

2nd July, 2011 was the first day at my office. There I went with my joining letter at sharp 8:30 AM, as I was told the office time was 9:00 AM. At first the office staff welcomed me and introduced with the Admin with formalities. Then I go for other employees like the BD team, NOC team, Accounts, Programmers. Then I waited for sometimes and took the BD room in another corner where four desks are side by side and give me one full desk with own drawer, cupboard. In addition, for handout and note down I was also provided with a pen and office diary to use.

Firstly, we need to share the room with the BD team, but after 3-4 months we the R&D team get a dedicated room which was totally helpful for deploying our tasks. Then the Admin & HR instructed us about the rules and regulations of the company. Then we go with our line Manager who warmly welcomed us in the family and give a short brief about how to work in this environment.

Then, go for the next steps at my desk, with a cup of tea and some handouts as a reading assignment I felt excited to cope up with the environment. After sometimes, employees one by one come to me to be introduced personally with me and about me and also told about the office. In the lunch time I also get some scope to mix up with them in a relax mood and had some chat. With the friendly environment I started my first day at office as an internee.

4.1 Fundamental Technologies

Here, in OSL some basic supporting software or tools are frequently used which are in somewhat different from other software industries. In the other hand, the base of the organization is on Linux platform and all the things are directly server based communication. Though on some extent these software and technologies are free of cost or very much negligible in cost but these helps to work on windows platform which is very much common for the engineers here and also to the fresher's.

First of all, it has to be described about **SSH** (Secure Shell) for data transfer and work from remote access. This SSH is a network protocol for secure data communication, remote shell services or command execution and other secure network services between two networked computers that it connects via a secure channel over an insecure network: a server and a client (running SSH server and SSH client programs, respectively).

Oracle VM VirtualBox is an x86 virtualization software package, originally created by software company Innotek GmbH, purchased by Sun Microsystems, and now developed by Oracle Corporation as part of its family of virtualization products. It is installed on an existing host operating system; within this application, additional guest operating systems, each known as a *Guest OS*, can be loaded and run, each with its own virtual environment. Supported host operating systems include Linux, Mac OS X, Windows XP, Windows Vista, Windows 7, Solaris, and OpenSolaris; there is also a port to FreeBSD (only OSE version). Supported guest operating systems include versions and derivations of Windows, Linux, BSD, OS/2, Solaris and others. Since release 3.2.0, VirtualBox also allows limited virtualization of Mac OS X guests on Apple hardware.

Next come to the **Team Viewer** which is a computer software package for remote control, desktop sharing, and file transfer between computers. It is possible to access a machine running Team Viewer with a web browser. While the main focus of the application is remote control of computers, collaboration and presentation features are included. Sometimes it's seen that there is no live IP in the server in

that case we use this tools to work from the office to give the support the client in an emergency case.

Then for keeping client's update and projects timelines there is another option of **Microsoft Office Groove**. Groove's uses have included coordination between emergency relief agencies, where different organizations do not share a common security infrastructure and where offline access is important, and amongst teams of knowledge workers, such as consultants who need to work securely on client sites. It is also used as a staging system for documents in development, where content can be developed then transferred to a portal when complete.

Another tool is also there for remote access though it is not fully used is **VNC** (Virtual Network Computing) **server**. This VNC server is a graphical desktop sharing system that uses the RFB protocol to remotely control another computer. It transmits the keyboard and mouse events from one computer to another, relaying the graphical screen updates back in the other direction, over a network.

Subsequently, for tracing the project with proper timeline and resources **Microsoft Project Management (MSP) 2010** is used now-a-days. It is designed to assist a project manager in developing a plan, assigning resources to tasks, tracking progress, managing the budget, and analyzing workloads. Again, this application creates critical path schedules, and critical chain and event chain methodology third-party add-ons also are available. Schedules can be resource leveled, and chains are visualized in a Gantt chart. Additionally, MS Project can recognize different classes of users. These different classes of users can have differing access levels to projects, views, and other data. Custom objects such as calendars, views, tables, filters, and fields are stored in an enterprise global which is shared by all users.

4.2 Supportive Technologies

Apart from the previously described technologies and tools here we are supposed to bind on some specific technologies which are rigorously depending on the sector the organization if focusing on. Not necessarily that we always are bound on these, but

to fulfil the client's product delivery and hardware dependencies perhaps we practices these supportive technologies which will be described on the next segments. However, now the R&D team is working hard to switch these platforms and provide a robust and platform independent technologies for the organization.

At first, we can go with **Asterisk**, a call manager which naturally based on linux platform. Asterisk is an open-source PBX software once installed in a PC's hardware along with the correct interfaces—can be used as a full-featured PBX for home users, enterprises, VoIP service providers, and phone companies. Asterisk is also both an open-source community and a commercial product from Digium™. You are free to use and modify Asterisk to suit your needs. Asterisk allows real-time connectivity between PSTN and VoIP networks. Since Asterisk is much more than a PBX, you not only have an exceptional upgrade to your existing PBX.

Next we can go for **Zaptel** (Zapata Telephony Driver) that provides all of the drivers and kernel modules, required to use Asterisk with a TDM connection. The stock kernel drivers available in the Asterisk distribution are compatible with all Digium hardware and Atribank hardware available from Xorcom. In addition to the kernel support for Digium hardware, the Zaptel module also provides a virtual timer kernel module, which is used by Asterisk for allowing conference calls to be made without the physical timer that is provided by Digium hardware.

Again, with the extension and upgrade version of zaptel here **Dahdi** (Digium Asterisk Hardware Device Interface). Zaptel has been replaced by the DAHDI framework. Unlike Zaptel, which was both a self-enclosed kernel module and a set of tools, the DAHDI framework has separated these into two distinct packages—dahdi-linux and dahdi-tools. This is also significant that these tools are easily embedded with tnt line and easily configurable.

4.3 Use of Open Source

It is only natural to extend the benefits of open source to computer telephony, especially when the computer is running an open source operating system such as Linux and telephony while being a crucial business and social enabler is typically

closed and still under the control of the supplier^[11]. Combining open source application software running on Linux based commodity PC/servers gives you total control at a very low cost base.

Open Source effectively increases user adoption by:

- Reducing the cost of ownership and making it affordable.
- Promoting community development & support.
- Eliminating vendor lock-in thus providing control back to the user.
- Inherently facilitating customization and localization activities, transcending geographical and cultural barriers.

Open source eliminates the barriers to knowledge, thus increasing competition amongst vendors and service providers, promoting innovation and eliminating the opportunity for monopolization. For developers, it enables them to avoid the duplication of effort, allowing them to concentrate on adding value by building on the foundation of others^[11].

By using Open Source software, telephony systems can be built for the price of a telephony card, a PC and a little effort. This can give your company a tremendous cost advantage over traditional business models that charge largely for their proprietary software. End-users can use this cost advantage to build and maintain their own low cost, high quality telephony systems.

VARs can use this cost advantage to lower their production costs, enabling higher profits or generating a competitive advantage through lower pricing to the customer. With open source software, at best you have a team of developers working with you to upgrade and fix bugs on your telephony system - all for *free*. This is why open source software potentially can be far more reliable and stable than comparable closed source systems. Open source software has a far lower cost of ownership for this reason. At worst, if there is a bug in open source software any competent developer can find and fix it, as they have the source available to them. In a closed source system, you are at the mercy of the software vendor^[11].

4.4 Technology in Use

As the organization is a solution based organization and their base product is “call centre solutions” so here comes with the very much familiar **VOIP** (Voice Over Internet Protocol) Technology which is a family of technologies, methodologies, communication protocols, and transmission techniques for the delivery of voice communications and multimedia sessions over Internet Protocol (IP) networks, such as the Internet^[9] [14].

Comparing the old and the new world, in the old soft-switch model, all components were sold separately, meaning you had to purchase each component separately and then integrate to the PBX or soft-switch environment. The costs and risks were high and most of the equipment proprietary.

