RESEARCH ON RURAL TELECOMMUNICATIONS

SABTUYAH BORHAN

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To my beloved parents,
Borhan Hj. Ahmad and Kalipah Joll

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ABSTRACT

This thesis is a combination of rural telecommunications literature review and a project, Radio Base Station. The aim of taking Radio Base Station as my project is to provide a sufficient coverage to the rural area like Kota Samarahan for the better reception on analog cellular phone service. Kota Samarahan now is a very fast developing division in Sarawak. Radio Base Station is the ultimate solution to provide a better service and good reception on analogue cellular phone. Cellular business is a profitable as nowadays the rural communities are well educated and using cellular phone is mostly accepted by them instead of using fixed line phone and public phone. In addition, cellular phone will ease their problem in long distance communication. In conclusion, it is advisable that the telecommunications companies must take consideration to provide services equally to the rural area as their obligation and charity to the public especially to the rural communities.

ABSTRAK

Tesis ini merupakan kombinasi kajian telekomunikasi luar bandar dan projek stesen radio. Tujuan memilih stesen radio sebagai projek tesis adalah untuk menyediakan liputan untuk perkhidmatan telefon selular analog di kawasan luar bandar di Kota Samarahan kerana ia merupakan bahagian di Sarawak yang berpotensi untuk membangun. Stesen radio adalah penyelesaian yang terbaik untuk menyediakan perkhidmatan telefefon selular analog. Perniagaan selular kini boleh memberi keuntungan kerana penduduk luar bandar juga menggunakan perkhidmatan tersebut selain daripada telefon talian tetap dan telefon awam. Ia juga boleh mengatasi masalah mereka dalam komunikasi jarak jauh. Kesimpulannya, adalah wajar bagi syarikat-syarikat telekomunikasi untuk menyediakan perkhidmatan di luar bandar sebagai kewajipan dan sumbangan mereka terhadap orang awam terutama sekali kepada penduduk luar bandar.

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CHAPTER 1

Introduction

As technological changes, as well as market and policy changes, it makes clear that competition in the telecommunications industry is inevitable. Now, it is critical that the needs and interests of all rural and frontier consumers such as business, education, farm, health and residential be identified and given equal consideration.

The telecommunications needs of rural consumers must be met and served equally with those urban areas. National policies encouraging greater competition must include a tangible commitment to policies and incentives [1] that bring competition equally to rural areas in comparison with urban areas, or that provide adequate substitutes where it is not possible.

Similarly, in a competitive environment all telecommunications providers must be subject to the same regulatory treatment. Lowering long distance through such as increased competition in long distance services and extended calling areas is particularly important, since rural consumers typically rely more heavily on long distance services. A uniform definition of basic telephone service for all consumers in rural, frontier and urban areas should be created and allowed to evolve over time to take advantage of new technologies.

[1] The government has not provided budget allocations. However tax exemptions has been given. (Pathamanathan, Othman : 1991)

Lastly, infrastructure sharing between larger and smaller local telephone companies should be encouraged in order to allow rural customers access to advanced telecommunications services at rates comparable to other areas. An expanded telecommunications infrastructure can make rural businesses more economically competitive by opening global markets, by attracting jobs and skills from crowded, expensive urban areas, and by making business information and tools more universally available. With appropriate use of telecom resources, rural no longer has to mean isolated.

CHAPTER 2

Rural Telecommunications

2.1 What is Rural Telecommunications?

There are a number of particular characteristics for rural areas in term of the way people live and work. Although traditionally we use the term rural in conjunction with anything to do with the countryside, ITU-T define rural telecommunications as communications in a rural zone. A rural zone is one that exhibits one or more of the following characteristics :

- Scarcity of primary power, or uncoordinated scattered power generation ;
- Scarcity of locally available qualified technical personnel;
- Topographical conditions, eq lake, desert, snow-covered or mountainous areas, are obstacles to the construction of conventional lines and transmission systems ;
- In some zones, tropical, semi tropical or other severe climatic conditions that make critical demands on the life and maintenance of equipment ;
- Economic constraints on amortizing investments.

The topographical factor like terrain, water and mountainous areas which lead to transmission obstruction also can be categorized as rural areas. But, nowadays there is no standard definition of rural telecommunications subscribers. It varies in different countries. For example, the number of residents in certain area that categorized as rural areas is

different between industrial countries and developing countries. According to R.E. Butler, former Secretary-General of the International Telecommunications Unions (ITU) quoted in *Telecommunications, 1989* also stated that the concept of rural and isolated regions definitely different depending on each country's definition.

2.2 Rural Telecommunications Needs

Most rural communities already have significant telecommunications assets to exploit for rural development. Telephones generally work well for voice communication. With advanced technology in telecommunications, it brings a lot of changes to rural subscribers. For instance, line quality is usually satisfactory for facsimile transmission an essential for business communication.

