

Grameen Telecom's Village Phone Programme in Rural Bangladesh: a Multi-Media Case Study

Final Report



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Background

This study was commissioned by the Strategic Planning & Policy Division of the Asia Branch Poverty Reduction Project, Canadian International Development Agency, as a case study amongst many undertaken as part of the Asia Branch Poverty Reduction Project, to investigate the impact of the GrameenPhone and Grameen Telecom provision of micro-credit cellular phone service on poverty reduction and the socio-economic situation of women Village Phone operators and users at large.

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Executive Summary

GrameenPhone is a commercial operation providing cellular services in both urban and rural areas of Bangladesh, with approximately 40,000 customers. A pilot programme of GrameenPhone, through the Grameen Bank and a wholly owned subsidiary called Grameen Telecom, is enabling women members of the Grameen Bank's revolving credit system to retail cellular phone services in rural areas. This pilot project currently involves 950 Village Phones providing telephone access to more than 65,000 people. Village women access micro-credit to acquire digital GSM cellular phones and subsequently re-sell phone calls and phone services within their villages. Grameen Telecom staff have announced that when its programme is complete, 40,000 Village Phone operators will be employed for a combined net income of \$24 million USD¹ per annum.

In rural areas where isolation and poor infrastructure services are often the norm, telecommunications can play an extremely important role in enhancing rural social and economic development. Grameen Telecom's Village Phone programme provides an excellent opportunity to learn more about how private sector development (PSD) in the telecom sector can make a significant contribution to poverty reduction. The Village Phone programme also provides an opportunity to review innovative strategies for incorporating targeted, micro-level PSD in the telecom sector within project design. Documentation of the impacts of Grameen Telecom's Village Phone programme and its innovative approach to poverty reduction provide valuable learning and case study materials that can contribute to strategies for improved success in poverty reduction.

Key Findings

Impacts on poverty reduction:

- The Village Phone programme yields significant positive social and economic impacts, including relatively **large consumer surplus and immeasurable quality of life benefits**. The consumer surplus for a single phone call from a village to Dhaka, a call that replaces a physical trip to the city, ranges from **2.64% to 9.8% of mean monthly household income**. The cost of a trip to the city ranges from 2 to 8 times the cost of a single phone call, meaning **real savings for poor rural people of between 132 to 490 Taka (\$2.70 to \$10 USD) for individual calls**.
- The main reasons Grameen Bank members reported for using the telephone are discussions of financial matters with family, including **discussions of remittances (42%) and social calls to family and friends (44%), accounting for 86% of all calls**. Bangladesh is a labour-exporting country with many rural villagers (predominantly men) working in the Gulf States. The Village Phone acts as a powerful instrument to reduce the risk involved in remittance transfers, and to assist villagers in obtaining accurate information about foreign currency exchange rates. Transferring cash from a Gulf State to a rural village in Bangladesh is fraught with risks; remittances are thus a key factor in demand for telephone use.
- Reducing the risk of remittance transfers from overseas workers has important micro-implications for rural households and villages. At the micro level, remittances tend to be used for daily household expenses such as food, clothing and health care. Remittances are thus an important factor in meeting household subsistence needs,

¹ All dollar figures quoted in this report are USD.

and can make up a significant portion of household income. Remittance funds are also spent on capital items including building or improving housing, buying cattle or land, and buying consumer goods such as portable tape/CD players and televisions. Once subsistence needs are met, remittances tend to be used for “productive investments,” or for savings.

- Social calls to family and friends frequently involve transfer of information about market prices, market trends and currency exchange rates, making the Village Phone an important tool for enabling household enterprises to take advantage of market information to increase profits and reduce productive expenses.
- The income that Village Phone operators derive from the Village Phone is about 24% of the household income on average - and in some cases it was **as high as 40% of the household income** - and Village Phone operators become socially and economically empowered.

Analysis of the business case, technical choices and regulatory context:

- Rural telephone service in Bangladesh is very profitable and, due to the existing regulatory environment, telecom operators are unable to meet the demand for services. Telephones in the Grameen Telecom Village Phone programme bring in **3 times as much revenue as urban cellular phones** (an average of \$100/month versus \$30/month). One competing telecom operator reports having **revenue from 12,000 urban cellular lines equal its revenue from 1,500 rural PCO lines**.
- The Village Phone programme appears to be the **best** available technical solution for rural universal access **under current regulatory and commercial circumstances**. The Village Phone programme is a technical and organizational solution to rural telecommunication access partly necessitated by a regulatory environment that is not conducive to advancing rural telecommunication infrastructure.
- **GSM cell phone technology** is a high-cost solution for universal access in rural areas. Limited cellular coverage of rural areas **may only be viable under the current set of cumbersome regulatory practices** - once the regulatory environment improves, cellular phone technology may not be the most viable and efficient means of providing universal service. GSM cell phone technology also places much higher tariffs on rural phone users than would be the case for wireless local loop (WLL) technologies. Without regulatory improvements, cellular technology is a practical solution. As well, cellular phone technology is currently **not a viable option for inexpensive email/Internet/data connectivity**. WLL and other options can provide much better bandwidth and cost of service.

Gender analysis:

- The Village Phone programme raises, perhaps for the first time, the important issue of gender when considering goals of universal telecommunication access.
- The concept of “universal access” is not gender neutral. **In the case of Bangladesh, the gender of the Village Phone operator and the physical placement of the phone within a gendered village context can either inhibit or improve women’s access to phones**. A woman’s home provides a space that is acceptable for other village women to access. **From the standpoint of revenue generation and profitability, it is important to ensure that the Village Phone is fully accessible to the entire village population:** if 50% of the user base faces obstacles to phone use, then a significant revenue stream is lost.

Key replicable elements of the Village Phone programme:

- The Grameen Telecom experience in business planning leads us to suggest one potential solution for attracting telecom operators to serve rural areas: **target un-served and under-served regions and provide support for acquisition of quality market appraisal knowledge and market data** through market research in the field. Market research will help to prove the business case, attract investment capital, and reduce the effort required by investors and operators.
- The Grameen Telecom experience points to a potential solution for telecom operators facing the significant challenge of managing the last mile of rural telecom operations: **link existing and successful micro-credit organizations with telecom operators (fixed line and/or wireless) to expand public call office (PCO) coverage in rural areas.** Small loans to rural entrepreneurs (perhaps targeted to women and youth) can enable entrepreneurs to establish PCOs and provide a range of services including telephone, fax, email and even web, photocopying and computer word-processing services. A franchise programme of this sort would also establish consistency of service across a region that would, in turn, support local social and economic development.

Introduction

GrameenPhone is a commercial operation providing cellular services in both urban and rural areas of Bangladesh, with approximately 40,000 customers. GrameenPhone was founded by three visionaries: Iqbal Quadir, an investment analyst who saw the role that telecommunications connectivity can play in poverty reduction within Bangladesh and who developed the concept in partnership with Muhammad Yunus, the founder of the Grameen Bank, and Khalid Shams, Deputy Managing Director of the Grameen Bank. Through their efforts in establishing operating and investment partnerships, investment in GrameenPhone began with initial funding of \$125 million USD, including a \$50 million loan from International Finance Corporation, Asian Development Bank and Commonwealth Development Corporation in Britain.

A pilot programme of GrameenPhone, in collaboration with the micro-credit facilities of the Grameen Bank through a wholly owned subsidiary called Grameen Telecom, is enabling women members of the Grameen Bank's revolving credit system to retail cellular phone services to rural areas. This pilot project currently involving 950 Village Phones and phone operators providing telephone access to more than 65,000 people. Village women access micro-credit to acquire digital GSM cellular phones and subsequently re-sell phone calls and phone services within their villages. Grameen Telecom staff have announced that when its programme is complete, 40,000 Village Phone operators will be employed for a combined net income of \$24 million USD per annum.

Advancing telecommunications for rural development has become a key focus of many development agencies such as the Canadian International Development Agency (CIDA), the World Bank, the International Telecommunications Union, and the Food and Agriculture Organization of the United Nations. It is clear that the world is in the midst of a telecommunications revolution and that telecommunication plays a vital role in the social, political, and economic development of every country. In rural areas where isolation and poor infrastructure services are often the norm, telecommunications can play an extremely important role in enhancing rural social and economic development.

While there is clear evidence of increasing spending on telecommunications enhancement in developing countries, there still exists a large gap between investments in urban centres and investments in rural regions of developing countries. Despite emerging evidence to the contrary, many telecommunications investors continue to believe that rural telecommunications investments are not profitable. At the same time, rural development planners remain relatively unexposed to information about the potential of telecommunications to assist in social and economic development efforts and thus they seldom incorporate rural telecommunications infrastructure and application components in their planning.

The rural social and economic development impacts of telecommunications investments have seldom been analyzed at the micro level. Likewise, experiments and innovations in approaches to rural telecommunications investment and applications are poorly documented. Grameen Telecom's Village Phone programme provides an excellent example of ways to combine rural development with telecommunications investment. Unfortunately, the methodologies used in establishing GrameenPhone's rural coverage, and the resulting impacts and lessons learned, have been poorly documented.

Grameen Telecom's Village Phone programme serves as an effective case study for CIDA and its partners to learn more about how private sector development (PSD) in the telecom sector can make a significant contribution to poverty reduction. The Village Phone programme also provides an opportunity for CIDA and its partners to review innovative strategies for incorporating targeted, micro-level PSD in the telecom sector within project design.

CIDA's Policy on Poverty Reduction states that CIDA will promote participatory approaches for building networks and involving governments in improving approaches to poverty reduction. This method includes enabling people to realize their own capacities and goals through participatory processes, contributing to donor coordination mechanisms, and supporting capacity building and institutional strengthening of various groups and organizations. It also includes implementing policies and programming to address the gender-poverty nexus. Documentation of the impacts of Grameen Telecom's Village Phone programme and its innovative approach to poverty reduction will provide CIDA and its partners with valuable learning and case study materials that can contribute to CIDA's own poverty reduction strategy.

CIDA's Poverty Reduction Project in Asia has recently begun a year-long process "with staff and a variety of CIDA partners, to help the Branch better understand the complexities of poverty, determine lessons learned from poverty focused projects in the field and develop a new poverty reduction strategy." This Multi-Media Evaluation Case Study evaluation of GrameenPhone is intended to help CIDA and its partners gain a better understanding of the strengths and weaknesses of the Village Phone model, and help catalyze discussion on possibilities for replicating aspects of the approach in other parts of Asia and the world.

CIDA's Policy for Private Sector Development in Developing Countries addresses the need to expand access to non-financial services, as well as capital available to micro-enterprises and small and medium-sized enterprises (SMEs). According to this policy, "access to modest financial and non-financial services and other forms of micro-enterprise support are key to reducing poverty - providing the poor, particularly women and the often-overlooked informal sector, with greater opportunities for self-employment and stabilized livelihoods during difficult times." Documentation of the evidence of the Village Phone's impact on village enterprises will assist CIDA and its partners to analyze the kinds of interventions required to achieve positive impacts and assess the potential for replication of similar interventions in other rural regions of developing countries.

The Multi-Media Case Study materials presented here can easily be integrated within CIDA's poverty reduction dialogues in both face-to-face and electronic modes. This report is "mirrored" in print format, on a web site (www.telecommons.com/villagephone), and on a CD-ROM, and it is accompanied by a short video documentary. As will become evident to the reader, the multi-dimensional nature of Grameen Telecom's Village Phone programme in Bangladesh is best described and analyzed in a "hypertext" context where the relationships among different "portraits" of the Village Phone programme can be illustrated. Readers of this report will, at times, find repetition, as there are units that are naturally linked to related information in other Sections. Although a print version of this report is available, a multi-media format is the most appropriate means of capturing and sharing this story, incorporating video clips, photographs, and links to key resources and web sites.

1. Portrait of the Village Phone Programme

1.2 Grameen Telecom's Village Phone (VP) programme

1.2 Origin of GrameenPhone and Grameen Telecom

1.3 How the VP programme works

1.4 Why GTC and the VP are unique

1.5 The cellular phone market world-wide

1.6 The cellular phone context in Bangladesh

1.7 Context of telephone services in Bangladesh and the Emergence of the Village Phone

1.1 Grameen Telecom's Village Phone (VP) programme²

Personal voice communication beyond hearing distance is simply not possible today from 90 per cent of the 68,000 villages of Bangladesh. The Village Phone (VP) programme established by Grameen Telecom provides an opportunity for universal access: according to Grameen Telecom, a person may not own a telephone but he/she should have access to a telephone within a ten minute walk.

The Village Phone initiative was developed by combining the Grameen Bank's expertise in village-based micro-enterprise and micro-credit with the latest digital wireless technology. Grameen Telecom (GTC) is a non-profit organization that forms part of the Grameen Bank family of organizations, and it focuses exclusively on the deployment of the Village Phone programme in rural parts of Bangladesh. GTC buys airtime in bulk from GrameenPhone Ltd. (GP), a for-profit corporation holding a nation-wide license to operate and maintain a mobile cellular network throughout the country. Bulk airtime purchasing from GrameenPhone Ltd. enables GTC to pass on savings to the Village Phone (VP) operator. GTC owns 35% of the shares of GrameenPhone Ltd., and plans to have controlling interest in GrameenPhone Ltd. in the near future.

The Village Phone is a unique undertaking that provides modern digital wireless telecommunication services to some of the poorest people in the world. A Grameen Bank member (most often female) purchases a phone under the lease-financing programme of the Bank and provides telephone service to people in her village. Each Village Phone operator is responsible for extending the services to customers for both incoming and outgoing calls, collecting call charges, remitting payments to Grameen Telecom, and ensuring proper maintenance of the telephone set. The operator's income consists of the difference between charges paid by customers and the airtime charges billed to the operator by Grameen Telecom. Repayment of the loan for the phone set is processed through the existing loan granting and collection procedures of the Grameen Bank. GTC prepares monthly bills for the airtime charges for each phone, and Grameen Bank managers at the community level collect monthly payments from operators, in person, at the village level.

² This information is summarized from interviews with Grameen Bank, GrameenPhone and Grameen Telecom staff, and draws significantly the following documents:

- Grameen Telecom (1999) "A brief understanding of village phone (VP): A concept paper."
- GrameenPhone (1998) Annual Report.

As of November 1999, Grameen Telecom reports that there were 950 village phones in service providing telephone access to more than 65,000 people. Grameen Telecom expects that when GrameenPhone has completed its network in December 2002, 40,000 VP operators will be employed for a combined net income of \$24 million USD per annum.

The objectives of GTC are:

- to provide easy access to telephones when needed all over rural Bangladesh;
- to introduce a new income generating source for villagers;
- to bring the potential of the Information Revolution to the doorsteps of villagers;
- to introduce telecommunications as a new weapon against poverty.

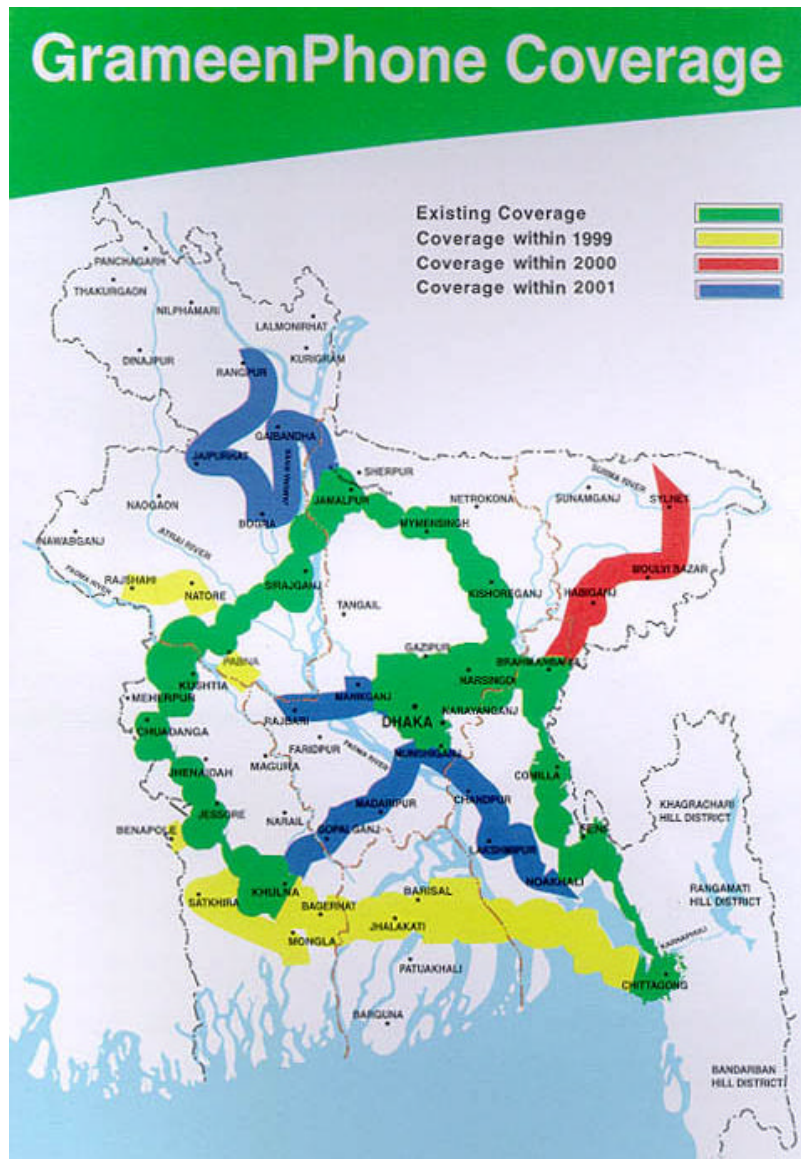


Figure A: Map of GrameenPhone Coverage (October 1999)

1.2 Origin of GrameenPhone and Grameen Telecom

In 1994, a Mr. Iqbal Quadir from a U.S.-based company called Gonofone contacted the Grameen Bank about the possibility of establishing a socially beneficial *and* profitable telecommunications venture in Bangladesh³. Quadir proposed extending telephone service to the poor in rural Bangladesh using the established principles and financial systems of the Grameen Bank (<http://www.devmedia.org/documents/ACF1055%2Ehtm> provides Mr. Quadir's first-hand description of the development of the Village Phone concept). This proposed telephone system would be implemented in such a way as to promote self-employment while furthering economic development goals. The International Telecommunication Union provided a telecommunications expert to assist the Grameen Bank in assessing the prospects of this venture.

In November 1995, Grameen Bank and Gonofone formed a consortium with Norway's Telenor (acting as the technical partner and investor) to develop their project. A few months later, Marubeni also joined the consortium as an investor. In mid-1995, the Government of Bangladesh formally announced the bidding process for the licensing of three additional cellular operators. This provided the sponsors with the opportunity to enter the profitable Bangladesh telecommunications market and thereby pursue their goal of providing telephone service throughout Bangladesh. To represent its interest in the venture, Grameen Bank formed a wholly owned subsidiary called Grameen Telecom. In November 1995, with technical support from Telenor, the sponsors submitted a bid for the license under a competitive bidding process established by the Government.

Throughout 1996, the sponsors proceeded to plan their project. They set up a project company, incorporated in Bangladesh in October 1996 as GrameenPhone Limited. In November 1996, after a protracted evaluation, three cellular licenses were awarded. GrameenPhone was one of the successful bidders. It signed its license agreement with the Government on 11 November 1996 and began operations on 26 March 1997.

1.3 How the VP programme works

Selection, Subscription and Training. GTC first gathers information on villages that have cellular coverage emanating from GrameenPhone's existing network of cellular towers. (The current coverage expands from base stations connected to the fibre optic cable along the Bangladesh Railway network, from base stations installed in major urban centres, and from GP's wireless tower microwave trunk spanning from Khulna to Chittagong, southeast to southwest; see Figure A⁴). GTC Unit Officers then visit the Grameen Bank branches in that area and prepare a list of villages where network coverage is satisfactory to provide Village Phone service. The GB branch manager selects women from among Grameen Bank members in those villages to act as VP operators.

The Grameen Bank has a special set of criteria for the selection of VP operators:

³ The following is largely based on two sources: ADB (1997) and Mr. Quadir's own story

⁴ GrameenPhone (1998) Annual Report.

- She must have a very good record of repayment of Grameen Bank loans;
- She should have a good business, preferably a village grocery store, and have the spare time to function as the VP operator. Initially, this may be a side business and eventually switch over to telecom business on a full-time basis after services and revenue justify a full-time commitment (note that analysis of data for this report suggests that the focus on village grocery store ownership may inhibit phone use by village women: see Section 2.5);
- She should be literate or at least she must have children who can read and write;
- Her residence should be near the centre of the village.

After the initial selection of a suitable VP operator by the GB branch manager, the respective Unit Officer of GTC ensures signal availability in the house or shop where the VP operator intends to use the phone. GTC experience has demonstrated that a weak signal can be augmented by use of a high gain antenna mounted on a four- to five-metre bamboo pole affixed to a dwelling or shop, with a coaxial cable running between the antenna and the phone. The high gain antenna effectively makes the GSM cellular phone a “fixed-mobile” phone for many VP operators, although the high gain antenna and pole can be moved within a village, if needed.

The final selection of the VP operator is made by the zonal manager of the Grameen Bank. GTC then buys a cellular phone user subscription on her behalf from GrameenPhone and provides the connection to the member. GTC supplies the necessary hardware and the GTC Unit Officer provides training to operate the phone. The price of the phone and the connection fee are paid by GB to GTC and the member pays these costs back to GB within the stipulated 2 or 3 year period through the existing weekly repayment system for the loan (whereas airtime bills are paid on a monthly basis). The telephone is provided to members under a lease finance programme of GB.

Billing. GrameenPhone prepares a monthly bill at the bulk airtime rate for Village Phones for total airtime used by all VPs. The bill includes the monthly fee for the rental of the line. The bill showing the net amount payable to GrameenPhone is sent to GTC’s head office for processing by the end of each month. GTC remakes the individual bills and sends them to the corresponding GB branches with a summary bill due from the branch. Grameen Bank branch managers are responsible for collecting the bills from VP operators and the branch pays the bill to Grameen Telecom six weeks later. This process provides an interesting solution to the problem of revenue collection that sometimes plagues the operators of rural telephone systems.



Part of the Village Phone operator's job is to keep accurate records of telephone calls made

After Sales Support. GTC has established Unit Offices to cover the VP operation in the field. The duties of the Unit Offices include: finding new areas with coverage, helping the GB branch managers select new members for becoming VP operators, training VP operators, and backstopping any problems faced by VP operators regarding handsets, or billing. GTC receives monthly computerized statements from GrameenPhone and uses these to monitor phone usage among all Village Phone operators. The statements enable GTC to track trends in phone use and spot anomalies in individual bills that could indicate billing errors or indicate that a Village Phone operator is experiencing some difficulty. Unit Office staff are then able to review individual cases with personal visits to the operators.

Thus far, GTC has 5 Unit Offices located in Dhamrai (Dhaka Zone), Norsingdee (Narayanganj zone), Comilla (Comilla Zone), Feni (Noakhjali zone) and Chittagong (Chittagong zone). The number of Unit Offices will increase as the coverage area grows. According to the present plan, GTC will have one Unit Office for two Area Offices of the GB and each Unit Office will be able to take care of approximately 300 to 400 VP operators.

Purchase & Payment. The basic Village Phone package (as of Oct.1999⁵) contains:

- Nokia 1610 transceiver
- 1200 mAh battery
- fast charger
- sign board
- calculator
- stopwatch
- user guide in Bangla
- price list for calling different locations

The basic Village Phone package costs 15,000 Taka, or approximately \$310 USD⁶. The VP operator pays for the phone through weekly loan payment instalments of 220 Taka or approximately \$4.50 USD. These payments are made through the local Grameen Bank branch, which is responsible for collecting on behalf of GTC. For the usage charge, the VP operators pay a minimum monthly bill of 154 Taka or approximately \$3.20 USD that includes the monthly fee for the line, Value Added Tax (VAT), a GTC service charge, and 100 Taka for the annual government license and royalty fee. Actual airtime charges are added on top of all this.

⁵ At the time of writing, it was reported that Grameen Telecom plans on using the Nokia 8110 Plus as the new mobile phone set model for VP operators (the Nokia 1610 Plus model is no longer being produced).

⁶ All dollar figures quoted in this report are USD and are based on the period covered by the field research for this report – October 1999. One US Dollar equaled approximately forty-nine Taka.

Electricity. Widespread access to electricity in rural Bangladesh enables the phone operator to recharge batteries or power the phone directly from an electrical outlet. Solar power sources are provided for two Village Phones in non-electrified villages. As Grameen Telecom expands its service, it will be providing phones to many more non-electrified villages. It thus provides a solar-powered solution for powering phones in these villages.

