

INTERNSHIP REPORT
ON
Regional Operation and Maintenance (ROM)

By

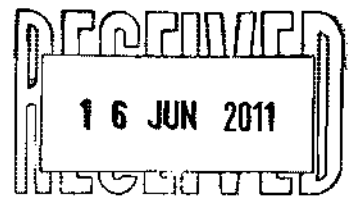
Muntasir Khan

Submitted to the
Department of Electrical and Electronic Engineering
Faculty of Sciences and Engineering
East West University

in partial fulfillment of the requirements for the degree of
Bachelor of Science in Electrical and Electronic Engineering
(B.Sc. in EEE)



Spring, 2011



Approved By

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Undergraduate Internship

Approval Letter

To whom it may concern



April 10, 2011

Mr. M. Sayeed Alam
Assistant Professor & Deputy Director,
Career Counseling Center,
East West University,
43 Mohakhali C/A, Dhaka-1212,
Bangladesh

Sub: Completion of Internship

Dear Sir,

We would like to inform you that Mr. Muntasir Khan has successfully completed his internship program in our organization starting from January 10, 2011 till April 10, 2011. He has worked in Regional operation and maintenance (ROM) under Technology Division.

We hope this program has provided practical knowledge to Mr. Muntasir Khan which will help to build up his career in related field.

We wish him every success in life.

Best regards

A handwritten signature in black ink, appearing to read "Shariful Islam".

Md. Shariful Islam
Head of Recruitment & Development
People & Organization
Grameenphone Ltd.

Grameenphone Ltd.

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Acknowledgment

All praise to Allah, the almighty, and the merciful. Without his blessing and endorsement this report would not have been accomplished.

The successful completion of this report might never be possible in time without the help some person whose inspiration and suggestion made it happen. First of all I want to thank my faculty advisor Md. Shamim Ahmed for helping me completing my report on **“Regional Operation and Maintenance”** in the context of Grameenphone.

I would also like to thank Mr. AHM Quamrul Ahsan, Manager of Dhaka West team and my supervisor of Grameenphone, and my colleague who helped me by providing informative instructions. I was closely attached with them during my internship tenure. Without them this report would have been very difficult.

I would also like to mention the name of Dr. Anisul Haque, Chairperson & Professor of the Department of Electrical & Electronic Engineering, and East West University (EWU) for being so kind during the period of my internship.

I also, thanks to my parents, and some friends who keep on this long process with me, always offer support.

And finally I also express my sincere gratitude to all those who participated to prepare the report. Most of them were field operation (FO) engineers of Grameenphone.

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Executive Summary

To fulfill the requirements to be a B.Sc Engineer from East West University, I have chosen the Industrial attachment or internee. I did my internship at Grameenphone Ltd. My internship title is “Regional operation and maintenance”. My major area is Telecommunication. So as a Telecom Engineer Regional operation and maintenance under technology division of Grameenphone is related to my field.

This report is written on the basis of technology division of Grameenphone. Here, I described about the regional operation and maintenance (ROM) of Grameenphone.

Grameenphone has been successful to build a superior image in comparison to the other operators. In other words, GP has a clear advantage over the competitors. Grameenphone has some additional features in comparison to its competitors. It is playing a vital role to increase the subscribers of Grameenphone. Another important thing is that GP users are mostly satisfied with the initial price of GP connections and handsets. Because, before GP’s introduction to the market, mobile phones were totally out of reach to the major part of the current market. Moreover, Grameenphone subscribers are happy with the country wide network.

At Grameenphone I have gathered practical knowledge about BTS, also called ‘site’ in Grameenphone. I was attached with “Regional operation and maintenance (ROM) department under “Technology” division in Grameenphone. There I was attached with Dhaka west team. The Dhaka west team cover Dhanmondi, Mohammadpur, Shamoli, Mirpur, Savar area. With the Dhaka west team I visited almost 50-60 site and get a knowledge about BTS. Specially the site was visited by the field operation engineers (FO) . The field operation engineers specially visit the site to maintain the BTS fault free. So, visiting the site I got a hand to hand experience about GSM antenna, RBS, rectifier, radio link and how they maintain the strong network connection of Grameenphone. To be a part of a Grameenphone I got a small experience about corporate life. . After all I want to say to be student of EEE,I am very much lucky to have a technical knowledge from a leading telecom company in Bangladesh.

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Table of Internship Work

The duration of my intern is three months: 10th January to 10th April.

My Internship Program Working Time:

Sunday to Thursday

9:00 AM to 06:00 PM (1 PM to 2PM Launch & Prayer)

Regular:

From 9am to 11am: official work

11am to 5/6pm site visit.

Sometimes I have to do official work all day.



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1. Company Information and Background

1.1. Company Profile:



Introduction of the company:

Company Name

Grameenphone Ltd.

Company Registration No.

C-31531 (652)/96

Legal Form

A public listed company with limited liability. Incorporated as private limited company on October 10, 1996 and subsequently converted to a public limited company on June 25, 2007. Listed on the Dhaka and Chittagong Stock Exchange Ltd. on November 11, 2009.

Vision: We exist to help our customers get the full benefit of communications services in their Daily lives. We're here to help.

Mission: Grameenphone is the only reliable means of communication that brings the people of Bangladesh close to their loved ones and important things in their lives through unparalleled network, relevant innovations & services.

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VALUES:

- **Make it easy**

Everything we produce should be easy to understand and use. We should always remember that we try to make customers' lives easier.

- **Keep promises**

Everything we do should work perfectly. If it doesn't, we're there to put things right. We're about delivery, not over-promising. We're about actions, not words.

- **Be inspiring**

We're creative. We bring energy and imagination to our work. Everything we produce should look fresh and modern.

- **Be respectful**

We acknowledge and respect local cultures. We want to be a part of local communities wherever we operate. We want to help customers with their specific needs in a way that suits way of their life best.

- **Brand promise**

Stay Close

GrameenPhone Ltd. (GP) is the market leader in the mobile telecommunication industry of Bangladesh. The address of its Head Office is: GP House, Bashundhara Baridhara Dhaka-1229 and Celebration Point, Plot No. 3 & 5, Road No. 113/A, Gulshan-2, Dhaka 1212, Bangladesh. GP is a joint venture between Bangladesh and Norway. Major shareholders are Telenor (68%) and Grameen Telecom (32%). Telenor is the state owned telecommunication company of Norway. It has operations in different countries of the world. On the other hand, Grameen Telecom is the sister concern Grameen Bank, one of the biggest Non Government Organizations (NGO) of Bangladesh.

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HISTORY:

- **November 28, 1996:** Grameenphone was offered a cellular license in Bangladesh by the Ministry of Posts and Telecommunications;
- **March 26, 1997:** Grameenphone launched its service on the Independence Day of Bangladesh;
- **June 1998:** GP started its services in the port city of Chittagong, the second largest city in the country. Cell to cell coverage in the Dhaka-Chittagong corridor also enabled GP to introduce its service in a number of other districts along the way;
- **September 1999:** GP started its service in the industrial city of Khulna. Once again, a number of other districts came under coverage of GP because of the cell to cell coverage between Dhaka and Khulna. Earlier in September 1999, it introduced the EASY pre-paid service in the local market. It also introduced the Voice Mail Service (VMS) and the Short Message Service (SMS) and other Value Added Services (VAS);
- **June 2000:** Grameenphone started its services in Sylhet, Barisal and Rajshahi, bringing all six divisional headquarters under the coverage of its network. The service in Barisal region was started after the microwave link between Khulna and Chittagong was completed;
- **August 2003:** After six years of operation, Grameenphone has more than one million subscribers;
- **November 2005:** Grameenphone continues to being the largest mobile phone operator of Bangladesh with more than 5 million subscribers;
- **November 16, 2006:** After almost 10 years of operation, Grameenphone has over 10 million subscribers. Grameenphone has built one of the most extensive infrastructures of Bangladesh and is a major contributor to the development of the national economy. Grameenphone is one of the largest private sector investments in the country with an accumulated investment of BDT 5200 core up to December 2005. Grameenphone is also one the largest taxpayers in the country, having contributed

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nearly BDT 5000 crore in direct and indirect taxes to the Government Exchequer over the years of which is amount, BDT 1670 crore was paid in 2005 alone.

GP was also the first operator to introduce the pre-paid service in September 1999. In addition to core voice services, Grameenphone offers a number of value-added services, in each case on both a contract and prepaid basis. It established the first 24-hour Call Center, introduced value-added services such as VMS, SMS, Fax & Data Transmission Services, International Roaming Service, WAP, SMS - based Push-Pull Services, EDGE, personal ring back tone and many other products and services.

Grameenphone nearly doubled its subscriber base during the initial years while the growth was much faster during the later years. It ended the inaugural year with 18,000 customers, 30,000 by the end of 1998, 60,000 in 1999, 193,000 in 2000, 471,000 in 2001, 775,000 in 2002, 1.16 million in 2003, 2.4 million in 2004 and it ended 2005 with 5.5 million customers.

Grameenphone offers the widest coverage in Bangladesh. The population coverage has increased from approximately 85% in 2005 to above 90% in 2006. In addition, Grameenphone also offers GPRS in most of the country and EDGE in urban areas.

From the very beginning, Grameenphone placed emphasis on providing good after-sales services. In recent years, the focus has been to provide after-sales within a short distance from where the customers live. There are now more than 600 GP Service Desks across (Customer Manager)s the country covering nearly all sub-districts of 61 districts. In addition, there are nine GP Customer Centers in all the divisional cities and they remain open from 8am-8pm every day including all holidays.

Grameenphone has generated direct and indirect employment for a large number of people over the years. The company presently has more than 4,500 full-time, part-time and contractual employees. Another 70,000 people are directly dependent on Grameenphone for their livelihood, working for the GP dealers, retailers, scratch card outlets, suppliers, vendors, contractors and others.

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In addition, the Village Phone Program, also started in 1997, provides a good income-earning opportunity to more than 200,000 mostly women Village Phone operators living in rural areas. The Village Phone Program is a unique initiative to provide universal access to telecommunications service in remote, rural areas. Administered by Graeme Telecom Corporation, it enables rural people who normally cannot afford to own a telephone to avail the service while providing the Village Phone operators an opportunity to earn a living.

The Village Phone initiative was given the “GSM in the Community” award at the Global GSM Congress held in Cannes, France in February 2000. Grameenphone was also adjudged the Best Joint Venture Enterprise of the Year at the Bangladesh Business Awards in 2002.

Grameenphone considers its employees to be one of its most important assets. GP has an extensive employee benefit scheme in place including Gratuity, Provident Fund, Group Insurance, Family Health Insurance, Transportation Facility, Day Care Centre, Children’s Education Support, Higher Education Support for employees, In-House Medical Support and other initiatives.

THE PEOPLE:

The people of Grameenphone are young, dedicated and energetic. All employees are well educated at home or abroad, with an even distribution of males and females and social groups in Bangladesh. They know in their hearts that Grameenphone is more than phones. This sense of purpose gives them the dedication and the drive, producing the biggest coverage and subscriber-base in the country. Grameenphone provides equal employment opportunities and recognizes the talents and energy of its employees.

THE SERVICE:

Grameenphone believes in service that leads to good business development. Telephony helps people work together, raising their productivity. This gain in productivity is development, which in turn

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enables them to afford a telephone service, generating good business. Thus development and business go together.