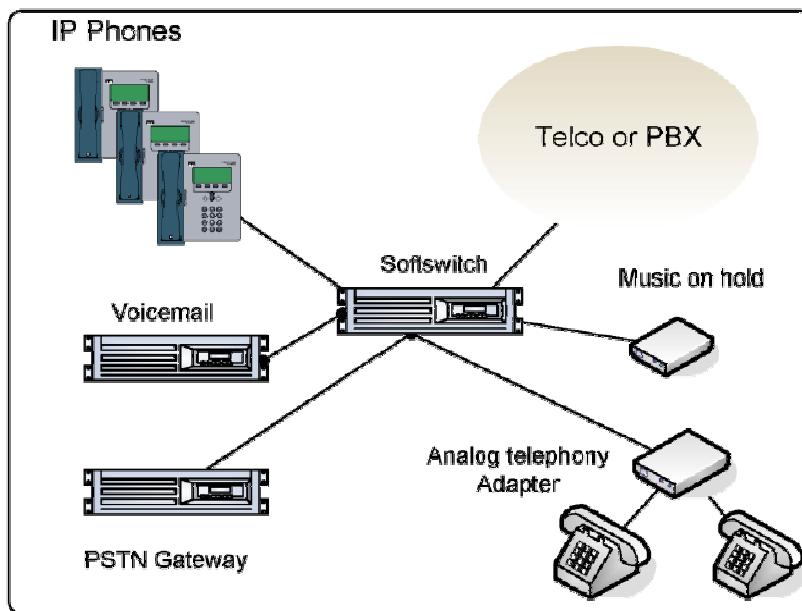


Fig: 4.1 Basic VoIP Technology

The first and simplest way to build a test machine is to purchase a card with one FXO and one FXS interface. Connect the FXO port to an existing line and connect one FXS to an analogue phone. This is the VoIP option. In this case, there would sign up with a voice service provider to have the SIP trunks and will have to purchase a SIP analogue telephony adapter^[13].

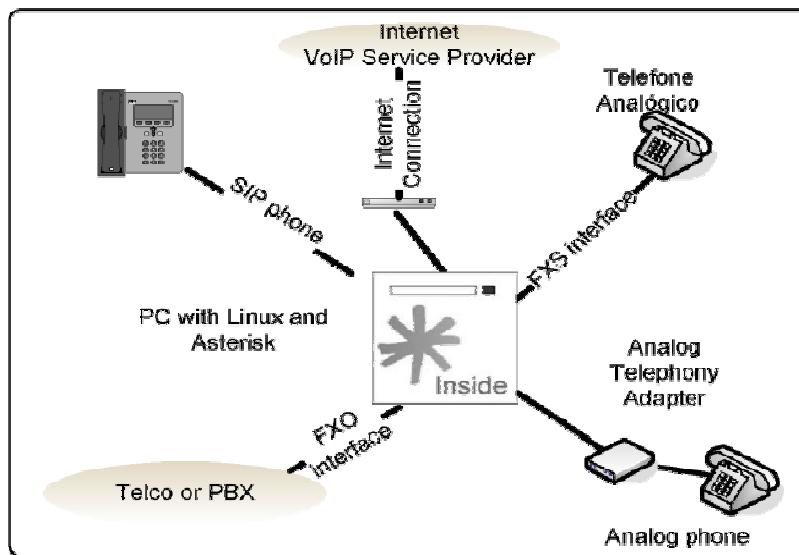


Fig: 4.2 PBX System Connection

The following image illustrates one of the most commonly used setups. Large companies generally do not want to take significant risk when investing in new technologies and simultaneously wish to preserve their investments in legacy equipment. IP-enabling legacy PBX can be very expensive; thus, connecting an Asterisk PBX using T1/E1 lines can be a good alternative for cost-conscious customers. Another benefit is the possibility of connecting to a VoIP service provider with better telephony rates.

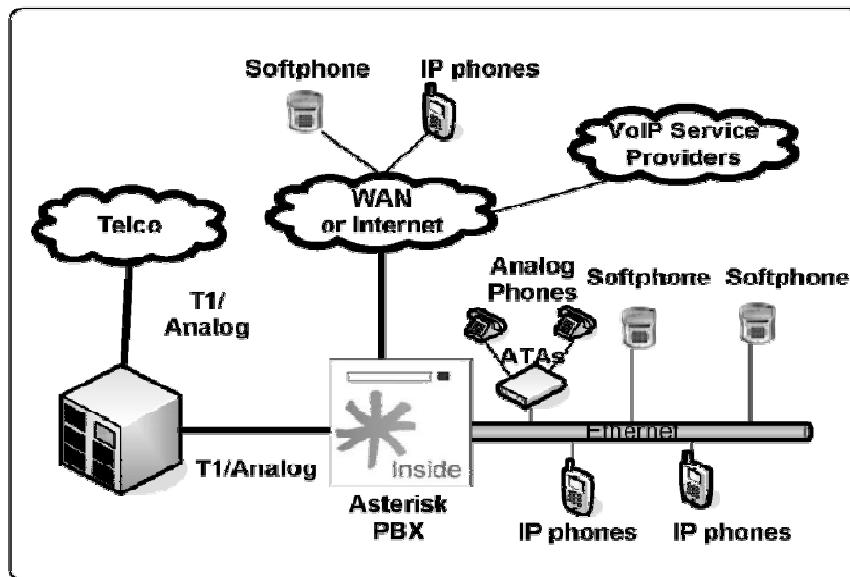


Fig: 4.3 Call Centre Technology in Commercial Perspective

4.5 Logistic Support

It is very much important to have an immense number of logistic supports to work on with these above technologies. Beyond that, as these systems is totally depending on run time hardware and servers always there is a need of testing with live servers and by calling. But, sometimes it creates problems and bugs while the system run on client's server though it may run smoothly with all functionality at the development centre.

First of all, the system needs a **FXO** (Foreign Exchange Office) **card**. The example is much better to explain the scenario, that is: When a customer receives phone service from a central office other than the one that would normally serve them, the line between the customer and the "Foreign" office is called a "Foreign Exchange" line^[10].

Again, to integrate with the system we need a **Softphone**, that is a software program for making telephone calls over the Internet using a general purpose computer, rather than using dedicated hardware. Often a softphone is designed to behave like a traditional telephone, sometimes appearing as an image of a phone, with a display panel and buttons with which the user can interact. A softphone is usually used with a headset connected to the sound card of the PC, or with a USB phone.

On the other hand we also need hardware **Xorcom**, where we will not directly use the VoIP, rather we would go for using PSTN or something like that. Xorcom designs and manufactures business telephony solutions that support both traditional PSTN and VoIP communication^[8]. All Xorcom products are based on the Asterisk open source platform, making them easy to install and maintain as well as cost-effective, since there are no per user license fees. Various utilities that maximize system uptime include backup and restore, dedicated redundant power supplies, and TwinStar – a unique award-winning hot failover solution for the entire PBX.

EyeBeam is a proprietary VoIP softphone for Windows that uses Session Initiation Protocol to facilitate voice, video conferencing and instant messaging. EyeBeam can

be configured to be used with many IP-PBX providers such as Asterisk and TalkSwitch and is compatible with many unified communication solutions including those offered by Avaya, Oracle and Cisco. We needed to use this tool as an alternative of the traditional telephone sets for testing calls, IVRs, conferencing etc.

With these above things we have to blend this together to run smoothly with the system. However, to test either the system goes well or not is simply to make calls routes call, transfer those and handle with its building methods.

5.1 Reading Assignment

Ay first while I along with my co-intern join here at OSL, I was assigned with some reading assignment as on the platform we were supposed to work on that is totally new and most critical. So, I was assigned with reading a book on **Asterisk** entitled “Asterisk Gateway Interface 1.4 and 1.6 Programming” by Nir Simionovich. This book was for known about organizations’ working platform and understanding existing systems and to develop myself on it.

Again, at the same time to know about routing and other protocols I needed to be familiar with the book on **SIP** entitled “Session Internet Protocol”, Third Edition by Alan B. Johnston. There the protocols and session control techniques are described properly.

Next is the main platform, on which the total organization is supposed to switch off because of the robustness and flexibility with high performance telephony system. This platform is **FreeSwitch**, for that I needed to read a book titled “FreeSWITCH 1.0.6” by Anthony Minessable, Michael S. Collins and Darren Schreiber. With the motto of forming R&D team I was mainly assigned to develop an IP-PBX system with this platform.



5.2 “Lantus Call Centre” – sanofi aventis

Sanofi-aventis Bangladesh Ltd. is a multinational company as well as one of the leading pharmaceutical companies in Bangladesh. They have ample of prominent name of products. Among them “Lantus” is one of their best selling products which is well-known among the people who takes insulin. The people who take insulin, they must take it as a regular basis. Agents used to call their customers manually who have the date of taking refill of Lantus within next few days. Agent needed to search their CRM data and find the customers who will be called. But they wanted to automate the system. They wanted a call centre solution which would automate the system for them. This is why they asked OSL for a highly efficient and automatic call centre.

5.2.1 Project Plot & Requirement

“sanofi-aventis” launches their product and with their customer service and promotion they need to have regular communication with the people who take insulin, they must take it as a regular basis. Agents used to call their customers manually who have the date of taking refill of **Lantus** within next few days. Agent needed to search their CRM data and find the customers who will be called.