Each solar power package supplied for a VP is made up of a sunlight receptor panel, a battery, a charge controller, associated circuitry, wires and a 12-volt 6-watt tube light. The panel has two sections, each of which have a power rating of 6.5 watts. So the whole panel can provide a total power of 13 watts. The voltage rating is 12V. Its capacity is 31 ampere-hours. The controller automatically controls the level of charging and discharging of the battery. With normal sunshine, this installation can support the power requirement of (i) a VP continuously and (ii) the tube light for over 4 hours in each 24 hour period. The VP itself consumes 6 to 7 watts at 9 volts. Consumption of power can be kept up at this rate - even if sunlight is blocked by clouds - for a continuous period of up to 3 full days, and only if the cloudy situation persists for longer, consumption must be cut down.

The whole package and its installation costs Tk 8,500 (\$175 USD approx.) and is supplied by Grameen Shakti, which is a subsidiary organization of Grameen Bank, just like Grameen Telecom (see Appendix 9 for a description of the Grameen Bank Family of Organizations). They provide a warranty of 20 years for the panel (imported from Japan), 5 years for the battery (acquired from a local supplier) and 1 year for the circuitry including the controller. Grameen Shakti reports that the cost of the whole unit is likely to go up in future because the solar panels will, in course of time, probably cost more on the international market.

The solar panels have stood the test of time for over 6 months in one of the villages and nearly 1 year in the other. So far, as we observed, those are functioning normally. The VP operators say that there has not been any problem with the units as yet and that they are satisfied with the performance.

Call Charges & Profit. GrameenPhone charges Grameen Telecom Tk.2 (\$.043 USD) per minute for a local call at peak hours, whereas urban GP subscribers pay Tk.4 (\$.086) per minute. For NWD (national) and ISD (international) calls, GP charges the BTTB (Bangladesh Telegraph and Telephone Board state monopoly) long distance rate plus the VP airtime charges. A 15% Value Added Tax (VAT) is added to call charges. To cover the administrative cost of GTC and GB, a 13% service charge is added to the total GP bill. VP operators are supplied with a price list that includes all kinds of charges and a margin of profit for them.

For example, for a local VP call to another mobile phone, the retail rate is Tk.5 per minute, out of which the GP rate is Tk.2, the VAT is Tk.0.30, and the service charge is Tk.0.30. The remaining Tk.2.40 (\$.051 USD) is the profit for the VP operator from which she has to pay the monthly line fee, the royalty fee and loan instalment for the handset.



Woman using her local Village Phone

A different rate applies for a local call to a fixed BTTB line as an additional Tk.1.70 is charged by BTTB; this charge is applied *per call* and is therefore charged for the first minute only. While GTC provides a set of recommended call rates, our site visits revealed that VP operators charged variable rates depending on their relationship to the user. Moreover, we also came across a non-VP Public Calling Office (PCO) operator in a small town who was using a GrameenPhone telephone only for calls to Dhaka, at a cost to the client of Tk.7 per minute, whereas his real cost is Tk.7.52/first minute, and each additional minute is Tk.5.24. Village Phone use appears to be very price sensitive, and where Village Phones are located near to towns with functioning PCOs, Village Phone operators are very aware of competitive pricing.

The following table shows the breakdown costs for a one-minute peak-time call (in Taka). The first column shows a call from a Village Phone to a fixed BTTB line (VP to BTTB); the second shows a call from a Village Phone to a GrameenPhone mobile line (VP to GP - this amount also applies for *each extra minute* of a VP to BTTB); the third column shows a call from a GP to a fixed BTTB line (GP to BTTB), and the last column shows the cost of each extra minute of a GP to BTTB call.

Table 1.A Comparison costs for a one-minute peak-time telephone call (in Taka)

	VP to BTTB (first minute)	VP to GP (also applies for <i>each extra minute</i> of a VP to BTTB)	GP to BTTB (first minute)	GP to BTTB (each extra minute)
GP charge	2	2	4	4
BTTB	1.7	0	1.7	0
Subtotal	3.7	2	5.7	4
15% VAT	0.55	0.3	0.85	0.56
Subtotal	4.25	2.3	6.55	4.56
Service charge	0.63	0.35	0.97	0.68
Total	4.88	2.65	7.52	5.24

The table above begins to explain why there is a wide range of fees charged for telephone calls. Our observations and survey data suggest that telephone users are very price sensitive and are generally reluctant to pay more for a telephone call unless the call involves important financial matters.

According to Grameen Telecom data for the month of September 1999, the **average total bill** was **6,110.64 Taka (approx. \$125 USD)** out a total of 652 Village Phones; the component costs are as follows:

Table 1.B Component costs for the average total phone bill (September 1999) of a VP operator

Item	Amount in Taka	Amount in USD \$
GrameenPhone bill	4,554.91	93
VAT and flood surcharge (15%)	681.74	14
GTC Service Charge (17.5%)	784	16
Government license fee	100	2
Total bill	Tk. 6,110.64	\$125

On average, the VP operator earns a net profit of 277 Taka per week (Bayes et.al., 1999); however, a much higher average net revenue is reported by GTC at 2,000 Taka/month (Grameen Telecom, 1999).

Cost of Phone Use and Demand. In Bangladesh, rural people's occupations are becoming increasingly diversified and many people live outside their villages. Fifty percent of rural households do not own any land; they seek off-farm and non-farm income earning opportunities. Less than 8% of the Grameen Bank members surveyed for this report indicated that their main occupation is agriculture. Labour mobility has increased enormously in the recent past and millions now work outside their own village and abroad. Population mobility is a key indicator of demand for telephone services because when people move and relocate, they have a greater need to communicate with family and friends, particularly when labour mobility involves significant remittances to family, as is the case in Bangladesh. Furthermore, the volume of rural-urban trade has increased at a rate much higher than the growth of the economy. Thus, two important factors - enhanced labour mobility and marketization of agricultural production - should result in a growing demand for telephone services.

The Government's stated plan to see card phones installed in towns on an extensive scale may facilitate outgoing calls from *thanas* (sub-districts), but not from the villages themselves. Data from Grameen Bank members surveyed for this report suggest that there is a demand for increased numbers of card phones and better access to pre-paid calling cards. Because tariffs for card phone use are lower than tariffs for Village Phone use, and because rural phone users are very price sensitive and express a willingness to travel to make phone calls, the Village Phone initiative may see a drop in demand for outgoing calls if card phones and pre-paid calling cards are more accessible in towns. Grameen Telecom will have to monitor this situation and may have to adjust its tariffs in order to remain competitive if alternative phones with lower rates are extensively deployed.

Village Phones enable rural people to make calls from their villages and also *receive* calls from outside. A VP operator has a financial incentive to ensure that incoming calls are completed and she is therefore willing to make the extra effort to find the person for whom the incoming call is destined. According to Grameen Bank member phone users surveyed for this report, 61% of the last phone calls completed were incoming calls received by villagers, and 58% of the last phone calls completed were connections with people (primarily family members) living outside of Bangladesh. Thus, the Village Phone provides an important link that enables relatives who have left the village to stay in touch with family at home. And almost 42% of Grameen Bank member phone users indicate that their main reasons for using the phone involve discussions of financial matters (primarily discussions about remittances) with family members. Only 7% of calls were made for business and trading reasons.

Our data reveals that the Village Phone plays a key role in facilitating family relationships and the flow of remittances to family members in the village when a family member has left the village for work in another country or Dhaka City. For example, 54% of Grameen Bank member phone users indicated that they were willing to spend between 100 to 300 Taka (\$2 to \$6 USD) for a three minute phone call involving a financial matter with a family member overseas, and 27% said they were willing to spend between 300 to 600 Taka (\$6 to \$12.25 USD) for this kind of call. Given an average reported monthly

income of 5,000 Taka (\$102 USD) for respondents' households, these figures represent significant proportions of monthly household income ranging from 2% to 12%.

1.4 Why GTC and the VP are unique

The Village Phone programme contains many rural development "firsts":

- First rural development micro-credit facility in a developing country to target the creation of **micro-enterprises based on information and communication technology (ICT) services**
- First rural development micro-credit facility in a developing country to assist in the creation of village telephone service businesses **using digital, wireless telephony**
- First private sector rural telecom initiative that specifically **targets poor village women** for establishing micro-enterprise (targeted, micro-level program)
- First private sector telecom initiative with **an explicit purpose of rural poverty reduction**

As a result of these factors, the Village Phone programme should be examined in-depth by both international donor and investment agencies and by technical providers as an innovative model. However, the Village Phone programme must be examined in context because it has evolved within a unique set of regulatory, commercial and technical circumstances. *We should not assume that the Village Phone programme can easily be replicated elsewhere as a complete package.*

1.5 The cellular phone market world-wide

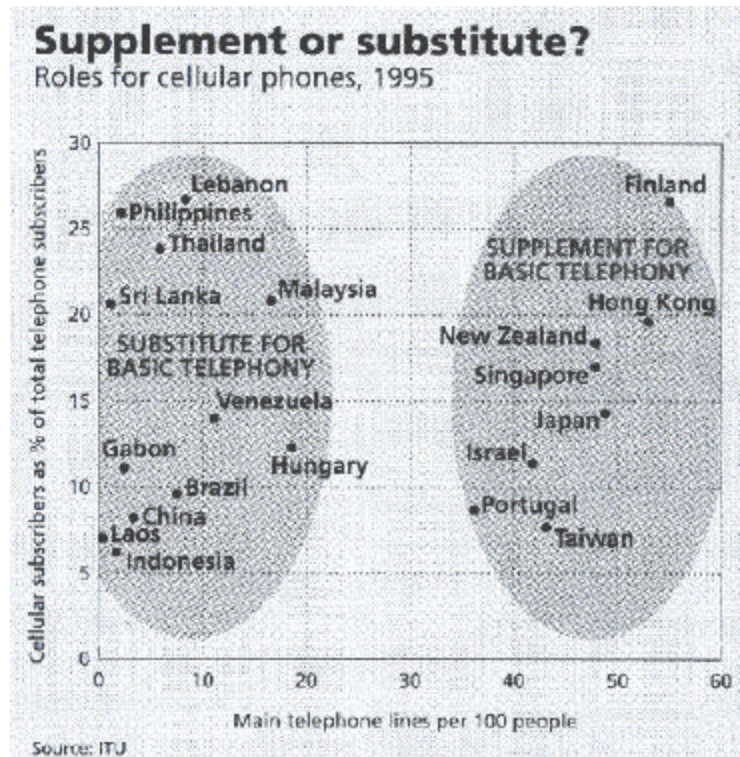


Mobile cellular phones using the GSM (Global System Mobile) standard made their debut in Scandinavia in 1992. GSM telephony has become the cellular phone standard for Europe and many countries in Asia and Africa. In contrast, North American cell phones tend to use the TDMA (Time Division Multiple Access) and CDMA (Code Division Multiple Access) standards. Dublin-based GSM Association (www.gsmworld.com) estimates that there are currently 200 million GSM subscribers world-wide versus 35 million CDMA subscribers. The GSM Association's 5-year growth forecast is for more than 700 million subscribers. Other projections describe this growth with regards to the number of landline subscribers: by 2002 there will be 2 cell phones for every 5 landline phone subscribers world-wide (*The Economist*, 1997).

In developing countries, the cell phone market is almost exclusively urban. Cellular technology provides significant

return on investment in urban areas with higher than average densities of upwardly mobile subscribers.

While the technology is primarily targeted to higher-income, mobile business people, many other middle-income urban users opt for cellular phones because of the reliability of the service and the ease in obtaining a line. In countries where the landline telephone system remains dominated by a state-owned PSTN (Publicly Switched Telephone Network) monopoly, such as in the Philippines and Bangladesh, it is common for people to wait a year to be connected to the main landline grid. As a result, in developing countries cellular phones are a substitute for landlines, whereas in industrialized countries they are a complement.



Source: *The Economist* (1997), p.19

1.6 The cellular phone context in Bangladesh

The GSM cellular phone market in Bangladesh has emerged during the last three years. The first licenses were granted in November 1996. Today, there are four national cellular operators with 100,000 subscribers centered in urban areas, and 80,000 additional subscribers are expected during 2000. (For a list of all national telephone operators in Bangladesh, please see Section 3.3) To put this growth in context, Bangladesh has approximately 500,000 fixed line telephones (350,000 considered operational), and 2/3 of these are in the Dhaka area. The country's teledensity is somewhere between 0.26 and 0.3/100 people - in other words, there are 2-3 fixed line phones per 1000 people. This teledensity is one of the lowest in the world. Teledensity is closely related to the development status of a country, as estimated by UNDP's Human Development Index (see Figure B). In the context of Figure B, this means that Bangladesh, with 28% of phone subscribers using mobile cellular technology, is poised to be off the *Economist* chart (see above) in a matter of months.

Unfortunately, the current growth rate of cellular subscribers is limited by a restricted number of interconnections to the national backbone owned and operated by the Bangladesh Telegraph and Telephone Board (BTTB). This has implications for both service providers and service purchasers. In order to avoid this constraint, several of the cellular operators have successfully opted to sell phones that only connect with other cell phones.

GrameenPhone Ltd. (GP) is one of the dominant national cellular phone operators with 50,000 subscribers as of October 1999. GrameenPhone leases and operates a 1,800km-long optical fibre cable from Bangladesh Railroad, effectively providing a parallel nation-wide network to the one operated by the BTTB state monopoly. Figure A shows the current and forecasted national cellular coverage offered by GP.

The rural telephone market is licensed to two operators with exclusive rights for 25 years: Sheba Telecom covers the south (195 thanas) and the Bangladesh Rural Telecom Authority (BRTA) covers the north (199 thanas) (please see maps published by BRTA in Appendix A.1). The licenses are for PSTN and allow for the use of any technology. Both Sheba Telecom and BRTA have opted for a combination of wireless local loop (WLL) technology systems and point-to-multi-point microwave technologies. BTTB remains the operator in the remaining 70 urban thanas (out of a total of 464). Sheba Telecom is the only operator with both a national cellular GSM license and a rural PSTN license.

We understand⁷ that there are 25-year exclusive territory license arrangements for Sheba's WLL line deployment in the south and BRTA's line deployment in the north, and we understand that ***these licenses were introduced with the assumption that rural telecom is not profitable – an obviously false assumption as shown in Sections 1 and 3 of this report.*** Grameen Telecom (GTC) can examine licensing options for becoming an alternative, national, rural telecom operator. Through its relationship with GrameenPhone, GTC has access to substantial infrastructure in the form of wireless towers, backbone service and operating experience.

1.7 Context of telephone services in Bangladesh and the Emergence of the Village Phone

Grameen Telecom (GTC) is a non-profit organization that owns 35% of the shares of GrameenPhone Ltd. (GP), a private sector, urban cellular telephone operation. GTC buys airtime in bulk from GrameenPhone and passes on most of the savings to the Village Phone (VP) operator, making use of Grameen Bank's extensive network (1,140 branches spread over 39,346 villages) and its loan collection system to collect revenue from the VP operators. GTC is using GSM (Global System for Mobile Communication) cellular telephone technology at the village level, taking advantage of the GP-installed urban capacity. GP leases and operates a 1,800km-long optical fibre cable from Bangladesh Railroad, effectively providing a parallel nation-wide network to the one operated by the state monopoly BTTB (Bangladesh Telegraph and Telephone Board).

A conservative estimate of the percent of cellular vs. landline telephone subscribers in Bangladesh is over 20%: 500,000 landlines vs. 100,000. A more realistic estimate that acknowledges the number of fixed lines that are not actually functioning comes closer to 30%. GrameenPhone alone plans to double the number of subscribers each year (in October 1999, GP had 50,000 subscribers). This is an unprecedented situation where the cellular network is poised to dominate the national telecom industry (the total number of cell phones is estimated to rise from 100,000 to 180,000 during 2000).

⁷ We were unable to access and review operator licenses, and base this statement on interviews with operators

While there are several private sector telecommunication operators in Bangladesh, the Bangladesh Telegraph and Telephone Board (BTTB) currently operates a state monopoly on interconnection services to all operators. Telephone services are dependent upon smooth interconnection among operators so that phone users can place calls to any other phone user, regardless of who operates the lines. BTTB has not provided sufficient interconnection to meet the service demands of its competitors, and this has distorted the telecommunication market in Bangladesh.

BTTB has granted rural licenses for 25-year monopoly “fixed-line” service to rural districts in northern and southern Bangladesh. These were awarded to the Bangladesh Rural Telephone Authority (BRTA), a private sector operator despite the official-sounding name, and Sheba Telecom respectively. Both operators are utilizing wireless local loop (WLL) technology that is generally recognized as a cost-effective, technical solution for universal telephone access in rural areas. GrameenPhone’s GSM cellular services are cost-effective solutions for dense user bases in urban areas, but GSM cellular is not the most cost-effective technology for rural service targets. Per line installation costs for BRTA are ranked as being among the lowest in the world for rural service, at about \$1,000 USD per line (Kayani and Dymond, 1997). This amount is far less than the installation costs for GSM cellular service targeted to a small number of rural PCOs or Village Phone operators.

GrameenPhone is able to provide rural service, despite the monopoly licenses held by BRTA and Sheba, because it holds a license for “mobile” service. Thus, the mobile character of GSM cellular phones enables GrameenPhone to work with Grameen Telecom to provide PCO-style operations in rural areas where its towers and signals can reach. Grameen Telecom is limited to providing Village Phones within the thin corridors covered by its network of cellular towers (see Figure A). There are large gaps in its rural coverage that must be covered if Grameen Telecom is to meet its goal of universal access.

BRTA and Sheba have been prevented from deploying extensive rural telephone coverage because BTTB has not provided them with sufficient interconnection to meet demand. They could deploy more phones, but users would experience problems when they try to connect to the phone lines of other operators. Even with the limited number of phones each operator has deployed today, users experience significant frustration with interconnection, often trying for over an hour to place a single call from a rural area to a number in Dhaka. BRTA currently operates approximately 20,000 lines, the majority in the form of official or unofficial Public Calling Offices, with plans to double this number if the interconnection problem is solved. Indeed, when we visited with BRTA, we were informed that it had a warehouse full of new digital wireless loop equipment that it could not deploy because of the interconnection problem. One of the competing operators to GrameenPhone currently operates 1,500 rural lines as Public Calling Offices and will likely also expand its coverage if the interconnection problem is solved.

It is within this context that the Village Phone emerged. When GrameenPhone first established its interconnection agreement with BTTB, it appears that GP was able to obtain a better interconnection arrangement than the rural operations of BRTA and Sheba. This arrangement, together with its ability to deploy phones in the rural fringes of its urban coverage and along its network corridor, enabled GP to work with Grameen Telecom to establish rural telephone coverage. As GrameenPhone’s subscriber base

grew, its interconnection arrangement was unable to keep pace with demand and its urban phone users experienced increasing interconnection frustrations. Eventually, GrameenPhone was placed in a position where the only way it could meet its growth targets was to offer phones that could connect to other cellular subscribers, but could not connect to BTTB lines. The Village Phones are configured to interconnect with BTTB lines, but all other new GrameenPhone customers cannot interconnect to BTTB's legacy of fixed network lines.

It is probably not justified to conclude that the Village Phone programme exists only because BTTB does not provide sufficient interconnection to competing rural operators in Bangladesh. However, this must certainly be a significant factor that led to the emergence of Grameen Telecom's service. It would be financial suicide for a GSM cellular operator to only target rural subscribers, but when a service targeted to urban customers also reaches into un-served rural areas with high demand, the additional cost of providing rural service is small. Combine that with a proven financial and revenue collection process in the form of the Grameen Bank and its extensive rural coverage, and you have a profitable scenario.

Demand in rural areas is high and cannot be met because so many rural areas in Bangladesh have remained un-served. This, in turn, is due to the interconnection obstacles faced by BRTA and Sheba that have prevented them from expanding profitably in parallel with demand. BRTA and Sheba both use WLL infrastructure which is generally much more cost-effective than GSM cellular for providing rural telecom services. In our interviews with representatives of BRTA and Sheba, we found there was strong desire for rural expansion because rural lines are very profitable; one source told us that their revenue from 12,000 urban cellular lines equaled the revenue from 1,500 rural PCO lines! Only the interconnection problems with BTTB prevent expansion of BRTA and Sheba networks.

Based on the International Telecommunications Union's (ITU) typical model for rural service, we can expect that people in rural Bangladesh will spend not less than 1.5% of GDP per capita on telecommunication services (International Telecommunications Union, 1994) "if they are appropriately deployed" (Kayani & Dymond, 1997: 9). Kayani and Dymond (1997) estimate rural income at \$171 USD per person per year (based on an estimate of an overall GDP per capita of \$220 USD⁸). This suggests \$2.57 USD per capita expenditure. Given a conservative estimate of rural population of 80 million people, this translates into a potential rural telecommunication revenue of *\$205 million USD per year*. And, as Kayani and Dymond (1997) note, rural expenditures can often exceed expectations because of the high cost of alternative forms of communication, such as travel by vehicle.

With this level of expected demand/revenue, it is not difficult to see how a technology designed as a personal communication tool for urban users in the north found an appropriate and profitable configuration for villages with hundreds of users in the south. That technology has been combined with a proven rural financial services organization, a commitment to rural poverty alleviation, experienced rural development professionals, and good management that is capable of exploiting narrow market opportunities in order to create the Village Phone programme.

⁸ Source – United Nations, 1995-96

One final consideration that is of considerable importance for future Internet and data services is that GSM cellular phone technology is currently ***not a viable option for inexpensive email/Internet/data connectivity***. WLL and other options can provide much better bandwidth and cost of service. Indeed, Grameen Communications' pilot rural Internet service centre uses BRTA's WLL service for dial-up Internet access to Dhaka because their experiments with GSM cellular phones for Internet access proved unsuccessful. If Grameen Telecom is to move forward with Grameen Communications in providing Internet and data services, it will find that only the cellular phone towers will be of much value: the GSM system is currently not upwardly compatible with high bandwidth Internet service. BRTA's WLL systems are much more likely to be an infrastructure capable of handling Internet traffic. This is one of the reasons that we later recommend that Grameen Telecom consider entering into partnerships with operators such as BRTA and Sheba.

2. Portrait of the Village Phone's Impact on Poverty Reduction

2.1 The Village Phone operator

2.2 User analysis and village-level impacts

2.3 Financial remittances from overseas workers and phone use

2.4 Consumer surplus made available through Village Phone use

2.5 Gender analysis

2.6 Satisfaction levels of users

2.1 The Village Phone operator⁹

This section begins by shedding light on the Village Phone operator, her role in the household, the dynamics of the household and her role in the village. This requires both a qualitative and quantitative portrait of her situation.

Who becomes a Village Phone operator?

A VP operator is always selected by the Grameen Bank from among its borrowers: since 95% of GB members are women (123,790 men vs. 2,246,340 women), VP operators are usually female. As the Grameen Bank deals with the poor, it is to be expected that the VP operator will come from a poorer-than-average household in the village. According to the Bayes et. al. (1999) study, phone-owning households were confirmed to be poorer than the villagers in general, regardless of whether land ownership or per capita income was used as a measure. However, the Bayes study also reports that in terms of social indicators, phone-owning households seem to be leaders in terms of literacy, child immunization rates, use of safe drinking water, and sanitary latrines. The rate of family planning households was 74% among VP operators compared to 57% among villagers in general. The differences may be attributed to the fact that all the phone-owning households are members of the GB, while only 37% of the Bayes sample villagers reported to be members of any NGO (Bayes et.al., 1999 p.15). Also, local Grameen Bank managers are asked by Grameen Telecom to recommend candidates who have demonstrated successful participation within their borrower groups and have shown that they can operate a profitable small business.

What is the net income for the household?

In the Bayes report, the income derived from the VP was reported to be about 24% of the household income on average; in some cases, it was as high as 40%. Both phone-owning households and others in the village derived the largest proportion of their income from non-agricultural activities (47% and 62% respectively). On average, the VP operator earns a *net profit* of 277 Taka per week (Bayes et.al., 1999); however, a much higher average *net revenue* is reported by GTC at 2,000 Taka/month (Grameen Telecom, 1999). On average, the VP operator earns an income of 14,400 Taka or roughly \$300 USD per year from providing telephone services. This exceeds the average per capita income of Bangladesh (\$286 USD) by \$14 USD. Most of the VP operators interviewed for this study indicated that the income earned through the VP was a supplement to income earned from other sources.

⁹ The source of this data is from the report by Bayes et.al. (1999), together with data from our survey and interviews

How does the VP operator's status change in the household?