THE TECHNOLOGY:

Grameenphone Global System for Mobile or GSM technology is the most widely accepted digital system in the world, currently used by over a billion people in 172 countries. GSM brings the most advanced developments in cellular technology at a reasonable cost by spurring severe competition among manufacturers and driving down the cost of equipment. Thus, consumers get the best for the least. Grameenphone is now the leading telecommunications service provider in the country with more than 10 million subscribers as of January 2007. Presently, there about 15 million telephone users in the country, of which, a little over one million are fixed-phone users and the rest mobile phone subscribers.

Starting its operations on March 26, 1997, the Independence Day of Bangladesh, Grameenphone has come a long way. It is a joint venture enterprise between Teleport AS (62%), the largest telecommunications service provider in Norway with mobile phone operations in 12 other countries, and Grameen Telecom Corporation (38%), a non-profit sister concern of the internationally acclaimed micro-credit pioneer Grameen Bank.

Over the years, Grameenphone has always been a pioneer in introducing new products and services in the local market. GP was the first company to introduce GSM technology in Bangladesh when it launched its services in March 1997. The technological know-how and managerial expertise of Telenor AS has been instrumental in setting up such an international standard mobile phone operation in Bangladesh. Being one of the pioneers in developing the GSM service in Europe, Telenor AS has also helped to transfer this knowledge to the local employees over the years.

GRAMEENPHONE CORPORATE GOVERNANCE:

In the fast-paced world of telecommunications, vibrant and dynamic Corporate Governance practices are an essential ingredient to success. Grameenphone believes in the continued improvement of

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- Corporate Governance. This in turn has led the company to commit considerable resources and implement internationally accepted Corporate Standards in its day-to-day operations.

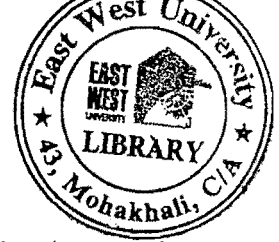
Being a private limited company, the Board of Directors of Grameenphone have a pivotal role to play in meeting all stakeholders' interests. The Board of Directors and the Management Team of Grameenphone are committed to maintaining effective Corporate Governance through a culture of Accountability, Transparency, Well-Understood Policies and Procedures. The Board of Directors and the Management Team also persevere to maintain compliance of all laws of Bangladesh and all internally documented regulations, policies and procedures. Grameenphone is a truly transparent company that operates at the highest levels of integrity and accountability on a global standard.

CORPORATE SOCIAL RESPONSIBILITIES; AN INTEGRAL PART OF GP:

Grameenphone started its journey 10 years back with a believe "Good development is good business". Since its inception, Grameenphone has been driven to be inspiring and leading by example, when it comes to being involved in the community. Grameenphone believe that, sustainable development can only be achieved through long term economic growth. Therefore, as a leading corporate house in Bangladesh GP intend to deliver the best to their customers, business partners, stakeholders, employees and society at large by being a partner in development.

Grameenphone defines Corporate Social Responsibility as a complimentary combination of ethical and responsible corporate behavior as well as a commitment towards generating greater good in society as a whole by addressing the development needs of the country.

To interact effectively and responsibly with the society and to contribute to the socio-economic development of Bangladesh, Grameenphone has adopted a holistic approach to Corporate Social Responsibility, i.e. **Strategic & Tactical**. Through this approach GP aims to, on the one hand involve itself with the larger section of the society and to address diverse segments of the stakeholder demography, and on the other remain focused in its social investment to generate greater impact for the society.



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Grameenphone focuses its Corporate Social Responsibility involvement in three main areas - **Health, Education and Empowerment**. They aim to combine all their CSR initiatives under these three core areas to enhance the economic and social growth of Bangladesh.

HEALTH:

Helping and caring for the community is an essential component of Grameenphone Corporate Social Responsibility; therefore they endeavor to make a positive contribution to the underprivileged community of Bangladesh by helping in improvement of the health perils in the country as much as possible.

Healthcare is still inaccessible for many Bangladeshis. Almost half of the country's population live below the poverty line and cannot even afford basic healthcare. Only 35% of the rural population use adequate sanitation facilities and 72% have access to clean drinking water. Moreover the people of the flood-prone areas suffer from many waterborne diseases.

The major problem in this sector is the significant gap between healthcare knowledge and practice and availability of the healthcare services. Therefore, all possible sources, be it public or private, should mobilize their efforts to make healthcare services available to the people who need it most, and thus help in achieving the MDG goals. GP's plan is to engage in programs, especially in the rural areas, that will assist in creating awareness about healthcare and healthcare services and help improve the overall quality of life.

Keeping their vision in mind - **We are here to help**; Grameenphone aim to extend their contribution to the development of the healthcare system and work to provide a brighter and healthier future for the people of Bangladesh.

EDUCATION:

Education is the key to prosperity and good life. Every human being should have the opportunity to make a better life for him or herself. One of the Millennium Development Goals (MDG) for

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Bangladesh is to achieve universal primary education; unfortunately too many children in Bangladesh today grow up without this opportunity, because they are denied their basic right to even attend primary school. The country's low literacy rate of 41% (2004 UNESCO Report), may indicate that we are far away in pursuit of sustainable development, but at the same time the gradual increase in the adult literacy rate gives us the hope that our nation has the potential to improve in this sector.

The marginalized and disadvantaged groups in general - particularly the rural and urban-poor of Bangladesh - have significantly less access to education than other groups. Though initial enrollment in primary school is high, the completion rate is notably low; approximately 65% (World Bank Report 2004) and a smaller percent of that even complete secondary school. Bangladesh government has provided lot of incentives, such as, free distribution of textbooks in primary schools, secondary stipend program for 100% of the girls, Food for Education project, to encourage and improve the educational sector of the country, which has helped in improvement in the literacy rate. But still we have a long way to go to make our country illiteracy free, thus GP look forward to support this sector, which will eventually help to build a developed country.

Providing access to education, especially for children from disadvantaged backgrounds who might not otherwise get the opportunity, is the main goal of Grameenphone CSR education initiatives. Many people in Bangladesh still lack the basic technological knowledge and marketable skills, thus GP plan to focus further to develop an educated and skilled workforce through creating opportunity in capacity development; skilled workforce would in turn be able to create and share knowledge and contribute to the economy of Bangladesh.

EMPOWERMENT:

Lack of empowerment and poverty is a chronic and complex problem for Bangladesh. According to UNDP HDI Report 2006, which measures the average progress of a country in human development, in terms of, life expectancy, adult literacy and enrolment at the primary, secondary and tertiary level, Purchasing Power Parity (PPP), etc., Bangladesh ranks 137th among 177 countries. Moreover, 50% of the total population of Bangladesh lives below the poverty line, defined by less than a dollar a day.

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Some of the major factors contributing to this situation are inequality in income distribution, lack of access to resources, lack of access to information and inadequate infrastructure. The rural people of Bangladesh especially are deprived of these facilities, which is a major issue to break out from the shackles of poverty prevailing in the country.

Empowerment is a key constituent towards poverty reduction, and it is a key driver for sustainable economic development. Empowerment is a process of enhancing the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes, which in turn helps them to secure a better life.

GP acknowledge that development and poverty reduction depend on holistic economic prosperity; therefore their aim is to increase development opportunities, enhance development outcomes and contribute towards development of the quality of life of the people through their CSR initiatives and innovative services. They would like to facilitate empowerment opportunities to the vulnerable people of Bangladesh, so that it enables them to better influence the course of their lives and live a life of their own choice.

SHAREHOLDERS OF GRAMEENPHONE LTD:

The shareholders of Grameenphone contribute their unique, in-depth experience in both telecommunications and development. The international shareholder brings technological and business management expertise while the local shareholder provides a presence throughout Bangladesh and a deep understanding of its economy.

ABOUT TELENOR AS:

Telenor as is the leading Telecommunications Company of Norway listed in the Oslo and NASDAQ Stock Exchanges. It owns 62% shares of Grameenphone Ltd. Telenor AS have played a pioneering role in development of cellular communications. It has substantial international operations in Mobile Telephony, Satellite Operations and Pay Television Services. In addition to Norway and Bangladesh,

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Telenor AS owns GSM companies in Denmark, Austria, Hungary, Russia, Ukraine, Montenegro, Thailand, Malaysia and Pakistan.

ABOUT GRAMEEN TELECOM:

Grameen Telecom Corporation, which owns 34.2% of the shares of Grameenphone Ltd., is a non-profit company and works in close collaboration with Grameen Bank. The internationally reputed bank for the poor has the most extensive rural banking network and expertise in micro finance. Grameen Telecom, with the help of Grameen Bank, administers the Village Phone Program, through which Grameenphone provides its services to the fast growing rural customers.

Grameen Telecom's objectives are to provide easy access to GSM cellular services in rural Bangladesh, creating new opportunities for income generation through self-employment by providing villagers with access to modern information and communication based technologies.