In this regard, we were not directly linked with the end users rather with the help of IS department we were acknowledged about the total scenario. To collect the exact requirement first of all, we did a brain storming with much flexibility with our system to integrate with. Secondly, we were supposed to integrate with their CRM, so we decided to use their database schema to avoid extra reporting hassles. Finally, the way with which they want the calls from the patient like by pressing their patient ID and route to the respective agent of that patient was the most challenging part.

5.2.2 Platform Selection & Developments

For this project initially we are not the person to decide the platform, so with the help of the project manager it was selected to provide them **oneXchange** with the internal customization of the total existing system. On the other hand the skill based routing means by pressing the patient id the call will route to the respective agent with pop-up from remote server, was not in the existing system. So, while developing those features I was thinking for php-agi and then for the more flexibility I switched to transfer with basic **AGI** (Asterisk Gateway Interface) [13].

5.2.2.1 Interactive Voice Response (IVR)

IVR is the automatic call handling process where caller listens to the pre-recorded voice and interacts as per the instruction given by recorded voice. The requirement of Sanofi-aventis was while their patients call to their call centre they should hear welcome message and listen to some instructions about the way they like to get help.

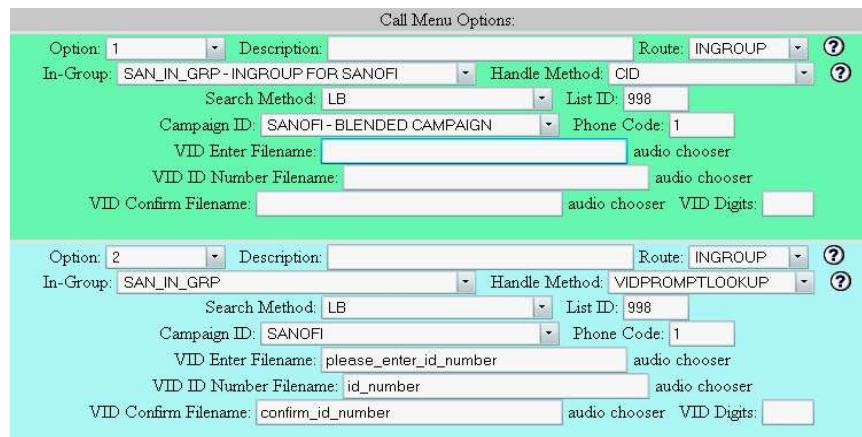


Fig: 5.1 IVR Menu from the wizard

5.2.2.2 Inbound Call Routing

Every Lantus patient is under one of the some agents who manage the relations between the customers and company through communication. They wanted that

when any registered customer calls to the call centre this call must be forwarded to the customer's respective agent after listening to the IVR.

5.2.2.3 Agent Screen Pop-up

This feature includes the screen pop-up with information when a patient calls or when patients are called by the agent. The information is fetched from the client's external CRM system.

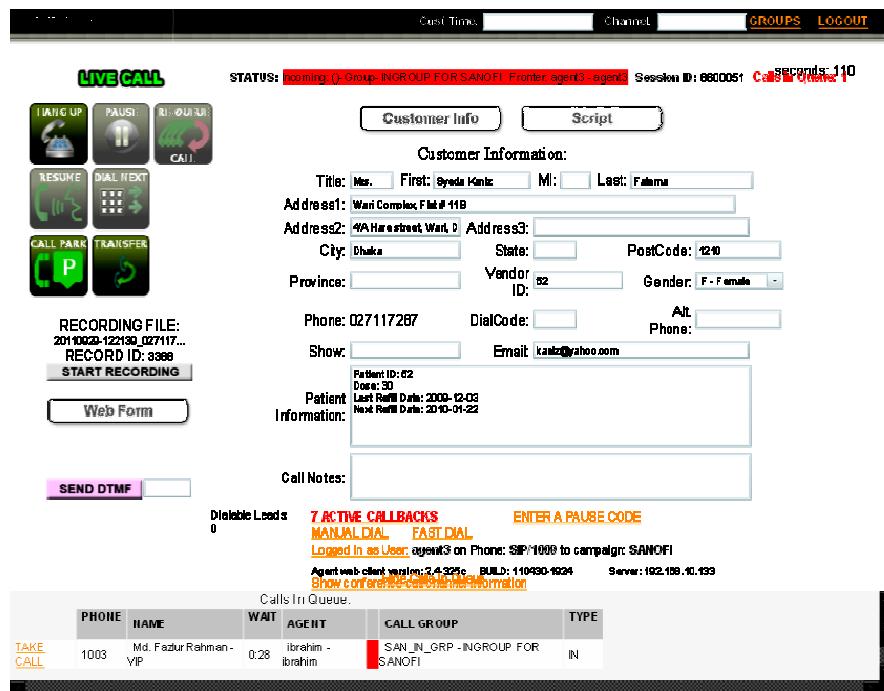


Fig: 5.2 Agent pop-up Screen while a call is connected

5.2.2.4 Schedule Call-back

Lantus patients need to refill the Lantus dose after two to three month on a regular basis. So the agents used to call the customers who have the refill date with next few days. The agent used to search the Lantus CRM (Customer Relationship Management) system and called those customers manually. Our system made this process automated. Now in our system agents need to just click the dial button. After logging to the system agents see a list of customers who have refill date within

next few days and need to call. This list is generated from searching the CRM system automatically.

CALLBACKS FOR AGENT agent3											
To see information on one of the callbacks below, click on the INFO link. To call the customer back now, click on the DIAL link. If you click on a record below to dial it, it will be removed from the list.											
#	CALLBACK DATE/TIME	NUMBER	INFO	NAME	STATUS	CAMPAIGN	LAST CALL DATE/TIME	DIAL	ALT		
1	2011-09-29 21:54:56	029669146	- INFO	Mahmuda	ACTIVE	SANOFI	2011-09-29 11:54:56	DIAL	ALT		
2	2011-09-29 21:59:21	029669146	- INFO	Mahmuda	ACTIVE	SANOFI	2011-09-29 11:59:21	DIAL	ALT		
3	2011-09-29 21:59:33	01199059545	- INFO	Mahmuda	ACTIVE	SANOFI	2011-09-29 11:59:33	DIAL	ALT		
4	2011-09-29 21:59:33	029669146	- INFO	Mahmuda	ACTIVE	SANOFI	2011-09-29 11:59:33	DIAL	ALT		
5	2011-09-29 21:59:36	01199059545	- INFO	Mahmuda	ACTIVE	SANOFI	2011-09-29 11:59:36	DIAL	ALT		
6	2011-09-29 21:59:36	029669146	- INFO	Mahmuda	ACTIVE	SANOFI	2011-09-29 11:59:36	DIAL	ALT		
7	2011-09-29 21:59:37	01199059545	- INFO	Mahmuda	ACTIVE	SANOFI	2011-09-29 11:59:37	DIAL	ALT		
8	2011-09-29 21:59:37	029669146	- INFO	Mahmuda	ACTIVE	SANOFI	2011-09-29 11:59:37	DIAL	ALT		

Fig: 5.3 Lists of Schedule Call-backs

5.2.2.5 Outbound Call

Outbound call refers to the normal outgoing call to a number dialled. Sometime they need to just dial a customer's number for just client follow-up.

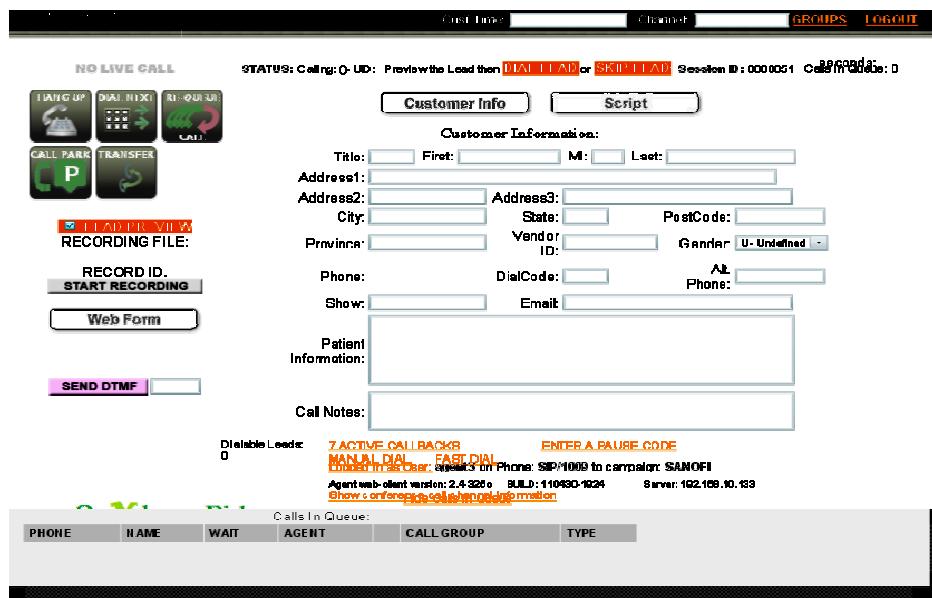


Fig: 5.4 Dial a Manual Outbound Call

5.2.2.6 Channel Release

For ingoing and outgoing call our system uses different types of VOIP provider's channels. When we use IPTSP & Tellular channel the then everything work well. Everything work means after hang up the call both sides (agent and patient) channels are released or disconnected. But when we use TNT line then sometimes its show that channel does not release from both sides^[17]. There also happen some unexpected busy. Actually it was a hardware device problem which was used for analogue and digital signal transmission.