The degree of empowerment of a woman with regards to micro-credit has been closely linked - among other factors - to the extent to which she controls the loan (Goetz and Sen Gupta, 1999; Hashemi et.al., 1996). In some cases, where the loan is provided as cash and the husband becomes the main decision-maker on the use of the money, negative consequences have been reported in the literature in terms of increased indebtedness and family violence. In such circumstances, the woman was seen as taking on the transaction cost of lending to men (Goetz and Sen Gupta, 1996; Rahman, 1999). In the case of the VP, we are not aware of any study that reports a comparable situation with regards to the husband taking control over the telephone. However, in our field visits, we did encounter one such case where the phone was in the hands of the husband (quite literally, and throughout our visit) who used it as part of his bazaar store business just 50 metres away. This led us to probe further and ask a number of questions about the implications of not having access to the phone (see Section 2.5 for more details).



Village women are becoming increasingly empowered through Grameen Bank programmes

Relative to the circumstances reported in the critical articles mentioned above, the VP operator at present does have some unique advantages. First, the revenue stream from the telephone is substantial. This seems to elevate the woman's position in her own household, particularly in regards to decision-making, and our interviews with VP operators and phone users confirmed this. Second, even when the phone may be in the man's control during the day, it is often moved to the house at night (where more women phone users tend to congregate). Lastly, because it is an in-kind loan, it cannot be used as capital for another, riskier enterprise which might not be in keeping with the Grameen Bank loan agreement.

2.2 User analysis and village level impacts

Who are the Grameen Bank members who are potential phone users?

During our field visits to communities in rural Bangladesh, we surveyed only Grameen Bank (GB) members. Most GB members are women and most can be considered to be among the poorer segment of village population, thus our focus on GB members should shed light on the role of the Village Phone in poverty reduction. The median age groups surveyed were between 26 to 30 and 31 to 40 years of age. Fully 90% of the sample was married. Almost half had no formal education, a quarter had only some primary school education, and a quarter had some high school education. In stating occupations, 36% stated that they were primarily involved in household activities, about

a quarter stated they were self-employed service providers (e.g. sewing, midwife), another quarter stated they were traders or business people selling goods from a business they owned, and about 8% stated that they were primarily involved in agriculture. Only 6% described themselves as employees of businesses or government.

Based on initial field visits, we became intrigued by the importance of village members using the Village Phone to stay in contact with village members who had become overseas workers or who were working in Dhaka. Our surveys and interviews reflect this interest and enabled us to shed new light on the important role the Village Phone plays in facilitating the transfer of financial remittances to family members residing in rural areas. We hypothesized that having a family member working overseas would have a significant impact on Village Phone use, in terms of calling/receiving patterns and in terms of willingness and ability to pay for phone calls. We found that 38% of the sample had at least one family member from their household living overseas, which in itself demonstrates the degree to which external migration for work is currently having an impact on village life in Bangladesh. Income from family members working overseas was indicated by 36% of those surveyed, with a typical monthly income received of about 3,000 Taka or about \$62 USD per month. The monthly household income, not including money received from family members overseas, had a mean of 5,000 Taka or about \$102 per month.

The income received in the form of remittances from overseas workers is a substantial part of village income. For those with family members working overseas, the remittance income they receive accounts for about 50% of family income. If we assume that the Bayes (1999) study is correct and the average village family has 6.18 members, then we can make a rough estimate of the mean per capita income for our sample of Grameen Bank members. If the mean monthly household income is 5,000 Taka, then we multiply by 12 months and divide by 6.18 and multiply this by the exchange rate to calculate a \$198 USD per capita income for the sample. This would mean that the Grameen Bank member population has a much lower per capita income than the \$286 USD per year of the average Bangladeshi. We conclude, and our interviews support this conclusion, that attracting additional income from family members overseas is very important to Grameen Bank members, and the Village Phone is a key tool used to ask for remittances and to reduce the risks associated with remittance transfers.

Ranking wealth is always a challenge in rural research. In this case, we used a set of indicators to see if we might see some correlations between a specific wealth indicator and phone use. In terms of the overall sample, 50% indicated that their household owned at least one cow, 54% of households indicated radio ownership, 34% indicated television ownership, and the mean amount of money reported to be required to construct the respondent's house was 35,000 Taka or \$715 USD. However, we did not find any significant correlations between these independent variables and the dependent phone use variable. This serves to highlight the importance of having a family member working overseas being a key variable influencing phone use.

Who is using the Village Phone?

Of the 292 Grameen Bank members surveyed in their villages, 34% reported never having used a phone while 64% reported having used a phone at least once. Having a family member working overseas was significantly correlated with phone use, with 75% of respondents with a family member working overseas reporting that they had used a phone while 45% of people with no family members working overseas had never used a

phone. In other words, if we were looking at a hypothetical village where no families had household members working overseas, only 55% of the Grameen Bank members in that village would be phone users, whereas in a hypothetical neighbouring village where each family had one household member working overseas, 82% of the Grameen Bank members would be phone users. The proportion of phone users versus non-phone users also increases in direct relation to increases in the proportion of household income received from family members working overseas. Our dataset indicates that *the single most important variable in relation to phone use is whether or not a household has a family member working overseas.*

There is also a clear correlation between respondents who have used a phone and respondents with higher average monthly incomes. Approximately 40% of those with average monthly household incomes (inclusive of money received from relatives working overseas) of 4,000 Taka or less reporting having used a phone, whereas 89% of those with average monthly incomes of 4,000 Taka or more reported to have used a phone. We also found a strong correlation between the percentage of household income received from family members working overseas and phone use, with those reporting higher percentages being more likely to have used a phone.

In ranking Grameen Bank member respondents according to the levels of poverty employed by Bayes (1999), over 10% of phone users in our survey would be ranked as “poor” and 90% as “non-poor.” Conversely, 73% of non-users could be ranked as “non-poor” and 27% as “poor.” This echoes with Bayes’ study which showed that 15% of the poor are phone users. Bayes found that one-fourth of the total phone calls are made by the poor segment of rural population, thus implying higher use density among the poor.

Who is not using the Village Phone?

When respondents who indicated that they had never used a phone were asked why, 78% reported that they had no one to call, which may be an indicator of a household in which members experience little migration for labour. Indeed, 83% of non-phone users had no family members working overseas. As reasons for not using the phone, only 7% indicated that they did not know how to use a phone. It is important to note that *none of the non-phone users indicated that phone use was too expensive.* This would seem to indicate that the cost of telephone use is not a significant barrier to phone use, as we had originally surmised from initial field visits.

When non-phone users were asked if anyone else in their household might have used a phone, 71% said that no one in their household had used a phone, 26% said that men in their household use the telephone more than women, only 2% reported that women in their household use the telephone more than men, and 1% reported that there were both men and women in their household who had used the phone. There is a marked gender difference between non-phone users and phone users in their responses to this question. Among phone users, the results were much more equal with 35% of respondents reporting that women use the phone more than men, 23% reporting equal use among women and men, and 39% reporting that men use the telephone more than women.

Among non-phone users, when asked how far they would be willing to travel to make a phone call if they needed money badly from a family member in another country, 39% reported that they would be willing to travel over 10 kilometers. This compares to 33% of the phone users stating that they would be willing to travel over 10 kilometers,

illustrating little significant difference between non-phone users and phone users on this question.

When asked how much they would be willing to pay for a 3-minute call if they needed money badly from a family member overseas, the mean response (64% of non-phone users) was between 100 and 300 Taka. Phone users indicated a slightly strong disposition to pay more for a similar call, which may simply indicate a better understanding of the costs of overseas calls.

When asked what they thought they might potentially use a telephone for, 63% of non-phone users indicated they might use the phone to discuss financial matters or remittances with family members. This provides additional evidence for the importance of the phone in facilitating the flow of income and wealth within a family. Among phone users, 42% indicated that their main use of the phone was to discuss financial matters or remittances with family members, and 44% reported social calls as being their main use of the phone.

Among female non-phone users (the majority of respondents to this survey were female), 58% said that they would prefer to use a phone operated by a female and 39% said that it did not matter. Only 3% indicated that they would prefer to use a phone operated by a man. Interestingly, among the small number of male non-phone users surveyed, these numbers were reversed.

How is the Village Phone being used?

The main reasons Grameen Bank members reported for using the telephone are discussions of financial matters with family, including discussions of remittances (42%) and social calls to family and friends (44%), accounting for 86% of all calls. While the Bayes survey and report focused on the value of the Village Phone for accessing agricultural pricing information, improving bargaining power with middle-persons, and resulting higher prices gained for local farm products, our results indicate that the predominant economic benefit derived by Grameen Bank members who use the phone are related to the facilitation of the flow of income and wealth between overseas workers or workers in urban cities such as Dhaka and their families in rural villages. The remaining categories of phone calls indicated by respondents included business calls (7%), calls involving matters of illness or death (4%), calls for arranging travel and visas (2%) and calls involving educational arrangements (1%).

Qualitative interviews with phone users provided us with anecdotal evidence of the ways in which telephone use can reduce the risk and the transaction costs associated with the transfer of funds, and help families in villages provide their wage-earning relatives with timely reminders of the need for funds at home. Using the phone to arrange for safe passage of funds and verification of the amount of funds being transferred were common comments among phone users interviewed.

Funds received from overseas workers and wage earners in urban areas make up a significant proportion of aggregate household income within a rural village. In the poor rural areas of countries such as the Philippines, Haiti and Bangladesh, where wage-earning potential is significantly greater and more attractive outside of the home country and beyond the village, remittances from relatives can become *the* single most important source of income for village members. This income is used for providing for basic needs, as well as for contributions to infrastructure, health and sanitation at the

household and village levels. A telephone call that solicits remittances or helps facilitate the smooth flow of remittances is a critically important call, one that can be worth many multiples of the cost of completing the call.

The importance of social calls is echoed by similar research we have undertaken in the Philippines and Ghana. While those of us interested in direct poverty alleviation may be disappointed to see that business uses are named by 8% of phone users as their main reason for using the phone, we must recognize the quality of life benefits derived from being able to converse with one's relatives and friends in distant places for a small fraction of the cost of traveling to see them. When the call is between a young boy and his father, who haven't seen or spoken to one another for over a year, as is captured in the photograph here in a call between rural Bangladesh and Saudi Arabia, the value is immeasurable. If a phone call can reduce homesickness, provide a loved one with support, or put a smile on a child's face, then that phone call is clearly improving quality of life in the context of rural poverty.



Child speaking with his father overseas

The majority of telephone use by Grameen Bank members surveyed is between rural villages in Bangladesh and places overseas where family members have gone to work. The majority of other telephone use is between the village and Dhaka city and other urban areas in Bangladesh where relatives and friends have gone to work or study. The majority of calls (61%) are calls that are *received*, not dialed, by phone users, and proportionately most of those calls originate from outside Bangladesh. Phone users are more likely to dial calls themselves when the other party resides within Bangladesh: the closer the other party is to the phone user, the more likely they are to dial the call than they are to receive the call. Received calls last significantly longer than dialed calls, and the length of call varies directly with the distance of the other party from the village.

Data obtained from Grameen Telecom for the period between 21 September 1998 to 20 October 1998 (a period when most Village Phones were located close to Dhaka) reflects our survey results. The percentages of different categories of calls *dialed* from 134 Village Phones were:

- Local (BTTB) - 67.97%
- GrameenPhone mobile - 17.70
- Other mobile - 6.05
- Nation-Wide Dialing (NWD) - 4.35
- International Subscribers Dialing (ISD) - 3.93

These numbers are virtually reversed when we look at data for calls received.

These results demonstrate that rural telephony is driven a great deal by urban realities and the realities of globalization. The people who place calls to their families in rural villages from telephones in Kuwait, Riyadh or Dhaka benefit as much or more from these telephone calls as do the rural receivers. As well, the majority of income available for rural telephone use is based with the telephone user in Kuwait, Riyadh or Dhaka. We conclude that families that have overseas workers or members earning wages in Dhaka are generally better off, and the phone acts as a lubricant to keep money flowing to the village with the fewest transaction costs.

Unfortunately, due to poor interconnection agreements and poor tariff structures, much of the telecommunication revenue generated from these incoming calls does not contribute to the maintenance or expansion of rural telecommunication services, which is a source of significant grievance for rural telephone operators such as BRTA and Sheba that are trying to expand service in a very challenging rural marketplace. This is reflected in phone user reports of the cost of their last telephone call: much of the expenditure for calls costing 1 to 100 Taka are paid for the privilege of receiving calls on a Village Phone. Just under 22% of calls generate local revenue of more than 100 Taka per phone call.

Among the 194 phone users sampled, 83% reported using the phone in the last three months. Frequency of phone use appears to be fairly evenly distributed across the occupational categories of all respondents, although there is a small but significant positive correlation between the average length of calls reported and the “government worker” occupational category. Perhaps this indicates that a government body is responsible for paying the cost of these calls and not the Village Phone user, or perhaps the nature of the business conducted on the phone requires lengthy conversations. No one in this occupational category reported having an average call length of less than seven minutes.

There is a significant correlation between respondents who receive larger amounts of money from relatives working overseas with the amount of money spent on phone calls. The mean length reported for an average phone call is three to six minutes. Interestingly, we note that when age is a variable, people 51 years and older tend to make shorter calls than their younger peers. As well, when age is a variable, we note that respondents aged 15 to 25 have, as a cohort, fairly consistent monthly spending habits located in the 100 to 300 Taka range. Other age groups exhibit a more normal curve across spending ranges.

We also note a tendency for more frequent callers to keep their phone calls within the range of three to six minutes. Perhaps this is indicative of the adoption of “phone culture” and an understanding of how to conduct conversations efficiently which is gained with more frequent use.

2.3 Financial remittances from overseas workers and phone use

Why are remittances such an important factor in Village Phone use?

Bangladesh is a labour-exporting country with many rural villagers (predominantly men) working in the Gulf States. When transferring remittances home, many Bangladeshis prefer to avoid formal banking system channels and use informal means to transfer

funds to family members at home. Remittances from overseas workers have important micro-implications for rural households and villages.

In Bangladesh, large numbers of workers find their employment overseas through unofficial channels and similarly use unofficial means for transferring remittance payments to family members. Unofficial remittance transfer methods are used to avoid exchange rate over-evaluation (which acts as an implicit tax), high bank charges, long delays in cashing cheques in foreign-currency denominations, and general uncertainty about the integrity of national financial institutions. Foreign workers will often resort to keeping earnings in foreign bank accounts and transferring foreign cash to relatives through kinship and friendship networks. Despite the risks involved in informal cash transfers, the benefits appear to outweigh the risks associated with official transfers through an inefficient banking system combined with restrictive foreign exchange practices. Once cash is received in Bangladesh by a family member, it can be saved, exchanged with local money traders, or used as an alternative local currency for purchases and productive investments.

At the micro level, remittances tend to be used for daily household expenses such as food, clothing and health care (Puri, S. and Ritzema, T., 1999). Remittances are thus an important factor in meeting household subsistence needs, and can make up a significant portion of household income. Remittance funds are also spent on capital items including building or improving housing, buying cattle or land, and buying consumer goods such as portable tape/CD players and televisions. Once subsistence needs are met, remittances tend to be used for “productive investments,” or for savings. Starting a small business or buying land enable families with migrant labourers to improve their local socio-economic standing in relation to established capital owners in the village. There is some evidence that remittance income can help poor families transcend long-term indebtedness and break free from the hold of moneylenders. This would especially be the case when families have accrued the business experience necessary to make effective investments, a key ingredient among families with Grameen Bank members.

The Village Phone acts as a powerful instrument to reduce the risk involved in remittance transfers, and to assist villagers in obtaining accurate information about foreign currency exchange rates. Transferring cash from a Gulf State to a rural village in Bangladesh is fraught with risks. Cash is often placed in the hands of other foreign workers who are returning home and, without access to reliable communication, there is no way for the transferee to notify relatives about the transfer or the amount of the transfer to expect. Reports of outright theft of cash, deductions from the original transfer amount, and extreme delays in the receipt of remittances are common. The Village Phone enables the transferee to provide timely and accurate information on the amount of the transfer, details on the person acting as courier, and the expected arrival date of the cash. In essence, the Village Phone is a risk management tool for improving the transfer of remittances.

As well, the Village Phone is used by rural families in Bangladesh to stay in touch with relatives overseas and keep them informed of family conditions (health, education, etc.) and family business developments. When there is a need for remittance transfer, family members can use the Village Phone to make a direct request for funds from the overseas worker. Without the Village Phone, there are few reliable avenues for staying in touch and making such requests. Given our data on Grameen Bank members' use of the Village Phone for financial discussions with family members, their clear view of the

importance of the service for contact with overseas workers, and the significance of remittance transfers for family welfare, we conclude that the Village Phone plays a very important role in poverty reduction.

It has been suggested (Puri, S. and Ritzema, T., 1999) that labour-exporting countries would benefit from policies and programmes that enable micro-finance institutions that are trusted at the village level to play a key role in channeling remittances, thus ensuring that families have access to safe and secure savings and credit schemes as well as business skill development programmes. The Grameen Bank's long-term focus on providing electronic communication facilities between its head office, zonal offices and branch offices, together with the telecommunication infrastructure of GrameenPhone, are important steps in enabling it to provide safe electronic banking services that could assist with channeling remittances from overseas workers to their relatives in villages.

In the Philippines, BayanTel offers "phone shop" services in over 300 public calling offices nationwide, including facilities for domestic and international money transfer. BayanTel's money transfer services are especially popular with overseas workers and their families. The Grameen Bank and GrameenPhone have most of the technical, telecommunication, and financial pieces needed to establish similar electronic money transfer services to the branch office level. It is likely only a matter of time before these services emerge.

2.4 Consumer surplus made available through Village Phone use

The Village Phone is a communication tool that provides very real and very substantial financial, travel and productive-time savings for rural villagers. Our analysis of the consumer surplus gained through phone use demonstrates that the Village Phone is clearly a cost-effective tool for enabling rural people to take active roles in productive activities and life outside the village.

Consumer surplus is a measure of how much a phone user gains by using a telephone rather than an alternative means of communication. In rural Bangladesh, the most common form of alternative communication is personal travel, and the costs associated with personal travel include transportation costs and the opportunity costs associated with being absent from normal village labour activities. Some indicative consumer surplus (real savings for users) measurements among public calling office phone users and phone owners in other developing countries are noted below:

- Savings of between 2.5 and 5.5 times the cost of a telephone call in Andhra Pradesh State in India (Saunders, Warford & Wellenius, 1994)
- Savings of at least four times the revenues paid to the telephone operator for telephone rentals in Egypt (Ibid)
- Savings of ten times the cost of business calls in Kenya (Ibid)
- Loss of 25% annual growth in business and expenditure of several thousand dollars per year among business organizations without phones in Tanzania (Ibid)
- Benefits of providing agricultural cooperatives with phones in Uganda estimated at \$500,000 per year (Ibid)
- Savings of 13.5 and 20.1 times the cost of telephone calls for Northern Luzon and Northern Mindanao (respectively) in the Philippines (Ibid)

- Savings of 2.6 times the cost of telephone calls in rural Thailand (Asian Development Bank, 1996).

In order to gain an understanding of the true value of a *single* telephone call for Grameen Bank members in terms of consumer surplus, we created a formula for equating the distance of a village from Dhaka with a conservative cost for travel to Dhaka from a village (see Appendix 11).

Our calculations indicate that that a single phone call made to facilitate, for example, a remittance payment from a family member wage labourer in Dhaka City can have a consumer surplus ranging from 2.64% to 9.8% of mean monthly household income. The cost of the trip ranges from 1.93 to 8.44 times the cost of the phone call, meaning real savings of between 132 to 490 Taka (\$2.70 to \$10 USD) for calls that substitute for travel between a village and Dhaka.

It is important to note that our sample group of Grameen Bank members is over 90% female, and females from rural areas in Bangladesh might have difficulty traveling to Dhaka without a male escort. It is safe to assume, however, that a productive male family member might be sent to Dhaka to act on behalf of a woman. Widowed and divorced women who account for over 8% of the people in our sample might have considerable difficulty making such a trip on their own, or finding a male to go in their stead. As well, many married women have husbands who are working overseas or who may be working in an urban area such as Dhaka City, and they too could experience these difficulties. Thus, it is probably safe to say that the consumer surplus for women would often be higher than we have conservatively calculated here because of the challenges associated with a woman making a journey to Dhaka City from a rural village.

2.5 Gender analysis



New Grameen Bank members proudly displaying their memberships

According to Grameen Bank staff, out of the 2,300,000 Grameen Bank borrowers in Bangladesh, 95% are women who lack any collateral to borrow money from conventional banks. Micro-credit has been targeted towards women as a tool for poverty alleviation. In parallel, the Grameen Bank offers literacy training, skills development, health advice, family planning, and political consciousness education as part and parcel of its micro-credit programmes. Grameen Bank and the Bangladesh Rural Advancement Committee's (BRAC) micro-credit programmes boast a rate of repayment of over 97% of the loans.

The focus on poverty alleviation through micro-credit for poor women has attracted much attention internationally, particularly in the case of Bangladesh. The financial sustainability of these micro-credit organizations has been positively reviewed by multi-lateral organizations (World Bank, 1995; Khandkher and Khalily, 1996), although the extent to which micro-credit has had a positive impact on women's empowerment has

been under scrutiny. In reviewing the literature, we came across substantial evidence of positive accomplishments, both in quantitative and qualitative terms (Hashemi et.al., 1996; Jain, 1996; Bayes et.al., 1999). However, we also identified critical reports describing problems that arise within households when women are not able to maintain control over loan resources (Rahman, 1999; Goetz and Sen Gupta, 1996). The latter were a useful point of reference to examine the potential advantages of phones relative to other loans, and the possible constraints of the VP programme in terms of empowering rural women.

Our focus

Our review of gender issues in the Village Phone programme of Grameen Telecom focused on the following types of questions:

- How does the VP enhance a woman's condition in her household and her status in a village?
- How does the VP differ from other Grameen Bank loans in terms of empowering women?
- What impact does a VP have on a village woman's daily routine?
- Are there differences in usage patterns when the VP is operated by a man?

Our findings about female operators

Rural women in Bangladesh, particularly in villages that are distant from the influence of urban centres, are limited by traditional patriarchal society in many ways, including the extent to which they are able to move around and beyond the village without a male escort. This is especially aggravated when their husband is absent, which is rather common due to the large number of Bangladeshi foreign workers. The degree of mobility is one of eight indicators used in a study to assess the degree of women's empowerment (Hashemi et.al., 1996). Having a telephone in the house may therefore be not only a profitable business opportunity for a woman operator, but also a space that is acceptable for other village women to access. Our findings indicate clearly that when women are VP operators, female Grameen Bank members are more likely to feel comfortable using a phone and will more likely have more equitable access to a phone.

There is evidence of increased social status that Village Phone operators have gained in their villages. For example, the fact that better-off villagers now come to a poorer woman's house to use the phone is significant (Bayes et.al., 1999). The woman's house is a centre of activity, with people waiting to make or receive calls. Moreover, the woman becomes very aware of the private and personal matters of many villagers. These factors, plus the added income, contributes to her increased status in the village (Bayes et.al., 1999).



Village Phone operator in her home

During our interviews with women Village Phone operators, we witnessed how the phone is being integrated into a woman's busy routine, both day and night. When the phone is a mobile phone, the operator has the ability to keep it with her while she is doing household chores or operating another business enterprise. While there is clearly an inconvenience with phone calls and errands, most women operators we interviewed felt that the benefits override the limitations. The average income earned contributes between 30-40% of the household income (Bayes et. al., 1999). It is therefore not surprising that many family members of the Village Phone operator are involved in the business. When a phone call is received, children are sent off as messengers to inform a village member. Husbands, sons and daughters of VP operators that we met proudly confirmed that they knew how to operate the phone. Adolescent children were able to easily tell us the international dialing codes for countries such as Saudi Arabia and Kuwait.

Our findings about male operators

The Village Phone is provided to the woman operator as an in-kind loan from Grameen Bank, whereas other types of loans (general, seasonal, house or leasing) tend to be in cash. Secondly, in some areas where the signal is weak, GTC has also found it necessary to add high gain fixed antennas to the phones. This technical solution fixes the GSM cellular telephone to one place, most often the woman's house. These two factors mean that the VP operation is very visible; in other words, where a male member of the family becomes the operator, the situation is easy to identify¹⁰. This is significant because studies by Rahman (1999) and Goetz & Sen Gupta (1996) illustrate cases where Grameen Bank member women are unable to maintain control over loans, and the uses to which loans are put are sometimes governed by husbands. In such cases, the woman becomes a vehicle for the man to access a loan from the Grameen Bank without the man having to necessarily abide by Grameen Bank principles.