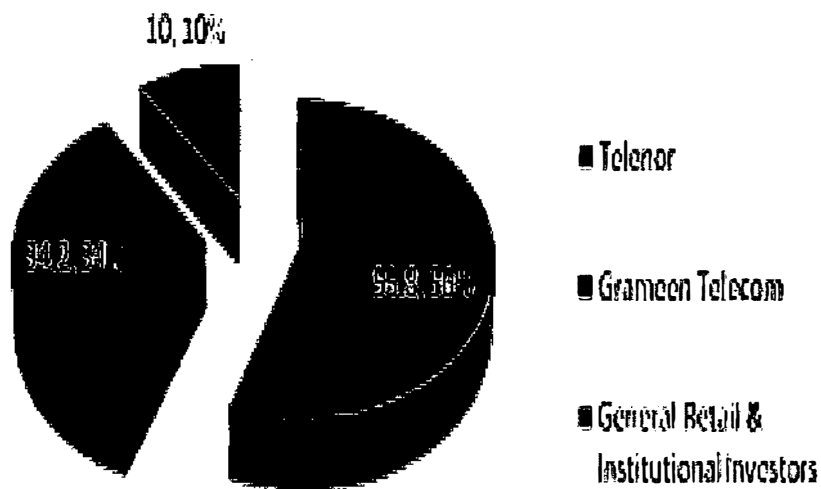


Figure 1: Share holders of Grameenphone

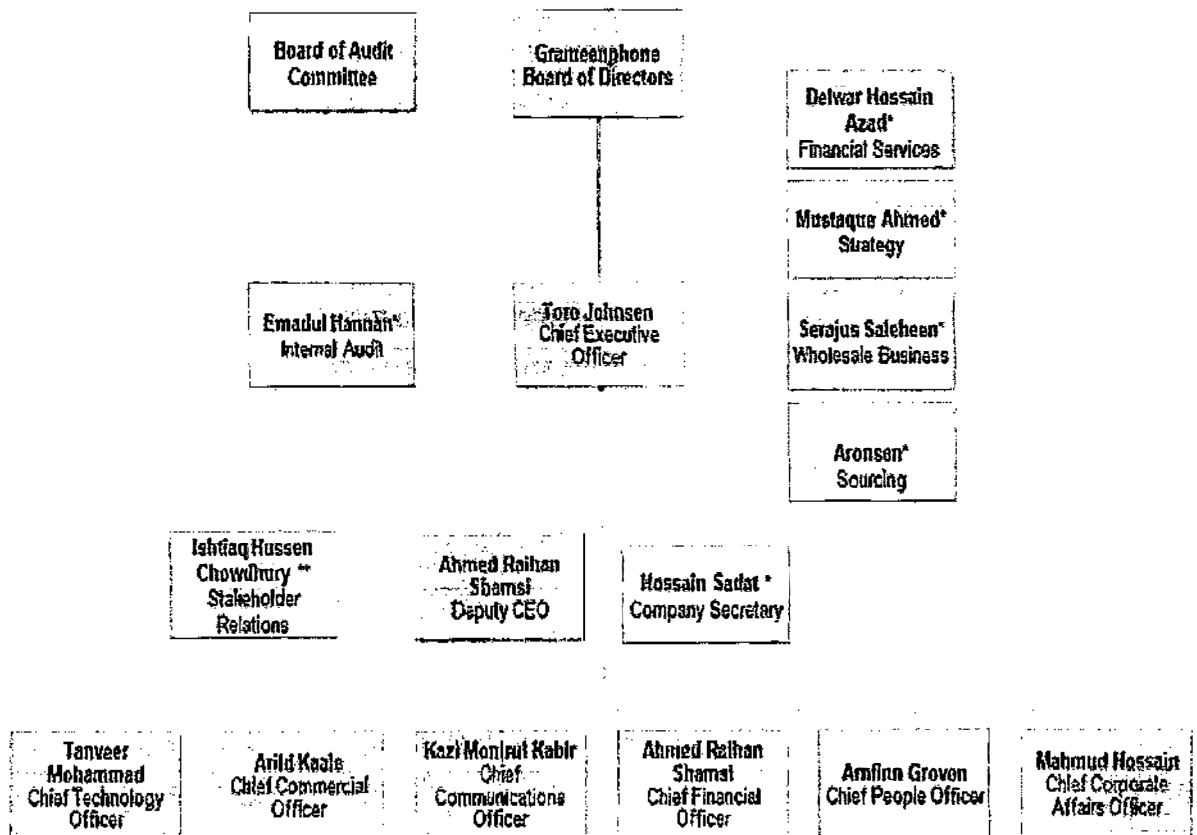
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MANAGEMENT OF GRAMEENPHONE LTD:

The top management of Grameenphone Ltd carried out their management roles comprehensively over the years. There has been replacement or changes in the positions but all have worked together to increase the overall performance of the organization. Management Team of Grameenphone comprises of the Managing Director, the Deputy Managing Director and the Divisional Heads of the company.

ORGANIZATIONAL STRUCTURE:

GP Organogram & Management



*Not a part of the Management Team

Figure 2: GP-Organogram and Management

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Grameenphone Management Team:

Tore Johnsen, Chief Executive Officer

Raihan Shamsi, Deputy CEO & Chief Financial Officer

Tanveer Mohammad, Chief Technology Officer

Arnfinn Groven, Chief People Officer

Kazi Monirul Kabir, Chief Communications Officer

Arild Kaale, Chief Marketing Officer

Mahmud Hossain, Chief Corporate Affairs Officer

They equally contributed to Grameenphone superior leadership, by carrying out their unique roles. They worked well together, respecting each other's abilities, & arguing openly & without any rancor when they disagreed.

DIVISIONS AT GRAMEENPHONE LTD.

Grameenphone Ltd. has approximately 5000 employees working at different levels of organizational hierarchy. There are 9 functional departments engaged in managing these employees- with the aim to meet organizational objectives. Grameenphone follows a mix of centralized and decentralized decision making process-where the top management mainly takes all the strategic decisions while the functional managers have flexibility to take decisions by themselves on a day to day basis. At Grameenphone the Managing Director is assisted by 9 Senior Executives who are heading different departments in the strategic decision making process. The departmental names of Grameenphone are given below:

- Commercial Division
- DMD's (Deputy Managing Director) Division
- Finance Division
- New Business Division
- Human Resource Division
- Information Technology

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- Technical Division
- Information
- Regulatory & Corporate Affairs

Grameenphone follows a 3-layer management philosophy in Bangladesh. These are Directors, Managers and Officers. The CEO is the top most authority of all the levels. Directors are the departmental heads that are responsible for the activities of their departments. Managers have the authority next to directors. These two layers represent the management level of Grameenphone. Officers are the next persons to stand in the hierarchy list. They are the typical mid-level employees of Grameenphone organizational hierarchy. These officers are responsible for managing the operational activities and operating level employees.

COMMERCIAL DIVISION OF GRAMEENPHONE:

Head of Function: Stein Naevdal

Reporting To: Anders Jensen, Managing Director

Main Objective:

Within the direction from the CEO of Grameenphone, the Head of Commercial Division/Chief Marketing Officer shall ensure that the Commercial function within Grameenphone at all times is aligned with and supports the realization of Grameenphone business objectives.

Main Responsibilities:

- Develop, maintain and implement strategies, policies and procedures for the functional areas, which include:
 - ✓ Marketing
 - ✓ Sales & Distribution
 - ✓ Customer Management

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- ✓ Customer Relationship Management
- ✓ Village Phone



- Monitor and control company-wide commercial activities;
- Provide support and consulting within scope to all divisions in the company, in order to ensure coordination, business alignment and adaptation of best-practices;
- Develop and maintain descriptions of departments reporting to the Head of Commercial Division/Chief Marketing Officer, defining their responsibilities and how work is organized between these departments;
- Ensure awareness of, and ability to comply with, legal requirements applicable for procurement activities and its governance documents, including SOA-required internal controls and Codes of Conduct;
- Ensure necessary capabilities company wide to perform the functions responsibilities.

DMD'S DIVISION OF GRAMEENPHONE

Head of Function: Frank Fodstad

Reporting To: Anders Jensen, Managing Director

Main Objective:

Within the direction from the CEO of Grameenphone, the Deputy Managing Director shall ensure that the Deputy Managing Director's function within the company at all times is aligned with and supports the business objectives.

Main Responsibilities:

- Develop, maintain and implement company strategies, policies and procedures for the functional area, which includes:
 - ✓ Revenue Assurance & Fraud Management
 - ✓ Fiber Optic Network

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- ✓ Legal & Compliance Unit
- ✓ Administration
- ✓ Corporate Headquarter Project

- Monitor and control Deputy Managing Director's divisional activities;
- Provide support and consulting to all other functions within scope, in order to ensure coordination, business alignment and adaptation of best-practices;
- Develop and maintain descriptions of departments reporting to the Deputy Managing Director, defining their responsibilities and how work is organized between these departments;
- Ensure awareness of, and ability to comply with, legal requirements applicable for the company and its governance documents, including SOA-required internal controls and Codes of Conduct;
- Ensure necessary capabilities within function to ensure that the organization is able to meet its current and future business objectives.

FINANCE DIVISION OF GRAMEENPHONE

Head of Function: Arif Al Islam

Reporting To: Anders Jensen, Managing Director

Main Objective:

Within the direction from the CEO of Grameenphone, the CFO shall ensure that the Finance & Supply Chain Management function within Grameenphone at all times is aligned with and supports the realization of Grameenphone business objectives. The CFO must prepare financial statements with reasonable assurance that statements are not materially misstated at the consolidated group level and for local statutory accounts.

Main Responsibilities:

- Develop, maintain and implement company strategies, policies and procedures for the functional area, which includes:

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- ✓ Treasury
- ✓ Financial Reporting & Controlling
- ✓ Tax
- ✓ Risk Management
- ✓ Supply Chain Management
- ✓ Investor Relations

- Monitor and control company-wide Finance & Supply Chain Management activities;
- Provide support and consulting within scope, to all other divisions in the company, in order to ensure coordination, business alignment and adaptation of best-practices;
- Develop and maintain descriptions of departments reporting to the CFO, defining their responsibilities and how work is organized between these departments;
- Ensure awareness of, and ability to comply with, legal requirements applicable for the functional area and its governance documents, including SOA-required internal controls and Codes of Conduct;
- Ensure necessary capabilities within the function to ensure that the organization is able to meet its current and future business objectives.

NEW BUSINESS DIVISION OF GRAMEENPHONE

Head of Function: Kafil H. S. Muyeed

Reporting To: Erik Aas, Managing Director

Main Objective:

Within the direction from the CEO of Grameenphone, the Head of New Business shall ensure that right emphasis is put on community relations, CSR activities and new business based on current and future technological developments and these areas are aligned with and supports the realization of Grameenphone business objectives.

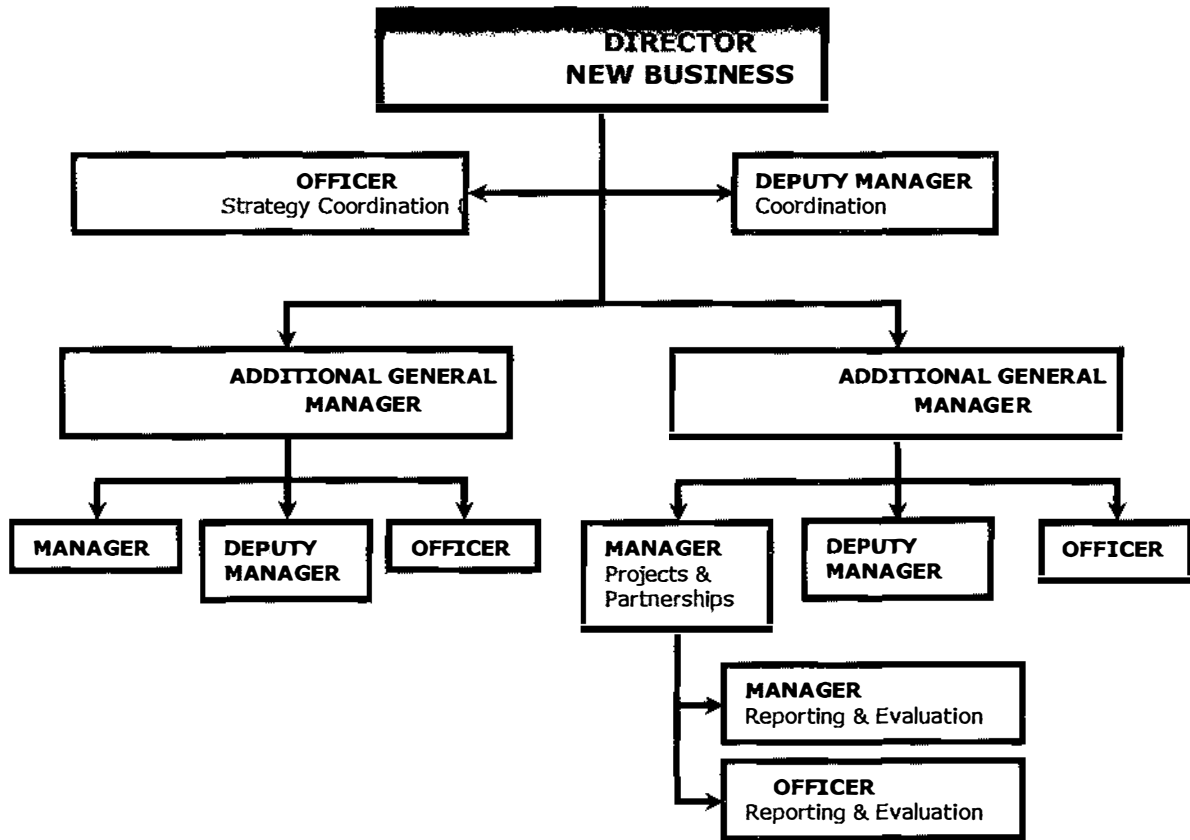


Figure 3: Organ gram of New Business Division

Main Responsibilities:

- Develop, maintain, and implement strategies and policies for the areas which include:
 - ✓ Community Relations
 - ✓ Corporate Social Responsibility activities
 - ✓ New businesses based on current and future technological developments
 - ✓ Strategy processes co-ordination aCM (Customer Manager)s the organization
- Monitor and control activities within own area;
- Develop and maintain descriptions of functions reporting to the Head of New Business, defining their responsibilities and how work is organized;

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- Ensure awareness of, and ability to comply with, legal requirements applicable for this function, including SOA-required internal controls;
- Ensure necessary capacity, competence and capabilities to perform the function's responsibilities.