5.2.3 Challenges

5.2.3.1 Very large project

A huge list of features, dependencies between features, some unchangeable restrictions etc. made this project a really big one. Each feature required a huge amount of internal operations. Features required a lot of extra new technologies to be involved such as perl, Lua, xml etc. So it took a lot of hard works to complete such a giant project within the timeline.

5.2.3.2 Strict deadline

When we were involved into the project the deadline of the project were very close. We did not get enough time to spend for background study. So we had to work some extra hour to recover that. Even we had to work at night in the office for some days. After that great endeavour we successfully achieved the deadline and deployed the application timely.

5.2.3.3 Totally new technology

From the very first day of the project we had to introduce with a technology (the VOIP Technology) which was totally unmatched with our academic area of knowledge. Besides that, we learnt several programming languages like perl, Lua xml etc. So learning the technology and applying this in a live project within a very short time was quite challenging. But we gave our best effort and were quite successful to cope us up with the new things.

5.2.3.4 Requirement change

Frequent changes of requirement from the client end were a big problem. Client changed their requirement about any feature even after the development of a large portion of that feature was already completed. We had the change designs several times for these kinds of issues.

5.2.4 Technical Findings

In this project we had to work with a lot of new technologies that we were not familiar with. We gave a lot of effort for learning those new technologies and implement the knowledge in a live project. Here is the list of technologies used in the project sanofi-aventis:

- html
- Php
- MySql
- Java-script
- Perl-script
- Lua
- AGI (Asterisk Gateway Interface)
- XML
- Shell-script
- Ajax

Perl

Not only for web development language, it can do Image creation, Networking via Telnet, SSH or FTP.

AGI

Skill based routing including an interface for adding functionality to Asterisk with many different programming languages. Perl, PHP, LUA etc.

XML

Extensive markup language, Provides a foundation for creating documents and document systems with Simplicity, Extensibility & Interoperability.

Ajax

Get rid of evil page while reloading and also to control the high level security & advanced technologies like JQuery or Grid.

5.2.5 Client Dealing & Completion

In this project I was the key person for client dealing as the earlier respective support engineer switched to another company. However, it was really a gigantic task to cope up with the frequent requirement change and have to convinced them with our developed system. However, making a bridge between the clients and programmer team was also a tough task and to design for the solution in that way similarly hard one.

Again, while went for the user acceptance testing (UAT) it was horrible to convince the total now technical persons with the system. Situation was tougher when the system troubles in the client environment and there need to check it out with solution. For this, I worked directly in the servers as the server was not hosted with any live IP which can be monitored from outside of the office. In this way with much troubleshooting and clients' requirement fulfilling I was able to complete the project with maintaining high customer satisfaction.



5.3 Project oneXchange

Onecall already have some well established products which are successfully running in the local market. “**oneXchange**” is one of these renowned call centre solutions. But the company wanted to go to the international market with this product. To be competent with other world class products authority had taken the decision to redesign the software. The main goal is to make the product as user friendly as possible. One other important issue is to enhance the call handle capability. For handling the call Asterisk was the call manager of the software. It could handle 120 calls at a time. But for a large call centre the number of calls at a time is very high. FreeSwitch call handling method can handle more than thousand of call at the same time. So the company had decided to switch the platform from Asterisk to FreeSwitch.

5.3.1 Platform

As the solution is of call centre technology it is an important issue to enhance the call handle capability. For handling the call Asterisk was the call manager of the software. It could handle 120 calls at a time. But for a large call centre the number of calls at a time is very high. FreeSwitch call handling method can handle more than thousand of call at the same time. So the company had decided to switch the platform from Asterisk to FreeSwitch^[16]. Though is a long term and big project but after completing the sanofi-aventis project successfully company found that dependability to assign to our R&D team.

5.3.2 Requirement Analysis

To develop software from the core is no doubt a gargantuan chore while ensuring the modular based design, flexibility and robustness. For this we went for **AES**

approach that is Analysis, Explore and Sketch. In the **Analysis** phase we analyzed the leading “call center solution” providers like Avaya, Inin, Drishti, Aspect, Genyses etc to enlist the features. Then we were go through the next **Explore** phase where we tasted on some open source software to find out the process how it works with telephony system. Finally, we build the **Sketch** of the total system where all the features are categorized to make a short list and made a feature tree to create the skeleton. A snap of the feature enlisting is given below:

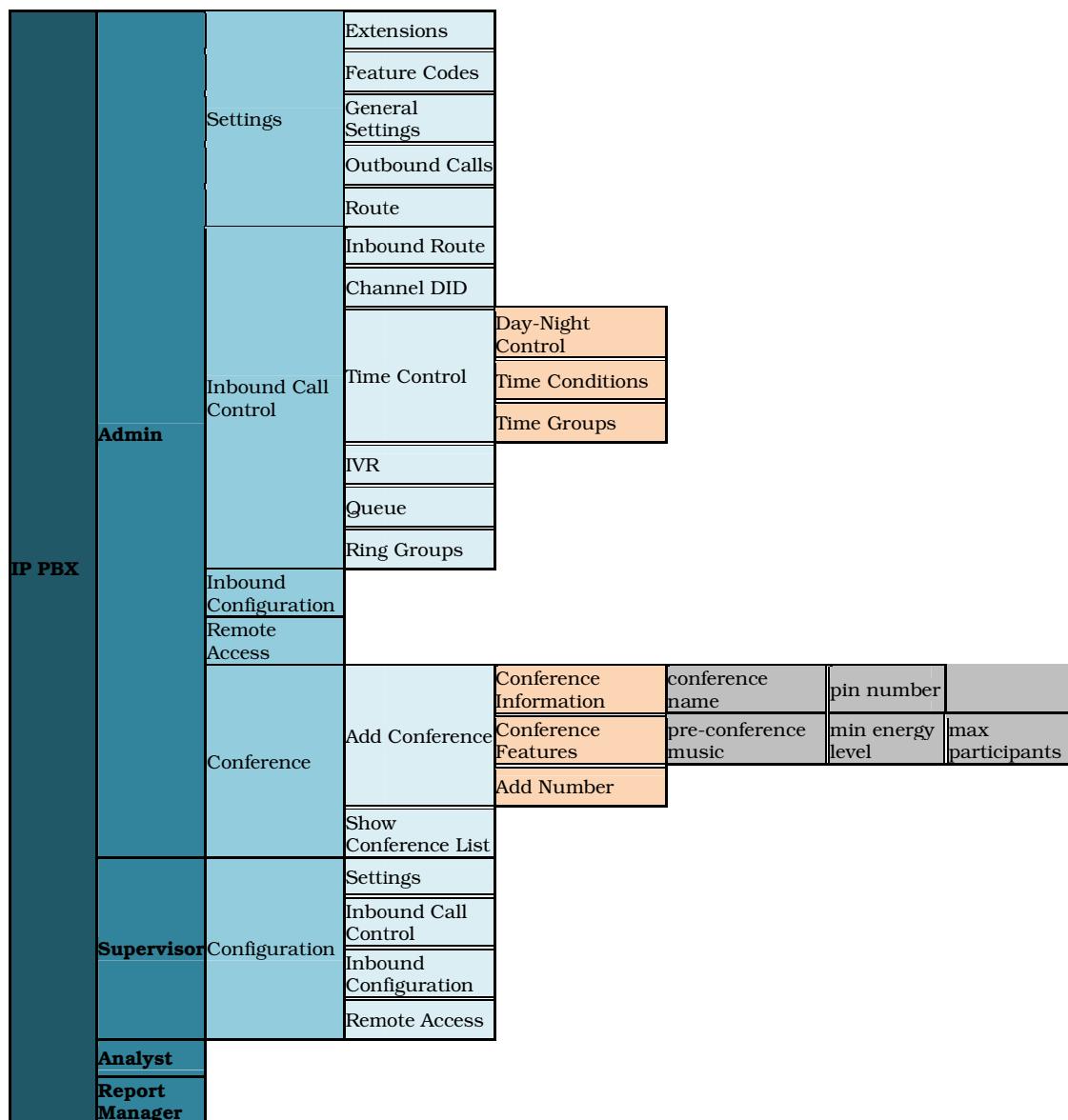


Fig: 5.5 Feature Enlisting after Requirement Analysis

5.3.3 Agile Scrum

In the total software project was under the Agile scrum method following. Scrum is an Agile Software Development Process. Scrum is an iterative, incremental framework for project management often seen in agile software development, a type of software engineering. Although the Scrum approach was originally suggested for managing product development projects, its use has focused on the management of software development projects, and it can be used to run software maintenance teams or as a general project/program management approach.

