The Pennsylvania State University

The Graduate School

College of Communications

UNIVERSAL SERVICE PROVISION IN WESTERN CHINA

A Thesis in

Mass Communications

by

Feng Wu

© 2005 Feng Wu

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

May 2005
The thesis of Feng Wu was reviewed and approved* by the following:

Richard D. Taylor  
Professor of Communications  
Thesis Advisor  
Chair of Committee

Jorge R. Schement  
Professor of Communications

Dennis K. Davis  
Professor of Communications

Chris Benner  
Assistant Professor of Geography

John Nichols  
Professor of Communications  
Associate Dean for Research and Graduate Programs  
in Mass Communications

*Signatures are on file in the Graduate School
ABSTRACT

Universal telecommunications services provision is an important factor in reducing regional disparities in China and ensuring sustainable economic development, social equity, and national stability. This study, by drawing on the universal service concept and institutionalism policy research, analyzes the disparity in telecommunications services access between the western and the eastern regions of China. Based on the analysis, the study attempts to provide a framework to motivate and assist further explorations of universal service provision in China and in other regions with similar features.

The objective of this study is three-fold: (1) to demonstrate the widening disparity in telecommunications services access between the eastern coastal and the western inland regions of China; (2) to examine the historical, geographic, and policy reasons for the disparity; and (3) to offer solutions, policy recommendations, and a conceptual framework for universal service provision in western China and in regions with similar features. To accomplish the objective, this dissertation conducted a case study of telecommunications development in China. The findings suggest that despite the rapid development of overall telecommunications capability in China, a widening gap in telecommunications services access exists between the western and the eastern regions of the country. The study also suggests that the gap is a reflection of not only geographical and historical reasons, but more importantly, strategic considerations and national policies. In recent years, a more fundamental problem confronting universal service provision in China has been the incompatibility between the need to provide services to disadvantaged regions, and the requirement arising from China’s entry into the World Trade Organization to transform to a full-fledged market-based economy characterized by competitive neutrality. The contradiction between a planned economy in a socialist system and commercial viability in a competitive quasi-capitalist free market economy is both the background and the cause of the difficulty and disagreement in universal service provision in western China.
Based upon its analysis, this study attempts to propose solutions and policy recommendations. The study suggests that emphases should be given to establishing a universal service mechanism, ensuring interconnection, promoting alternative technologies, segmenting the market, and improving the policy-making process and regulatory conduct. This study also suggests that the current approach to universal service provision continues to be bound by the limitations of a past regulatory era. When new elements emerge and change the industry’s underlying facts, the dominant and classical model becomes increasingly inadequate. Thus this study presents a new universal service model that emphasizes heterogeneity and flexibility, and is likely to be more suited to the new telecommunications environment in China and in other regions with similar features.
# TABLE OF CONTENTS

LIST OF FIGURES ..................................................................................................... ix

LIST OF TABLES ....................................................................................................... x

ACKNOWLEDGEMENTS ........................................................................................... xi

Chapter 1  INTRODUCTION ...................................................................................... 1

1.1 Information, Telecommunications, and Access Disparity ......................... 3
1.2 The Case of China: An Overview ................................................................. 5
   1.2.1 Telephone Infrastructure Development: From 1949-1979 ................. 5
   1.2.2 Telephone Infrastructure Development since 1979: A Gradual
       Political and Economic Reform ....................................................... 6
   1.2.3 Unequal Telecommunications Development: Problem Statement..... 8
1.3 Significance of the Problem ........................................................................... 9
   1.3.1 Importance of the Western Regions to China .................................. 9
   1.3.2 The “Go West” Plan ...................................................................... 10
   1.3.3 Opportunities and Challenges ...................................................... 11

Chapter 2  LITERATURE REVIEW ......................................................................... 13