HUMAN RESOURCE DIVISION OF GRAMEENPHONE

Head of Function: Emad Ul Ameen

Reporting To: Erik Aas, Managing Director

Main Objective:

Within the direction from the CEO of Grameenphone, the Head of HR shall ensure that the HR function within Grameenphone at all times is aligned with and supports the realization of Grameenphone business objectives. The Head of HR shall optimize the human resources in Grameenphone, through individual performance management and organizational development, as well as nurturing a culture supporting the realization of the vision and values. In order to achieve this, leadership excellence is a key focus area for HR.

The units in HR Division include:

- HR Operations;
- Recruitment & Selection;
- HR Development;
- Health, Safety & Environment
- Expatriate and Travel Support.

Main Responsibilities:

- Develop, maintain and implement company HR strategies, policies and procedures in order to establish organizational capabilities company-wide to meet current and emerging business needs, which include:

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- ✓ Leadership
- ✓ Employee Capabilities
- ✓ Organizational Design
- ✓ Collaboration
- ✓ Recruitment
- ✓ Compensation & Benefits
- ✓ Employee relations and Health, Safety & Working Environment

■ Monitor and control company-wide HR activities;

■ Provide support and consulting within scope, to all divisions in the company, in order to ensure coordination, business alignment and adaptation of best-practices;

■ Develop and maintain descriptions of departments reporting to the Head of HR, defining their responsibilities and how work is organized between these departments;

■ Ensure awareness of, and ability to comply with, legal requirements applicable for the function and its governance documents, including SOA-required internal controls and Codes of Conduct;

■ Ensure necessary capabilities company wide to ensure that the organization is able to meet its current and future business objectives.

INFORMATION TECHNOLOGY DIVISION OF GRAMEENPHONE

Head of Function: Lutfor Rahman

Reporting To: Erik Aas, Managing Director

Main Objective

Within the direction from the CEO of Grameenphone, the Head of IS/IT shall ensure that the Information Security/Information Technology function within Grameenphone at all times is aligned

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with and supports the realization of Grameenphone business objectives. The Head of IS/IT shall ensure the realization of the business objectives through delivering services and information with sufficient quality.

Main Responsibilities:

- Develop, maintain and implement company strategies, policies and procedures for the functional area, which includes:
 - ✓ Strategy and Architecture
 - ✓ IS/IT Governance
 - ✓ IT Quality and Risk Management
 - ✓ IT Sourcing (In compliance with Company Procurement Policy)

- Monitor and control company-wide IS/IT activities to create transparency and facilitate best practice within IT.

- Provide support and consulting to all divisions in the company, in order to ensure coordination, business alignment and adaptation of best-practices.

- Develop and maintain descriptions of departments reporting to the Head of IS/IT, defining their responsibilities and how work is organized between these departments.

- Ensure awareness of, and ability to comply with, legal requirements applicable for the functional area and its governance documents, including SOA-required internal controls and Codes of Conduct.

- Ensure necessary capabilities within the function to ensure that the organization is able to meet its current and future business objectives.



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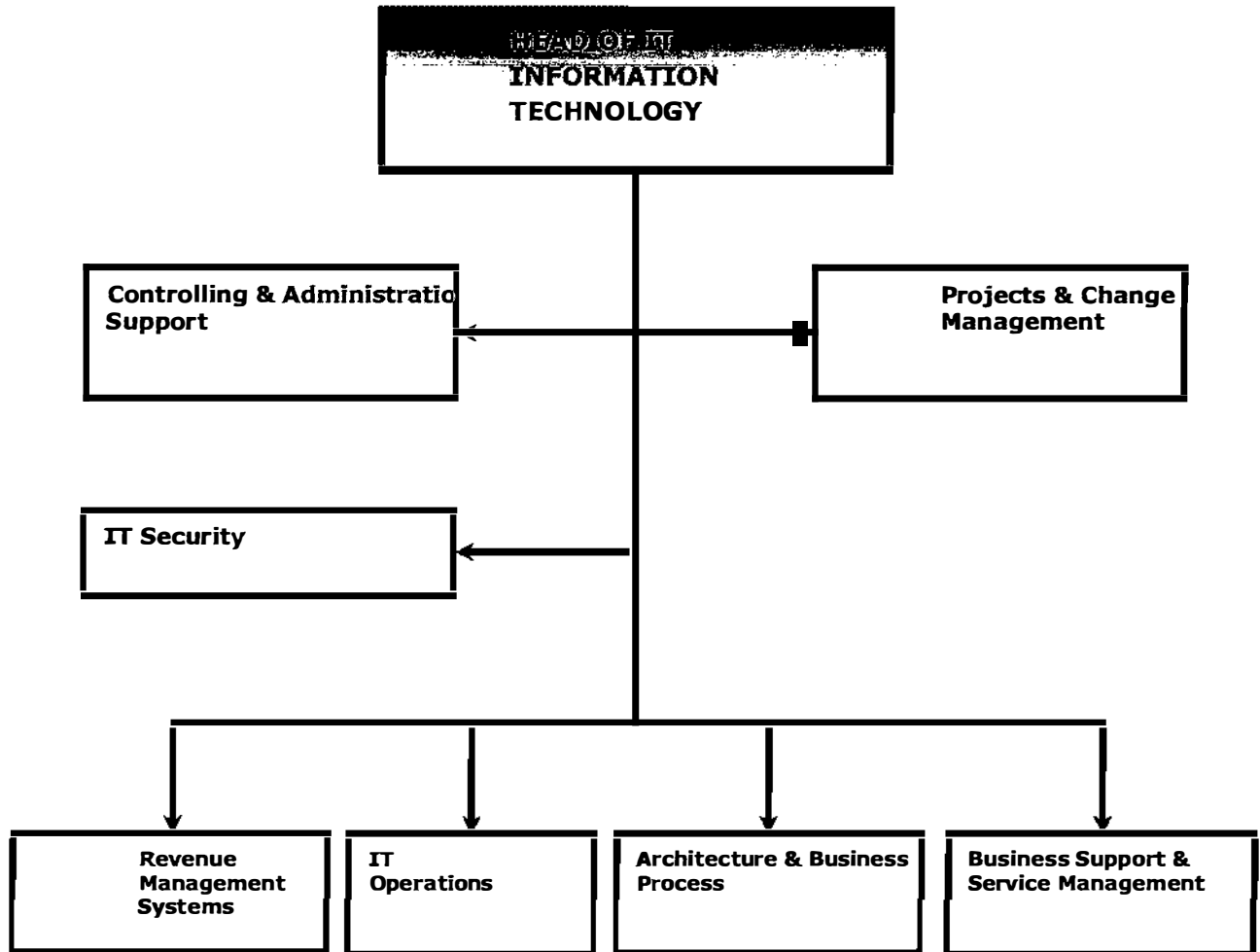


Figure 4: Organogram of Information Technology Division

TECHNICAL DIVISION OF GRAMEENPHONE

Head of Function: Shafiqul Islam

Reporting To: Erik Aas, Managing Director

Main Objective:

Within the direction from the CEO of Grameenphone, the Head of Technical/CTO shall ensure that the technical function within the company at all times is aligned with and supports the business objectives. There are five departments within the Technical Division,

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- **Planning:** The purpose of this unit is to plan the entire GP Telecom network including Core Network Planning, Integrated Network Planning, Service Network Planning, Transmission Planning and Radio Planning.
- **Implementation:** The task of the Implementation Department is to build the GP telecom network or execute the plan of the Planning Department in the field.
- **Operation:** This department is responsible for running the network. This includes Operation and Maintenance of the network.
- **Network Quality & Performance:** The purpose of this department is to monitor and improve Network Quality and Performance.
- **Network Advancement:** The purpose of this department is to provide Technology Strategy Planning; adopt new technology considering midterm and long term technology evolution and new business opportunities; technology evaluation and Industry update; and review network plans and architecture for constant renewal.

Main Responsibilities:

- Develop, maintain and implement company strategies, policies and procedures for the functional area, which includes:
 - ✓ Network Planning
 - ✓ Network Expansion and Advancement
 - ✓ Network Operations
- Monitor and control the Technical functions activities;
- Provide support and consulting to all functions within scope, in order to ensure coordination, business alignment and adaptation of best-practices;

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- Develop and maintain descriptions of functions reporting to the Head of Technical/CTO, defining their responsibilities and how work is organized between these functions;
- Ensure awareness of, and ability to comply with, legal requirements applicable for the company and its governance documents, including SOA-required internal controls and Codes of Conduct;
- Ensure necessary capabilities within function to ensure that the organization is able to meet its current and future business objectives.

REGULATORY & CORPORATE AFFAIRS DIVISION OF GP

Head of Function: Khalid Hasan

Reporting To: Erik Aas, Managing Director

Main Objective:

Within the direction from the CEO of Grameenphone, the Head of Regulatory & Corporate Affairs shall ensure that the Regulatory & Corporate Affairs function within the company at all times is aligned with and supports the business objectives.