Scrum is a process skeleton that contains sets of practices and predefined roles. The main roles in Scrum are:

1. “**ScrumMaster**”, who maintains the processes (typically in lieu of a project manager)
2. “**Product Owner**”, who represents the stakeholders and the business
3. “**Team**”, a cross-functional group who do the actual analysis, design, implementation, testing, etc.

A **sprint** is the basic unit of development in Scrum. Sprints tend to last between one week and one month, and are a “timeboxed” (i.e. restricted to a specific duration) effort of a constant length.

Each sprint is preceded by a planning meeting, where the tasks for the sprint are identified and an estimated commitment for the sprint goal is made, and followed by a review or retrospective meeting, where the progress is reviewed and lessons for the next sprint are identified.

During each sprint, the team creates a potentially deliverable product increment (for example, working and tested software). The set of features that go into a sprint come from the product “backlog”, which is a prioritized set of high level requirements of work to be done. Which backlog items go into the sprint is determined during the sprint planning meeting. During this meeting, the Product Owner informs the team of the items in the product backlog that he or she wants completed. The team then determines how much of this they can commit to complete during the next sprint, and records this in the sprint backlog. During a

sprint, no one is allowed to change the sprint backlog, which means that the requirements are frozen for that sprint. Development is timeboxed such that the sprint must end on time; if requirements are not completed for any reason they are left out and returned to the product backlog^[12]. After a sprint is completed, the team demonstrates how to use the software.

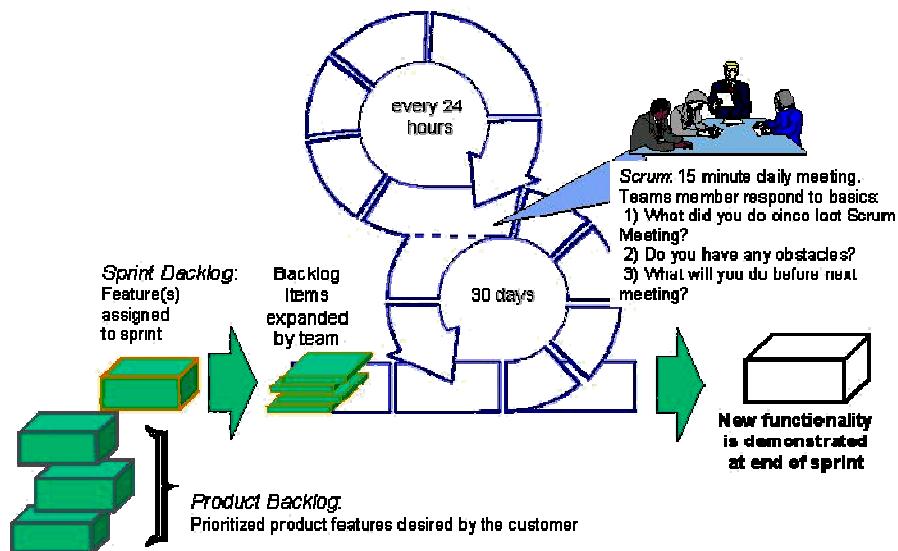


Fig: 5.6 Scrum Process

Scrum enables the creation of self-organizing teams by encouraging co-location of all team members, and verbal communication between all team members and disciplines in the project.

A key principle of Scrum is its recognition that during a project the customers can change their minds about what they want and need (often called requirements churn), and that unpredicted challenges cannot be easily addressed in a traditional predictive or planned manner. As such, Scrum adopts an empirical approach—accepting that the problem cannot be fully understood or defined, focusing instead on maximizing the team's ability to deliver quickly and respond to emerging requirements^[12].

Like other agile development methodologies, Scrum can be implemented through a wide range of tools. Many companies use universal software tools, such as

spreadsheets to build and maintain artifacts such as the sprint backlog. There are also open-source and proprietary software packages dedicated to management of products under the Scrum process. Other organizations implement Scrum without the use of any software tools, and maintain their artifacts in hard-copy forms such as paper, whiteboards, and sticky notes.

5.3.4 Project Planning & Management

The main challenge of this project was the project planning. We had no previous experience of project planning. So it was very hard for us to plan such a large project. We took the help of our senior colleagues and previously done projects. After doing a lot of background study on project planning we were a bit confident on it.

Microsoft Project was used to schedule the tasks. We divided the whole project into smaller tasks. We estimated the task duration and assigned the task to the respective member of the team. These entire things were designed and managed by the Microsoft Project.

Dividing the full project into smaller tasks was another challenge for us. There were very complex dependencies among the tasks. While planning the project we had to keep those dependencies into account. Also some new complexities rose while implementing those tasks.

Before starting the task implementation we had to calculate the duration of every task. This was quite difficult to predict the approximate duration of a task. Interdependencies among tasks made the whole process worse. We had to analyze each task so deeply that the possible duration becomes as closer to the actual duration as possible.

After planning the project we started implementing the tasks. Though we invested a huge effort on calculating the task duration accurately but while we were implementing the task sometimes it took more time to complete a task than calculated.

For the next internee period our project timeline is like:



Fig: 5.7 Project Timeliness

With the help of the Microsoft Project Management 2010, here the project timeline of 2 special features is given to give a brief scenario of our project planning.

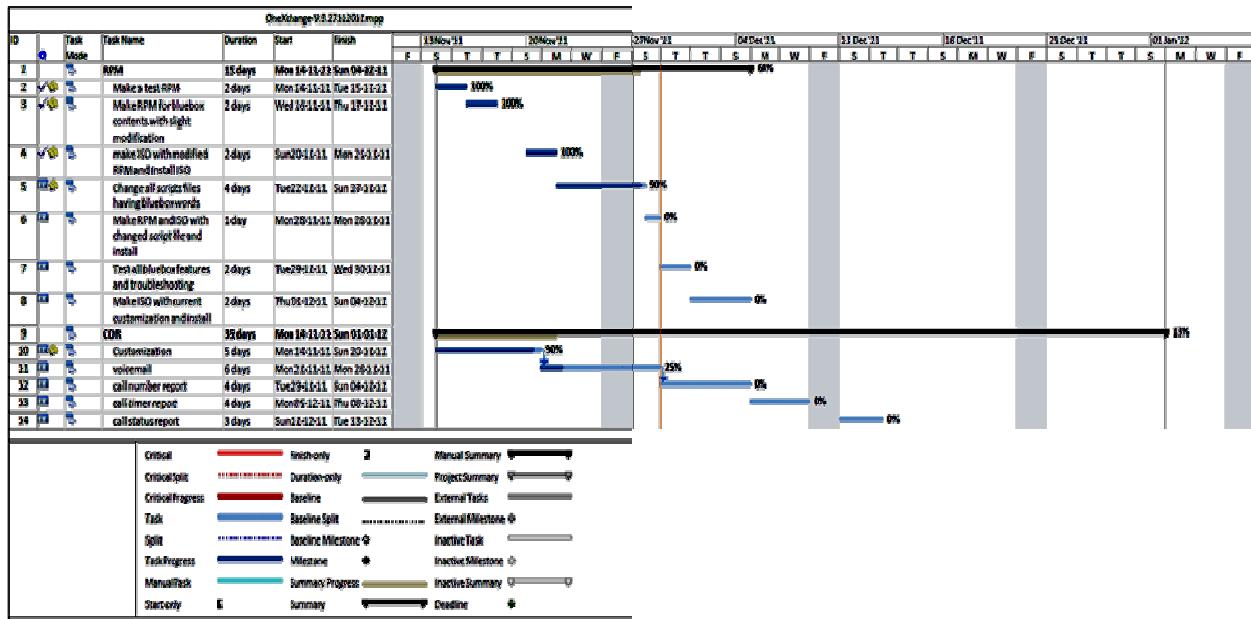


Fig: 5.8 Gantt Chart of Project Specified Task List

5.3.5 System Features

5.3.5.1 Auto attendants

Auto Attendant module or sometimes also called IVR module enables the system to help the caller find his call destination without the human operator. This module enables the system administrator to create, modify or delete different auto attendants.