During our survey instrument pre-testing visits to villages, in one case we witnessed where a VP was supposed to be operated by a woman but was in her husband's control at his village store. In this case, it was difficult not to see the obvious indicators of the location of the high gain antenna and the fact that the phone never left the man's hands. When asked if she could tell us the international dialing code for Saudi Arabia, a number that every other VP operator could tell us instantly, the woman was only able to answer after being prompted by her husband. When we spoke to women in this village, we could find only a small few who had actually used the phone. This case helped confirm our finding of the gendered nature of *universal access* when the phone is operated by a man in a rural Bangladeshi village. It also increased our focus on the importance of gender in examining the Village Phone program.

Interestingly, when asked about this particular instance, Grameen Telecom field staff and Grameen Bank managers did not seem to share our understanding that women's access to the phone would be limited. This might have something to do with the fact that virtually all the Grameen Telecom staff and Grameen Bank managers we met were men.

¹⁰ Our telephone user survey of Grameen Bank members documents the extent to which there is a relationship between women-operated VPs and women using the VPs, versus those VPs where a husband or son has installed the telephone in a village street corner or marketplace.

If Grameen Telecom is to fulfill its ambition of universal access, then its staff, and the Grameen Bank managers with whom it facilitates the Village Phone program, need to review the conditions necessary for universal access among both men and women. From the standpoint of revenue generation and profitability, it is important to ensure that the Village Phone is fully accessible to the entire village population. If 50% of the user base faces obstacles to phone use, then a significant revenue stream is lost.

Phones for men and phones for women

Based on the experiences above, in the process of analyzing our data, we decided to pay particular attention to the gender of the Village Phone operator and the impact of gender on phone use patterns.

Of the 43 Village Phone sites surveyed for this report, 10 site operators were male: roughly 25% of Village Phone operators. Given that 95% of Grameen Bank members are reported to be women, this weighting of Village Phone operators towards men seems difficult to explain. Looking more closely at data collected by our research team, we realized that 5 of the 10 sites with male operators are located in Chittagong District in southeastern Bangladesh. The other 5 sites are all located within a single thana, Singhar thana, Manikgani district (35 kilometers northwest of Dhaka), where 5 of 8 sites visited are operated by males. *These two thanas combine to accommodate all 10 of the male Village Phone operators.* This leads us to hypothesize that there may be a relationship between Grameen Bank and/or Grameen Telecom approaches to management in these areas, and the selection of male Village Phone operators. Another, and perhaps complementary explanation, might be that more traditional patriarchal values about women's roles are stronger in these areas.



Where a VP operator is male, more men tend to use the telephone than women

Our research team further reported that at some of the Village Phone sites where men were operators, often at marketplaces, it was difficult to find female Grameen Bank members with whom to conduct an interview. Indeed, a review of our data reveals that at 6 specific Village Phone sites where the operator is a man, there is a consistent pattern of 100% male interviewees at these sites, despite the research team's efforts to locate female users. All 5 of the sites located in Chittagong district fit this pattern, as

does one site in Singhar thana. We are unable to explain the disproportionate number of male Grameen Bank members sampled in these areas.

However, at the other four sites where the operator happened to be a man, the research team was able to interview relatively even numbers of male and female Grameen Bank members. Conversely, at none of the 32 Village Phone sites where the Village Phone is operated by a woman did the team have the opportunity to interview a male Grameen Bank member. Given that 95% of Grameen Bank members are female, this was an expected result.

Our data from Grameen Bank member phone users reflect these disproportionate male operator cases. Of the 56 male Grameen Bank members surveyed, 36 (64%) were interviewed in the six villages with a male operator and where only men were able to be included in surveys. Among all male phone users surveyed, 44% indicated that they would prefer a male phone owner, 6% indicated that they preferred a woman phone owner, and 50% said that the gender of the phone owner did not matter. However, when asked the gender of the person who provided the phone service for the most recent phone call that they made, 93.75% of the male phone users indicated that a male phone owner had served them. In the case of female respondents, 52% of female phone users responded that they preferred a woman phone owner, 2% preferred a male phone owner, and 46% had no preference; however 82.1% of the female phone users indicated that their most recent phone call had been served by a female phone owner.

Our data would seem to strongly confirm that men tend to use telephones owned by male operators while women prefer female operators, an important consideration when trying to expand phone service and ensure *universal telephone access* for both men and women. Our field interviews confirmed this as we probed this issue further. Women indicated that they preferred visiting the home of another village woman in order to use the VP, versus visiting a nearby market shop. Some phone users mentioned that it was simply more convenient to visit the home of another village woman to use the phone because their daily activities were spent within a cluster of household compounds. Others mentioned that because they knew the female VP operator they felt comfortable using the phone in her home. Several indicated that because they rely on the VP to *receive* calls, not to place them, that they could count on the female VP to locate them when they received an incoming call. Finally, members of our Bangladeshi research team told us that in more traditional villages it is frowned upon for women to be seen publicly in marketplaces that are dominated by men.

To the best of our knowledge, this is the first documented evidence of gender being significantly important in the provision of universal access to telephone service. In rural Bangladesh, if the only phone locally available is in the hands of a male VP, or in a market-area PCO operated by a man, then the percentage of female users is likely to be small. When we reviewed our data to examine research sites where VPs were operated by men, we found that only 6.25% of Grameen Bank member phone users were recorded as women. In comparison, where the operators are female, 82% of the Grameen Bank member phone users were recorded as women. The latter is, of course, expected given the high proportion of Grameen Bank members who are women, but this fact only highlights the differential access afforded by VPs operated by men.

Gender and phone location

In the near future, fixed public phones will become increasingly common in rural Bangladesh. If normal assumptions are made about high human traffic areas (such as marketplaces) being good places to put pay phones, to maximize phone revenue, new phones are likely to be placed in high traffic areas that are not frequented as much, or as often, by women. In contrast, when a GTC Village Phone is placed in a woman's home, there seems to be a good match between the technology and the times and places that are open and socially acceptable to women in rural Bangladesh. A portable phone can go where the Village Phone operator goes, or she can deliver it directly into the hands of another woman in the village. The Village Phone business is still operational while other business activities are underway, while children are being fed, and while farms are being tended. The ease of use of the phone means that adolescent children can take over operation of the business whenever necessary.

Female Village Phone clients are more likely to feel comfortable doing business with another woman, particularly if they do not have to travel to a public place to gain access to the phone. Other local Grameen Bank members typically receive a favourable discount on Village Phone use, a custom that is encouraged because it would be poor business to provide too many Village Phones in one area and the Village Phone business provides only one Grameen Bank member with both a lucrative business opportunity and higher status within the village.

The current GB criteria for the selection of VP operators explicitly includes having a store business as one possible advantage. Our findings suggest that this criteria is not consistent with the goal of women's empowerment as such stores tend to be operated by men (husbands or other male relatives), and thus phone use by women is reduced. Our survey data clearly confirms that women generally prefer to use phones operated by women.

Empowerment and phone location

There is growing evidence of the positive role of VPs in terms of women's empowerment (Bayes et.al., 1999). We are conscious of the fact that this potential stands to be eroded when the control over the phone is not in the woman's hands. Relative to other kinds of loans, this fact can be more easily monitored by GTC than other types of GB loans. In future, this may also provide additional criteria for VP operator selection: for example, not having a male family member involved in trade/market vending in the vicinity of the woman's home. To restate a point made above, we believe that if Grameen Telecom is to fulfill its ambition of universal access, then its staff, and the Grameen Bank managers with whom it facilitates the Village Phone programme, need to review the conditions necessary for universal access among both men and women. The context of universal access across gender may have to be continually revisited at both management and field levels.

Female market for phone services

Woman-operated Village Phones will likely remain a viable business even when competition from fixed wireless phones arrives. The VP may remain a niche market for a long time for two reasons: 1) other rural telephone operators (BRTA and Sheba Telecom) are more likely to seek the higher-density towns or larger villages, with lesser

investments in remote, distant villages, and; 2) VPs are set to capture village women's phone needs more than the competition. Should Grameen Telecom consider the adoption of wireless local loop (WLL) phone card pay phones, then current Village Phone operators are well placed to act as franchisees and distributors of phone cards on behalf of Grameen Telecom. As well, if the services of Grameen Telecom expand to include email messaging, fax and even web access, then current Village Phone operators would be well-suited to assume management of such expanded telecommunication services.

Establishing a women's phone culture

If in future BRTA or Sheba Phones were to install a great deal more Public Call Offices (PCOs) or phone card pay phones in high traffic areas in villages *and if* this would out-compete the women VP operators, we feel that the VP experience has already proven effective in several ways. The VPs have created a "phone culture" among women by enabling them to have access to a communication tool that they might otherwise be culturally excluded from using. The Village Phone operators and female users have shown rural societies that women can easily gain the skills and capacity to run a VP and that women have just as many reasons to use telephones as do men. The Village Phone initiative has provided women with a recognized right/role as phone clients and phone business operators. Our interviews with some male phone operators give us reason to believe that, without VPs, husbands and male family members would not have been as willing or able to allow women such an opportunity. Our survey data supports this conclusion.

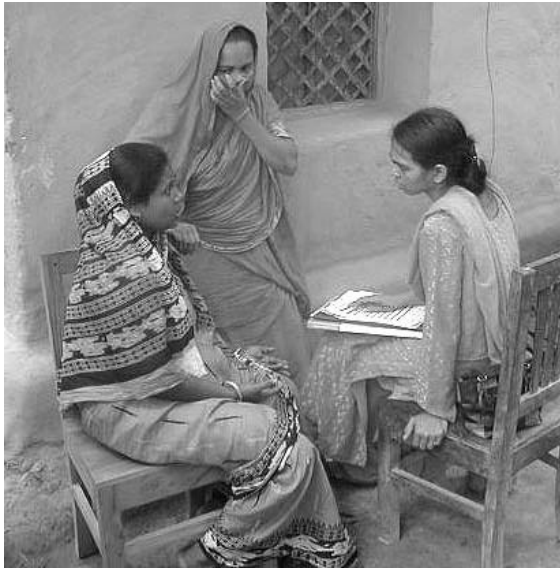
2.6 Satisfaction levels of users

Among the improvements suggested, access to a telephone directory ranked highest among phone users. Coming in tied for third place are better functioning phones, less expensive calling charges and more privacy.

The second-ranked suggestion for improvement was better access to telephone cards. As explained earlier, we believe that this is related to phone users' experiences with pre-paid card phones in towns and urban areas. Phone card phones are generally less expensive to use than those operated by people. This finding should be of significance to Grameen Telecom: if competing rural telephone companies begin to deploy significant numbers of less expensive phone card phones, and if they can provide a good distribution of phone cards, then Grameen Telecom's revenue and the revenue of Village Phone operators could be seriously reduced. Alternatively, Grameen Telecom might want to consider providing phone card phones as franchised units to its existing Village Phone operators, who could then provide an efficient means of distributing phone cards and continue to generate good revenue. This model has proven effective in some parts of Latin America and enables the operating company to provide well-managed and high-quality rural service.

Our findings differ from the suggestions of phone users in the Bayes (1999) survey. The top two priorities noted in our survey were access to telephone directories and better access to phone cards whereas Professor Bayes found that the top two priorities were lower rates and improved technical service quality. The differences might be accounted for by the more Dhaka-focused sample in the Bayes study (made necessary by the

limited number of Village Phones in operation at that time), by improvements in service and value of service by Grameen Telecom over time, and by the emergence of a user “phone culture” focused more on informed user needs.



Female Village Phone users being interviewed by field researcher

Despite their desire for changes, phone users were generally not willing to spend more on telephone calls if their desired improvements were to materialize. Over 58% said that they would not be willing to spend more each month on phone calls, although 14% of phone users indicated that they would be willing to spend over 100 Taka (\$2 USD) per month more. This demonstrates that there could perhaps be better profit margins if a rural operator is able to meet demands for improved service. And our data indicates that those higher expenditures for better service are more likely to come from younger phone users aged 20 to 30, an age group that would more likely be receptive to a wider range of phone services, including card phones.

Finally, those who are self-employed also show a tendency to be willing to spend more on improved services. Other dependent variables do not demonstrate any significant differences.

When asked how much they would be willing to pay to have a phone installed in their homes, almost 30% of phone users were not willing to have a phone installed. However, 35% were willing to pay between 10,000 to 20,000 Taka (\$205 to \$410 USD) and 13% were willing to pay between 20,000 to 30,000 (\$410 to \$613 USD). This is a significant willingness to pay when we consider that the mean amount spent on building a house is 35,000 Taka, or about \$715 USD and the mean household income of those surveyed is about 5000 Taka per month or about \$102 USD. Again, those who are self-employed show a tendency to be willing to spend money to have improved access to telephone services, but in this case, they are joined by respondents involved primarily in household activities. There is a clear positive correlation between average monthly income and willingness to pay for the installation of a telephone.

When we examine respondents' answers to questions about their willingness to pay, dependent upon three categories of calls, those involving financial matters with family members overseas, those involving financial matters with family in Bangladesh and those involving social discussions, we see that a clear differentiation between willingness to pay for social calls and willingness to pay for calls involving the flow of money and remittances among family members. Thus, any services that can improve communication among family members in rural Bangladesh with their relatives in Dhaka or overseas, such as “Call-Me” cards or improved marketing programs, are likely to achieve higher revenues while also meeting the financial needs of villagers.

When we examine the results for our question regarding phone users' willingness to continue to try to make a connection for an important call, we see an indication of the current poor level of service within the Bangladeshi phone system. Approximately 50% of phone users are willing to keep trying for 26 minutes or more to make an important call. If connection rates and service levels are improved, the connected calls alone would provide a significant revenue boost to all operators.

3. A Business Case for Rural Telecommunications

3.1 The telecommunications sector in Bangladesh

3.2 A business case for rural telecommunications

3.3 Current operators and competitive environment

3.4 Regulatory constraints

3.1 The telecommunications sector in Bangladesh¹¹

Bangladesh is among the poorest countries in the world. The UNDP lists it as number 144 according to the Human Development Index, a composite of development and human development indicators (Sierra Leone has the lowest index, 175; and Canada has the best, 1). The per capita income is \$240 USD¹² (1998), whereas the adjusted rural per capita income is estimated at 80% of the national (Kayani and Dymond, 1997). Agriculture accounts for 32% of GDP and more than two-thirds of all employment. The manufacturing sector's share of GDP remains at 11% (1996/97), while the services sector is burgeoning and accounts for over 40%. Life expectancy is 58 years. Approximately 53% of the population are illiterate, over 80% live in rural areas, and about 47% are still living below the poverty line.

To a large extent, the present underdevelopment and poverty of the country is related to the underdevelopment of basic infrastructure. Most rural areas remain largely inaccessible and are consequently unable to take advantage of opportunities conducive to growth and development. As in many other countries of the developing world, the role of telecom in economic development is only now gaining prominence as a tool for rural development. The telecom sector has received scant attention from policy makers, and the country has only recently witnessed an expansion of its network, especially in urban areas.



An example of Bangladesh's poor telecommunications infrastructure

As reported by Bayes, A. et.al. (1999), "Although the share of GDP accounted for by the transport and communications sectors hovers around 12-15%, the dismal performance of the telecom sector in particular can hardly go unnoticed. The country's present infrastructure is considered to be inadequate in scope, technology and the quality of services." (p.7) The Bayes report includes reference to a recent publication produced jointly by the World Bank and Bangladesh Center for Advanced Studies (BCAS) which presented the limitations of telecom services in Bangladesh (World Bank and BCAS,

¹¹ This section is a summary of Chapter 2 of the report by Bayes, A. et.al. (1999) "Village Payphones and Poverty Reduction: Insights from a Grameen Bank Initiative in Bangladesh"

¹² \$240 USD is the per capita income quoted throughout Bayes et.al. (1998). Based on 1998 World Bank figures, Bangladesh's GNP per capita income was \$350 USD.

1998). We copy a summary of indicators that provide a general picture of the telecommunications sector there:

- The telephone density of 0.26 lines per 100 people is one of the world's lowest (India: 1.0, Nepal: 0.5, Pakistan: 2.1, Sri Lanka: 1.0, Thailand: 2.5)
- The waiting time for a connection is more than 10 years.
- The installation charge of \$450 USD for a new line is one of the highest in the world (e.g. Pakistan \$90 USD, India \$60 USD).
- The charge for calling the UK, \$1.50 USD/minute, is about six times higher than the charge for calling Bangladesh from the UK.
- On average, only 2 of 10 calls are successfully completed.
- The complaint rate averages 50 complaints per 100 lines per year, clearly indicating the poor quality of services. (pp.7-8)

From Monopoly to Market

Bangladesh is in the awkward stage of moving from a monopoly to a liberalized telecommunications environment. In this transition, there are numerous obstacles that are symptomatic of the difficulty associated with the transition in the absence of an independent regulatory body. The following excerpt from the Bayes, A. et.al. (1999) report summarizes the situation precisely:

For decades, the Bangladesh Telegraph and Telecom Board (BTTB) assumed the role of the natural monopolist for the provision of telephone services. Originally, there were two reasons for encouraging a state monopoly: first, given the magnitude of the start-up investments and the cost of maintaining services, only a state monopoly had the possibility of doing the job properly, and second, it was believed that a monopoly enterprise would be able to convert the economics of scale into improved services at lower costs. With the passage of time, however, digital and cellular-phone technologies have eroded the bases of these arguments. The advent of these technologies has given rise to a certain euphoria, also in Bangladesh. Some private operators are now making their mark in the country, demonstrating that "small is beautiful" may sometimes hold true in the telecom sector as well. On the other hand, it is argued that private, competitively managed firms are vastly more efficient (World Bank and BCAS, 1998). This one change in perception has brought about a shift away from a state-run monopoly to greater competition. In the course of Bangladesh's fourth Plan (1990-1995), a new era dawned in the field of telecom, and newly licensed private-sector operators started operations. Bangladesh Rural Telecom Authority (BRTA) was licensed to provide telecom services in 199 Thanas (the lowest administrative unit in the Bangladeshi government). BRTA has since installed 27 exchanges at thana-level centers of rural growth.

In November 1996, licenses to operate cellular mobile phone networks were issued, and Grameen Bank, Telecom Malaysia, International Bangladesh Ltd. and Sheba Telecom Ltd. entered the market. The basic assumption was that their operations would increase competition and consequently reduce the costs of cellular mobile phones considerably. It should be mentioned that all of the above are joint-venture companies in which Bangladeshi units collaborate with foreign companies. Thus, in the private sector, there are 7 different operators providing different services. In addition, the country is being provided with Internet and electronic mail services by six private companies: Integrated Services Network, Grameen Cybernet, BRAC, Prodesta and Spectranet (Planning Commission 1998). (p.8)

The Fifth Plan

The woes of the telecom sector in Bangladesh are the consequences of inadequate investments in the past. The International Telecom Union (ITU) has urged the government to recognize basic telecom service as a human right.

"It is a right that Bangladesh lacks because its communications are in the grip of a mismanaged state policy. " (World Bank and BCAS, 1998).

The Government's Fifth Plan document deals succinctly with past performance. Bayes et.al. (1999) report that: "Up to June 1997, the total number of telephone lines stood at 463,185 in the public sector and 21,000 in the private sector. The private sector is confined mainly to various *thanas* and villages. From a paltry 2000 in 1994/95, the number of cellular phones had risen to 39,000 by 1996/97. During the 1995 period, 95,000 digital lines were installed in Dhaka. In the same period, 41,250 new digital lines were installed in Chittagong (the main port city). With the support of the BTTB, Internet connections were installed on a private initiative in 1995/96." (p.9)

According to the Bayes et.al. report, allocations to this sector have started to grow, and the Fifth Five Year Plan prepared by the Planning Commission in 1998 is expected to allocate funding as follows:

- **Public sector:** Of the public-sector outlay for communications totalling Tk.23,784 million (USD 1 = Tk. 40)¹³, 91% has been earmarked for the BTTB. The financial outlay would be used to install and expand digital exchanges, install national and international trunk lines, innovative programmes like data communication network and information technology
- **Private sector:** It is envisaged that the private sector investment will be about Tk.34,500 million for developing different telecom services already licensed and for BLT/BOT schemes of BTTB. In the fifth plan, more private sector participation in the value added services like cellular mobile, paging, e-mail, Internet, voice mail etc. is expected. (p.9)

For an in-depth review of the Fifth Five Year Plan (1997-2002), we provide excerpts from the Bayes (1999) report in Appendix 12, including Fifth Plan Objectives, Fifth Plan Strategies and Projections on Village Phones and Poverty Reduction.

The Bayes et.al. report is coherent with the findings of this report:

"There has been some progress in the development of the telecom sector over the years, but the pace is inadequate to catch up with the very rapid process of globalization. In order to do that, Bangladesh needs to institute drastic changes in policy aimed at: (a) embracing and investing in high-level telecom technology, (b) pursuing institutional reforms that would prompt competing private operators to enter the market to meet demand and effectively deliver services and (c) developing an appropriate regulatory framework assuring consumers and providers alike of a predictable environment in which to do business. (p 11)

¹³ The exchange rate at the time of writing the TDG Report was Tk49 per 1 USD.

3.2 A business case for rural telecommunications

Rural telecommunication planners tend to focus on several key factors in order to establish and analyze the business case scenario:

- **population density** (telecom investments tend to go to high density areas)
- **per capita income** (a rule of thumb is that 1.5 to 2% of PCI is spent on average on telecommunication, although this amount is typically much higher in rural areas)
- **cost per line installed** (which depends on the technological package; WLL tends to average \$4,000 USD/line)
- **topography** (the flatter the territory, the better)
- **teledensity** in terms of the number of telephone lines per 100 population (suggesting how saturated the market may be; there is a positive correlation between teledensity and per capita income; see Figure B)
- **willingness to pay** (an indicator of demand) **and consumer surplus** (indicator of how much a user saves when using a phone, mainly in terms of avoiding time/income loss and transportation costs)

A review of indicators from Bangladesh shows how unique this context is¹⁴:

Population density: 850 people per square kilometer (among the highest in the world)

Per capita income: \$220/year¹⁵ average with a lower average of \$171/year for rural areas (among the lowest in the world)

Cost per line: As low as \$1,000/line (among the lowest in the world for implementation)

Topography: Flat river delta with recurrent flooding

Teledensity: Between 0.2 and 0.3/100 people (among the lowest world-wide)

Willingness to pay: 54% of Grameen Bank member phone users in the current survey indicated that they were willing to spend between 100 to 300 Taka (\$2 to \$6 USD) for a three-minute phone call involving a financial matter with a family member overseas, and 27% said they were willing to spend between 300 to 600 Taka (\$6 to \$12.25 USD) for this kind of call. Given an average reported monthly income of 5,000 Taka (\$102 USD) for respondents' households, these

¹⁴ Bangladesh is listed as number 144 in the UNDP Human Development Index, a composite of development and human development indicators (Sierra Leone has the lowest index, 175; and Canada has the best, 1). Please see Figure B in Appendix A.1.

¹⁵ United Nations, 1995-96. 1998 World Bank Figures calculate Bangladesh's GNP per capita income at \$350 USD.

figures represent significant proportions of monthly household income ranging from 2% to 12%.

Consumer surplus: The Bayes study shows savings of no less than 70 Taka per call, which is a very high figure (Bayes et.al.1999). Survey findings for our report show savings of between 132 to 490 Taka (\$2.70 to \$10 USD) for calls that substitute for travel between a village and Dhaka.

Facts and Figures

- **Per rural line revenues are very high.** Sheba Telecom's revenue from 1,500 rural subscribers (mostly personal fixed phones used as Public Call Offices) brings in the same amount of revenue as 12,000 urban GSM subscribers. This is equivalent to \$240 USD/month; the average *annual* revenue from rural phones is \$1,000. BRTA reported PCO bills of 3 laks/mo (\$6,000) and Sheba of 2.5 laks/mo (\$5,000). Some of the BRTA PCO lines are in use for up to 18 hours each day: an astonishing level of use. Sheba Telecom reported Erlang¹⁶ counts far beyond their original estimate¹⁷. Telephones in the Grameen Village Phone programme bring in 3 times as much as urban phones (an average of \$100/month versus \$30/month).



Phones are becoming much more in demand in rural and remote areas

- **The rural market is practically untapped.** With a population density ranging from 750-1000 people per square kilometer, Bangladesh has one of the highest population densities in the world. With an adjusted rural annual per capita income of \$171 (contrasting with the national average of \$220 -using 1997 data- and with an average of \$1,100 in Dhaka), along with phone line installation costs as low as \$1,000/line (according to BRTA prices), it is estimated that there is a business case for one phone for every 183 people (Kayani and Dymond, 1997). The current teledensity in Bangladesh is 2-3 phones per 1000 people, suggesting a market that is practically untapped¹⁸. An expansion to one phone per 183 people would raise the teledensity to 5.46.