Main Responsibilities:

- Develop, maintain and implement company strategies, policies and procedures for the functional area which includes:
 - ✓ Regulatory & Corporate Affairs
 - ✓ External Relations
- Monitor and control Regulatory & Corporate Affairs activities;

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- Provide support and consulting to other functions within scope, in order to ensure coordination, business alignment and adaptation of best-practices;
- Develop and maintain descriptions of departments reporting to the Head of Regulatory & Corporate Affairs, defining their responsibilities and how work is organized between these departments;
- Ensure awareness of, and ability to comply with, legal requirements applicable for the company and its governance documents, including SOA-required internal controls and Codes of Conduct;
- Ensure necessary capabilities within function to ensure that the organization is able to meet its current and future business objectives;

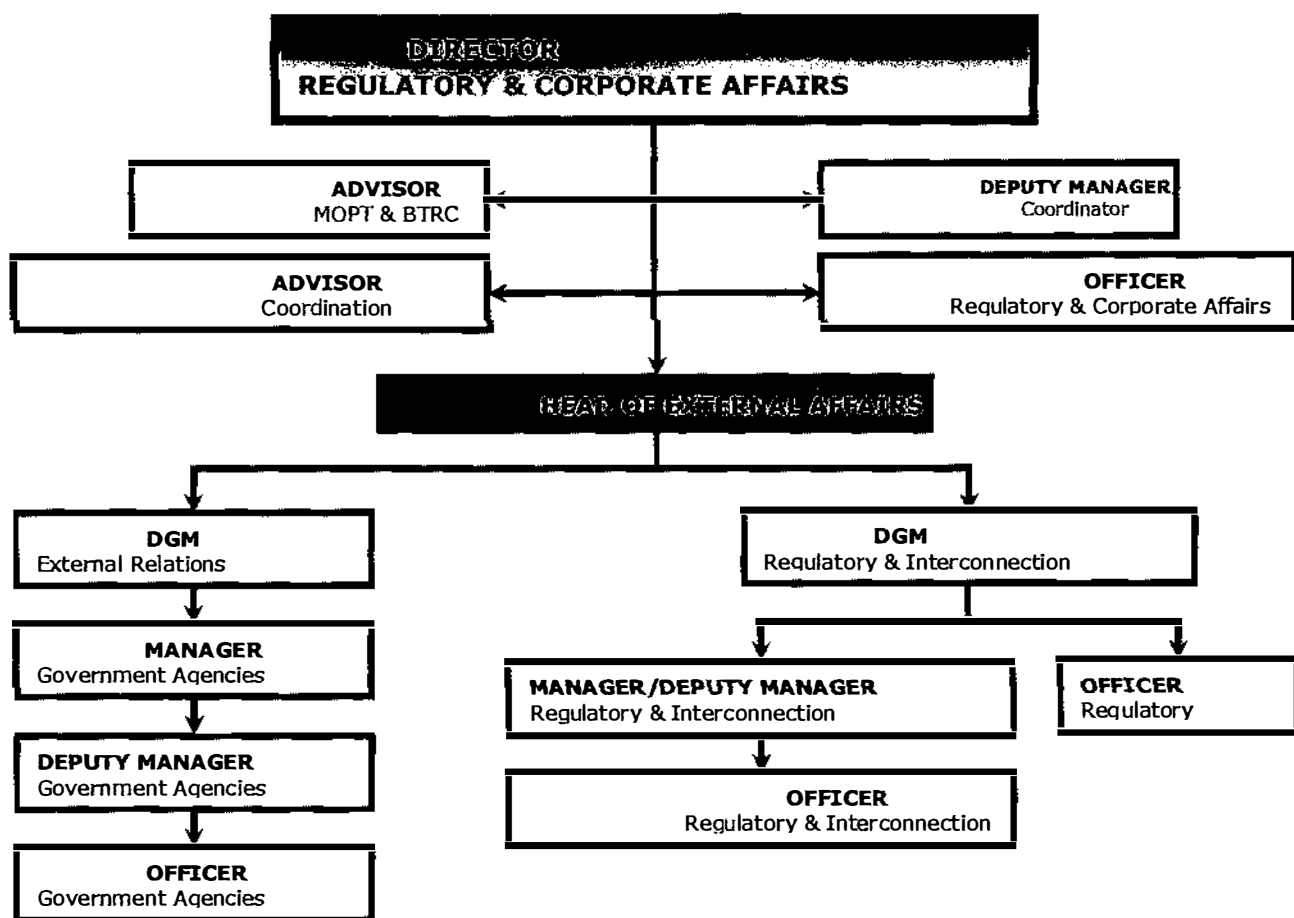


Figure 5: Organogram of Regulatory & Corporate

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INFORMATION DEPARTMENT OF GRAMEENPHONE

Head of Function: Yamin Bakht

Reporting To: Erik Aas, Managing Director

Main Responsibilities:

The Department is responsible for:

- ✓ Maintaining Public Relations;
- ✓ Maintaining Media Relations;
- ✓ Publishing GP Newsletters;
- ✓ Publishing Annual Reports;
- ✓ Maintaining the content of GrameenPhone website;
- ✓ Maintaining the content of **grameenphone@work** Intranet site.

The department consists of three people and is headed by a **General Manager**.

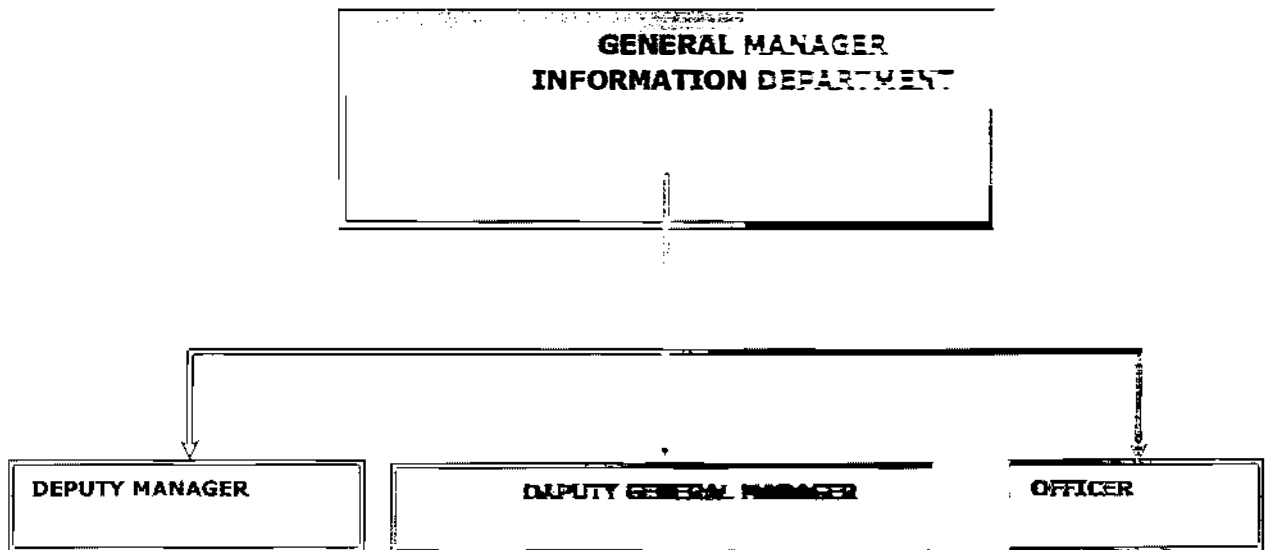


Figure 1: Organization of Information Department

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ASSESSING GRAMEENPHONE'S CURRENT STATE & FUTURE DIRECTION

As my discussion shows, GP is doing great in its business. Their market share is significantly high. The mobile telecommunication industry is also growing at a significant pace.

But, if we assess the external environment, we find, the path for Grameen Phone is not that smooth. The service of GP is extensively dependent on BTTB (Bangladesh Telephone & Telegraph Board). In many cases, GP did not get full support of the government owned department.

E.g. Initially, GP provided connections that were accessible to BTTB land phones. But at one point of time, BTTB stopped to provide anymore support in this regard. At that time GP had to innovate the 'mobile to mobile' concept to continue the business growth.

So, it has the scope to enhance and strengthen its market position. To do so, they need to put more stress on their policies like efficiency, quality, innovation, and customer responsiveness.

If everything goes right, with least risk I can say, GP is headed towards a bright future.

1.2. Origin of this Report

This report is based on internship program. Grameenphone Ltd arranges internship program to gather practical knowledge telecom sector. Which is followed by their Engineers for universities students..

1.3. Report Background:

The purpose of this report is to fulfill the internship requirement for the degree of B.Sc in Electrical and Electronics Engineering from East West University. I have started my industrial training in the GP House and successfully completed with lots of experiences. And based on that I prepared this report where I tried to mention every point that I gather from there.

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1.4. Objective of this Report:

The first objective of writing the report is fulfilling the partial requirement of EEE program. In this report, I have attempted to give an overview of Grameenphone Ltd. The study aims at some objectives, which are as follows

- Understanding corporate life of Grameenphone.
- To get a technical knowledge about RBS,GSM
- To solve technical problem.
- To have a experience about BTS equipments.
- To understand the telecom industry and its business.

1.5. Methodology:

Grameenphone Ltd. is one of the leading mobile phone companies in Bangladesh. The report is based on secondary research

The secondary data has been collected from

- Different papers of GP.
- GP website.
- Intern report submitted by several internship students.
- Different project papers of Grameenphone.

1.6. Scope of study:

The scope of organization part covers the organizational structure, background, and objectives, functional departmentalization; of Grameenphone Ltd. Especially this report focuses on the Regional Operation and maintenance (ROM) of Grammenphone Ltd.

2. Regional Operation and Maintenance (ROM)

2.1. Responsibilities:

- **First line Fault handling:**

- Field Operation is the owner of all kind of equipments at sites and any site itself.
- First line fault handling of all kinds of equipment of Transmission, Power and BTS equipments.
- For Handling faults, there is specified Service Level Agreement which is popularly known as SLA (allowed time varies from Fault to Fault) for each type of fault

- **Preventive Maintenance:**

- Preventive maintenance means 'To take initiative to remove all sorts of possible causes of faults before fault appears.
- In other word, PM is called Corrective Maintenance.
- There is specified Preventive maintenance form/check list, which is to be fulfilled while doing any preventive maintenance.
- Preventive maintenance is a periodic routine work, 2 cycles in a year at each site.
- Ensure the security of Optical fiber, coordinating with patrolling team of Admin department.

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2.2. Physical Connections of all kinds of PCMs, NE integration:

- Hundreds of connectivity are required like, MSC-MSC, MSC-BSC, BSC-BSC, BSC-TSC etc. Some connections required to be connected physically after having the software connections. FO engineers make these physical connections.
- When any new node is integrated with the existing network elements, connectivity required to be established with the new element and many physical connections required to be made and are done by FO engineers.
- ROM engineers do capacity up gradation, when required as per the network requirement.
- Whenever new optical transmission link is required to be established, installation and commissioning of interface cards (Optical/Electrical), establishing the link is FO engineer's responsibility.
- Connectivity/commissioning of PCMs with other operators are FO engineers' responsibility on requirement basis.

2.3. External Power Maintenance:

- All sorts of Power maintenance are our responsibility. When commercial power is unavailable, power backup ensuring by generator running is one responsibility of FO engineers.
- When any fault occurs with the commercial power, Energy meter/Service line/Transformer related or what else, its FO engineers' responsibility to take care for removing the fault and ensure power to site.
- First line Maintenance of Battery, Auto Generators, Portable generators, Fuel loading at all auto generators are FO engineers' responsibility.

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2.4. BTS Environment control:

Standard Environment is required to be maintained in the Base Station by:

- Maintaining the room temperature at 24°C
- Cleanliness
- Humidity free
- Air tight room
- Flammable item free etc.

All these environmental issues are to be controlled / maintained by FO engineers.