5.3.5.2 Caller Detail Record (CDR)

This module is used to view the caller detail records. The caller detail records show all the main information about all calls that passed through the system. The main module page consists of a table that shows the main information about calls.

Fig: 5.9 Call Details Report of oneXchange

5.3.5.3 Ring Group

Ring groups are groups of devices that can be called at the same time using one number. For example there can be a ring group called Sales that has a number 4000. When a caller calls 4000 all the phones that belong to that ring group will start ringing. This module enables the system administrator to create, modify or delete different ring groups.

5.3.5.4 Conference

The Conference module is used to create, modify or delete conference rooms. In these conference rooms callers can join with or without passwords according to the configuration. This feature made it easier to control the access to the conference.

5.3.5.5 Network List

Access control lists are lists of domain names, IP addresses and IP address ranges that can be used to identify various network-related activities, such as inbound callers that can bypass authentication, local callers who are on NAT, etc. This module enables system admin to create and modify these lists.

5.3.5.6 Context Manager

Contexts are rules that tell the system how calls should be routed. Contexts combine all the SIP devices, interfaces and trunks and tell the system how and where to route calls. This module enables the system administrator to create, modify or delete different contexts.

5.3.5.7 External Destination

External Destination module enables us to route the call to an external destination. This can be for an example a mobile phone. We can forward a call using SIP URI or using an already created trunk.

5.3.5.8 Trunk Manager

Trunk Manager Module is used to setup trunks (connections) to other VoIP systems. Trunks are connections used to route calls to external destinations. For example a trunk can be a connection to a VoIP provider or a GSM gateway.

5.3.5.9 Permissions:

Permissions module lets you setup different system access permissions. We can assign a user the following three types of permissions:

- *Full Access* - if you select this option, user will have full access to the module administration.
- *Disabled* - if you select this option, user will have no access to the module administration page.

- Custom - if you select this option, then you can select more detailed options for user access. The detailed options depend on module. Some modules don't have detailed options.

5.3.5.10 Live Call Monitoring

Here, when a call is connected, talk times, agents status and other states are described. With the following interface this feature will be more explainable.

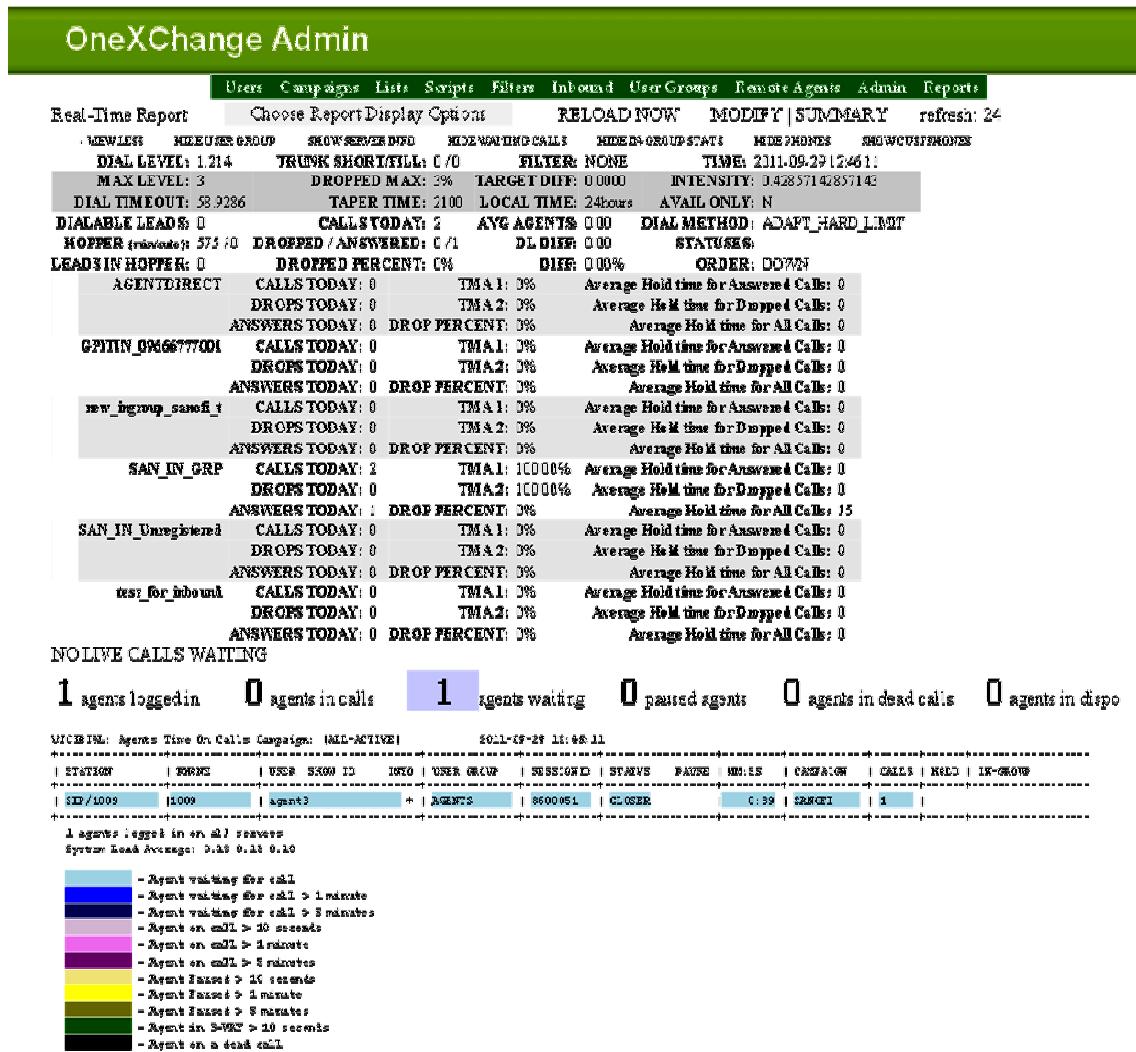


Fig: 5.10 Live Call Monitoring Panel

5.3.6 Technical Feasibility

While working into the project we learnt a lot of new technologies. We had to spend some time to learn first before implementing those technologies in to the project. Here are short descriptions of about the technologies that we have used:

5.3.6.1 PHP & MySQL

Our application was a web based VOIP application so we have used PHP as the language. We have also used MySQL as the database. The authority gave us the responsibility to choose the platform for the application. As we were well acquainted to both PHP and MySQL so we suggested this platform. As PHP and MySQL both are open source and easy to user into the large scale projects so we decided to use this platform.

5.3.6.2 Kohana Framework

Kohana PHP is an HMVC PHP5 framework that provides a rich set of components for quickly building robust and dynamic web applications. It is a relatively lesser known framework when compared to other, such as CakePHP or CodeIgniter, and has a small "strong but elite" community. Kohana has all the advantages from the CodeIgniter framework plus ORM and a fully object-oriented programming model based on PHP 5.x+ (e.g., auto loading of classes). So we decided to go with this framework.

5.3.6.3 jQuery

jQuery is a cross-browser JavaScript library designed to simplify the client-side scripting of HTML. This is the most popular JavaScript library in use today. There are some very good facilities that we could only get from jQuery.

jQuery is free, open source software, dual-licensed under the MIT License or the GNU General Public License, Version 2. jQuery's syntax is designed to make it easier to navigate a document, select DOM elements, create animations, handle events, and develop Ajax applications. jQuery also provides capabilities for developers to create plug-ins on top of the JavaScript library. This enables

developers to create abstractions for low-level interaction and animation, advanced effects and high-level, theme-able widgets. The modular approach to the jQuery framework allows the creation of powerful and dynamic web pages and web applications.

5.3.7 Code Analysis

In respect of the lines of code as per we have developed up-to the submission of the report. With the internal coding strategy the following statistics is based on the lines of code in respect of the languages used.