¹⁶ An Erlang is a measure of telephone traffic density. One Erlang indicates 100 percent busy condition during one busy hour. It is normal to assume a network-wide average traffic of 0.03 to 0.08 per subscriber, although business lines typically average 0.10 to 0.15. (Kayani and Dymond, 1997: xi)

¹⁷ Sources include interviews with: Abu Sadat M. Sayem, Sheba Telecom Senior Executive; Maj. Mashiur Rahman Siddiqui, Deputy General Manager, BRTA; N.H.M. Sarif Uddin (Nazmul), Senior Manager, Grameen Telecom.

¹⁸ Other countries' teledensities. Canada= 59.0, India=1.0 (UNDP 1997 Human Index Report)

- **Rural network expansion.** The main constraint for rural network expansion is the lack of interconnection to the Bangladesh Telegraph and Telephone Board (BTTB) system. Restricted expansion is not caused by a lack of investment capital, as many believe. While most operators have, or are planning to build their own backbone network, they still need to interconnect to BTTB. BRTA plans to double its subscriber base from 20,000 to 40,000 and the Deputy General Manager reported having a warehouse of equipment ready to install if/when the interconnection issue was solved. As well, Sheba Telecom is expanding its wireless local loop network. It is noteworthy that several sources reported that all private urban and rural operators have come together to offer BTTB free investment capital for an upgrade to its switching capacity, as an incentive for BTTB to increase interconnection lines.
- **Rural phone prices.** The price for a Sheba Telecom phone and line ranges from 35,000 to 48,000 Taka. The price depends on the signal reception that stipulates the need for an indoor or outdoor antenna. A BRTA phone and line range from 10,120 Taka for a phone that only connects to the NWD, to 20,120 Taka for one that allows ISD, and up to 27,750 Taka for a WLL that links to both NWD and ISD. A Grameen Telecom Village Phone costs 15,000 Taka. We believe that Sheba and BRTA phone costs include both the set and the installed line costs, while the Village Phone cost does not include the installed line cost of the cellular infrastructure.
- **Topography.** Not only does Bangladesh have a very high population density, but it is also predominantly a flat river delta. Wireless technology with a line of sight distance of 30-40km means that the entire 144,000km² territory could be covered by a handful of towers (as few as 15 with a 50km radius). For this reason, both rural operators - BRTA and Sheba Telecom - are making extensive use of wireless local loop (WLL) technology. GrameenPhone, in contrast, relies on the fibre optic cable along the 1,800km length of railway track. While this encompasses a very large coverage area, there is still a substantial part of the country that lies beyond this backbone. For GP, extending beyond the fibre optic backbone is strategically important and WLL technology, in combination with the fibre optic cable, may become attractive if/when expansion is possible within its license frequency.

Estimated Demand for Rural Telephone Lines

The above facts would suggest that there is a market for at least 100,000 rural telephones in Bangladesh, and this is a very conservative figure. Based on the International Telecommunications Union's (ITU) typical model for rural service, we can expect that people in rural Bangladesh will spend not less than 1.5% of GDP per capita on telecommunication services (International Telecommunications Union, 1994) "if they are appropriately deployed" (Kayani & Dymond, 1997: 9). Kayani and Dymond (1997) estimate rural income at \$171 USD per person per year (based on an estimate of an overall GDP per capita of \$220 USD¹⁹). This suggests \$2.57 USD per capita expenditure. Given a conservative estimate of rural population of 80 million people, this

¹⁹ Source – United Nations, 1995-96

translates into a potential rural telecommunication revenue of *\$205 million USD per year*. And, as Kayani and Dymond (1997) note, rural expenditures can often exceed expectations because of the high cost of alternative forms of communication such as travel by vehicle. If we assume that each line needs to generate \$1,000 USD per year to be financially viable, then this would equate to a total of 205,000 rural lines!

Rural women gather to use local Village Phone services



3.3 Current operators and competitive environment

The following table summarizes the current telephone operators in Bangladesh, their license types, their technological solutions, and their client base coverage.

Table 3.A Bangladesh rural telephone operators, licenses, technology and coverage

Operator	License	Technology	Coverage
BTTB (unregulated national operator with monopoly over interconnections and ISD)	<ul style="list-style-type: none"> • National trunk and interconnections • International gateway • PSTN urban 	<ul style="list-style-type: none"> • Mostly fixed and some wireless trunk 	450,000 fixed lines in 70 <i>thanas</i> where major cities and towns are located
GrameenPhone	<ul style="list-style-type: none"> • Cellular nation-wide 	<ul style="list-style-type: none"> • GSM mobile, Fibre optic trunk 	50,000 subscribers in major urban centres and towns along railway corridor; 950 Village Phones
Sheba Telecom	<ul style="list-style-type: none"> • Cellular nation-wide • Rural south PSTN 	<ul style="list-style-type: none"> • GSM mobile, 5 WLL and wireless trunk planned 	12,000 subscribers in Dhaka; 1,500 subscribers across 195 southern rural <i>thanas</i>
BRTA	<ul style="list-style-type: none"> • Rural north PSTN 	<ul style="list-style-type: none"> • WLL and fixed line • Wireless trunk 	20,000 subscribers across 199 northern rural <i>thanas</i>
CityCell	<ul style="list-style-type: none"> • Cellular urban 	<ul style="list-style-type: none"> • Analogue mobile and GSM 	N/A
AkTel	<ul style="list-style-type: none"> • Cellular nation-wide 	<ul style="list-style-type: none"> • GSM mobile 	N/A

All telephone operators reported ambitious expansion plans; however, all are constrained by an interconnection bottleneck with BTTB. At the time of our visit (October 1999), the four GSM mobile operators were finalizing an agreement with BTTB

that would allow them to become investors in a switching upgrade. This would enable them to expand their interconnections and respond to the urban and rural market demand.

A further indication of the scope for a competitive market is the high elasticity of demand for rural phone calls. In other words, people are aware of price differences and are willing to walk some distance to save a few Taka on a single phone call. We witnessed how one road-side PCO operator (just outside Dhaka district) offered different phone rates through different phones (BTTB line and GrameenPhone mobile) for different call destinations at different times of the day. The following chart demonstrates the different rates that may be charged by service providers:

Table 3.B Range of telephone charges: high elasticity of demand

Call destination	BTTB charge	GrameenPhone charge
International or local BTTB call	Tk.10 /minute	Tk.12 /minute
Dhaka mobile number	Tk.10 /minute	Tk.07 /minute

In Comilla District, during the period of our research, GrameenPhone did not have a direct connection to Dhaka. Instead, calls must go through Chittagong, thus making a call to Dhaka an expensive long-distance call. In this situation, only the calls made with VP service to Chittagong were more competitive as were the international incoming calls, both of which were charged at Tk.5/minute.

Table 3.C Range of telephone charges caused by infrastructure and rate structure

Call destination	Sheba charge	Village Phone charge
Village in district to Comilla (city)	Tk.10 /minute	Tk.24 /minute
Village to district Dhaka	Tk.20 /minute	Tk.45 /minute

This variable price situation is bound to improve when GrameenPhone authorizes a flat Tk.15/minute rate for all NWD calls.

3.4 Regulatory constraints

The two licenses granted for rural telephone provision in Bangladesh effectively provide BRTA and Sheba Telecom with monopolistic rights to service the north and south portions of the country respectively. The fact that both licenses give exclusive rights for a 25-year period suggests an assumption: at the time of granting the licenses, rural telephony did not *appear* to BTTB to offer a profitable business case. However, our conclusions suggest that there is a very good business case for rural telephony, and both BRTA and Sheba Telecom stand to gain substantial profits if and when they can address the interconnection problems with BTTB.

In contrast, the business case for the urban cellular market is more evident. The urban environment is highly competitive, and the projections for growth are substantial. For example, GrameenPhone has a target to double its urban subscription base every year for the next few years. Moreover, the demand for mobile phones is so large that several GSM operators have succeeded in marketing cell phones that only interconnect to other

mobile phones. This is effectively creating a parallel phone system that does not rely on the BTTB trunk.

All phone operators, urban and rural, are constrained by the limited number of interconnections provided by BTTB. In addition, they are subject to a monopolistic control by BTTB that limits revenue sharing arrangements for ISD calls and denies them for NWD calls. Also, a refusal by BTTB to allow other technologies to be used, such as VSAT, is a further restriction.

There have been many calls for a review of interconnection agreements and revenue sharing arrangements. The lack of an independent regulator has thus far allowed BTTB to maintain a monopolistic behaviour in these two areas. In April 1998, GrameenPhone accepted an arrangement involving no revenue sharing with BTTB's network, although this agreement contradicted international norms and the Government's official policy (GrameenPhone, 1998). While this phenomenon is a clear constraint, evidence from other countries suggests that market forces could eventually overcome this situation.

The resident representative of the World Bank to Bangladesh described the country's telecom challenge in a nutshell:

"Fast, effective telecommunications are the lifeblood of modern societies and economies. To join the global information revolution and exploit its potential for accelerated growth, Bangladesh must, first, concentrate on adopting high-level telecommunications technology and investing in infrastructure; second, undertake institutional reforms enabling competing private operators to meet demand and effectively deliver services; and, finally, develop an appropriate, autonomous regulatory framework to assure consumers and providers alike a predictable environment in which to do business. These challenges amount to major departures from current practices." (Temple, 1999)

The telecom sector in Bangladesh is still regulated by the Telegraph Act of 1885, and the Wireless Act of 1933. These outdated acts are inadequate in dealing with Bangladesh's challenges today. Readers interested in a short review of Bangladesh's Telecommunications Laws and Regulations can view an attached summary.²⁰

The Government has responded to the inappropriateness of laws with a proposed Bangladesh Telecommunications Act that the Ministry of Posts and Telecommunications (MOPT) presented to private and public stakeholders during a workshop in December 1998 (GrameenPhone, 1998). However, as of December 1999, very little progress regarding the establishment of an independent telecom regulator had been made. Although Cabinet, in principle, approved the draft law in September to set up the Telecom Regulatory Board, it is yet to be placed before Parliament for passage. Critics say the draft approved by Cabinet is a watered down version of the one originally planned. However, once it is placed in Parliament, there may be a debate leading to some amendments. Meanwhile, the Telecom Regulatory Commission is doing the job of overseeing the sector during the interim period. It is headed by a BTTB official on deputation and is controlled by the MOPT.

²⁰ Source - ADB (1997) p.38

4. Telecom for Rural Development Portrait

4.1 Reviewing Grameen Telecom goals and assumptions

4.2 A Snapshot of Grameen's Village Phone programme

4.3 Key research findings related to telecommunication and rural development in Bangladesh

4.4 Gender-related findings

4.5 Recommendations toward universal telecom access in rural Bangladesh and elsewhere

4.1 Reviewing Grameen Telecom goals and assumptions

- Grameen Telecom's goal is **universal access to telecommunications** in rural areas, which will advance social and economic development.
- Grameen Telecom is **not limited to working with any one particular technology or telecommunication operator**, provided that it does not affect the business of GrameenPhone.
- Grameen Telecom is **committed to enabling rural entrepreneurs to gain access to telecommunications, through Grameen Bank-associated credit programmes**, in order to create viable rural businesses and micro-enterprises.
- Current partnership with GrameenPhone does not limit **exploration or establishment of partnerships with other telecom providers**, provided that it does not affect the business of GrameenPhone.

4.2 A Snapshot of Grameen's Village Phone programme

- The Village Phone programme appears to be the **best** available technical solution **under current regulatory and commercial circumstances**.
- The Village Phone programme is a technical and organizational solution to rural telecommunication access partly necessitated by a regulatory environment that is not conducive to advancing rural telecommunication infrastructure.
- The marriage of Grameen Bank's revolving loan system & network of branches with cellular phone loan scheme is unique and **working very well**.
- Grameen Telecom **staff are committed and providing excellent service** to users.
- There are significant positive social and economic impacts, including relatively **large consumer surplus and immeasurable quality of life benefits**.
- The Village Phone programme raises, perhaps for the first time, the important issue of gender when considering goals of universal telecommunication access.



Villagers of all ages make use of Village Phones

4.3 Key research findings related to telecommunication and rural development in Bangladesh

- It is probably not justified to conclude that the Village Phone programme exists only because BTTB does not provide sufficient interconnection to competing rural operators in Bangladesh. However, this must certainly be a significant factor that has led to the emergence of Grameen Telecom's services. **Bangladeshi telecommunication regulations are definitely not supportive of advancing telecommunications in rural areas**, and are thus an obstacle to achieving rural development benefits from rural access.
- Rural Bangladesh holds **potential rural telecommunication revenue of \$205 million USD per year**, but this potential revenue is not being leveraged for improving investments in telecommunication services that can contribute to rural development and universal access.
- According to a variety of sources, the BTTB's current target was to have about 600,000 lines installed by 1998, and about 900,000 lines by the year 2000. "Even with private sector providing another 100,000 line units in 2000, an achievement that will depend heavily on BTTB's ability to provide interconnectivity, supply will fall nearly 500,000 short of demand and the number of lines will still be less than 10 per 1000 population - among the lowest in the world" (World Bank and BCAS 1998). The Government of Bangladesh's Fifth Five Year Plan requires the installation of over eight million lines by 2020. Even the conservative projection foresees a requirement of more than four million lines. Either way, supporting infrastructure - adequate numbers of interconnection circuits and long-distance channels - must be provided to ensure the effective operation of access lines. These challenges far exceed the demonstrated capacity of the BTTB. We support Bayes (1999) in the belief that **only privatization can give rise to a telecom sub-sector strong and modern enough to support 7-8% annual growth in GDP**.
- In the Bayes et al. (1999) report, the income operators derived from the Village Phone was reported to be about 24% of the household income on average; and in some cases it was **as high as 40% of the household income**.
- The main reasons Grameen Bank members reported for using the telephone are discussions of financial matters with family, including **discussions of remittances (42%) and social calls to family and friends (44%), accounting for 86% of all calls**. The Village Phone is **used more by respondents for receiving incoming calls than for dialing out of the village**.
- 54% of Grameen Bank member phone users in our survey indicated that they were **willing to spend between 100 to 300 Taka (\$2 to \$6 USD) for a three minute phone call** involving a financial matter with a family member overseas, and 27% said they were willing to spend between 300 to 600 Taka (\$6 to \$12.25 USD) for this kind of call. Given an average reported monthly income of 5,000 Taka (\$102 USD) for respondents' households, these figures represent significant proportions of monthly household income ranging from 2% to 12%.
- A single phone call made to facilitate, for example, a remittance from a family member wage labourer in Dhaka City can have a **consumer surplus ranging from 2.64% to 9.8% of mean monthly household income**. The cost of the trip ranges from 1.93 to 8.44 times the cost of the phone call, meaning **real savings of between 132 to 490 Taka (\$2.70 to \$10 USD) for calls** that substitute for travel between a village and Dhaka.

- Telephones in the Grameen Telecom Village Phone programme bring in **3 times as much revenue as urban phones** (an average of \$100/month versus \$30/month).
- Of the 292 Grameen Bank members surveyed in their villages, 34% reported never having used a phone and 64% reported having used a phone at least once. **Having a family member working overseas was significantly correlated with phone use with 75% of respondents with a family member working overseas reporting that they had used a phone** while 45% of people with no family members working overseas had never used a phone. **Having a family member working overseas was the most important independent variable in determining phone use.**
- Labour mobility among respondents' families, and especially **labour mobility to destinations overseas, contributes significantly to demand for and willingness to pay for telephone services.**
- When respondents who indicated that they had never used a phone were asked why, 78% reported that they had no one to call, which may be an indicator of a household in which members experience little labour mobility. Indeed, **83% of non-phone users had no family members working overseas.** As reasons for not using the phone, only 7% indicated that they did not know how to use a phone. It is important to note that ***none of the non-phone users indicated that phone use was too expensive.*** This would seem to indicate that the **cost of telephone use is not a significant barrier to phone use**, as we had originally suspected.
- There is **strong respondent support for access to phone card pay phones** as an alternative tool for accessing telephone services.

4.4 Gender-related findings



Village Phone operator

- Universal access is not gender neutral. **In the case of Bangladesh, the gender of the Village Phone operator and the physical placement of the phone within a gendered village context can either inhibit or improve women's access to phones.** A woman's home provides a space that is acceptable for other village women to access. **Our findings indicate clearly that when women are VP operators, women who are Grameen Bank members are more likely to feel comfortable using a phone and will more likely have more equitable access to a phone.** From the standpoint of revenue generation and profitability, it is important to ensure that the Village Phone is fully accessible to the entire village population. If 50% of the user base faces obstacles to phone use, then a significant revenue stream is lost.

- 52% of female phone users responded that they preferred to use a phone operated by a woman phone owner, 2% preferred a male phone owner, and 46% had no preference
- When we reviewed our data to examine research sites where Village Phones were operated by men, we found that only 6.25% of Grameen Bank member phone users were recorded as women. In comparison, where the operators are female, 82% of the Grameen Bank member phone users were recorded as women. The latter is, of course, expected given the high proportion of Grameen Bank members who are women, but this fact only highlights the differential access afforded by VPs operated by men.
- The current GB criteria for the selection of VP operators explicitly includes having a store business as one possible advantage. Our findings suggest that this criteria is not consistent with the goal of women's empowerment as such stores tend to be operated by men (husbands or other male relatives), and thus phone use by women is reduced.
- The consumer surplus we have calculated based on travel from a village to Dhaka would likely be higher for women than for men due to the various gender-related challenges associated with a woman making a journey to Dhaka City from a rural village.

4.5 Recommendations toward universal telecom access in rural Bangladesh and elsewhere

- Our data would seem to strongly confirm that in rural Bangladesh, men tend to use telephones owned by male operators while women prefer female operators, an important consideration when trying to expand phone service and ensure *universal telephone access* for both men and women. To the best of our knowledge, this is the first documented evidence of gender being significantly important in the provision of universal access to telephone service. **Future programmes focused on universal access ought to include analysis of gender and access.**
- **GSM cell phone technology** is a high-cost solution for universal access in rural areas. Limited cellular coverage of rural areas **may only be viable under the current set of cumbersome regulatory practices** – once the regulatory environment improves, cellular phone technology may not be the most viable and efficient means of providing universal service. GSM cell phone technology also places much higher tariffs on rural phone users than would be the case for wireless local loop (WLL) technologies. Without regulatory improvements, cellular technology is a practical solution.
- Cellular phone technology is currently **not a viable option for inexpensive email/Internet/data connectivity**. WLL and other options can provide much better bandwidth and cost of service. It appears that Grameen Communications and Grameen Telecom will expand their pilot telecentres in rural areas (such as the pilot Village Computer and Internet Programme launched in June 1999 in Madhupur village, Tangail). If this programme expands on a large scale, given current cellular data capabilities, a non-cellular connectivity solution will clearly be required. The Madhupur telecentre recently acquired a WLL terminal from BRTA and is reporting significantly improved Internet connections.

- Telecommunication investors, financial institutions that provide telecom loans, urban telecom operators, and telecom equipment vendors are generally reluctant to involve themselves in rural operations because they see telecom ventures in rural areas, especially those in developing countries and emerging markets, as high-risk, troublesome, or not worth significant effort. The Grameen Telecom experience leads us to suggest one potential solution: **target un-served and under-served regions and provide support for acquisition of quality market appraisal knowledge and market data** through market research in the field, in order to prove the business case, attract investment capital, and reduce the effort required by investors and operators. Telecom operators and equipment vendors typically have the technical resources and operational expertise necessary to leverage profitable rural telecom opportunities, and if they are presented with a solid business case, this relieves them of the burden of researching rural markets themselves. In the case of Grameen Telecom, it was business case interventions on behalf of Gonophone and Grameen Bank that attracted external investment from a qualified foreign operator.
- Initiatives such as Grameen Telecom are proving that micro-credit programmes tied to the development of Public Calling Office (PCO)-type micro-enterprises can significantly increase rural access to telecommunication systems. However, in many regions of developing countries and emerging nations where rural service exists, the challenges of acquiring service and equipment prevent rural entrepreneurs from establishing locally-owned and managed PCO operations. As well, operators of existing rural telecommunication systems may be reluctant to expand due to the challenges of revenue collection, equipment maintenance, vandalism, and customer support. The Grameen Telecom experience points to a potential solution: **link existing and successful micro-credit organizations with rural telecom operators (fixed line and/or wireless) to expand PCO coverage in rural areas**. Small loans to rural entrepreneurs (perhaps targeted to women and youth) can enable entrepreneurs to establish PCOs providing a range of services including telephone, fax, email and even web, photocopy and computer word-processing services. A franchise programme of this sort would also establish consistency of service across a region that would, in turn, support the social and economic development of the region.
- We understand that there are 25-year exclusive territory license arrangements for Sheba's WLL line deployment in the south of Bangladesh and BRTA's line deployment in the north, and we understand that these **licenses were introduced with the assumption that rural telecom is not profitable – an obviously false assumption**. Grameen Telecom can examine licensing options for becoming an alternative, national, rural telecom operator, perhaps integrating alternative technologies such as WLL or collaborating with Sheba and/or BRTA. Through its relationship with GrameenPhone, Grameen Telecom has access to substantial infrastructure in the form of wireless towers, backbone service and operating experience.
- **Examine the possibility of widening the reach of Grameen Telecom through partnering with BRTA and Sheba, and others**, as appropriate (especially once interconnection problems are resolved) to provide business opportunities in association with, or with the support of, Grameen Bank's credit programme for a variety of end-user technologies including:
 - **WLL terminal village phones** (similar to cell phone strategy)

- WLL terminals at village **married to PABX** to provide **a local village exchange** and multiplying the number of phones available from a single line
 - VP operator could become a local network operator
- **PCO operations - Communication shops** including phone, fax, email, Internet, computer training, photocopying, etc.
- **“Virtual telephones”** or village voice mail systems that can provide everyone with their own telephone number and access to a voice mailbox
- Village or town pay phones (card phones would be best). These **pay phones would be owned and operated by a Grameen Bank member** (a possible alternative or supplement to the current VP-style system).
- BRTA and Sheba do not appear to be very interested in operating end-user technologies – during interviews we heard clearly that they prefer the more technical job of supplying operating service and having a straightforward method of collecting revenue. This provides **a substantial market opportunity for facilitating the operation of end-user technologies and services**, especially those that provide consistent, high-quality and low-cost services and which enable the operator to simply provide technical service without the worries of revenue collection and rural service at the village level.
- Grameen Telecom’s technical staff express a strong desire to improve their understanding of available technologies and options for rural universal access solutions. **Technical staff would benefit immensely from a rural telecom learning programme** that could include study tours, visits with equipment vendors, and dialogue with independent rural telecom analysts.

