

COUNTRYWIDE INTERNET CONNECTIVITY USING WiMAX DEPLOYMENT CAN BOOST RURAL DEVELOPMENT OF BANGLADESH

Md. Azmal Hossain, Lt Cdr MD. Shahedul Islam, Md. Rakibul Haque

Department of Computer Science and Engineering, Military Institute of Science and Technology, (MIST)
azmal.cse@mist.edu.bd, shahed59@yahoo.com, rakib_haq@yahoo.com

Abstract: Being a popular mechanism for access based networks; wireless access medium has found its growth potentials unmatched against wired medium in areas which require rapid rollout and has constraints to infrastructure. Right now Bangladesh is experiencing a boom in Internet usage starting from 2002 when prices of access devices started to be slashed, providing options to home users to dream on wireless connectivity. After the establishment of the NFAP, it is possible to create a structured wireless access network throughout Bangladesh. A developing country which has limited infrastructure will find it increasingly difficult to compare WiMAX with access network technologies such as CDMA and GSM. In this article, I have tried to provide information which would make it logical for the development of rural people for a nationwide WiMAX deployment. As networks such as WiMAX require large bandwidth as well as supporting infrastructure, therefore the deployment of fiber optic infrastructure throughout the country would enhance the WiMAX network flourish. Fiber @ Home is the first company which acquires the NTTN (Nationwide Telecommunications Transmission Network) license in Bangladesh, issued by the BTRC is responsible to cover Bangladesh by laying out fiber optic network that will eventually become the major backbone for all kinds of telecommunications and electronic entertainment services, we are enjoying these days. A WiMAX based infrastructure deployment of such a large scale is principally dependent on the frequency allocation for the operator. And the operator will use 2.5GHz or 3.5GHz for the nationwide WiMax deployment.

Key words: WiMAX, CDMA, GSM, BTCL, OFDMA, Rural Development,

1.0 Introduction

Bangladesh is one of the most densely populated countries of the world and has recently been experiencing a boom in the telecommunication & IT sector. Lack of proper infrastructure investment by private sector entrepreneurs have led to the foreign investment invasion of our telecom sector, thanks to which, access to telecommunication has become readily available to all the classes. Along with telecommunication, Internet based services have started to boom after the pricing model of the Internet bandwidth [which is controlled solely by the Bangladesh Telecommunication Company Limited (BTCL)] were slashed down and provision of Internet services were made available by mobile telecom operators.

Recently the Bangladesh Telecommunication Regulatory Commission (BTRC) has been keen in exploring the potentials of WiMax in Bangladesh. A number of developed and developing countries are progressing towards WiMax as an access technology and create a suitable infrastructure based deployment to cater high speed Internet based applications. In such countries the licensing itself has become an extremely expensive tool to propagate the technology itself.

WiMax as a technology is still at its infancy and requires a number of modification / tweaking along with industry experience to become an industry standard and acceptable for Internet and telecommunication applications. At present a

number of vendors are propagating the technology which is based on OFDMA and others are joining in the bandwagon to increase the acceptability for the technology itself. At present vendors such as Alcatel Lucent, Huawei, Cisco, Alvarion, SR Telecom, Cisco, Nokia Siemens Networks are backing up the WiMax forum with its requirements. The projection for WiMax need is provided as below:

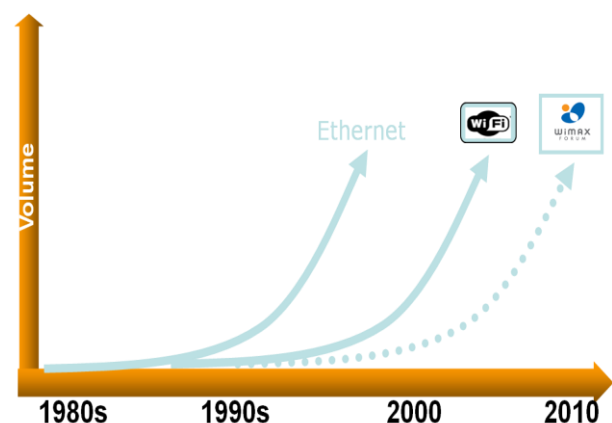


Figure 1: Projection of WiMAX as an access technology by 2010 [1].