2.1 The Definition and Importance of Information ............................................. 13
   2.1.1 The Post-Industrial Society ............................................................ 14
2.2 Telecommunications and Social Economic Development ......................... 17
   2.2.1 What is Development .................................................................... 18
   2.2.2 Telecommunications Model of Development ................................... 19
   2.2.3 Telecommunications and Economic Development .......................... 20
   2.2.4 Telecommunication, Labor Division, and Employment ................... 23
   2.2.5 Telecommunications and Rural Economy ...................................... 26
       2.2.5.1 Developing Countries’ Rural Economy .................................. 26
       2.2.5.2 Developed Countries’ Rural Economy .................................... 27
   2.2.6 Social Effects of Telecommunications ............................................. 28
   2.2.7 Criticism on the Telecommunications - Growth Studies .................. 31
2.3 Globalization and International Regimes ...................................................... 33
   2.3.1 Globalization: The Concept and Definition ...................................... 34
   2.3.2 New Institutionalism ..................................................................... 35
   2.3.3 International Regime Theory ......................................................... 37
2.4 Universal Service ......................................................................................... 38
   2.4.1 Universal Service: The Concept and Definition ............................... 38
       2.4.1.1 Universal Service ................................................................. 38
       2.4.1.2 Difference Between ‘Universal Service’ and ‘Universal
           Access’ ...................................................................................... 41
   2.4.2 Measurement, Basic Access Indicators, and Causes .......................... 42
Chapter 3 RESEARCH QUESTIONS AND PROCEDURES

3.1 The Case Study Method

3.2 Organizing the Research
   3.2.1 Determine the Research Questions and Select the Case
   3.2.2 Determine Data Gathering
   3.2.3 Collection of Data
   3.2.4 Evaluate and Analyze the Data

3.3 Inquiries Beyond the Scope of This Study

Chapter 4 EVOLUTION OF TELECOMMUNICATIONS IN CHINA

4.1 Telecommunications Development in China
   4.1.1 The Start of Telecommunications in China: Before 1949
   4.1.2 Development of Telecommunications in China after 1949: A Long and Rough Buildup
     4.1.2.1 Early Period: The First Two “Five-Year” Plans
     4.1.2.2 The Cultural Revolution and the Three Years Aafter (1966-1979)
     4.1.2.3 The Reform Era (1980 – 2002): Rapid Development

4.2 Telecommunications Development in the Western Regions of The Country
   4.2.1 Geographic Characteristics of the Western Region of China
   4.2.2 Unequal Telephone Development
     4.2.2.1 Disparity between Eastern China and Western China
     4.2.2.2 Urban and Rural Disparity

Chapter 5 CAUSES OF THE TELEPHONE ACCESS DISPARITY

5.1 Geography of Western China

5.2 Policy Transitions and The Impact on Telecommunications Development
   5.2.1 The Role of The State
   5.2.2 A Brief History of the Evolving Organization of the MPT in the Pre-reform Era
   5.2.3 National Strategy and Policy Before 1980 – the Pre-Reform Era
   5.2.4 Defense Consideration and Telecommunications Growth in Selected Western Regions in Early Periods
   5.2.5 From 1980 to 1994: The First Phase of the Reform Era
     5.2.5.1 Policies on Telecommunications Development
5.2.5.2 Policy on Foreign Involvement .................................................. 98
5.2.5.3 “Engulfing” Strategy and Its Impact on Telephone Disparity ... 99
5.2.6 From 1994 to 1997 ........................................................................ 103
5.2.7 From 1998 to the Present ............................................................. 105
5.3 The Impact of the Telecommunications Market Reform on Telephone Development in Western China ........................................... 106
5.3.1 Before 1998: From Monopoly to Limited Liberalization ........... 107
5.3.2 After 1998: Towards Full Competition through Market Restructuring ............................................................. 109
5.4 External Impacts of Social Norms and Emotions ......................... 111
5.4.1 Globalization as Competition, Deregulation, and Liberalization ... 113
5.4.2 External Impacts from International Regimes such as the World Trade Organization .................................................. 114
5.4.3 Commitments to the World Trade Organization ....................... 116
5.4.4 The Impact of China’s Accession to the WTO ......................... 118
5.4.4.1 Impact on Market Performance and Structure ..................... 118
5.4.5 Impact on Universal Service ...................................................... 122
5.5 National Development Plan for the Western Regions .................. 123