Language	Code Lines	Comment Lines	Comment Ratio	Blank Lines	Total Lines
PHP	291,966	135,173	31.6%	65,108	492,247
JavaScript	87,167	12,422	12.5%	13,101	112,690
CSS	86,903	3,815	4.0%	2,671	93,189
HTML	13,176	226	1.7%	3,459	16,861
XML	2,053	0	0.0%	10	2,063
shell script	722	14	1.9%	140	876
SQL	309	74	19.3%	49	432

Fig: 5.11 Lines of Code by Languages

From the above data if we go with the percentage on which the project works were divided into is:

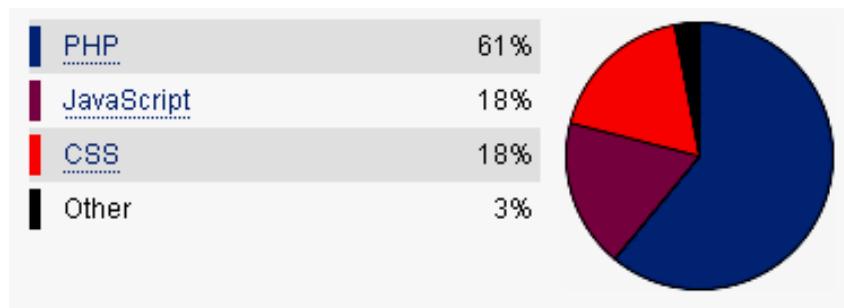


Fig: 5.12 Percentage of Code by Languages

In the other hand, we need to emphasize on the browser dependencies as it is a web-based application. So, much security is ensured on this purpose.

5.3.8 Future Extent

The main motto of the R&D team started with a large depiction, so as we had planned for a long time in this consideration. So, some advanced features technologies are also under this contemplation. Though call centre technologies are not demanded in our country with much flexibility and in quality but keeping the scope of those advanced modules is also a big challenge.

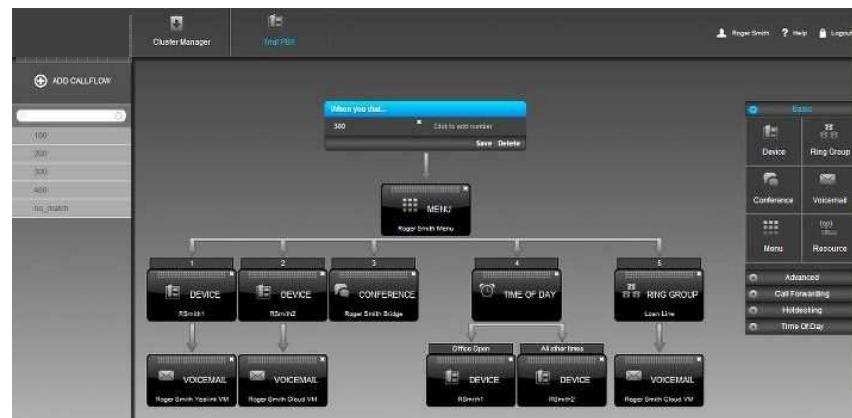


Fig: 5.13 Drag and Drop menu service for IP-PBX

The features that we didn't think about 6 months earlier that we were developing and configuring. In this respect I can draw some examples of those modules like Screen recording, Intelligent voice recognizer, Call timeliness, Routing territories [15] [18]etc.

As it is a long time project where keeping the opportunity of more modules and features in demand of the clients here is a sample snapshot of the UI that is for voicemail. In this way we are developing the new product for **oneXchange** with the customer demand and more robust features.



5.4 “Customer Call Service” – Pubali Bank

Pubali Bank Limited is one of the big banks since 50 years and for the last few years they are trying to launch a customer service through call centre technology. For this, OSL was vendor to provide them the solution. Here, their main target is to use the remote database, poll data and then transfer it to the customer with Bengali voice. Again, also there is a scope to have a direct communication with the agents where the agent pop-up information will be the customers' information that will also from remote database. On the other hand, they wanted the agent window from **Drishti**, so it become another challenge to customize their product with own environment and integrate with **oneXchange**.

5.4.1 Solution Providing

As there was an agreement with Pubali Bak is to provide them with OSL partner group Drishti Ameyo Solution, but there was some requirement of third party database access and with the polled data send it as bangle voice to the bank customer. Again, with the IVR design there was an immense tree by which a customer can reach to the agent or get their desired query result. For this we also needed another designing tool named nodeflow designing. Again, the project has imitative just a few days ago, so the requirement phases and other explanations are not in details.

5.4.2 Node-Flow Designer

This designer is build on the platform of JAVA where in the backend XML files are working. The Node Flow Designer is a GUI- based tool for not only developing IVR applications, but also extended communication applications for use in Intelligent Networks of large enterprises and telecom companies. The solution has an inbuilt support of advanced application interfaces like web-services or IN API.

Adding to the USP of Node Flow 2.0 is its Modular design that enables creation of independent IVR templates that can be a part of the main IVR call flows. Any changes in this template would automatically reflect in the IVRs where this has been included. This type of design is a mandate for the intricate network of IVRs found in customer service infrastructure of a large enterprise like telcos.

In telecom companies the IT Infrastructure is built in pieces. It evolves over time and multiple applications are added as per requirement. Telecom service providers have an array of customer services for which they deploy independent yet integrated IVR solutions often from multiple vendors on requirement basis. These are basically switching and extended IVR applications. This gives rise to complexity in maintenance of the IT infrastructure as well as creates gaps for latency to seep in.

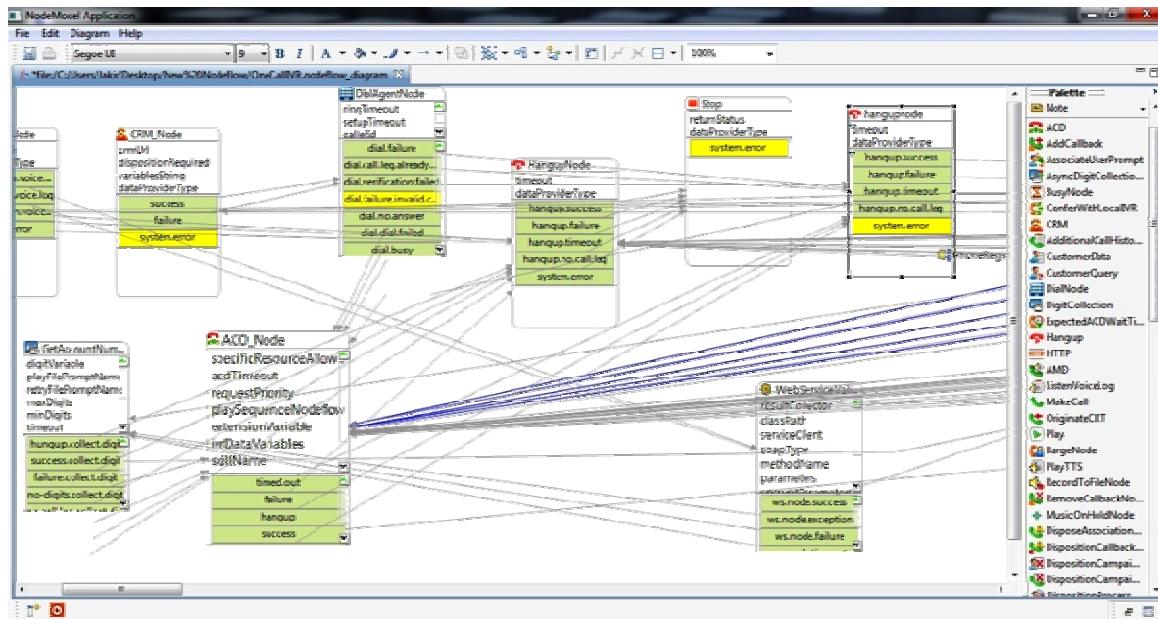


Fig: 5.14 Node Flow for an IVR

5.4.3 Technical Issues

The full-featured solution perfectly caters to international Contact Centers that strive to deliver superior customer interactions with multi-channel and multimodal contact and maintain business productivity and efficiency.

Armed with capabilities, such as the Predictive Dialer, ACD (Automatic Call

Distributor), IVR (Interactive Voice Response), IP-PBX, Voice Logger, Quality Monitoring, CTI, CRM and Reporting^[13], the solution is ideal for international campaigns for customer support, telemarketing and sales, collections, technical support, marketing research, helpdesk and other processes across various verticals such as BPO^[14], communications, financial services and technology^[8]. These technical issues are given below:

- Innovative technology for easy integration with existing applications, high uptime and faster development of customized applications.
- Host of features such as Skill based routing, Dynamic Call Pacing, High AMD rates, Multiple Campaign Management, Call Compliance, lead management, Quality Monitoring, Reporting and Analytics^[14].
- High Scalability from tens to thousand of seats without heavy investment into telephony equipment and hardware.
- Easy to use GUI based interface that simplifies call routing & treatment, reporting, recording and administration.

5.4.4 Project Planning

For starting this project we need a lot of brain storming about how to provide the solution. At first, we decided to customize at root level which was not feasible to complete in the project timeline. Again, then we thought of integrating with oneXchange but it was also an overwhelming and create problem on Call details records. So, after all decisions there were an assignment of 5 more programmers for this development where I co-ordinate with them to complete the project. Now, with the innovative node flow designer and raw asterisk customization this project is going to be complete.