From the figure above it can be seen that the wireless revolution has brought about a change in technology presenting WiMax as an option for high speed data communication applications such as video, video and Internet. The evolution of the WiMax industry started from the late 1990's when the need of high speeds was realized for wireless access mediums. When Wi-Fi was becoming a

standard requirement in the ICT industry, scientists were quick to realize the potentials of an OFDM based technology which would cater the needs to high speed data in the future.

2.0 Feasibility Study

A nationwide WiMax deployment is considered as an ambitious project. Being a national infrastructure a project of such huge stature needs to be carefully planned and implemented to ensure proper rollout and business growth. WiMax as an access medium allows for a number of applications considering urban and rural environments.

Bangladesh is a rapidly upcoming nation considering the development of the ICT sector. In recent times a number of new technologies have been welcomed through the telecom regulator BTRC, which have made their way to the service providers. Compared to the GSM and CDMA technology, WiMax as an access network will require sometime for popularity in comparison to its wireless rivals and needed to be harvested for few years.

There are a number of concerns that needs to be considered before the deployment of a network of such epic proportions can take place. The components which are essential for business include: Population of the nation, Population density, Average household income, Technological penetration, and Statistics of education.

The GDP of the nation (according to the Bureau of Statistics) shows that in 2006-2007 fiscal year, the GDP of Post & Telecommunication sector stood at BDT 68.288 billion and this figure is ever increasing. The telecommunication sector saw an overall growth of 24.9% during this period and has attracted new foreign investment. In April 2008, Etisalat of Dubai, SA Telecom of Korea and Vodafone turned their eyes on Bangladesh for a chance to participate as a WiMax operator in Bangladesh. With over 150 million populations, the country has already been able to achieve a 25% penetration in mobile phone services through the help of telecommunication operators presently playing in the markets.

The opportunities for WiMax in Bangladesh can be identified in a number of ways. The application for WiMax in divisional cities will be limited to

residential broadband services for wireless Internet connectivity for the masses. Else than that the corporate society will also subscribe itself to WiMax technology to harness requirements of office Internet and corporate VPN based intranet services.

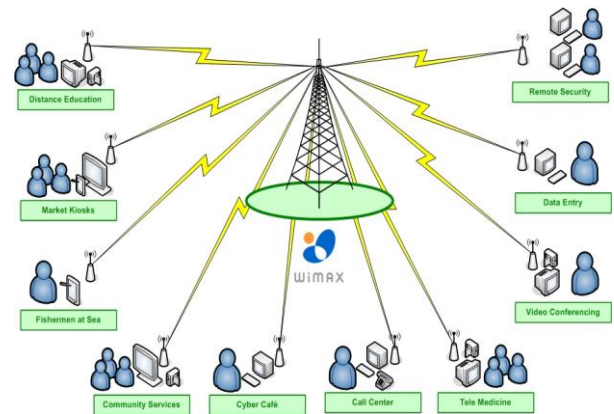


Figure 2: The diagram above portrays the possibilities in application level for WiMax in rural communities of Bangladesh.

3.0 How can WiMAX deployment enhance rural communities of Bangladesh?

As the business case for WiMax in urban environment has been justified, the deployment in rural areas will be a major challenge. To achieve a greater penetration for WiMax throughout the nation the applications have to be custom tailored to meet the requirements of the rural community. At present the rural communities in Bangladesh are hugely deprived from the benefits of technology due to which dependency amongst the rural community remains a major hazard. The digital divide can be bridged once the community is educated. This is why a number of education institutes needs to be set up in the rural communities and ensure quality education for the rural communities. The applications of WiMax in rural Bangladesh will principally look into the following:

a. Distance education: As the rural Bangladesh is deprived of quality education, latest technology can help in creating a wonderful atmosphere which will help bridge the digital divide. High bandwidth applications such as video conferencing will be possible through distance education and such applications would help rapidly develop remote communities properly. A qualified instructor from city can simultaneously communicate a class full of students through

video conferencing aided by qualified volunteers to aid in the remote classroom concept development. Students educated through such infrastructure would definitely be able to provide quality output for the nation.

b. Kiosk based deployment in Markets:

2007 saw some of the worst food crisis in not only Bangladesh but also throughout the world. This could have been easily mitigated if a properly planned out supply chain was placed throughout the nation by the government detailing the extent of food stock and pricing in rural markets. For instance it was seen that pricing of daily consumable vegetables in cities skyrocketed whereas in rural areas the prices were lower which exploited the farmers creating artificial crisis in the markets, where a group of ill minded businessmen profited in between. WiMAX based kiosks in rural communities would greatly help in reporting the quantity of consumables which can be collected properly and distributed throughout the nation through an efficient supply chain management system initiated by the government.

c. Fishermen catch at sea: Everyday a great number of fishermen have to venture into the waterways for fish which serves as a principal requirement of the population of the country, especially the lower mass. These fishermen are exploited by middlemen, which can be easily overcome if WiMAX access point and handheld terminals are provided to fishermen who can update a database of fish catch to the local market. Similarly an effective supply chain management can ensure that these fishes are brought at proper prices from the fishermen maintaining the market stability.

d. Connectivity for ‘Community Services’: Community based services such as Internet surfing, foreign remittance services, Internet TV applications for community such as for agriculture can be catered through WiMax terminal and PC deployments. Remote schooling for household members such as the elders who have not been exposed to proper education through schooling can be helped through such technological deployment. Especial emphasis needs to be put for proper education as education can help in the proper upbringing of a nation. Not only that a number of businessmen from city can directly interact with rural communities and place order for

specific commodities and ensure collection through proper channels.

e. Cyber café / hubs in rural areas: Cyber cafés and cyber hubs in rural communities will greatly be benefited by Internet. This will greatly help communities to start interaction helping in education. As the Internet is a great tool for communication, collaboration & education, rural communities can browse the Internet and promote the usage of Internet in the rural communities as well as contribute in various sectors of the economy by harnessing its benefits. Cyber café’s will allow high speed Internet browsing as well as communication such as video, voice and chatting services to enhance interactivity experience. Even emails can be exchanged with dear ones living in cities or abroad as and when required.

f. Call center applications: Call centers & telemarketing have become a very popular industry in the Asian region, especially India which has seen a tremendous growth in the call center industry. Utilizing call center services university graduates as well as locals with fluency in dialect can help in call center services providing remote support or telemarketing services to a number of industries. These applications will help generate good revenue for not only the nation but also start promoting ICT as a tool which can help generate earning.

g. Telemedicine: Statistics of the health ministry shows that Bangladesh lacks proper medical infrastructure as well as lack of quality doctors who can help diagnose any illness. With the help of telemedicine applications using WiMax patients in rural communities can ensure proper diagnostic services for their illnesses and also export their medical data in real time by scanning. Since Voter ID cards have now been introduced, introduction of digital medical files could also help doctors remotely retrieve patient data. This way patient’s medical treatment can be properly ensured and would help in saving more lives.

h. Video conferencing for remote communities: Video conferencing for communities through WiMAX will greatly help the foreign community to communicate with their relatives in Bangladesh. A prepaid system can be introduced where the caller would be charged for video calls being made to a specific terminal in rural areas. This will encourage video conferencing and other high

bandwidth applications to slowly develop in rural communities encouraging foreign remittance. Else than that once the video conferencing culture picks up, it will become more popular as a medium of communication as it allows for more interaction compared to telephonic conversation and chatting.

i. Data entry: The data entry sector has matured greatly in our neighboring India with an estimated couple of hundred million dollars worth data entry works being conducted every year throughout the country. Home makers and students make a part-time income by such data entry services and medical transcription services. WiMAX technology can help such services to rapidly develop in rural areas creating an inflow of data entry works for Bangladesh. Else than that the nation's educated unemployed population can be employed under such services.

j. Remote security: Many of the developed nations of the world deploy powerful monitoring systems to secure operations of its mission critical architecture. CCTV based security systems deployed in such nations require a 24/7 NOC based operation for instantaneous monitoring, which involves expensive man hour. With the help of the Internet such solutions are now outsourced to other countries. People in rural communities can use WiMAX to observe live video streaming of such CCTV appliances and raise the alarm as and when required using interactive console from the remote end. This will not only promote rural communities to get involved with ICT based activities but will also engage the unemployed group for social activities and making a positive earning.

k. Financial Services: It is possible to run e-commerce activities such as remote branch banking which will allow for penetration of commercial activities to Thana Level. This will encourage more remittance services as well as encourage inter-district financial services where people can send money instantaneously to their relatives and can remotely receive cash from them and authenticate themselves through video conference if necessary.