Secondly, computer data modems work over the telephone lines, at least for relatively low speed data transmission, even if the new 28,800 bit per second modems now shipping with personal computers do not run at full speed on some rural lines. A number of the advanced telephone services available to urban residents, including call waiting, call forwarding, three-way calling, caller identification and voice mail, are also available to many rural residents.

Many rural communities could use cable television networks for distance learning. Rural communities without cable television have near-equivalent video services available through antennas that receive signals from communication satellites located in outer space. Many of the services available via telephone in urban areas are also available in rural areas, through a long distance toll call that adds a substantial rural cost penalty.

Cellular telephone services may provide additional communication links for rural people. The wider local calling areas of cellular providers sometimes provide some relief. Rural communities can often better utilize for rural development what is from the high cost of short haul long distance charges from the wireline telephone carriers.

One important step in a development plan for any rural community is to prepare an inventory of the telecommunications infrastructure and services already available already available. For some rural communities the first and most urgent telecommunications need is to bring their basic local telephone service up to current minimum acceptable standards, with single-party, touch-tone service provided with digital switching, and line quality sufficient for voice, facsimile and data transmission at the 28,800 bits per second speed supported by the modems in current personal computers. For a tiny number of small settlements and remote agricultural or resource extraction businesses, getting any kind of telephone service is the first priority.

Rural communities and rural residents pay in several ways the rural penalty that results from the greater distances and lower population densities that are the defining characteristic of rural. One of prices they pay that is harmful to rural economic development is long distance telephone toll charges. For the past 50 years telephone regulators have kept long distance telephone rates artificially high in order to provide subsidies for local service. FCC studies have shown that rural residents pay a higher proportion of their income for telephone service than do urban residents. Most of the differences results from the higher long distance charges rural residents pay because needed services that would be a local call in an urban area require long distance calls in rural areas.

This artificial distortion of prices harms rural businesses because they pay above cost rates for necessary services that urban businesses have included with their basic rates. It harms rural businesses because customers are reluctant to pay the high telephone toll charges to reach them. It is a perverse subsidy that harms rural residents by having their greater use of long distances services at artificially high rates subsidize lower basic phone rates for urban areas. This is a case where public policy has created a situation in which the poor (rural people) subsidize the rich (urban people). Rural people, businesses and communities need the lower long distance rates that they could have if long distance services prices were closer to the costs of providing such services instead of kept artificially high to provide subsidies for people who may not need them.

A rebalancing of the telephone rate structure to bring prices more in line with costs, combined with explicit subsidies for low income people, both rural and urban, would cost much less than the present system of keeping local rates artificially low for people who can easily afford the cost. The economic benefit to rural communities would be considerable.

Providing local Internet access for consumers to be entertained by surfing the net will not be sufficient for rural economic development. Providing ways for rural consumers to have better electronic access to vendors outside their local community may improve their quality of life, but will not necessarily improve the local economy. The real economic advantage for rural businesses will be for them to be able to provide information about their goods and services to the rest of the world through the Internet. For this they need a knowledgeable local Internet provider that can provide the database server and the technical support needed to help novice users put their information onto the net.

Not everyone in rural communities needs high speed, broadband data communications services. Many schools, medical facilities, government offices and businesses do need these advanced services to interconnect their local area networks into wide area networks and for a variety of other specialized applications. Urban areas have access to higher data rate digital services, such as switched 56 kilobit data circuits, frame relay (fast packet switching), higher data rate leased line services and ISDN services. In many rural areas, such services are not available at any price. Rural areas need to have such services available on demand to their local institutions and businesses. It is not time yet to include high data rate services for every household as a universal service goal because the costs would be prohibitive.

Many telephone companies are reluctant to make the investment needed to provide advanced optional services on their rural telephone switches. Like broadband data services, however, carriers could provide most such optional services from a distant telephone switch, provided only that there is sufficient interexchange trunk capacity. Rural communities wanting advanced services might have more success if they can persuade their telephone carrier, or the state regulatory authority, to establish pricing based on what services would cost if installed locally, independently of what switch provides them.

2.3 Providing Telecommunications Services to Rural Areas

All countries in world are facing challenges in achieving rapid telecommunications sector development but none so daunting as extending services to rural areas. A combination of a low-income subscriber base, low population density and often difficult terrain in rural areas, indebted national governments and the existing structure of telecommunications

sectors in the region renders the provision of services to rural and low-income urban areas extremely difficult. The difficulties in providing services to rural communities is largely related to the return on investment. Difficult terrain and a dispersed population contribute to the high cost of provisioning traditional wireline networks in rural areas. This fact combined with a low-income subscriber base comprised of low-volume, low-revenue generating users often points to a financially unattractive situation for outside investors and the national service provider.

Varying technological solutions offered is a good alternative in order to provide telecommunications services to rural areas. With standard wireline networks alone do not appear to be the solution. Today, new wireless technologies are the most efficient solution to the rural telecommunications dilemma.Cellular is the fastest growing and the systems include TACs, AMPs, GSM and CDMA. In general terms, cellular is most cost effective for very large rural areas with uniform subscriber density. In terms of providing access to low-income areas, cellular is already proving effective.