Chapter 6 UNIVERSAL SERVICE PROVISION IN WESTERN CHINA: SOLUTIONS AND POLICY RECOMMENDATIONS ................ 128

6.1 From A Planning System to A Market Economy: the “Visible Hand” vs. the “Invisible Hand” .......................................................... 131
6.2 Setting Up a Universal Service Mechanism .................................... 133
6.2.1 Setting the Goals and Scopes of Universal Service in Telecommunications ................................................................. 135
6.2.2 Universal Service Fund ............................................................... 139
6.2.2.1 Sources of the Fund ................................................................. 140
6.2.2.2 Choosing the Provider of Universal Service ....................... 142
6.2.3 Interconnection ......................................................................... 144
6.3 Wireless Solution ........................................................................... 146
6.3.1 Affordability ............................................................................... 149
6.3.2 Cost and Construction Cycle ...................................................... 150
6.4 The Role of the State and the Regulator ........................................ 156
6.4.1 The Role of the State .................................................................. 156
6.4.2 Regulatory and Policymaking Mechanism ............................... 157
6.5 Geographical Solution .................................................................. 161
6.5.1 Segmentation: Regional Approach .......................................... 161
6.5.2 Urbanization ............................................................................. 163

Chapter 7 CONCLUSIONS: THE SEARCH FOR A NEW UNIVERSAL SERVICE PROVISION PARADIGM ........................................ 165

7.1 Introduction and Overview ............................................................. 165
7.2 The Case of China ..........................................................................................165
7.2.1 Telecommunications Development in China .......................................165
7.2.2 East-West Disparity ..............................................................................166
7.2.3 Geographical Conditions and Policy Factors .......................................167
7.2.4 Policy Recommendations .....................................................................170
7.3 Deconstruction and Re-Conceptualization of Universal Service ..........173
7.3.1 The Classical Model of Universal Service Provision...........................173
7.3.2 Elements of a New Model .................................................................174
7.3.2.1 Competition ................................................................................174
7.3.2.2 Alternative Technology ..............................................................175
7.3.2.3 Interconnection ...........................................................................175
7.3.2.4 The Role of the Regulator ..........................................................176
7.3.2.5 The Role of the Consumer .........................................................176
7.3.2.6 The Segmentation of the Market ................................................177
7.3.3 Proposals ...............................................................................................177
7.3.4 Universal Service in China – Re-Conceptualization and New Dimensions..........................................................178
7.4 Suggestions for Further Study ...............................................................181
7.5 Conclusion ......................................................................................................182

Bibliography ................................................................................................................184

Appendix A MAP OF CHINA: ADMINISTRATIVE DIVISIONS ..................204

Appendix B AVERAGE EXCHANGE RATE OF RENMINBI (RMB)
AGAINST US$, 1949-2003 .................................................................................205

Appendix C DISTRIBUTION PATTERN OF GDP AND GDP PER CAPITA,
2000 ......................................................................................................................207
LIST OF FIGURES

Figure 4-1: Wired Teledensity vs. GDP per capita by Region, 2003 ......................76
Figure 4-2: Wired Telephone Teledensity by Province, 2003.................................78
Figure 4-3: Top Ten Provinces in Wired Telephone Sets, 2003..............................81
Figure 4-4: Telecommunications Fixed Assets Investment: Top Ten Provinces, 2003 ......................................................................................................................82
Figure 4-5: Regional Main-Line Teledensity vs. Urban Main-Line Teledensity ....83
Figure 4-6: Percentage of Villages without Telephony Services by Region, 2002 ......................................................................................................................85
Figure 5-1: MPT’s Sources of Funding in 1994 ......................................................97
Figure 5-2: Development of Telephones in Eastern and Western Areas, 1985-1996 ......................................................................................................................101
Figure 5-3: Ratio of Regional Telecommunications Fixed Assets Investment in National.................................................................................................................102
Figure 5-4: The Market Share of China’s Telecommunications Industry in 2003 ....110
Figure 5-5: The Comparisons of Productivity and Production Efficiency Between China Telecom and Some Foreign Telecom Carriers (1997)* .........................119
Figure 6-1: Fixed-Line Subscribers vs. Wireless Subscribers in China (1995 – 2004).....................................................................................................................147
Figure 6-2: Long-distance Optical Cable Development (1995-2004)......................151
Figure 7-1: New Implications and Dimensions of Universal Service Provision.......179
LIST OF TABLES