l. E-Commerce in Rural Bangladesh: A number of international fashion houses and boutiques are increasingly focusing on local culture and as a result South Asian countries are seeing a slow and steady growth in exports of handicrafts. Through financial institutions,

each of the rural entrepreneurs or workers can directly interact with foreign entities and sell local handicraft commodities to foreign buyers. This will allow WiMAX users to engage in video conferencing services as well as foreign transaction services through foreign currency inward remittance.

m. Transportation Sector Development: Online ticketing services can be developed for bus services along with tracking services. Else than that to enhance the journey in-bus services such as browsing the Internet and video conferencing on the move will enhance the journey experience creating a strong demand for travel industry. WiMax terminals connected to the internal network within the buses will ensure maximum flexibility in connectivity in the level of such luxury services.

n. E-Government Services: The government of Bangladesh will be greatly helped with the deployment of WiMax throughout Bangladesh if e-government services are introduced. Each of the respective departments of the government can be connected at the field level to create a fully automated decision making process, thus ensuring an interactive government. Remote offices can exchange documents, communicate easily using telephone and also conduct video conferencing as well between each other making it possible for a totally interactive government model running e-governance throughout the country.

o. IP-TV (optional): Internet based TV can also become an interactive learning tool for rural communities and interacting in a number of issues. Starting from on demand TV applications, rural communities can view programs as and when required using WiMax as a tool for such applications. Though the amount of bandwidth that is require for such services needs to be properly calculated because the number of BTS and the bandwidth throughput per BTS will actually determine the allowance of such applications.

p. E-Agriculture: Bangladesh is principally an agriculture centric country with a vast amount of population in the rural community being engaged in agriculture, technology such as WiMax can be made available to the farmers in order to interact with them. Each of the farmers can provide up to the mark information regarding their crops to the ministry of agriculture which will have an

interactive database which will update daily information. Farmers can be provided with laptops and mobile WiMax terminals to interact and provide up to the mark information, and get video conferencing facilities for support from the ministry.

Considering such applications it will be a long and sustained effort that needs to be slowly cultured to harness the benefits of technologies such as WiMax in Bangladesh. According to the Bureau of Statistics, there is a population of 124 million (census of 2001) in Bangladesh spread across 64 districts, showing that around 6.84% of the population totaling to 8.5 million residents live in the capital city of Dhaka. The comparison ratio for the area of land in cities in comparison to rural Bangladesh stands at 11.84%. This means a far greater majority of the land of the country remains outside the city limits and require development ^[4].

This means when the deployment will be concerned, such technology has to find its way to cover 88% of the land outside the cities where business feasibility would require to be justified.

4.0 Conclusion

This article is concentrated upon the benefit for the deployment of countrywide WiMax network in Bangladesh. To meet information regarding the aspects of WiMax based network deployment, the following needs to be studied in-depth: Network Architecture, Frequency Planning in 2.5GHz & 3.5GHz, Human resource planning for the network, Business feasibilities of Customer Premises Equipment manufacturing in

Bangladesh, Longevity of WiMax network components in rural environments, Customer behavior in rural communities, and Wireless architecture available in rural areas which may be leased. I have tried to highlight a brief of the feasibility of the deployment of WiMax network in Bangladesh

By the year 2010, it is believed that WiMax will be a much matured technology and will be able to provide a much matured vision along with roadmap to business entrepreneurs who are interested in the deployment of WiMax technology. Bangladesh is a potential country in terms of technology but a sophisticated technology such as WiMax has to be properly considered before a decision is taken on the deployment in Bangladesh.

References:

- [1] *A Comparative Analysis of Mobile WiMAX™ Deployment Alternatives in the Access Network*. WiMAX Forum. http://www.wimaxforum.org/technology/downloads/mobile_wimax_deployment_alternatives.pdf. May 2007.
- [2] *WiMAX Deployment Considerations for Fixed Wireless Access in the 2.5 GHz and 3.5 GHz Licensed Bands*. WiMAX Forum. http://www.wimaxforum.org/technology/downloads/DeploymentConsiderations_White_PaperRev_1_4.pdf. June 2005.
- [3] www.btrc.gov.bd
- [4] www.bbs.gov.bd