2.5. Network Elements and Sites Maintained by ROM Engineers:

2.5.1. Transmission Equipments:

- a) **Optical Transmission**
- b) **Microwave Transmission**

a) Optical Transmission Equipment:

- 1) Optical Fiber – Bangladesh Railway Fiber network, Highway Fiber Network, Overhead Fiber network, Leased Fiber
- 2) Siemens - hiT 7070, SMA4

b) Microwave Transmission Equipment:

- 1) Siemens – SRAL, SRAL XD, SRT 1C, SRT1F, SRA S3, SRA S4
- 2) NEC – Paso link, Paso link +, NEC 300S
- 3) Ericsson – Minilink

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2.5.2. BTS Equipments:

Ericsson:

- a) RBS 2202 – GSM 900
- b) RBS 2102 – GSM 900, Out Door BTS
- c) RBS 2206 – GSM 900, GSM 1800
- d) RBS 2106 – GSM 900, GSM 1800, Out Door BTS
- e) RBS 2308 – GSM 900, GSM 1800, Indoor BTS

2.5.3. Power Equipments:

- a) Rectifier
- b) Battery
- c) Air Cooler
- d) Surge protector
- e) Energy Meter
- f) Distribution Board

2.5.4. Rectifier:

- 1) DELTA
- 2) BSMCBD
- 3) ELTEK Flat pack
- b) Battery:
Uasa, GNB, Narada – 2v, 300 AH

2.5.5. Air Cooler:

American Air – Capacity 4 to 5 tons, Used only for Core sites.
Hayes and Heir, Whirlpool, Cool line, General, Unitech, LG
- Capacity - 1.5 ton to 2 ton; used for BTS

2.5.6. Surge Protection Device:

Erico, LPI, Dennshen

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2.5.7. Voltage Stabilizer:

Green Power, Newtech, Galaxi, Navana

– Capacity 8.5 KVA to 40 KVA, used in BTS and core sites, Need basis

2.5.8. Generator:

ATS Generator

– SDMO, Tempest, pramac, wsm,fgwilson, himunisha

Capacity – Core Sites, 50KVA to 200KVA; Need Basis

Portable generator

- Honda, WFM

Capacity – 7.5 KVA to 8.5 KVA; Used for BTS power back up.

2.5.9. The Standard Forms / Check list Forms:

1. Preliminary Acceptance Test (PAT) form
2. Preventive Maintenance (PM) form
3. AC servicing Check list form
4. Generator Servicing Check list form
5. Rectifier Setting Check list form
6. Technical Review form (TR form) for Collocation and 3 Cabinet integration.
7. Generator Commissioning form



2.5.10. Fault Handling Process flow:

- Fault appeared, Displayed at NMC (Network Management centre)
- TR issued and Information to FO engineers and they are responsible Team leader
- FO engineer Attend to site for fault handling

3. BTS (BASE TRANSCEIVER STATION)

3.1. Common Faults and Recovery/Removal of Faults for BTS:

The BTS includes all Radio and transmission interface equipment needed on the radio site to provide Connection with the mobile station over the air interface.

Each BTS operates at a given pair of frequencies,

One frequency is used to transmit signals to mobile station and the other one to receive signals from Mobile stations.

3.2. RBS (Radio Base Station):

RBS includes all radio and transmission interface equipment needed on the site to provide radio transmission for one or several cell.

RBS is the Ericsson's product name for the GSM Base Transceiver Station.

3.3. RBS Cabinet:

- The RBS cabinet houses up to 12 TRUs plus common equipment needed for serving the cell configuration.
- The double transceiver, dTRU, consists of two transceivers in one unit of the same size as classic single TRU
- Cable entries for antenna jumpers, transmission cables, and mains power are concentrated on the roof of the cabinet.
- Power supply can be either 230 V AC, -48 V DC or +24 V DC.

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3.3.1. RBS 2206 consists of following elements.

- DXU – Distribution Switch Unit
- DTRU – Double Transceiver Unit
- CDU – Combining & Distribution Unit
- CXU – Configuration Switch Unit
- PSU – Power Supply Unit
- DCCU – DC Connection Unit
- FCU – Fan Control Unit
- IDM – Internal Distribution Module
- OXU – Optional Expansion

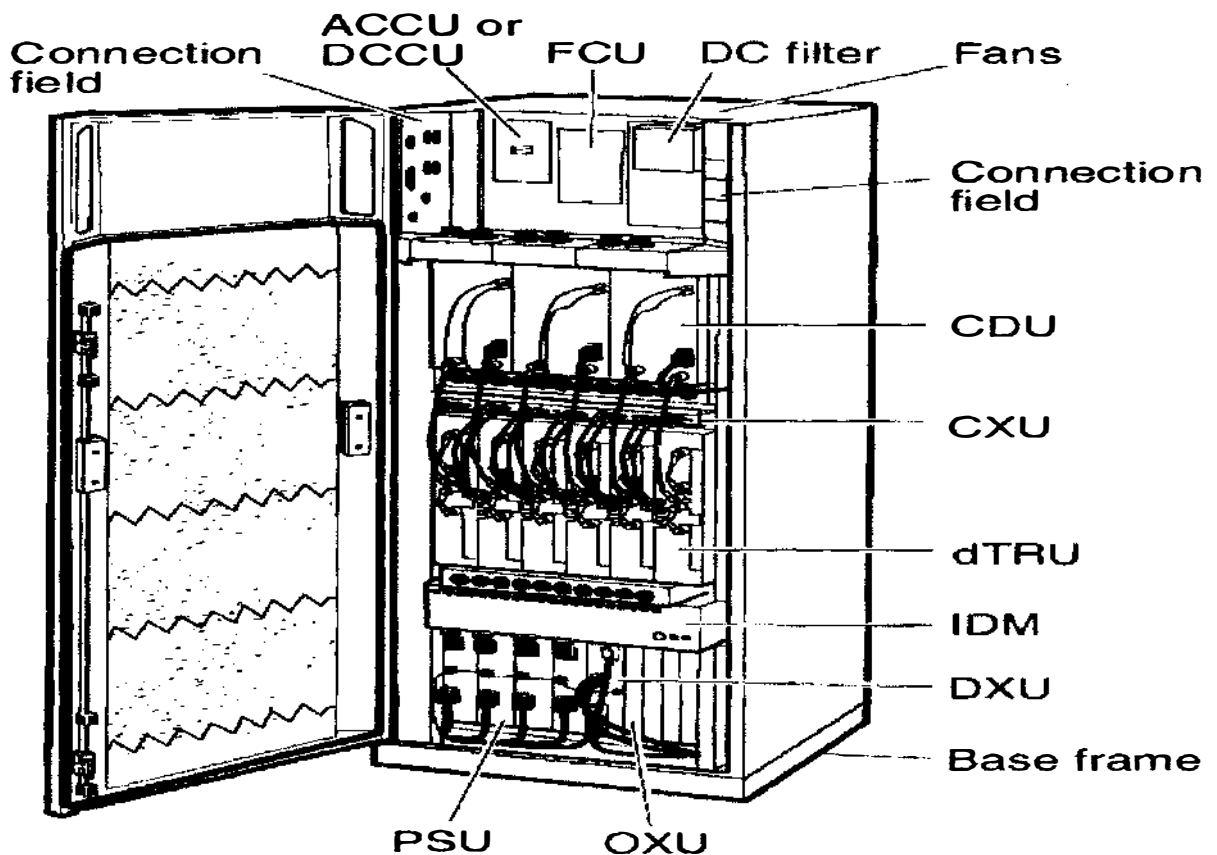


Figure 7: RBS

4. POWER SYSTEM

4.1. Rectifiers:

4.1.1. Eltek Rectifier:

ELTEK Flat-Pack System:



Figure 8: *ELTEK Flat-pack MCU & modules*

This Flat-pack system can accommodate 6 no. of rectifier modules (upto 9 for new systems) and one master controller Unit named MCU which control every thing. All the 6 modules are distributed in three different phases like 2+2+2 or 4+2+2 (for horizontal systems) or 3+3+3(Vertical Systems).

Specification of System:

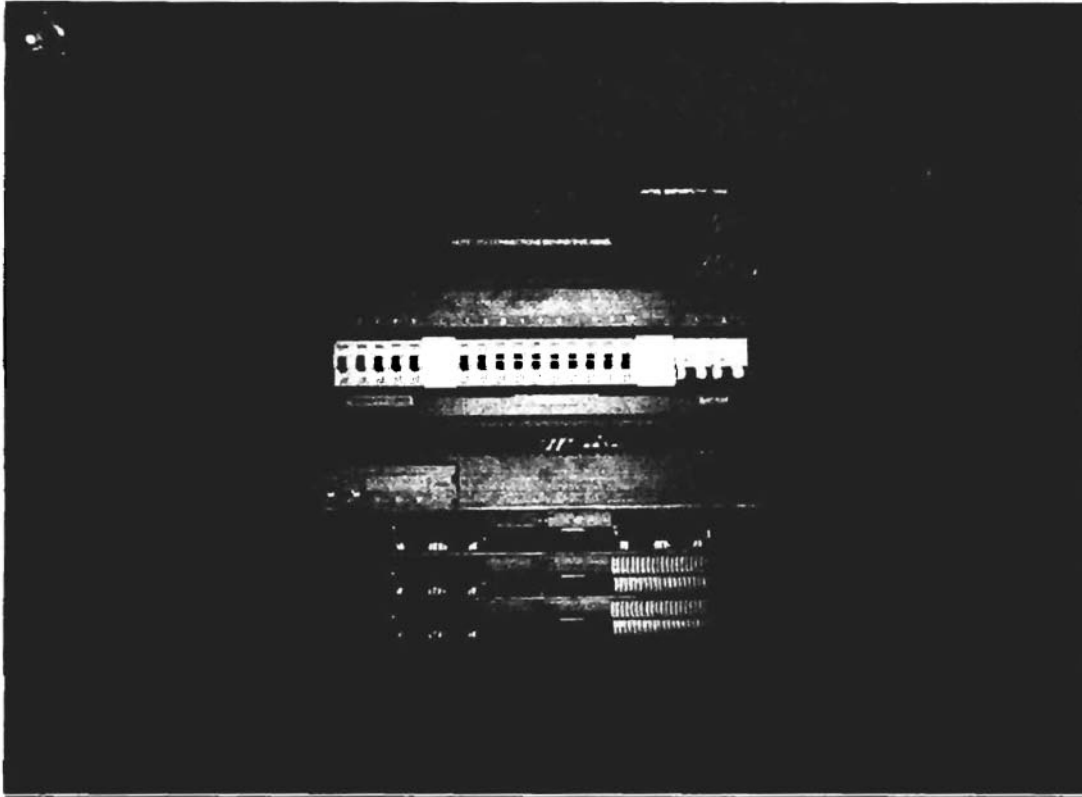


Figure 9: ELTEK Flat-pack Rectifier System

Each module Capacity

1500 watt or 30 amp

Working voltage limit

85 V to 312 V

Each Module output will be

550 to 600 watt or 11 to 12 amp at 85 V to 150 V

1100 watt or 22 amp at 150 V to 185 V

1500 watt or 31 amp at 185 V to 312

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Interfacing cable Construction:

A standard serial cable (without DTR connection) can be used for PC communication, in which case the Flat-pack MCU must be suitably configured.

4.1.2. BSMC Rectifier System

In GP network there are different models of BENNING System. It can be classified in 3 ways:

- a. The system with 25 amp modules
- b. The System with 50 amp modules
- c. The new Com-10 system with 50 amp modules
- d. BSMC BD system with 30 Amp module (black)

-Now GP removing all the BENNING system with 25 amp modules gradually from our network.

-The following part includes the system with 50 amps module & the new Com-10 systems with 50 amps module.

The old BENNING system with 50 amps module:

Pictorial View:



Figure 10: BSMC Rectifier system with 50 amp modules.