Multiple Access Radio Systems (MARs) are another technology option. This system may prove effective in providing access to isolated locations. Satellite-related communications technologies also are emerging as a contributor to solve the rural telecommunications problem .Very Small Aperture Terminal (VSAT) satellite systems are now widely used. Low Earth Orbiting systems (LEOs) are also being touted intriguing technological solution. It is clear that no one technology will satisfy the demands of rural telecommunications. Different technologies will be more or less appropriate based on specific circumstances, and it is most likely that a mix of these technologies will provide the ultimate solution.

Another option is the development of community-owned telephone systems. Such cooperatives offer several advantages, including: the local community provides labor and equity; profits are reinvested in the community and; local ownership reduces such problems as vandalism and non-payment of bills.

The final solution to providing service will require a delicate blend of appropriate technological choices in combination with management and financing mechanisms, initiated at the governmental level, to support the development of rural providers.

2.4 The Role of Telecommunications in Rural Economic Development

Telecommunications technology is evolving rapidly, in the near future we may hold our medical records on a pocket sized card or have simultaneous discussion with electronic pen pals across the globe. Technology will continue to evolve at phenomenal rate. Telecommunications offers a unique opportunity for rural development. Rural areas are at a particular disadvantage because they do not receive the technology as quickly as urban areas do. Rural communities must ensure that they are not left behind. Rural communities must stay abreast of new developments and participate in the technological revolution.

Telecommunications can provide rural communities with a connection to the world, facilitating information exchange and development. It is also a fundamental to service industries as well as the rural economic diversification strategies. Telecommunications can provide communities with an opportunity to compete in the fast growing sector. Subsequently, it represents a tool with which rural businesses and citizens can directly participate in national and global economics.

As an electronic highway, telecommunications allow urban-based industries and customers to access rural products, services, and market more easily. Without a modern telecommunications infrastructure, rural communities may be left behind and denied the economic and quality of life opportunities new technologies have created.

Telecommunications and information technology can also provide increased opportunities for health care delivery, education and community development generally available only in urban areas. Access to sophisticated databases, information services and value-added networks can improve the efficiency and productivity of rural firms. Communities can benefit from it and it can be a useful tool to make traditional rural economics such as agriculture and mining, more competitive in a global marketplace.

In conclusion, telecommunications offers a unique opportunity for rural development. Telecommunications systems and their effective use can help overcome the geographic boundaries and the isolation of rural communities and promote their participation in the global economy. In rural and urban areas alike, traditional activities increasingly rely on telecommunications. Rural areas need to access and use the information highways just as the urban areas.

CHAPTER 3

The Rural Telecommunications in Malaysia

In Malaysia, the rural telecommunications has bring a new challenge to the Malaysian telecommunications industry. At present, the telecommunications development in rural areas is left behind compared to urban areas. Though there are many big telecommunications companies but the problem is still not resolved.

The government offers incentive to telecommunications companies who provide services to rural areas to overcome the problem. Furthermore, there are two conditions stated in operating licence[2] to ensure that the telecommunications companies do not discriminate the rural communities. The first condition is the financial assistance is provided for the development of telecommunications in rural areas. Secondly is the persons in rural areas should not be discriminated in the provision of telephone service.

In the Malaysian environment where there is no equal access, all network operators are extremely keen to take on customers, economic or uneconomic wherever possible in order to generate some revenue on their network. The new entrants have indicated their keenness to deliver universal service in specific areas which could be designated by the government without duplication by all operators (which would be uneconomic to do so) instead of contributing to the Universal Service Obligation (USO)

[2] Telecommunications in Malaysia Towards Vision 2020, Ministry of Energy, Telecoms and Post, Malaysia (1996)

fund (the pay or play principle). The government could designate the provision of service to a particular group of uneconomic users or in a particular geographic area including specifying the duration, exclusivity, pricing, quality, monitoring of performance and enforcement.

It is obviously seen that most of the telecommunications companies provide services to areas or regions that is profitable to them, not the rural area. It cannot be denied that the telecommunications companies are doing business as the profit is the bottom line of the companies. In rural area, geographical factor in term of difficulties to access, power supplies, unstable terrain, low population are among the obstacles that the telecommunications companies have to cope with. The high cost but cannot produce sufficient revenue to recover the capital and operational costs is a clear reason why those companies seem to neglect the rural areas.

On the other hand, the telecommunications companies are still urged to provide services to rural areas as their obligation. Currently, a pioneer and the biggest telecommunications company in Malaysia, Telekom Malaysia Berhad is manage to provide services to most rural areas in Malaysia. There are various services can be provided to the rural areas depending on the characteristics and conditions of the area. The rural technologies that can be implemented to the rural area are ;

3.1 Radio In Local Loop (RILL)

3.1.1 RAS 1000

The RAS 100 is made up of the following modular components :-

- Switch Interface Module (SIM). Acts as a concentrator. Holds the subscriber terminals. Interface with the local exchange.