6.1 Problems & Challenges

Though I am a member of R&D team, I have worked on some live projects with client-end works. Moreover, during the development phase at in-house, I also go through some challenges which are totally new to an internee. Here, with some sample case studies I will describe the problems and challenges that I faced in my whole intern life.

From the very beginning the problem I faced is to work on an existing system with some feature development and enhancement. In brief, I can say that in the student life naturally we work with a new project while the total project is designed through our mind and the capability of our tasks. But here, we need to add some features to the existing system while I have to understand the total system with coding strategies. In this stage I have found the lacking of proper documentation and findings. But instead of that, some standard coding styles helped me in this regard.

On the other hand, work timely with report was a great challenge for me. As I was used to work alone in a silent mood, whereas, here I was bound to work while taking with others, break down of concentration and such other issues. Taking these challenges helped towards professional attitude.

6.2 Stress Management

The most significant experience with OSL is the stress management. To complete a project in timeline with proper testing with hardware feasibility was really a big deal. However, most importantly I can say about staying night at office to complete the project. This happened because the deadline was very close and no proper solutions were to find. However, for this additional work I was praised and with the increase of KPI, get some bonus in salary.

In addition, while working on this pressure a word always buzzing in my mind is, “when to finish”. As the clocks are moving with its’ own speed and I had to utilize my brain with researching to the same speed to complete the project at any how.

This stress give me confidence on work as at the end me along with the project team members were able to finish the project successfully and delivery to the client on time.

6.3 Work on Live Project

As an internee it is really an auspicious thing is to work on with live project. On this regard, I was totally worked on with the project “**sanofi-aventis: Call Centre**” and was the key person to communicate with, so there I had experienced with all possible incident that amplify myself towards a corporate life. Again, I am also now in-charge of another project of “**Pubali Bank: Call Centre**”, but this project is now in alpha status so I haven’t yet gain much about these experiences. Here, I mainly focus on the **sanofi-aventis** project to describe my experiences.

6.3.1 Technological Support

Though in our graduation period we had mainly focused on software development rather than hardware engineering but here in the **sanofi-aventis** project I had to give hardware support with instalment, configuration, troubleshooting and embedded with the software portion. For this, I had to learn more about the practical part of networking and it’s implementation.

6.3.2 Client-end Work

In the **sanofi-project** we were not provided with remote access. So that, for a long period of time I need to visit the client office for trouble shooting. There, I had some experience about how to talk with a client, how to manage them, in which point they need to be convinced of.

To extract, I am now also going for a training session of this project to the user-end where all the users are non-technical. There I have to answer lots of technical issues with non-technical words and make the ease and familiar with the system.

In addition, for the training the handouts are also made by me with a very much non-technical words to describe with.

6.3.3 User Acceptance Testing (UAT)

The UAT is totally a new part of experience for a software engineer because, in the software development period we many times go for various kinds of testing but the testing which is accepted from the user-end is made up with different format. However, in this view, I have also experienced of how to make the UAT form, how to judge with, how to make familiar with the technical testing to the non-technical persons. This UAT is very much important for a software industry because here the qualification of the software is judged. In addition, before finishing the UAT a project is not considered as complete.

6.3.4 Practice with dealing Clients

For some hardware malfunction problem it was very much difficult for us to provide that company proper support. So as to them, because they were facing problems for a long time which hampers their potentiality of works. In this regard, I was sent to troubleshoot that but like before the server problem I was unable and that task was not possible to finish on that day. But, their management became as rude as they didn't allow me to leave their office before the elucidation. In those worst circumstances our CEO along with top management took really appreciable and professional steps by maintaining a good relationship with them and also gave me mental support.

6.4 Technological Enhancement

In the student life we seldom use particular tools or software to enhance the quality and ease to work. Elsewhere, we are not also habituated of using software by buying it. These practices are well formed here at OSL. Though here we are mainly using linux platform especially on CentOS but we very much need other tools to use

it easily whatever from remotely also. The technologies are described earlier in the chapter 5 on the topic 5.1. So, these enhancement of technologies are shown us our capability to mix up with a new technology.

On the other hand, being used to with this kind of software are really good for learning as well as preparing thyself at any kind of situation. Another important thing is the core technology that we use here at OSL frequently is totally new and also same for the platform named “FreeSwitch” is new-flanged in the world of telephony system and networking. However, working with the own customization platform is challenging too.

Again, as we can check our development through live testing it is a kind of exciting substance. While integrate it with hardware tools and the real time implementation happening which we learnt earlier from different courses get much interested. By the way I am also enhancing my technical knowledge as well as getting interested more in this sector.

6.5 Work apart from the Frame

It is a great opportunity to have scope to work in different sectors and here at OSL I got that opportunity to work not only in the boundary of researching or programming but also with doing tasks of Admin department like help to manage of store and other in-house staffs. Again, with the PR department worked on making Whitepaper and case study on project. Most important is to work as an Accounts, like to cheque deliver, payment confirmation, debit and credit to the bank, account to account money transfer etc. These kinds of working experience helped me to introduce with other sectors of people and variety of works.

In this respect one more things should be added to organize an in-house indoor sports week inside the office. In this event I played the key role of arranging games, scheduling, taking times from the participants, influences themselves, buying gifts, anchoring the prize giving and also maintain the budget including the dinner after the ending ceremony.

6.6 Employee of the Month

As per chapter 4, there was a term used “Employee of the month” which is kind of recognition for an employee on respect of his/her work ability, motivation, dedicatees, punctuality and other issues. Beyond the experience I have also recognised with this kind of things. That is the **“Employee of the Month of October, 2011”**. This recognition was especially for the hard labour and project completion in time including the basic criteria.

In general this recognition is naturally for the permanent employees, but due to dedicatees with quality of work. From the starting of my intern life it was a big challenge for me to get this recognition. So now while I see my picture in the notice board, I feel proud and also working hard to get this acknowledgement again.

7.1 Findings

7.1.1 Career Development

Through the total period of internship the most beneficiary thing is the career development. In this interlude I have learnt about some professional behaviour and the way how to prepare myself as an IT professional. This program provides instruction and support with communication skills, individual career counselling, job coaching, assessments and portfolio development. Here, mixed up with other culture and diversity of people gives an opportunity for self development too.

7.1.2 Professional Stance

In the corporate world a professional approach is very much essential that is developed in this epoch. To illustrate, the strategy of express own potentiality, presentation skill, talk with clients, manage and convince people, acquiring confidence, leadership training are significant. However, how to build a strong acquaintance with the colleagues, work smoothly with them, maintaining courtesy are also in the same line with professional attitude.

7.1.3 Reference

In the commercial globe linkage and good relationship helps as a bridge to rise on the hierarchy of the positions. So, as I had an experience of working at client-end and outside the frame towards some business organization like banks I have met up with many proficient employee and by maintaining well congress with them there I got a scope of referring them with gaining own experience. These kinds of relations are appreciable for both the organization and for the employees. Overall, according to the business law a good reference takes an employee as well as the total organization in a notorious position.

7.1.4 Dealing with Clients

The most difficult and challenging part is to defeat with the clients with delivery products in time. Again, to convince and familiarized the customer with the system is also more exigent. In addition, while the User level testing phase goes on the requirements and bugs are coming at an outsized number. So, to handle and become ease with these scenarios client handling techniques are most significant. In this intern life cycle this training was faced by me at every stage which assists to stable my mind and create passions. Again, from it I also learnt how to work in a knotty atmosphere confidently.

7.2 Recommendation

After working these five months at OSL, I have learnt many things and notified about the large sector of **VoIP** and it's future in Bangladesh. As same I had the opportunity to work with the pioneer call centre solution provider, so I hope I can also be a well contributor of this sector in our country. Moreover, in the respect of our academic life, if these types of technologies are added in some courses then it will be a better option for the next generation students to be familiar with this sector and can easily cope up with that. Again, the real life work practice which can be gathered from OSL, no doubt gives an internee a life time experience that can be also useful for career.

Again, the large number and area of clients of OSL create an opportunity to have a meet with the leading corporate world with direct working facility and also face to face communication. So, at the end I can say that, this six month of internship was very much productive. This experience of working in the software industry will boast me for my future career. To become an efficient IT specialist only academic study was not enough but this internship gave me a path way to alter that lacking with enriched practical experience.

So, I am really grateful to the **BIT Program Office** for giving me a chance of this experience in the last quarter of my academic life and also a blissful thanks to the **Intern and Placement Office** to be familiarized with us in this regard with **Onecall Solutions Limited.**

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