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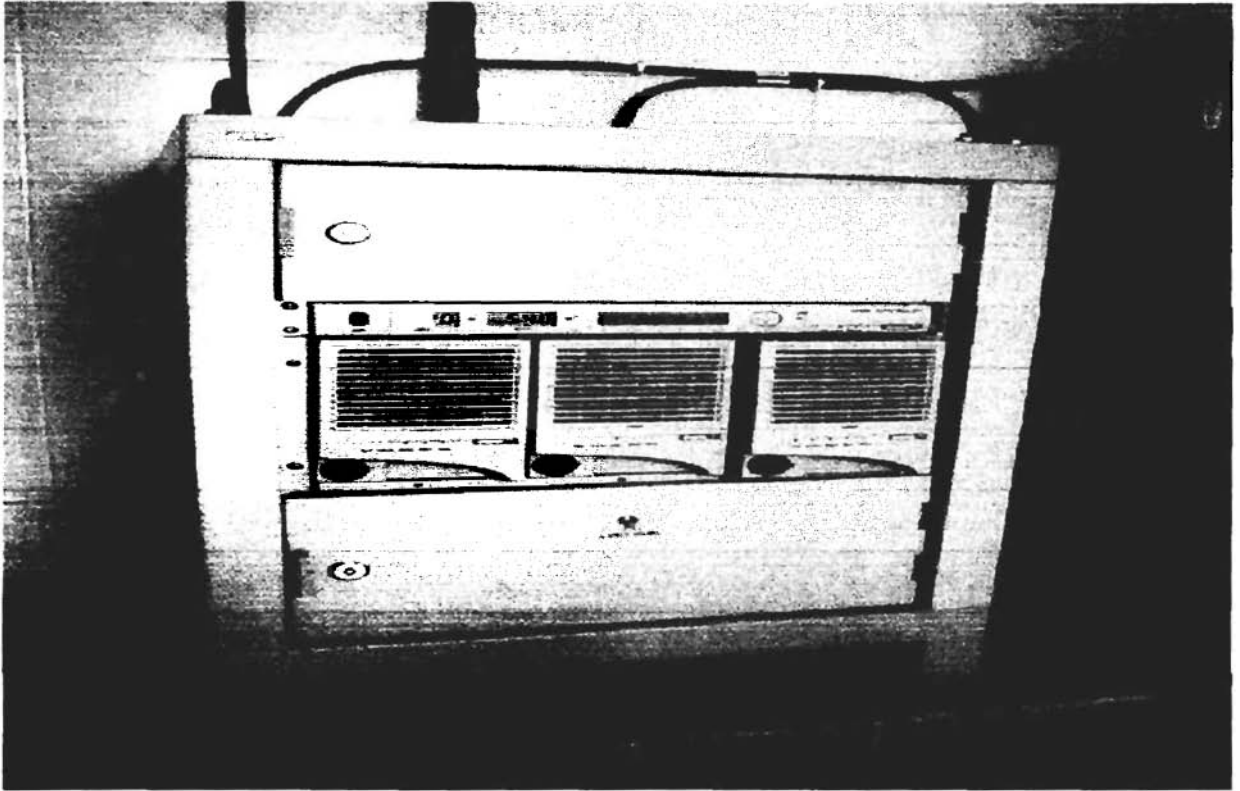


Figure 11: Pictorial view of the BSMC Com-10system (look-1)

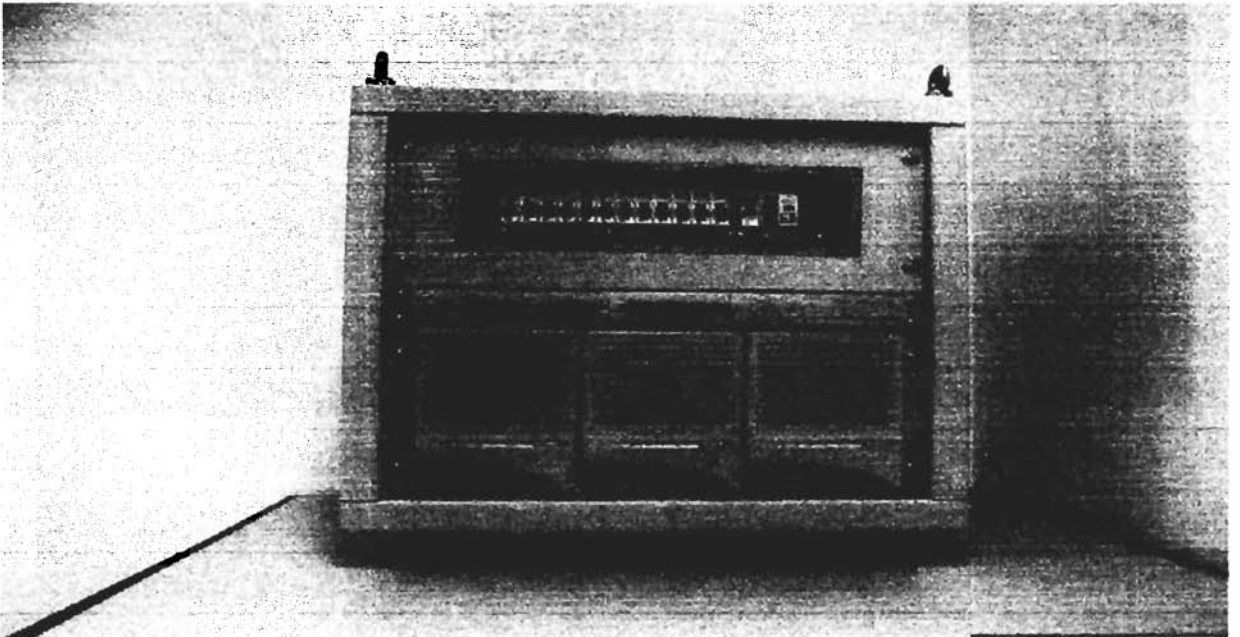


Figure 12: Pictorial view of the BSMC Com-10system (look-2)

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4.1.3. ASCOM RECTIFIER

In GP network there are different models of ASCOM System. It can be classified in 3 ways:

- a. The system with 1500 W (30 amp) modules
- b. The system with 3000 W (60 amp) modules
- c. The new system with 2000 W (40 amp) modules

Except the module rating, the models are same in structure & operation

Pictorial View:

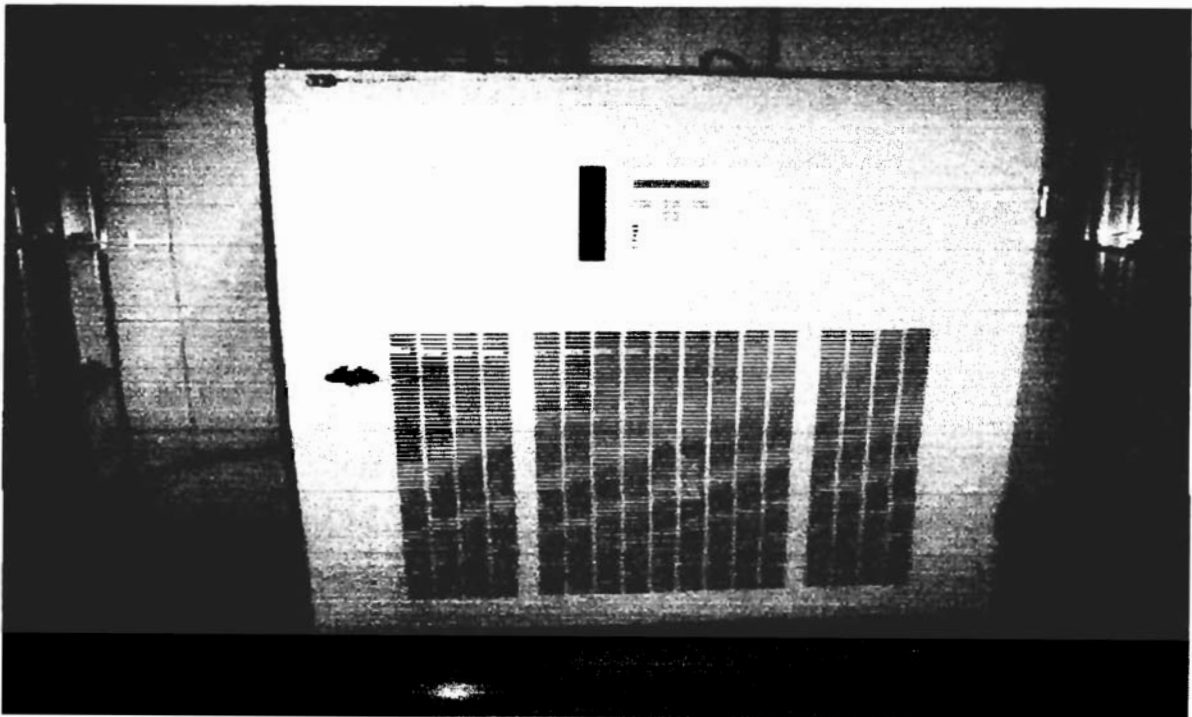


Figure 13: ASCOM rectifier with 3000 W modules

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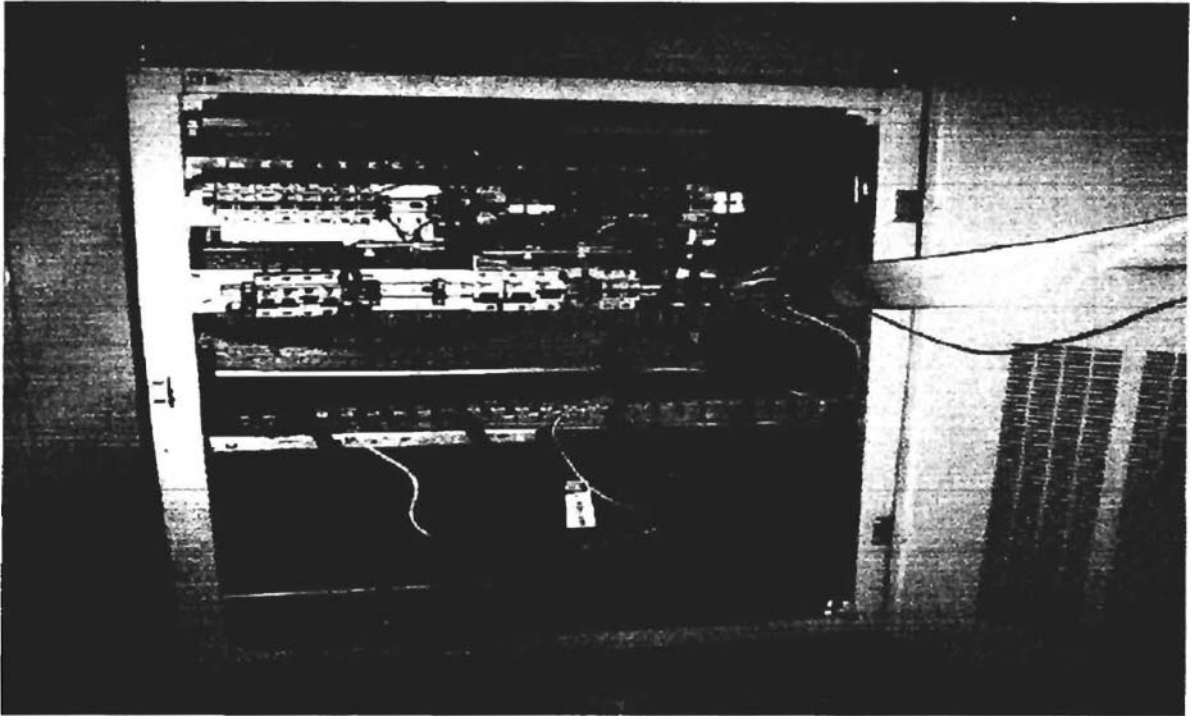


Figure 14: ASCOM rectifier with 3000 W modules

The system with 2000 W (40 amp) modules (2 LVD System):



Figure 15: ASCOM rectifier with 2000 W modules (2 LVD System)

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4.2. Generators

-In Grameenphone network two types of generators are used

-Auto Generator

-Portable generators

There are several brand auto generators:

SDMO (supplied by Electro Mechanical Services Limited)

Pramac (Supplied by Rahimafrooz energy Services Limited)

Tempest (Supplied by Cross world limited)

WFM (supplied by Energypac power Generation limited)

4.2.1. Details of portable Generator :



Figure 16: Portable generator

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4.2.2. Stand by Generator/ Auto Generator.