A.1 Figures

Figure A: Map of GrameenPhone Coverage (October 1998)

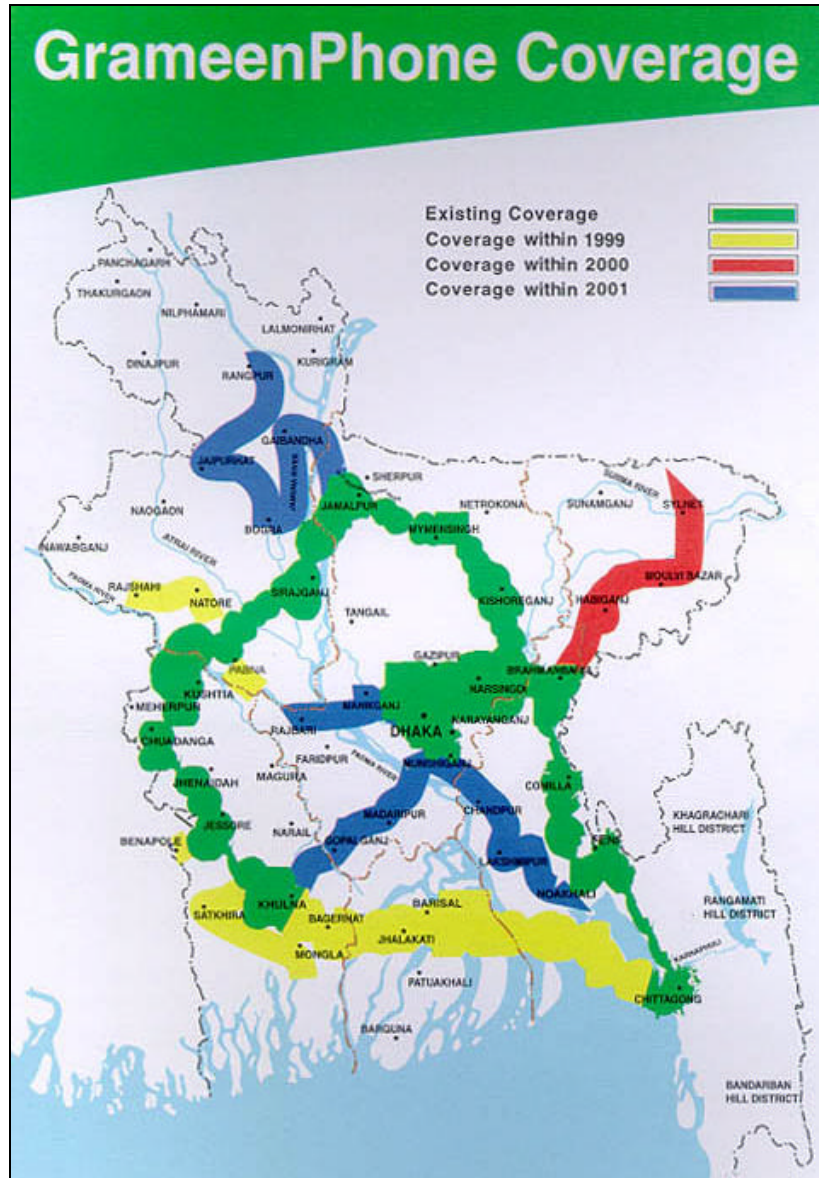
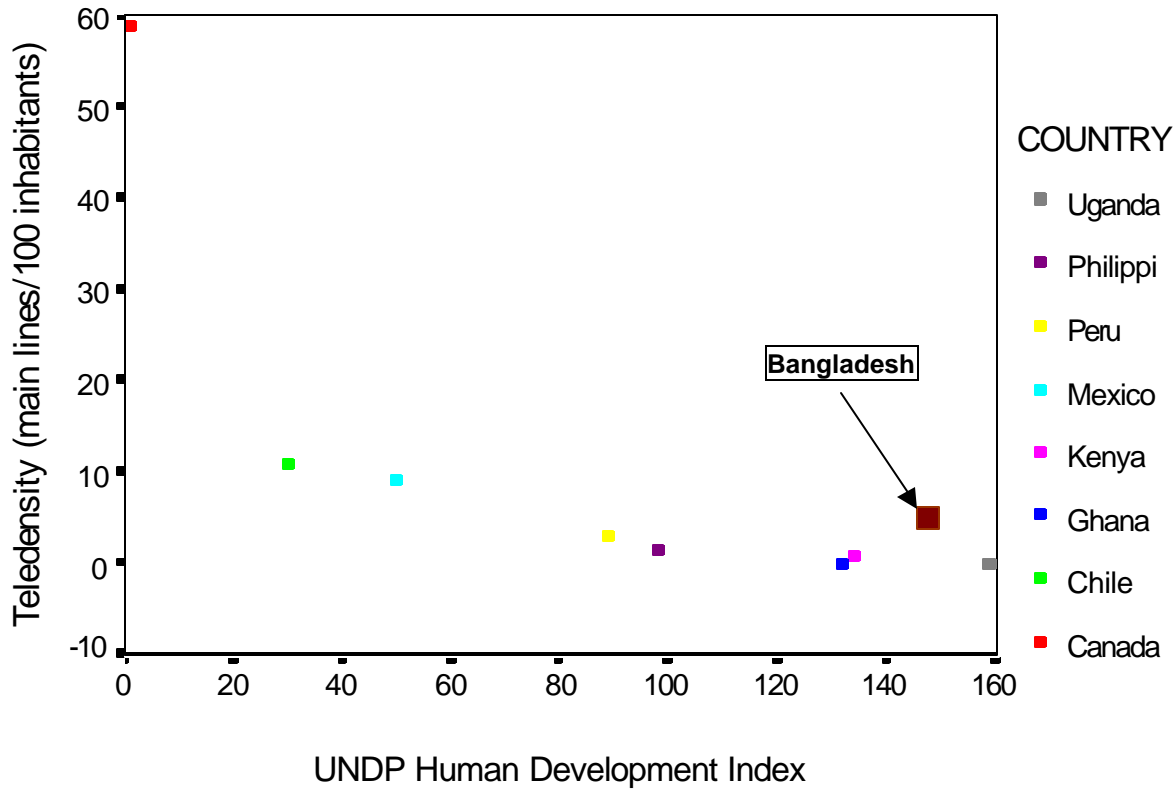


Figure B: Teledensity and HDI Graph Relative to Other Countries

Scatterplot for HDI and Teledensity, 1997 data



Bangladesh Statistics

- Human Development Index (HDI): **144**
- **0.2** main telephone lines per 100 people
- Population doubling date as per 1994 growth rate: 2037

(Source: *Human Dev. Report*, UNDP, 1997)

- Per Capita Income (national): **\$220 USD**
- Per Capita Income (rural adjusted): **\$171 USD** (ratio of 2.4 to 5.9)

(Source: Kayani & Dymond, 1997)

Country Comparison

	Teledensity	HDI
Canada	59	1
Chile	11	30
Mexico	9.3	50



Figure C.1: Bangladesh Rural Telephone Authority: BRTA Subscriber Service Coverage Area

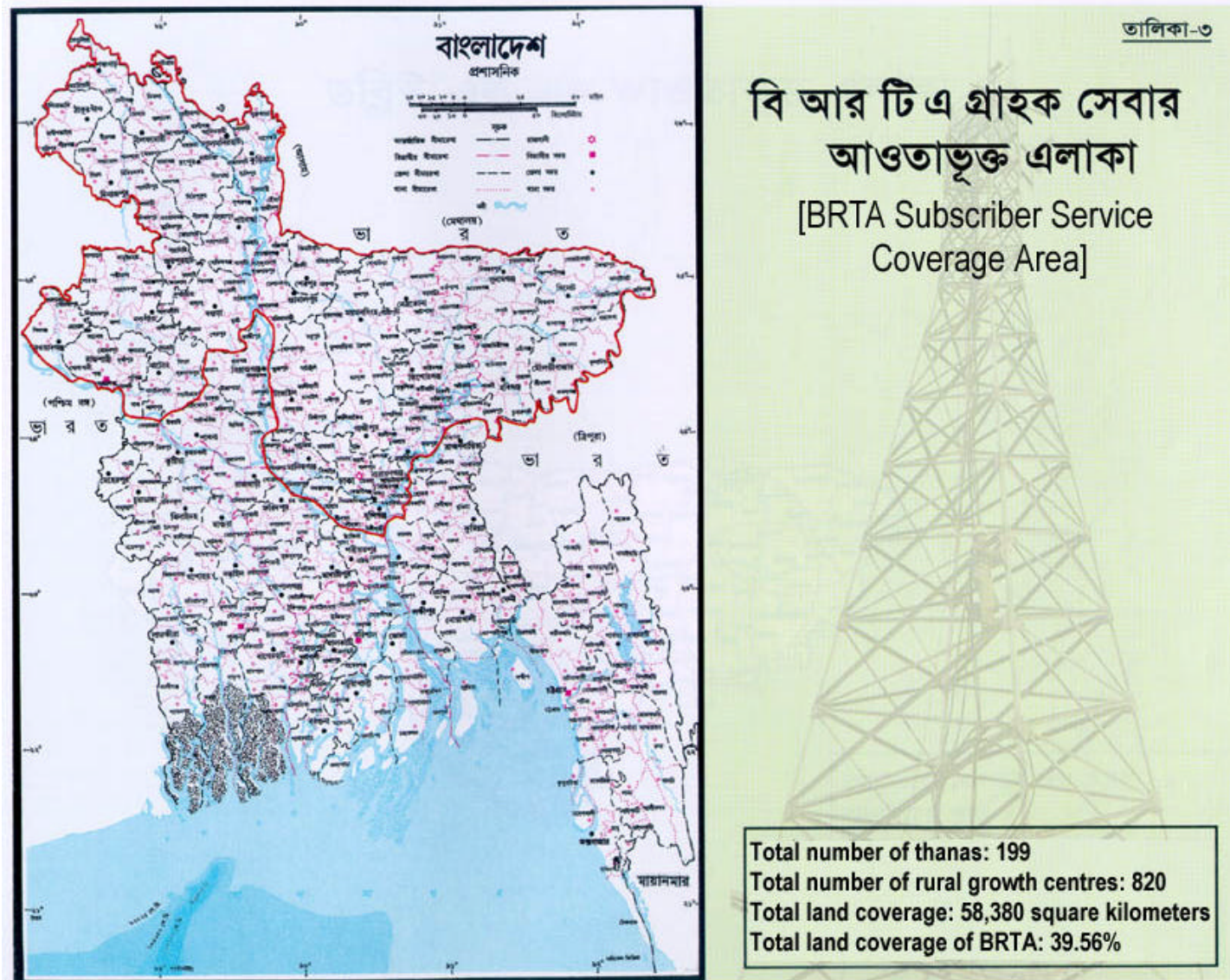


Figure C.2: Bangladesh Rural Telephone Authority: Towers Located in BRTA Coverage Areas

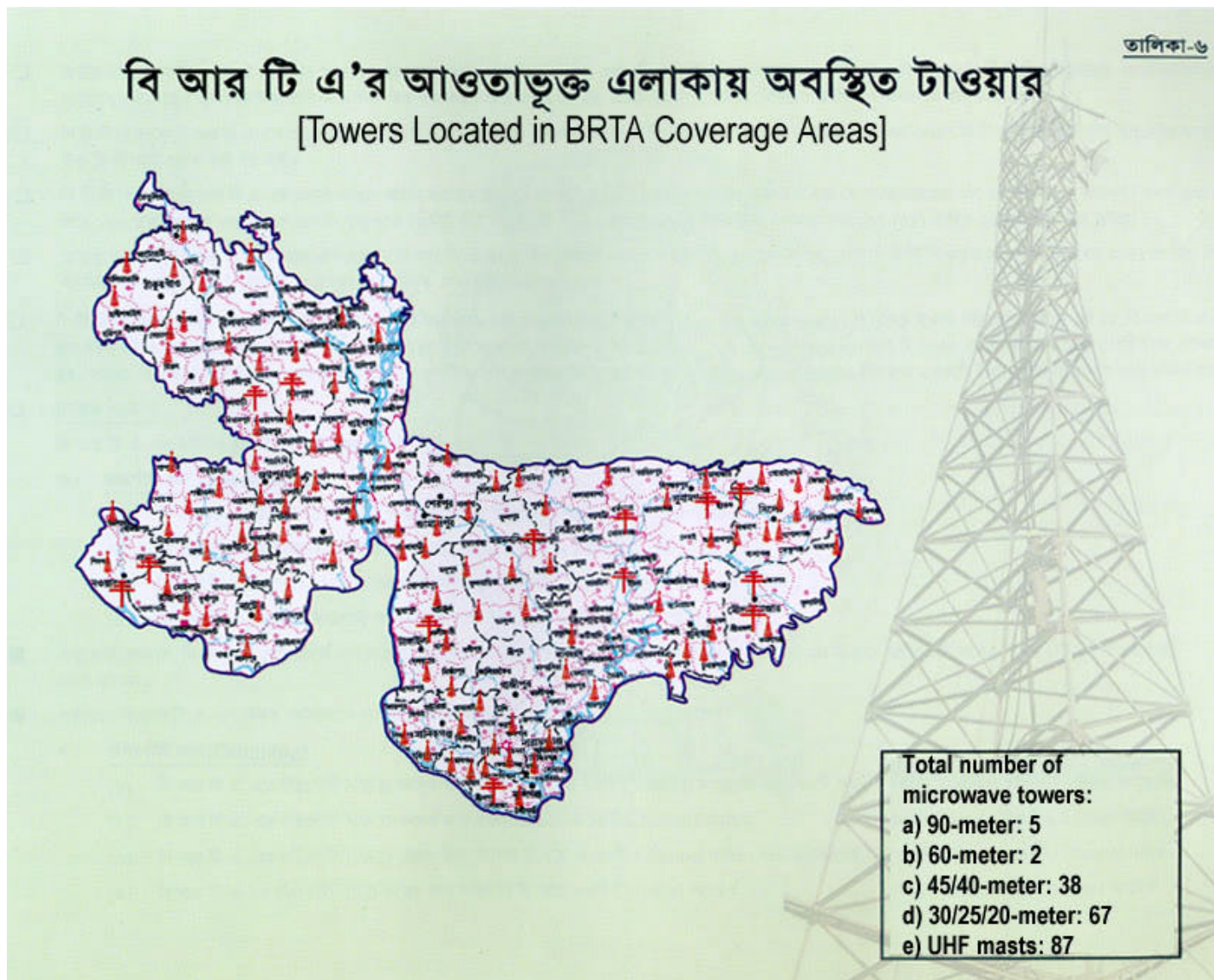


Figure C.3: Bangladesh Rural Telephone Authority: Microwave routes/links under BRTA Coverage

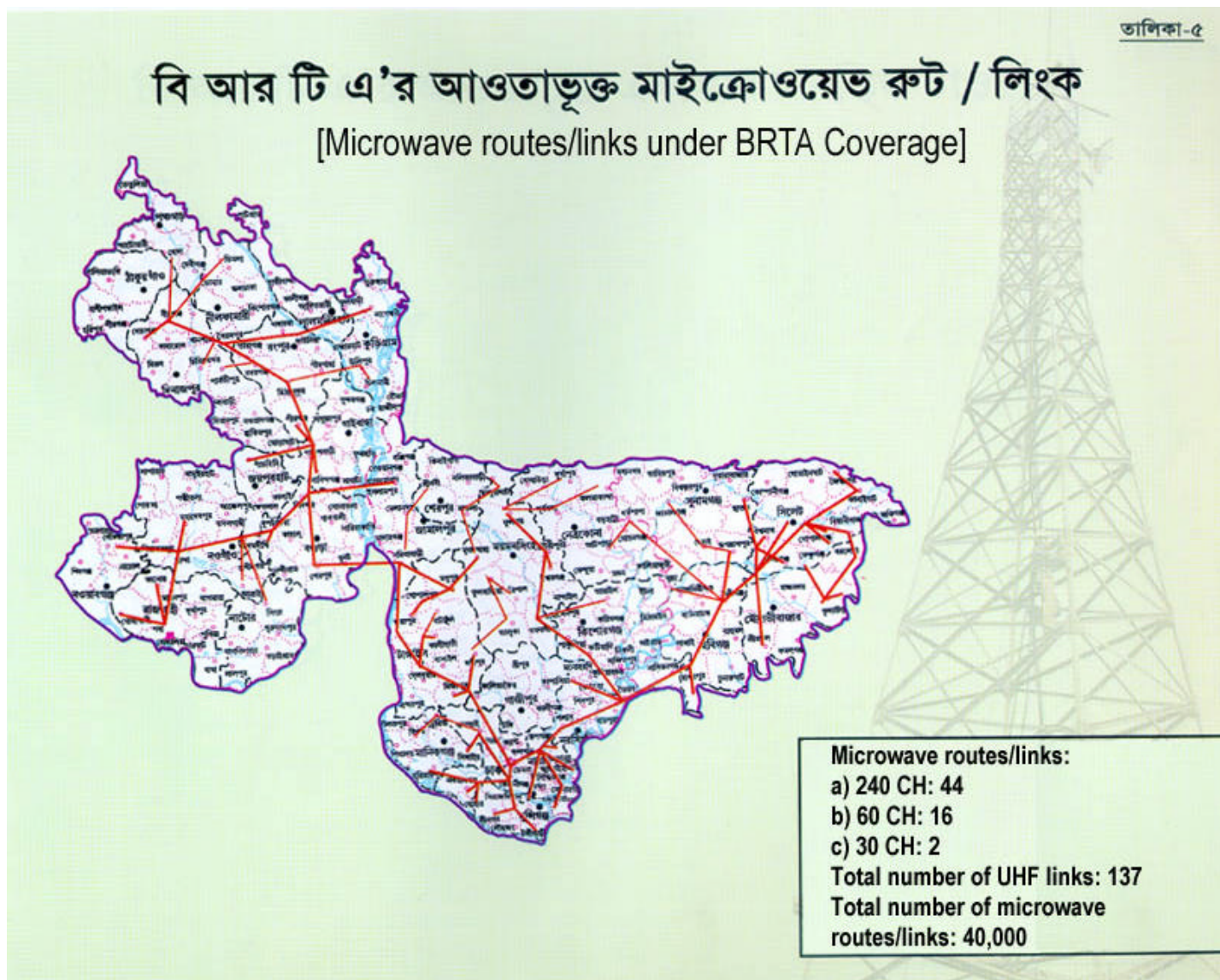
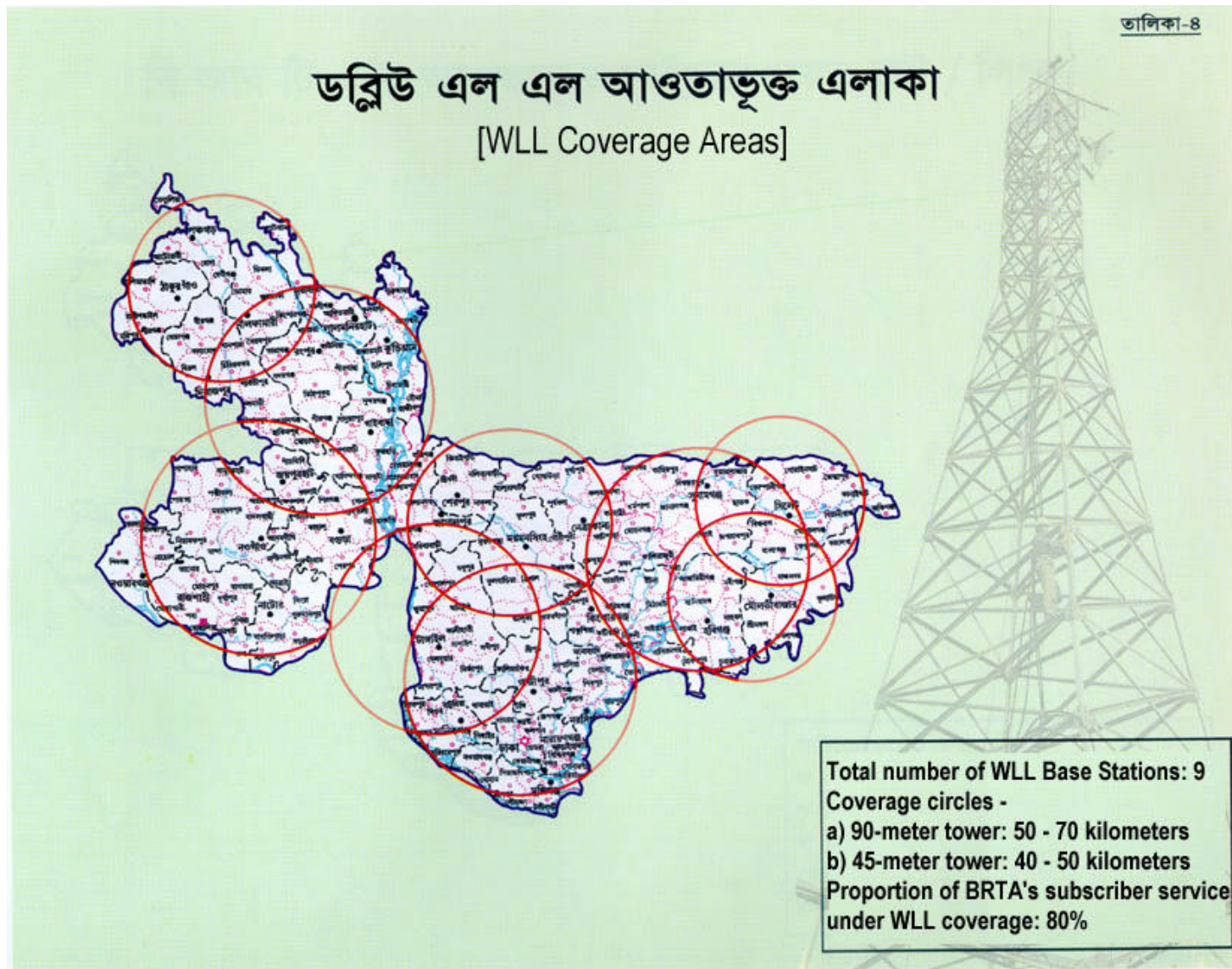


Figure C.4: Bangladesh Rural Telephone Authority: Wireless Local Loop Coverage Areas



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A.3 Related Materials

News Clippings and Related Documents

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A.4 Web sites

Grameen Bank Web sites

Grameen Bank

<http://www.grameen.org> or <http://www.grameen.com>

Grameen Cybernet Ltd.

<http://www.citechco.net>

GrameenPhone Ltd.

<http://www.grameenphone.com>

Grameen Trust

<http://www.grameen.org/grameen/gtrust>

The People's Fund

<http://www.peoplesfund.org/main.html>

First-hand account of the development of the Village Phone concept (by Mr. Iqbal Z. Quadir)

<http://www.devmedia.org/documents/ACF1055%2Ehtm>

Press Releases Referring to GrameenPhone or Grameen Telecom

IFC Invests In Bangladesh's GrameenPhone (July 1999)

http://www.ifc.org/pressroom/Archive/1999/00_02/00_02.html

ADB Helps Finance Nationwide Cellular Telephone System in Bangladesh (January 1998)

<http://www.adb.org/News/1998/nr006-98.asp>

Telenor: GrameenPhone signs long-term international loan agreement

<http://www.telenor.com/display.cfm?m=5&s1=1&file=PressDetail.cfm&id=72>

Micro-credit Web sites

Calmeadow (site includes extensive links to micro-credit organizations around the world)

<http://www.calmeadow.com>

Micro-credit Summit Homepage

<http://www.microcreditsummit.org>

Virtual Library on Micro-credit

<http://www.soc.titech.ac.jp/icm>

Eldis Links on Micro-credit (British Library for Development Studies)

<http://nt1.ids.ac.uk/eldis/mcprofile.htm>

Other Related Links

Canadian International Development Agency (CIDA)
<http://www.acdi-cida.gc.ca>

TeleCommons Development Group
<http://www.telecommons.com>

GSM Info Online – Bangladesh
http://www.gsmworld.com/gsminfo/cou_bd.htm

Bangladesh 2020: A Long-Run Perspective (extensive World Bank publication available online)
<http://wbi0018.worldbank.org/lo+web+sites/bangladesh+web.nsf/0704a4348e105b2e462566720023975f7798edeba2b94b034625670a0022c0e9>

Grameen Phone: Empowering the Poor through Connectivity (excellent December 1999 article)
http://www.cisp.org/imp/december_99/12_99camp.htm

Bikash - A Rural Women's Project in Bangladesh (Novartis Foundation for Sustainable Development)
http://www.foundation.novartis.com/women_bangladesh.htm

Bottle of Promise: What's wrong with wireless local loop?
http://www.teledotcom.com/410/features/tdc410_bottle.html

With and Without Wires
<http://www.teledotcom.com/0198/opinion/tdc0198purchasing.html>

Death of Distance: How the Communication Revolution will Change our Lives
<http://www.deathofdistance.com>

Eldis Links on Gender (British Library for Development Studies)
<http://nt1.ids.ac.uk/eldis/gcountry.htm>

Federal Standard 1037C: Glossary of Telecommunications Terms
<http://glossary.its.blrdoc.gov/fs-1037>

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Tel. 017710005

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A.6 Abbreviations

ADB	-	Asian Development Bank
BR	-	Bangladesh Railway
BRAC	-	Bangladesh Rural Advancement Committee
BRTA	-	Bangladesh Rural Telecom Authority
BTTB	-	Bangladesh Telegraph and Telephone Board
CDC	-	Commonwealth Development Corporation
CDMA	-	Code division multiple access (cellular phone standard)
Erlang	-	A measure of telephone traffic
GB	-	Grameen Bank
GC	-	Grameen Communications
GCN	-	Grameen Cybernet
GP	-	GrameenPhone Ltd.
GNP	-	Gross National Product
GS	-	Grameen Shakti ("Energy")
GSM	-	Global System for Mobile Communications (cell phone standard)
GTC	-	Grameen Telecom
IFC	-	International Finance Corporation
ISD	-	International Straight Dialing
Lac/Lakh	-	Numeric worth 100 thousand taka (expressed as 1,00,000 taka)
MOPT	-	Ministry of Posts and Telecommunications
NWD	-	Nation-Wide Dialing
PCO	-	Public calling office
TDMA	-	Time division multiple access (cellular phone standard)
Telenor AS	-	The state-owned telecommunications company of Norway
VAT	-	Value Added Tax
VP, VPP	-	Village Phone, Village Pay Phone
WLL	-	Wireless local loop

A.7 Telecommunications Glossary

-A-

Access

Sometimes known as "Local Loop", access is the provision of connectivity between the subscriber telephone terminal and the local exchange.