The Basic function of alternator is same in Portable Generator and Stand by Generator.

Other Differences:

- AVR (Automatic voltage regular) is use in auto Generator but not at portable Generator.

The controlling system of Auto Generator is Micro processor based system.

- All stand by Generator run by Diesel and all portable Generators run by patrol or Octane. So Engine of Auto Generator is Diesel Engine and portable Generator is patrol Engine.
- Diesel Engine use for heavy duty and Patrol Engine is use for non commercial purpose.
- Auto Generator is water cooling system and portable Generator is air cool or natural cooling system.

Auto Generator is three phase and portable Generator is single phase. There is Temperature sensor, Lube oil pressure sensor, over speed sensor at the Auto Generator but not at. Portable generator

4.3. BATTERY

In case of AC main power unavailability back-up batteries are used in GP network. The batteries are VRLA (Valve Regulated Lead Acid) batteries. We use different brands of batteries, but the major brands are:

1. OERLIKON (ERICSSON) – for switch
2. YUASA- for BTS
3. GNB - for BTS
4. NARADA- for BTS



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In Grameenphone BTS most of the cells are 2 volt cell. Depending upon the rack the battery can be arranged in different tier. But the important thing is to get 48 volt by series and parallel combination

During Battery connection / maintenance some cautions need to be taken.

- Never pour water or water like material on battery
- Battery rack should be properly grounded.
- Never connect + ve and – ve terminal o f the same cell
- The battery terminal should be properly tightened. Any loose contact will damage the battery terminal and battery

5. TRANSMISSION SYSTEM

5.1. Basic Transmission System

- **PDH (Plesiochronous Digital Hierarchy)**
- **SDH (Synchronous Digital Hierarchy)**

PDH Hierarchy

- **Plesiochronous Signals**

Data signals, which have the same nominal transmission rate, but come from different sources will always have a slightly higher or lower value than the nominal bit rate, i.e. there is a small amount of variation between them.

Such signals are *almost synchronous* to each other, which is why they are termed plesiochronous. In a *plesiochronous* network, the individual link sections are not synchronous to each other.

Principles of PDH Multiplexing

□ PDH signals with a higher transmission rate are obtained by multiplexing several lower-rate signals.

- **Multiplex Operation**

Several input signals with the same nominal bit rate are combined to form one multiplex signal and then relayed to the receive side via one common transmission path.

- **Demultiplex Operation:**

On the receive side, the sum signal is again distributed to the corresponding outputs.

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- **Synchronous Signals (SDH):**

Data signals with the same nominal bit rate have different sources, like the plesiochronous signals, but are controlled by a central clock frequency (the so-called master clock). The signals are clock-aligned to each other, which is why they are termed *synchronous*.

5.2. Transmission Media

Physical path between transmitter and receiver

- Copper, which is used in two main types of cable: paired cable and coaxial cable;
- Glass fiber, which is used in optical fiber cable; and
- Radio waves, which are used in terrestrial point-to-point systems or area coverage systems (such as mobile telephony), and for point-to-point or area coverage communication via satellite.

6. MY EXPERIENCE

To be a B.Sc Engineer from East West University, I have chosen the Industrial attachment or internee. I did my internship at Grameenphone Ltd from 10th January to 10th April. I did my internee in Regional Operation and Maintenance department under Technology division. Actually there are four department under Technology division, Network operation center, Planning, Implement and Regional operation and Maintenance (ROM). There are four regional team in ROM, Dhaka East, Dhaka West, Dhaka North and Dhaka West. I actually attached with Dhaka West team. It was a great experience to work in a leading telecom company in Bangladesh.

I am a student of Electrical and Electronic Engineering and my major was in Communication engineering. I have completed three major courses Communication:

1. Digital Communication
2. Mobile and Wireless Communication
3. Advanced Telecommunication

In mobile and wireless communication courses I have learn about Cellular concept and channel allocation, Multiple access techniques: FDMA, TDMA, CDMA and definitely about GSM. I have learn about different modulation technique in Digital communication.

GSM:

GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. There are five different cell sizes in a GSM network—macro, micro, pico, femto and umbrella cells. The coverage area of each cell varies according to the implementation environment. Macro cells can be regarded as cells where the base station antenna is installed on a mast or a building above average roof top level. Micro cells are cells whose antenna height is under average roof top level; they are typically used in urban areas. Picocells are small cells whose coverage diameter is a few dozen meters; they are mainly used

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indoors. Femtocells are cells designed for use in residential or small business environments and connect to the service provider's network via a broadband internet connection. Umbrella cells are used to cover shadowed regions of smaller cells and fill in gaps in coverage between those cells.

Cell horizontal radius varies depending on antenna height, antenna gain and propagation conditions from a couple of hundred meters to several tens of kilometers. The longest distance the GSM specification supports in practical use is 35 kilometers (22 mi). There are also several implementations of the concept of an extended cell, where the cell radius could be double or even more, depending on the antenna system, the type of terrain and the timing advance.

Indoor coverage is also supported by GSM and may be achieved by using an indoor picocell base station, or an indoor repeater with distributed indoor antennas fed through power splitters, to deliver the radio signals from an antenna outdoors to the separate indoor distributed antenna system. These are typically deployed when a lot of call capacity is needed indoors; for example, in shopping centers or airports. However, this is not a prerequisite, since indoor coverage is also provided by in-building penetration of the radio signals from any nearby cell.

The modulation used in GSM is Gaussian minimum-shift keying (GMSK), a kind of continuous-phase frequency shift keying. In GMSK, the signal to be modulated onto the carrier is first smoothed with a Gaussian low-pass filter prior to being fed to a frequency modulator, which greatly reduces the interference to neighboring channels (adjacent-channel interference).

GSM networks operate in a number of different carrier frequency ranges (separated into GSM frequency ranges for 2G and UMTS frequency bands for 3G), with most 2G GSM networks operating in the 900 MHz or 1800 MHz bands. Where these bands were already allocated, the 850 MHz and 1900 MHz bands were used instead (for example in Canada and the United States). In rare cases the 400 and 450 MHz frequency bands are assigned in some countries because they were previously used for first-generation systems.

Regardless of the frequency selected by an operator, it is divided into timeslots for individual phones to use. This allows eight full-rate or sixteen half-rate speech channels per radio

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frequency. These eight radio timeslots (or eight burst periods) are grouped into a TDMA frame. Half rate channels use alternate frames in the same timeslot. The channel data rate for all 8 channels is 270.833 kbit/s, and the frame duration is 4.615 ms.

The transmission power in the handset is limited to a maximum of 2 watts in GSM850/900 and 1 watt in GSM1800/1900.

GSM has used a variety of voice codecs to squeeze 3.1 kHz audio into between 5.6 and 13 kbit/s. Originally, two codecs, named after the types of data channel they were allocated, were used, called Half Rate (5.6 kbit/s) and Full Rate (13 kbit/s). These used a system based upon linear predictive coding (LPC). In addition to being efficient with bitrates, these codecs also made it easier to identify more important parts of the audio, allowing the air interface layer to prioritize and better protect these parts of the signal.

GSM was further enhanced in 1997 with the Enhanced Full Rate (EFR) codec, a 12.2 kbit/s codec that uses a full rate channel. Finally, with the development of UMTS, EFR was refactored into a variable-rate codec called AMR-Narrowband, which is high quality and robust against interference when used on full rate channels, and less robust but still relatively high quality when used in good radio conditions on half-rate channels.

During my internship in Grameenphone Ltd. I have visited about 50 to 60 sites with my team and there I saw radio base station (RBS), Indoor base station (IBS), Repeater which is required in such a area where signal power is very low. The purpose of repeater is to increase the signal strength by repeating the signal.

In Grameenphone Ltd. With Dhaka west team I have went to a garments factory where we situated a repeater and it was a great opportunity for me to have a great experience.

Undergraduate Internship

I have gone out with my team and visited many BTS and see GSM antenna which is 60 degree align from one another and each antenna is covered one cell. What I have learn in my courses are very much similar.

I have also experience about site master. The main purpose of site master is to identify the fault of RBS cable. The RBS cable is connected through the GSM antenna to RBS. If the RBS cable have any fault, the signal is not pass through cable properly so it is very hard to find the fault in the RBS cable because it is very long wire ,then the site master helps to find out fault in a specific distance at where the cable is damaged.

In a large building (garments factory in mirpur), we have situated a Indoor base station (IBS), it operate at different frequencies.

In GP-House when I have to do official work then I have to do online update about the BTS equipments condition.

I have also have to check the bill which we receive from the vendors and receive the BTS equipments from the vendors.

I had a great experience about corporate life. In the fast-paced world of telecommunications, vibrant and dynamic Corporate Governance practices are an essential ingredient to success. Grameenphone believes in the continued improvement of corporate governance. This in turn has led the Company to commit considerable resources and implement internationally accepted Corporate Standards in its day-to-day operations.

7. CONCLUSION

7.1. Observations:

From Grameenphone's view, it believes Excellency in its service towards its subscribers. It is growing and at the same time being competitive. To keep up this upward trend and leading position absolute dedication to understanding and fulfilling their customer needs with the appropriate mix of standard service, reliability, improved technology and skilled as well as dedicated manpower necessary.

7.2. Recommendation:

The authority of university must make a specific policy for intern students. The students are supposed to complete all their necessary courses before internship; and university must consider class schedule for them if needed. On top of that, the authority should help the students for getting a good internship.

To increase practical knowledge on different issues, the university authority is supposed to table the students to different companies which will benefit the students in their job field.

7.3. Summary

It was very finicky to work in the environment of the largest telecommunication industries in Bangladesh. Grameenphone provide one of the best services to their customer and also to their employee that is conducted by HR division. By working in "Regional and maintenance" department under technology division the experience and knowledge was learnt would be helpful enough to sustain with the real world situation.

8. REFERENCE

- ❖ GP annual report 2010.
- ❖ <http://www.grameenphone.com/>
- ❖ <http://www.grameenphone.com/about-us/corporate-information>