Asymmetric Digital Subscriber Line (ADSL)

ADSL allows very high-speed data movement over regular copper telephone lines. The term is "asymmetric" because the speeds going INTO your house or business are much greater than the speeds sent from you back up the line. Operating in this "unbalanced" way makes sense because the large files requiring a lot of speed and bandwidth are coming TO your computer screen, while all that's being sent back from you is a relatively small amount of data -- the signal you send back down the line when you click your mouse or type on your keyboard.

Amplifier

A device used to increase the strength of electronic signals.

Analogue Transmission

A form of transmitting information characterized by continuously variable quantities as opposed to digital transmission, which is characterised by a series of discrete numbers. All telephone companies support a minimum analogue data speed over phone lines. If your community telephone exchange has "analogue switching equipment", then you do not have access to the new communication technologies. See also "digital" and "modem."

Antenna

The device that concentrates a beam of electromagnetic waves to a focal point so as to send/receive signals.

Aperture

The effective cross-sectional area of the antenna. The larger the aperture, the stronger the signal the antenna receives or transmits.

Asynchronous transfer mode (ATM)

"Asynchronous" is a fancy word for "same." ATM is a switching technology that allows voice, data and video information to be moved over the same (asynchronous) communications network.

-B-

Backbone

The main line that ties networks, phone systems or computers together. It's like the human skeleton, with many small connections (called nodes or terminals), branching off from the backbone.

Bandwidth

A way of measuring how much information flows through a line over a unit of time. Bandwidth can be measured in various ways such as the number of bits transmitted per second (See bit rate). The range of frequencies, expressed in Hz that can pass over a given transmission channel. The bandwidth determines the rate at which information can be transmitted through the medium.

Baud, baud rate

How transmission speed (bandwidth) is measured in the digital world. Bits per second (bps) in a binary (two-state) telecommunications transmission.

Binary

Numbering system having only digits, typically 0 and 1

Bit

The smallest single unit of information (either a 1 or 0 in a binary system).

Bit rate

The speed at which bits are transmitted usually expressed in bits per second (bps).

Bridge

A telecommunications "bridge" is used to connect several telephone circuits (for conference calls) or to link up computer networks

Broadband Channel

A communication channel, such as microwave, coaxial cable, satellite, or fibre optics, that transmits data at rates of megabits (million bits) per second or higher.

Bypass

Establishing communications link without using facilities of the local carrier (PTT).

Byte

In most computer systems, one byte = eight bits. A byte is the memory space needed to store one letter of the alphabet.

- kilobyte (KB) = about a thousand bytes (1,024 bytes)
- megabyte (MB, or "megs") = about a million bytes (1,048,576 bytes)
- gigabytes (GB, or "gigs") = 1,000 megabytes

-C-**C-band**

Refers to the frequency in the 4 GHz to 6 GHz range. It is susceptible to terrestrial microwave interference, which is a particular problem in cities and urban areas of world-wide coverage, and is less susceptible to rain and weather fades, than Ku-band. Typically used for DTH and telecommunications.

Cable

In the world of telephone companies, a cable is one or more insulated wires inside a common protective wrapper. Don't confuse this with coaxial cable, a special form of cable used by cable television firms. Coaxial cable is made up of one or more tubes, each of which has a wire inside (and thus insulated from) other wires around it. This makes it possible to run many more circuits through a coaxial cable using a system called "multiplexing." (See multiplexing)

Capacity

The maximum amount of traffic that a circuit or circuit group can handle.

C-Band

The designation for satellite communications operating at 6 Ghz (billion cycles per second) uplink and 4 Ghz downlink. These frequencies are also used for terrestrial Microwave.

CCITT

International Consultative Committee for Telegraphy and Telephony; a committee established by the International Telecommunication Union.

CDMA

Code Division Multiple Access (CDMA) is a cellular phone standard popular in North America.

Cellular

A mobile telephone system that uses radio waves to provide coverage in certain geographic areas or "cells". These cells are usually adjacent to each other and combine to offer continuous coverage over wide areas such as entire cities or highway corridors.

Central office switching centre

The place where your phone line is linked up with all the other phone lines in your area, and out to the rest of the world.

Channel

An electrical transmission path between two or more stations. Channels may be furnished by wire, radio, fibre or a combination of all three.

Circuit

A physical transmission path between two or more points. (See channel)

Common Carrier

Usually a company that owns a transmission medium and rents, leases or sells portions for a set tariff.

Communications satellite

A device sent up into space used to relay telecommunications signals between two or more points. The main advantage of satellites is the relatively low cost of the earth station equipment needed to link up with satellites compared to stringing wire or fibre optic cable over very long distances.

Connectivity

Capability of exchanging data between telecommunications devices.

Convergence

The mixing together of television, computer, telephone, radio, cable and wireless technologies. Through digital technology voice, image and sound can be reduced to digital "bits" and sent over any kind of access line.

Coverage (Footprint)

The area on earth capable of effectively receiving satellite transmission.

Crossbar

Electro-mechanical exchange system in which connections are made by actuating bars in a crossing matrix.

-D-

DCE

A device that establishes, maintains, and terminates a session on a network. It may also convert signals for transmission.

Dedicated access line

A direct, permanent connection between a phone or computer and something else outside. For example, a branch office might have a dedicated access line to the company's head office, for phone calls, data, or both.

Demodulation, demodulator

Demodulation converts data back and forth between digital and analogue. A demodulator is the technology that does this. (See modulation, modem.)

Digital

The form of electronic processing and transmission in which all information, including analogue waveforms and control data, is converted to binary format.

Digital compression

Techniques used to compress digital signals to allow transmission within a much smaller bandwidth.

Digital Signal

A electrical signal carrying information by means of variations in its duration and amplitude.

Digital switched network (DSN)

A high-speed digital switched public network which allows access to a wide range of services such as telecommuting, videoconferencing, telemedicine, distance education and criminal identification at prevailing long distance rates and discounts. (See also Integrated Services Digital Network, or ISDN)

Digital transmission

A system for sending information over access lines where sound waves and other information are transmitted in a series of on and off pulses, or beeps. This type of transmission is sharper, clearer and quieter than analogue transmission. (See analogue)

Digitize

The way to convert analogue signals to digital form.

Double Hop

Information that is passed from terminal to terminal in two stages - from terminal to hub to terminal, via a satellite link. (Terminals in a star configuration can communicate with each other only in this manner).

Downlink

The retransmission of a signal from a satellite transponder down to the earth stations.

Duplex Transmission

Simultaneous two-way (transmit and receive) independent transmission.

-E-

Earth station

The antennas, receivers, transmitters and other equipment needed on the ground to transmit and receive satellite communications signals.

EDS

Electronic Data Systems.

Erlang

Standard measure of telecommunications traffic.

Encoding/Decoding

The process of organising information into a format suitable for transmission, and then reconverting it upon reception.

Exchange

A basic unit for the administration of telephone service, which generally includes everyone in one town plus adjacent areas. There can be more than one exchange within a larger town or city. The territory served by an exchange, within which local rates apply, is known as the **exchange area** or **local service area**.

-F-

Fibre Optics

Glass strands through which light transmits telecommunications signals.

Fibre optics transmission system (FOTS)

A system which uses glass fibres the size of human hairs through which light is transmitted. By changing the patterns of light sent through the lines, information is transmitted. These

signals are read by light-sensitive devices. Fibre optics generally allow for a much greater speed and bandwidth than transmitting over regular wires, microwave or satellite.

Final mile

Communications systems required to get from the earth station to the point at which the information or program is to be received and used.

First Mile of Connectivity – phrase that reverses traditional thinking that sees rural areas as being at the “last mile” of telecommunication connectivity.

Footprint

The geographical area covered by a particular satellite. See coverage.

Frame relay

A high-speed data service.

Frequency

The number of times a complete electromagnetic wave cycle occurs in a fixed unit of time, usually one second.

Frequency Modulation

Technique by which a radio wave's frequency is varied (modulated) so it can carry a signal.

-G-**Gateway**

Device that interconnects networks running incompatible communication protocols. It translates one set of protocols to another.

General Tariff

The official published rates and rules provided by a telecommunications common carrier.

Geostationary (Geosynchronous) orbit

A method of keeping a satellite parked over the same spot on earth all the time. The satellite is put into an orbit so it travels around the earth at the same speed as the earth is turning on its axis. From earth, the satellite thus appears to be parked.

Most communications satellites are in an orbit 22,300 miles (35,800 Km) over the equator. The main uses of GEO satellites are: signal relays for broadcast, cable and direct TV; meteorology; intelligence operations; mobile maritime telephony.

GSM

Global System for Mobile Communication (GSM) is a cellular telephone standard created in Scandinavia in 1992 (www.gsmworld.com)

-H-**Hardware**

Electrical and mechanical equipment used in telecommunications and computer systems.

HDTV

High density TV. A new standard designed to replace the NTSC (National Television Standards Committee) standard by the year 2005.

High gain antenna

An antenna that improves the efficiency of signal reception, a high gain antenna is commonly used to improve signal reception in areas at the fringes of the electro-magnetic waves transmitted from a wireless tower.

High speed

Refers to data communications systems operating at speeds above 9,600 bits per second. (See low speed; medium speed)

Hub

The master Earth station in the VSAT network.

Hertz (Hz)

The basic measure of frequency with which an electromagnetic wave completes a full cycle from its positive to its negative pole and back again. Each unit is equal to one cycle per second. KHz, MHz, GHz (1 thousand, 1 million and 1 billion cycles per second respectively).

-|-

IDN

Integrated Digital Network: exchange and inter-exchange network configuration in which all plant in path of a call is digital and digital technical processes are integrated end-to-end.

Integrated Services Digital Network (ISDN)

A telecommunications service that links you directly to the telephone company's digital network. With ISDN, your access line is fully digital. In other words, ISDN provides a completely digital link making possible the simultaneous, high-speed transmission of voice, data, still image and video signals over a single telephone line.

Interface

Devices that operate at a common boundary of adjacent components or systems and that enable these components or systems to interchange information.

International Telecommunications Union (ITU)

An organisation set up to promote world-wide standards and the development of linked networks throughout the world. Without the ITU, it would not be possible to make phone calls between continents. (www.itu.org)

Intertoll trunk

A line linking the switching offices of different telephone exchanges used to route long distance calls.

-K-

Ka-band

Refers to the frequency in the 20-30 GHz range. The Ka-band will allow the use of terminals with even smaller antennas than Ku-band. Spectrum availability is also significant. Ka-band satellites will operate like a telephone network, supporting broadband and narrowband applications.

Kbps

Kilobits per second. Refers to transmission speed of 1000 bits per second. (See byte)

Ku-band

Refers to the frequency in the 12 GHz to 14 GHz range. Can support data, video, and voice with smaller dishes than G-band. More susceptible than G-band to problems arising from atmospheric conditions such as rain fade, but less susceptible to terrestrial microwave interference. Typically used for DBS (Direct Broadcast Satellite) TV, but increasingly for high-bandwidth Internet and data services.

-L-

LAN (see Local area network)

L-band

The frequency range between 0.39-1.55 GHz, also known as the 1.5GHz band. Typically used for Digital Audio Broadcasting (DAB).

Leased line

A telecommunications channel leased between two or more points at a flat monthly rate. Also called dedicated or private line

Line

A communications channel. Also called a circuit, trunk or facility. It often refers to access to the public switched telephone network (e.g., residence line, individual business line).

Local area network (LAN)

A way of connecting several computers together that are located close to each other, either in the same room or building, so that they can share files through a server and share devices like printers and copiers.

Local exchange carrier

Your local telephone company -- the one that provides you with access lines.

Local loop

A line connecting you to your local phone company's central office/switching centre.

Local Multipoint Communication Systems (LMCS)

A wireless service capable of carrying basic and advanced communication services such as "wireless" cable TV, high speed Internet access, video conferencing and various other multimedia programming. Present LMCS technology operates within a 4-5 km radius but relay points can be set up to cover wider areas. In an LMCS community, homes and businesses send and receive the signals through small, unobtrusive antennae plus the associated electronics that are about the size of a shoebox.

Low Earth Orbit (LEO)

Satellites in an orbit 100 to 1,000 miles above the earth. LEO Satellites are used mainly for communications, spying and remote sensing. The smallest LEOs are used mostly for data communication. Big LEOs carry the world-wide mobile phone network. Broadband LEOs offer high-speed, high-bandwidth data communications such as videoconferencing.

-M-

Microterminal

Another name for VSAT.

Middle Earth Orbit

Satellites at an orbit of 1,000 to 22,300 miles, used mainly for GPS (Global Positioning System) types of surface-navigation systems. MEO will soon host four new constellations of voice and data satellites.

Microwave transmission system

A high-capacity transmission system that sends information using high-frequency radio signals called microwaves. Originally, microwave systems offered only analogue transmission. Today, microwave systems are commonly digital.

Modem

Computers generate data in digital form. To send this digital stuff over an analogue phone line, the data has to be converted. A modem does this. Literally, "mo-dem" is a contracted form of the words "modulate-demodulate" because it is converting (modulating) data back and forth between analogue and digital formats.

Multiplexing

Techniques that allow a number of simultaneous transmissions over a single circuit so as to accommodate multiple users or uses.

Multipoint

A line or channel connecting more than two specific service points.

Multimedia

Technology that employs several types of media such as video, audio or data, or several different media components such as videotape and laser disk players, computers or video cameras, in a single presentation.

-N-

Network

Circuit over which computers or other devices may be connected with one another.

NTSC

National Television Standard Committee: TV transmission standard used in America and parts of Asia.

-O-

Optical fibre

See fibre optics

-P-

PBX

A private telephone switch that establishes voice-grade circuits over tie-lines between individual users and the switched telephone network.

PCO

Public Call(ing) Office: a commercial location for making telephone calls. PCOs are very common in developing countries where few people own private telephone lines.

Packet

A group of digital bits put together in a bundle or *packet* to make transmission faster. One little packet includes not only your data (such as what you type on your computer screen) but also control information such as a source and destination address and an identification number.

Packet Switching

Technique where bit grouped packets are specifically routed to their destinations based on the availability of transmission paths.

Personal communications services (PCS) or personal digital phones

This is a wireless technology, which offers an alternative to cellular phones. The digital phones are small (about the size of a pack of cigarettes) and offer many of the features that regular wired telephones users enjoy such as call display, call forward, E-mail, faxing etc.

Point-to-Multipoint (PMP)

A type of subscriber radio system in which a number of outlying localities within line-of-sight of a single station or repeater can be connected into the telephone network at one central point. The central station is usually co-located or directly connected with the exchange and thus provides the technical network interface between the remote subscribers and the telephone exchange service. This system is commonly used in rural areas to connect widely dispersed subscribers into the network.

Pots

Jargon for “plain old telephone service.”

Protocol

A formal set of conventions governing how communication systems can talk to each other.

Publicly switched telephone network (PSTN)

The world-wide dial-up telephone network or a portion of that network. Whatever system you own should be linked somehow to the PSTN so you can make long distance phone calls, or go on the Internet.

Pulse Code Modulation (PCM)

A Common form of encoding and transmission in which analogue speech signals are converted to digital format for the purpose of multiplexing and transmission over distance. PCM is commonly used in multi-circuit inter-exchange trunk system, or “subscriber carrier” systems in which a number of telephone subscribers along a route are served from the same cable.

-R-

RAN

Rural Area Network

Router

A specialised switching device to link geographically separated local area networks and computer systems.

Remote Switching Unit (RSU)

An extension of a larger digital telephone exchange, in which a number of telephone lines (in groups of up to 256) can be located remotely from the main exchange and connected via a transmission system.

RTB

Rural Telephone Bank

-S-

Satellite

An orbiting system in space that receives radio Communications signals from earth stations on earth and then retransmits them to earth stations at distant locations.

Signal

The combination of waves that travel along a transmission channel and act on the receiving unit.

Softside of Telecommunications

There's more to telecommunications than satellites, computers and telephones. As communities gain access to new information and communication technologies, it is important that they are trained to use, operate and manage the systems. It is equally important that

ICTs are applied to the benefit of the community – for education, economic development, telemedicine, human rights, etc. Programs that support the human side of telecommunications are sometimes referred to as the softside of telecommunications.

Spectrum Coordination

Coordination of the frequencies utilised by various users so as not to interfere with each other.

Strowger

Early automatic telephone switching system using selectors which rotate directly under dial or other pulses.

-T-

T1 Carrier

A time division multiplexing system for carrying digital voice and data at approximately 1.544 Mbps.

TDMA

Time Division Multiple Access is a cellular telephone standard popular in North America.

Telecentre

Also known as Multimedia Centre, Public Calling Centre (see PCO), or Community Access Centre. A public location where people can access communication tools. An evolving phenomenon.

Telecommunications

The transmission or reception of signs, signals, images, sound or intelligence of any kind over wires, by radio waves, or other technical system.

Telecommuting

Use of computer and telecommunications to enable people to work at home.

Teledensity

The number of telephones or telephone lines per 100 population.

Teledesic

Teledesic is preparing to launch a global, broadband "Internet-in-the-Sky." A constellation of 288 low-Earth-orbit satellites are expected to provide affordable, world-wide, "fibre-like" access to telecommunications services such as broadband Internet access, videoconferencing, high-quality voice and other digital data needs - everywhere on the planet. (www.teledesic.com)

Telephone

A device often taken for granted if you have easy access to the use of one. Used mostly for voice communications. A telephone takes sound and converts it into electrical waves, which can then be sent over communications channels.

Throughput

The aggregate user data carried by the channel during a specified time period. Expressed in bps or packets per second.

Tollcarriers

Companies that provide long distance services.

Transmission system

What you need to move information from one location to another. This could be copper wire, fibre optic lines, or radio waves.

Transponder

An electronic device on a satellite used to boost or amplify signals before sending them back to earth. The transponder receives an uplink signal at one frequency, converts its frequency, amplifies it, and retransmits it to the ground. Satellites generally have 10 - 40 transponders.

Trunk

Transmission path and main network cable that serves as a common artery between switching units, central offices or data-concentration devices.

-U-

Universal Intelligent Communication Network (UICN)

Future concept of telecommunications network wholly controlled by artificial intelligence.

Uplink

The transmission of signals from an earth station to a satellite.

-V-

VSAT

Very Small Aperture Terminal. An earth station with a small antenna of usually 0.9-1.8 metre (3 - 6 foot) diameter. Typically used in point-to-multipoint data networks.

Voice Coder

Modulator that translates the analogue (voice) signal into a digital signal.

Voice Mail

A voice messaging system in which spoken messages are recorded for later play back or transfer to others.

-W-

Wide area network (WAN)

A network which links computer systems together over a wide area, such as between different towns or provinces. Similar in purpose to LANs (local area networks) which allow files to be shared and data transferred over shorter distances

Wired telephone service

Basic telephone service using wires. This wireline is often called the "local loop" or "twisted pair."

Wireless communication

Sending signals without a physical connection using technologies such as cordless telephones, cellular telephones or microwaves.

Wireless Local Loop (WLL)

Systems that use wireless technology (radio) to connect subscribers to the local telephone exchange. The vast majority of the world's exchange service customers are connected via dedicated copper wire. WLL is a cost-effective solution in developing countries where meeting basic service demand through build-out of the wire network would take much longer to achieve.

A.8 TDG rural research methodology

In order to gain an accurate understanding of telephone usage by Grameen Bank borrower members at the village level in Bangladesh, an in-depth research mission was carried out in October-November 1999. The TeleCommons Development Group (www.telecommons.com), a Canadian-based consulting firm, organized and carried out this work in partnership with a local field research team composed of recent or imminent university graduates. A highly qualified Bangladeshi research team leader was hired to execute the field research after a period of orientation and training for the entire team.

Fieldwork involved secondary data collection in rural villages; interviews with key informants from Grameen Bank, Grameen Telecom, GrameenPhone, BRTA and Sheba Telecom; in-depth discussions and review of the existing research conducted by Professor Abdul Bayes of Jahangirnagar University; selection of villages to be surveyed with input from Mr. Sharif Uddin (Nazmul) Senior Manager of Grameen Telecom; 300 one-on-one interviews with VP operators and local Grameen Bank borrower members; village focus group meetings, and video and digital photo documentation.



Local Bangladesh team responsible for implementing TDG's rural research methodology

Survey Period. A detailed survey questionnaire was refined and pre-tested during five rural village field visits from 30 September 1999 to 13 October 1999. Survey implementation began on 14 October 1999 and was completed on 23 November 1999. Survey pre-testing was combined with researcher training and a team collaboration and input for developing the research approach.

Data gathered. The survey data is meant to supplement information gathered by the Professor Abdul Bayes (1999) research on Village Phones undertaken in 1998. Questionnaire elements included:

- Basic demographic variables such as gender, age, marital status, education, occupation, together with information on household income, household wealth and remittances from family members working overseas
- Household use of telephone by gender
- Current telephone calling and receiving patterns, including expenditures, length, destination, and purpose of calls.
- Ability and willingness to pay for telephone calls based on relative importance of calls

- Respondents' recommendations for improving telephone use

Survey sample size and population chosen. The population chosen for the survey research consists of all Grameen Bank members in Bangladesh. We considered random sampling of villagers; however, we do not believe that we would have been able to obtain a representative sample. We also believe that there may be some future value in our choice because this population represents a group that attracts significant research attention, thus inviting comparisons of research on their telecommunication habits and other aspects of their lives. This population also presented us with the significant logistical support of Grameen Bank branch managers who helped us in locating sites for interviews and support of Village Phone operators who could be called in advance so that they could help us to coordinate timing for interview visits and announcements directed toward Grameen Bank members within a village. Finally, we make the assumption, supported by the existing research on Grameen Bank members, that they tend, as a group, to be poorer than the average villager. Thus, in focusing on the role of the Village Phone in poverty alleviation, as a rural development tool, and as a tool for women's empowerment, surveying Grameen Bank members enables us to look at a specific population that is, in a sense, a research beacon for these issues.

Research instruments. Extensive pre-testing (see below) of survey instruments took place in order to ensure accurate findings from personal interviews and community focus group meetings. Pre-testing coincided with orientation and training of the research team. After each of five village pre-test and training visits, the entire team would de-brief and make note of changes needed in survey instruments, focus group facilitation, videotape process and the overall field visit schedule and process.

Focus groups. In this project, focus groups were used to draw out anecdotes and stories from villagers about how the telephone has brought improvements to their lives. Most often, these groups consisted of female Grameen Bank borrowers. Meetings were facilitated by a female interviewer in order to encourage more input from the women. Focus group facilitators kept track of the most interesting stories, and the team would take individual focus group members aside to have them tell their stories on videotape.

**Women's focus group meeting
being held in local home**



Survey team. The survey interview team (please see Appendix A.5) consisted of two male and two female interviewers. One of the female research team members had also

conducted survey interviews the previous year for the Bayes et.al. (1999) study of Village Phones. All members of the team have experience in conducting research in rural areas and the team videographer is experienced in video documentary production related to rural development projects. The research team leader, Moin Haq, is superbly qualified and an excellent qualitative and quantitative researcher.

Survey Questionnaire Pre-testing. The TeleCommons Development Group's experiences with survey research questionnaires and research processes in rural areas of developing countries have shown the importance of methodical pre-testing of survey instruments. In the case of the Village Phone Survey Questionnaire, the instrument was refined through the following steps:

- September 30 to October 1, 1999 - Original questionnaire (based on TeleCommons Development Group surveys elsewhere) reviewed and revised with Research Team Leader and staff of Grameen Telecom in Dhaka
- October 2 - Pre-testing of questionnaire in two representative VP villages (Comilla area, Comilla thana) in conjunction with training of survey research team
- October 4 & 5 - Review and revision of questionnaire in Dhaka with survey research team and members of Grameen Telecom to create a second draft
- October 6 - Second pre-testing of questionnaire in an additional two representative VP villages (Nalabdi & Mogradpara villages, Sonargaon thana, Narayanganj district)
- October 7 & 8 - Review and revision of questionnaire with survey research team and members of Grameen Telecom to create a third draft
- October 9 - Third pre-testing of questionnaire in an additional two representative VP villages (Kortatal & Palashbagpara villages, Palash thana, Narsingdhi district)
- October 10 - Review and revision of questionnaire with survey research team and members of Grameen Telecom to create a fourth draft
- October 11 & 12 - Fourth pre-testing of questionnaire in a non-VP rural area (Modhupur, Tangail thana), and an additional two VP villages (Hemayetpur and Panpar villages, Savar thana, Dhaka district)
- October 13 - Final review and revision of questionnaire with survey research team and members of Grameen Telecom to create final version

Limitations of the Survey Research Data

- Sampling was purposive and not random, thus limiting generalizability.
- Sample size (n=300) does not permit robust statistical analysis, so we are limited to descriptive statistics and discussion of obvious correlations.
- Villages were chosen in coordination with Grameen Telecom staff and Grameen Bank staff, which may bias the sample.
- Sample is limited to the regions covered by GrameenPhone wireless signals as of October 1999.
- Of the 300 people surveyed, 8 were not Grameen Bank members and were removed from the database; however, status as Grameen Bank members is based on self-reporting and we did not attempt to verify this by reviewing registration cards or Grameen Bank databases. Thus, there is a possibility that some people surveyed and included in the database are not Grameen Bank members.

- The population chosen consisted of Grameen Bank members because we believed that this population would be representative of relatively poor rural villagers and because our data can be compared to a large body of existing research on Grameen Bank members, as well as future research results from this population. However, studying only Grameen Bank members does not make it possible to generalize the findings to all rural Bangladeshi villagers, nor does it make it possible to generalize the findings to men since the sample is made up primarily of women.
- The villages surveyed only represent villages in the south of Bangladesh. The findings are not definitely not generalizable to Grameen Bank members villages in the north where contexts are quite different.
- Comparisons to the Bayes et al. (1999) study are difficult for several reasons: 1) population - we use Grameen Bank members; the Bayes report uses "villagers"; 2) the Bayes report does not present us a sort of survey instrument, so survey questions could be quite different in nature between the two studies; 3) Bayes studied the Village Phone programme at a very early stage of its development when phones were distributed in the area immediately surrounding Dhaka. Thus, the Bayes data is limited to understandings of Village Phone use in that geographical area. Our study expanded to reach places quite distant from Dhaka where phones had more recently been provided.

A.9 The Grameen Bank Family of Organizations²¹

Grameen Bank (www.grameen.com or www.grameen.org)

The Grameen Bank (GB) concept was developed in 1976 by Professor Mohammad Yunus, creating a banking system based on mutual trust, accountability, participation and creativity (Grameen means “village” in Bangla). GB provides credit to the poorest of the poor in rural Bangladesh without any collateral and boasts a loan repayment rate of 96-100%. Grameen's approach is widely acknowledged as effective in reducing poverty, and its micro-credit model has been applied in more than 50 countries around the world.

Grameen Bank undertakes a strategy of sectoral interventions (eg.in fisheries, textiles, telecommunications and other sectors) in order to address the poverty issue in Bangladesh more effectively and create opportunities for the poor to access resources. This strategy has given GB the scope to explore the country's resource potential with the aim to meaningfully involve poor people directly or indirectly as the ultimate beneficiaries. The Grameen family of organizations exhibit a great deal of dynamism and a quick pace of change. We were keen to learn about the extent of complementarity among the organizations, coupled with a large degree of autonomy between them. What holds them together is the Grameen Bank commitment to tackling poverty alleviation by combining micro-credit with other technologies and productive opportunities.

The following table provides a summary of GB's extensive coverage:

Table: May 1999 Grameen Bank Figures²²

Item	Nos.	Item	Million (Taka)	Million (US\$)
Number of Branches	1,140	Cumulative amount disbursed	115,375.99	2,801.92
Number of Villages	39,346	Amount disbursed during this month	1,501.00	30.95
Number of Centers	67,174	Cumulative amount of Housing Loans disbursed	7,383.95	184.33
Number of Members	2,370,130	Housing Loans disbursed during this month	29.79	0.61
Female	2,246,340	Cumulative amount of savings in Group Fund	8,644.85	209.04
Male	123,790			
Cumulative number of houses built with GB housing loans	506,680	Balance of total savings (excluding Group Fund)	905.04	18.66

Grameen Trust (www.grameen.org/grameen/gtrust)

As a result of the success of Grameen Bank in reaching and serving the poor with credit, many people and organizations have begun to use Grameen's principles in their own work. This has created a great deal of demand for training and technical assistance from Grameen and in some cases for financial support to start Grameen-style programmes. It is primarily to meet this demand that the Grameen Trust (GT) came into being in 1989 as a private, non-profit, non-governmental organization.

²¹ SOURCE: Grameen Bank website

²² SOURCE: Grameen Dialogue, July 1999

Grameen Fund

Grameen Fund is the venture-capital arm of Grameen Bank's family of enterprises dedicated to poverty alleviation in Bangladesh. Its emphasis is on providing finance to ventures that are risky, technology-oriented and otherwise deprived of financing from existing formal lending institutions. Grameen Fund started operations in February 1994.

Grameen Krishi Foundation

In 1991, the Grameen Krishi Foundation (GKF) was established to continue and expand upon the work which began in 1988 as Grameen Bank's Rangpur-Dinajpur Deep Tubewell Project. GKF works with farmers in northern Bangladesh and Tangail District to improve irrigation facilities, cultivation activities, seed production and other services that benefit farmers' lives. Support includes credit, dairy/poultry, fish production, technology transfer, women's development, and marketing programs.

Grameen Uddog

Grameen Bank has set up a not-for-profit company named Grameen Uddog ("Rural Initiative") to assist poor textile workers in Bangladesh. The primary objective of the company is to revive the handloom industry by marketing handwoven fabrics at the international level. Grameen Uddog supplies weavers with raw materials like yarn and dyes, enabling the weavers to fill orders from home and abroad according to international standards. Grameen Uddog has field officers located in rural villages to ensure quality and provide assistance to local weavers.

Grameen Motsho Foundation

Grameen Motsho ("Fisheries") Foundation (GMF) was established in February 1994 and focuses on interventions in the fishery industry in order to create opportunities for the poor. Activities include undertaking production, transportation, storage, and marketing of fish to bring improvement to the quality of life for the poor, and planning, organizing and operating fisheries and fishery-based enterprises which help to promote employment, income generation, professional and management skills.

Grameen Kalyan

Grameen Kalyan ("Rural Welfare") was registered with the Registrar of the Joint Stock Companies in November 1996. The objective of the company is to provide financial support in the form of loans and grants to the staff and members of Grameen Bank and their families. These funds will promote improved health services and centres, education and training facilities, new and appropriate technologies and other useful services that will help to alleviate poverty for Grameen Bank members and staff.

Grameen Shamogree

Grameen Shamogree ("Rural Products") was registered in January 1996. Its purpose is to market Bangladeshi products throughout the country and around the world, especially in labour-intensive industries (hand-loom, cottage industries, agricultural products). Various enterprises have been undertaken as a part of Grameen Shamogree, including a printing and packaging industry, a cold storage and two display sales centers for marketing fabric, garments, handicrafts, etc.

Grameen Telecom and GrameenPhone (www.grameenphone.com)

Grameen Telecom (GTC) is a non-profit organization that owns 35% of the shares of GrameenPhone Ltd. (GP), a private sector, urban cellular telephone company that was

awarded a nation-wide cellular license in November 1996. GTC buys airtime in bulk from GrameenPhone and passes on most of the savings to its Village Phone (VP) operators, making use of Grameen Bank's extensive network (1,140 branches spread over 39,346 villages) and its loan collection system to collect revenue from the VP operators. GTC is using GSM (Global System for Mobile Communication) cellular telephone technology at the village level, taking advantage of the GP-installed urban capacity. GP leases and operates a 1,800km-long optical fibre cable from Bangladesh Railroad, effectively providing a parallel nation-wide network to the one operated by the state monopoly BTTB (Bangladesh Telegraph and Telephone Board).

Eventually, GTC will become the major shareholder of GrameenPhone, making the Grameen Bank members themselves the owners of GP.

Grameen Shakti

Grameen Shakti (GS) is a not-for-profit rural power company whose purpose is to supply renewable energy to unelectrified villages in Bangladesh. GS expects not only to provide renewable energy services, but also to create employment and income-generation opportunities in rural Bangladesh. GS will focus on supply, marketing, sales, testing and development of renewable energy systems of solar PV, biogas, and wind turbines.

Grameen Cybernet Ltd. (www.citechco.net)

Grameen Cybernet Ltd. commenced operation in July 1996 and is currently the largest Internet Service Provider in Bangladesh²³. It is a joint venture between Grameen Fund and CITech Ltd., a well-known private computer and information technology distributor. The company boasts over 6000 clients in various sectors, offering dial-up Internet access, technical support, web consulting and a help desk.

Grameen Communications

Grameen Communications is a not-for-profit company that aims to increase awareness and promote the use of information on the Internet for improving education, research, social welfare, health and sanitation in Bangladesh. To do this, Grameen Communications organizes regular seminars, workshops, training programmes and projects utilizing the Internet both at the premises of Grameen Communications and at client sites. Educational, research, social, non-government and government institutes are able to exchange academic, statistical and research information among themselves in large volume at affordable prices.

A pilot Village Computer and Internet Programme was launched on 1 June 1999 in Madhupur village, Tangail district by Grameen Communications. This project is meant in part to provide low-cost computer training to villagers in order to improve their skills and opportunities for jobs. Grameen Communications rents one room from the Grameen Bank branch and has equipped it with several computers, a modem and a dial-up Internet connection using a BRTA phone line. Visitors are able to send electronic mail messages to relatives overseas for a moderate price of 15 Taka per page of text and 8 Taka per page for receiving email printouts. If any image needs to be scanned and then sent through email, they charge 15 Taka per minute for sending the image. Using a scanner, customers may send original hand-written letters or documents, and a digital camera is available to send photographs.

²³ Other large NGOs have also established similar services, such as Proshika.net.

The young team is experimenting with great enthusiasm and a very slow connection to the Internet at less than 2400 baud. In November 1999, a total of 33 email messages were sent through the pilot site, while a total of 27 email messages were received. Farmers are interested in learning more about how the technology may help them to avoid middlemen by connecting directly with buyers and to learn about prices of commodities in Dhaka and other markets. They are now planning to set up a new computer laboratory, which will be meant mostly for the use of local schools and colleges. Charges for such uses will be settled through negotiation. For this, they are now looking for new premises within Modhupur, where they plan to shift their present facilities. Along similar lines of their pilot project, Grameen Communications is now thinking of setting up such facilities at two new locations, most probably in Jamalpur and Comilla districts. This is a beginning, and a very significant one! Grameen Communications is trying to improvise new, cost-effective services within the constraints of a very basic telephone infrastructure. Grameen Telecom is considering partnering with Grameen Communications in order to create more such telecentres throughout rural Bangladesh.

A.10 Investors in GrameenPhone and Hardware Providers

GrameenPhone is a public limited company incorporated in 1996. The following is a brief description of the GrameenPhone shareholders:

Telenor AS (www.telenor.com) is the telephone operating company of Norway and it owns 51% of GrameenPhone Ltd. Telenor has helped to lead the development of cellular technologies across Europe and is using its extensive experience to invest in Bangladesh's emerging market.

Grameen Telecom (www.grameen.com/grameen/gtelecom) is a non-profit organization which holds 35% of GrameenPhone's shares. Grameen Telecom uses the existing Grameen Bank network to facilitate Village Phone services in rural areas throughout Bangladesh, providing a new source of income for villagers and allowing easy access to telephones.

Marubeni Corp. (www.marubeni.co.jp) is one of Japan's leading companies involved in international trade, marketing and investment ventures. Marubeni invests world-wide in manufacturing and infrastructure projects, including telecommunications. As a 9.5% shareholder in GrameenPhone, Marubeni aims to improve Bangladesh's overall capacity to contribute to the global economy.

Gonofone Development Corp. (4.5%) is the New York-based company responsible for the concept of what is now GrameenPhone. Gonofone was incorporated in 1994 to develop telecommunications projects internationally.

In addition, GrameenPhone received a \$50 million loan from three leading international financial institutions in order to become established: the International Finance Corporation (IFC), the Asian Development Bank (ADB) and the Commonwealth Development Corporation (CDC). These organizations each hold three per cent of GrameenPhone preferred shares. (For more information on these investors, related press releases have been issued by the [IFC](#) and the [ADB](#).)

Hardware providers

The GrameenPhone network uses Global System for Mobile Communications (www.gsmworld.com) cellular and optical fibre transmission technologies. GrameenPhone has leased a 1,800km-long optical fibre transmission system from the Bangladesh Railway (BR). Other hardware providers for the project include:

- **Ericsson, Sweden** (www.ericsson.se): contracted for two system components - a switching centre in Dhaka (turnkey system) and cell site (base station) equipment
- **SEMA, France** (www.sema.fr): sub-contracted by Ericsson to provide a turnkey billing system

- **Telenor Installation, Norway** (www.telenor.com): fee-for-service contract to provide installation services of the cell sites. Telenor Installation will also help design the civil works, as needed ([Telenor press release](#) on GrameenPhone)
- **Siemens, Germany** (www.siemens.com); **NEC, Japan** (www.nec.com) **and others:** suppliers for additional equipment, such as microwave radio equipment, as required.

A.11 Consumer Surplus Calculations

In order to gain an understanding of the true value of a *single* telephone call for Grameen Bank members in terms of consumer surplus, we created a formula for equating the distance of a village from Dhaka with a conservative cost for travel to Dhaka from a village.

The best way to categorize the villages that we surveyed would be the following:

- (1) Villages lying within 25 km of Dhaka city
- (2) Villages lying between 25 to 50 km from Dhaka city
- (3) Villages lying between 50 to 100 km from Dhaka city (that is, villages clustered around Comilla town)
- (4) Villages lying beyond 100 km from Dhaka city (that is, villages clustered around Chittagong city)

The assumptions used to create our formula are as follows:

(a) The average number of hours required for a person to make a return trip to Dhaka city by public bus service and to make the necessary inquiry with a relative or business would be a minimum of 2 hours for category (1), a minimum of 3.5 hours for (2), a minimum of 6 hours for category (3) and a minimum of 16 hours for category (4). Here it is assumed that traffic conditions are normal, when in fact “normal” is more likely a high state of traffic congestion and unpredictable chaos. With “abnormal” traffic conditions, delays of up to an additional 50% (or even more) of the normal expected time have been observed; that is, a journey that normally takes 2 hours might take up to 3 hours in abnormal circumstances. For our purposes, we assume smooth traffic flow. Another point to take note of here is that a person making a round trip from category (4), that is, Chittagong area, to Dhaka will almost inevitably have to stay there overnight.

(b) In Bangladesh, people do not normally calculate labour time in terms of hourly wages - those are calculated only on a daily or monthly basis. The average daily wages or income in all the four categories of villages are normally between Tk. 80 to 120. It must be emphasized that in the context of Bangladesh, loss of even 1 or 2 hours of work, with a few exceptions where adjustments can be made, means the loss of the whole day's wages. We also do not factor in any real or in-kind costs for childcare or replacement labour for food acquisition/preparation. Therefore we conservatively estimate that a trip to Dhaka for one day is worth Tk. 80 for one day's labour value. Thus for categories (1), (2) and (3), we cost each round trip visit to Dhaka as Tk. 80.

(c) For each person, the average return trip fare to Dhaka by public bus service and the estimated transport cost within Dhaka city are around Tk. 70 for category (1), Tk. 90 for category (2), Tk. 140 for category (3), and Tk. 280 for category (4). However, for category (4) people, an overnight stay in Dhaka city is almost inevitable. Roughly 25% of the people are expected to stay at their relatives' houses, while the others must find a hotel room. The cheapest daily hotel room rent per person in Dhaka city is around Tk 50.

(d) The charges for a 3-minute telephone call to Dhaka city are Tk. 18 (Tk 6 x 3) from categories (1) and (2), and Tk. 75 (Tk 25 x 3) from categories (3) and (4).

A Calculations for Category (1) Villages lying within 25 km of Dhaka city

Consumer surplus = Cost of wages + cost of travel – cost of 3 minute call to Dhaka
Consumer surplus as a percentage of monthly household income = Consumer surplus/mean monthly household income

Consumer surplus = 2 hours round trip travel plus time in Dhaka (Tk. 80 wages) + transport cost (Tk. 70) = Tk. 150 – Tk. 18 = Tk. 132 (\$2.70 USD)

Consumer surplus as a percentage of mean monthly *household* income = Tk 132/5000 = 2.64%

Cost of trip is 7.33 times the cost of the phone call (132/18)

B Calculations for Category (2) Villages lying between 25 to 50 km from Dhaka city

Consumer surplus = 3.5 hours round trip travel plus time in Dhaka (Tk. 80 wages) + transport cost (Tk. 90) = Tk. 170 – Tk. 18 = Tk. 152 (\$3.10 USD)

Consumer surplus as a percentage of mean monthly *household* income = Tk 152/5000 = 3%

Cost of trip is 8.44 times the cost of the phone call (152/18)

C Calculations for Category (3) Villages lying between 50 to 100 km from Dhaka city (that is, villages clustered around Comilla town)

Consumer surplus = 6 hours round trip travel plus time in Dhaka (Tk. 80 wages) + transport cost (Tk. 140) = Tk. 220 – Tk. 75 = Tk. 145 (\$2.96 USD)

Consumer surplus as a percentage of mean monthly *household* income = Tk145/5000 = 2.9%

Cost of trip is 1.93 times the cost of the phone call (145/75)

D Calculations for Category (4) Villages lying beyond 100 km from Dhaka city (that is, villages clustered around Chittagong city)

Consumer surplus = 16 hours round trip plus time in Dhaka overnight (Tk. 160) + accommodation (Tk. 50) + transport cost (Tk. 280) – Tk. 75 = Tk. 490 (\$10 USD)

Consumer surplus as a percentage of mean monthly household income = Tk 490/5000 = 9.8%

Cost of trip is 6.53 times the cost of the phone call (490/75)

A.12 Excerpt from Bayes et.al. (1999) Report

The recently launched Fifth Five Year Plan (1997-2002) document duly appreciates the role of the sector and posits the following objectives and strategies regarding the development of the telecom sector of the country. Its objectives are:

- to provide for universal telephone services;
- to expand the telecom infrastructure in both urban and rural areas so as to enable providers to install one telephone per 100 people by the year 2002, compared with the present ratio of 0.39 telephones per 100 people;
- to add international telephone circuits and ancillary facilities for smooth international telecom operations both in urban and rural areas;
- to ensure telephone connections to all industries, particularly those located in Export Processing Zones (EPZs) and industrial estates;
- to improve the quality of services;
- to attract foreign direct investment;
- to increase the role of the private sector in telecom and
- to strengthen the telecom regulatory board for the task of establishing appropriate legal and institutional frameworks for introducing and sustaining fair competition among operators in order to protect consumers' interests.

The strategies for achieving these objectives include:

- creation of an environment friendly to telecom-related infrastructural development programmes so as to enable providers to install enough telephone lines to meet the increasing demand in both rural and urban areas;
- encouraging the private sector to compete with the public sector;
- encouraging the private sector to participate more in rural areas and to offer cellular mobile services throughout the country;
- developing incentive packages needed to convince private-sector investors to expand national and international telephone capacity and transmission links;
- meeting the increased investment requirements of the BTTB, primarily by selling bonds and debentures and
- initiating reform measures to make the BM more efficient and cost-effective.

Universal access and penetration of phone lines in rural villages

At present, Bangladesh has 500,000 telephone lines - just one-third of the number it will need by the end of this century. This assessment is based on the assumption that the annual rate of GDP growth will average 6% (World Bank and BCAS, 1998). According to a variety of sources, the BTTB's current target was to have about 600,000 lines installed by 1998, and about 900,000 lines by the year 2000. "Even with private sector **providing another 100,000 line units** in 2000, an achievement that will depend heavily on BTTB's ability to provide interconnectivity, supply will fall nearly 500,000 short of demand and the number of lines will still be less than 10 per 1000 population - among the lowest in the world" (World Bank and BCAS 1998).

Table 2.1: Projection of ALIS*/1000 Population

Year	Conservative projection for ALIS*	No. of lines required	High-growth projection for ALIS*	No. of lines Required
1997	5.7	700,000	5.7	700,000
2000	10.0	1,200,000	15.0	1,837,500
2010	15.0	2,160,000	25.0	3,150,000
2020	25.0	4,125,000	50.0	8,250,000

*ALIS stands for 'Access Lines in Service' Source: World Bank and BCAS (1998)

Table 2.1 shows projections for telephone penetration per 1000 population. The high-growth scenario requires the installation of over eight million lines by 2020. Even the conservative projection foresees a requirement of more than four million lines. Either way, supporting infrastructure - adequate numbers of circuits and long-distance channels - must be provided to ensure the effective operation of access lines. These challenges far exceed the demonstrated capacity of the BTTB. Only privatization can give rise to a telecom sub-sector strong and modern enough to support 7-8% annual growth in GDP.

SOURCE: Bayes, A., von Braun, J. & Akhter, R. (1999) *Village pay phones and poverty reduction: Insights from a Grameen Bank initiative in Bangladesh*. Information and Communication Technologies and Economic Development. vol.8 ZEF-Discussion Papers on Development Policy No. 8. Bonn: Center for Development Research, ZEF. Bonn, 31 May-1 June. Full report is available online in PDF format at http://www.zef.de/zef_englisch/publikation/publ_zef_dp.htm

A.13 Survey Data

The following is a list of graphic representations of the data collected during TDG fieldwork. This data is a result of one-on-one interviews with 292 Grameen Bank members in rural Bangladesh. A complete description of our research methodology can be viewed in Appendix 8.

Demographic Information on All Survey Respondents (n=292)

- Phone users vs. non-phone users
- Age
- Marital status
- Education level
- Occupation
- Number of family members working abroad
- Average monthly income received from overseas
- Average monthly income per household (not including money from overseas)
- Number of cattle owned by household
- Radio ownership by household
- Television ownership by household
- Amount of money spent to build house
- Residency in the surveyed area
- Residency and gender
- Occupation and gender
- Occupation and average monthly income (from both abroad and local sources)
- Per-capita income and phone usage
- Average monthly income and phone usage
- Number of family members working overseas and average amount of monthly money received from overseas
- Number of family members working abroad and phone usage
- Percentage of income received from abroad in relation to total monthly income and phone usage
- Cattle ownership and phone usage
- Television ownership and phone use

Data on Non-Phone Users (n=98)

- Reasons for not using the phone
- Use of phone by all household members
- Number of family members working abroad
- Distance willing to travel in order to make a phone call (purpose of call = urgent financial matter with family overseas)
- Amount willing to pay for a 3-minute phone call (purpose of call = urgent financial matter with family overseas)
- Main purpose for using telephone IF respondent became a phone user
- Preference for gender of phone operator

Data on Phone Users (n=194)

- Usage of telephone within the last three months
- Preference of male phone users for phone owner's gender (n=32)
- Preference of female phone users for phone owner's gender (n=162)
- Preference vs. reality for phone operator's gender
- Normal distance traveled to make a phone call
- Use of phone by all household members
- Average number of phone calls per month
- Average length of each paid telephone call
- Average monthly spending on phone calls (in Taka)
- Suggested improvements to telephones
- Willingness to spend more per month on phone calls if improvements made
- Amount of money respondent is willing to pay for installing a private telephone
- Amount willing to pay for a 3-minute call (reason for calling = urgent financial matter with family member in Bangladesh)
- Amount willing to pay for a 3-minute call (reason for calling = social call within Bangladesh)
- Amount willing to pay for a 3-minute call (reason for calling = urgent financial matter with family member overseas)
- Comparison of amount willing to pay for a 3-minute call (in Taka)
- Distance willing to travel to make a phone call (reason for calling = urgent financial matter with family member overseas)
- Amount of time willing to retry in order to make a phone call
- Main reason for using telephone
- Gender of phone operator used for most recent call
- Location of person spoken with during most recent phone call
- Purpose of most recent phone call
- Direction of most recent phone call
- Duration of most recent phone call
- Distance traveled to make the most recent phone call
- Cost of most recent phone call (in Taka)
- Average length of phone calls compared to average number of phone calls per month
- Direction and duration of most recent phone call
- Direction of most recent phone call and location of person spoken with
- Relationship between direction of the most recent phone call and location of person spoken with
- Duration of most recent call and location of person spoken with
- Present level of spending on phone calls and willingness to spend more if improvements made
- Age and willingness to spend more on phone calls if improvements made
- Occupation and willingness to spend more on phone calls if improvements made
- Average amount of money received from overseas compared to willingness to spend more on phone calls if improvements made
- Number of family members working abroad compared to willingness to pay more on phone calls if improvements made
- Age and average amount of money spent each month on phone calls
- Age and average number of phone calls per month

- Age and average length of phone calls
- Occupation and average amount of money spent each month on phone calls
- Occupation and average number of phone calls per month
- Occupation and average length of phone calls
- Occupation and amount willing to pay for installing a private telephone
- Relationship between the willingness to pay for installing a phone line and average monthly income (Amount 10001-20000 takas)
- Average amount of money received from overseas compared to the average amount of money spent each month on phone calls
- Average amount of money received from overseas compared to the average number of phone calls per month
- Relationship between average monthly income and willingness to pay 301-600 Taka for a 3-minute phone call (purpose of call = urgent financial matter with family in Bangladesh)