Table 4-1: Growth of China’s Telecommunications Industry, 1949-1966............ 70
Table 4-2: Growth of China’s Telecommunications Industry, 1966-1979............ 71
Table 4-3: Growth of China’s Telecommunications Industry (Telephony), 1980-2004.............................................................. 74
Table 4-4: Regional Divisions of China ............................................................. 75
Table 4-5: Wired Teledensity vs. GDP per capita by Region, 2003.................... 77
Table 4-6: Telecommunications Development by Region and Province, 2004 .... 80
Table 4-7: Regional Wired Telephony Teledensity, 2002.................................. 84
Table 4-8: Administrative Villages without Telephone Services by Region, 2002 ... 85
Table 5-1: Geographical Characteristics by Regions......................................... 88
Table 5-2: Timeline of China’s Regional Preferential Policies, 1979-94.............. 100
Table 5-3: The Impact of China’s pre-WTO entry on its telecommunications industry ................................................................. 121
Table 6-1: Five Stages of Universal Service in Telecommunications............... 138
Table 6-2: 2004 Telecommunications Development by Province..................... 148
Table 6-3: Mobile Business, 2002 ................................................................. 150
Table 6-4: 2002 Telecom Capacity by Province............................................... 152
ACKNOWLEDGEMENTS

Doing a doctoral dissertation as a foreign student presents many challenges and difficulties. Such an endeavor cannot be completed without the help and assistance of many people. To the following people I owe particular credit for their insights, their support, and their patience.

First and foremost, I gratefully acknowledge the indispensable advice and enormously generous assistance of Prof. Richard Denny Taylor, my advisor and the chairman of my committee, not only on this dissertation, but also throughout my entire doctoral program. Prof. Taylor has constantly provided guidance, knowledge, caring, support, patience, and personal encouragement that are of great help to me. What is more important to me is the extremely high level of integrity that he brought to the exercise of his responsibility in guiding this dissertation. It will always remain a significant model to be emulated in guiding all my future endeavors.

My gratitude also goes to Prof. Jorge Reina Schement, who was an inspiration for my interest in exploring the issues of universal service and the information society. He also taught me a great deal about structuring my thoughts and getting them across to others. I am also indebted to Prof. Dennis Karl Davis. It was in his class I began my pursuit of globalization which later became an important part of this dissertation. His encouragement and comments have been very helpful to my research. To Prof. Christopher Benner, my outside member, I owe an especial debt of gratitude for his assistance, wisdom, and insight in helping me analyze the issue from the perspective of geography and space, a helpful approach which was new to me.

To my mother, father, sisters, and brothers-in-law, I owe a deep debt of gratitude. They helped me to stay motivated throughout the years of my studying in the United States. Their endless love, support, and encouragement indeed made this dissertation possible.
...if society does not determine technology, it can, mainly through the state, suffocate its development. Or alternatively, again mainly by state intervention, it can embark on an accelerated process of technological modernization able to change the fate of economies, military power, and social well-being in a few years. Indeed, the ability or inability of societies to master technology, and particularly technologies that are strategically decisive in each historical period, largely shapes their destiny, to the point where we could say that while technology per se does not determine historical evolution and social change, technology (or the lack of it) embodies the capacity of societies to transform themselves, as well as the uses to which societies, always in a conflictive process, decide to put their technological potential. (Castells, 2000, p.7)

Human activities are organized around the desire to improve life. The human desire for better life has never stopped, producing most of the key inventions in all of human history. With the advancement of science and technology, some great transformations came to Europe during the 19th century and then to other continents (Polanyi, 1944). Not only has agricultural production been transformed, but social and economic institutions have changed radically. Information technology is one of the key inventions that are believed to be instrumental in allowing or helping the restructuring of the world during the 20th century. It has been increasingly recognized that the economy of the world is based to a considerable extent on the allocation of information as a primary resource (e.g., Bell, 1973; Porat, 1977; Castells, 2000). This new economy that emerged in the last quarter of the 20th century has been given many names. Castells (2000) calls it informational, global, and networked to identify its “fundamental distinctive features and to emphasize their intertwining” (Castells, 2000, p.77). Many others tend to use the term “post-industrial society” that was coined by Daniel Bell to demonstrate “the codification
of theoretical knowledge” (Bell, 1973, p.46) and the new and complicated patterns of conflict and compromise among social and economic institutions. “Post-fordism” is another term that has been used more to indicate a different production model replacing the previous and familiar one (Cox, 1987; Jessop, 1991).

However, this thesis will not focus on the question of what term or theoretical model is more appropriate to demonstrate all the features of the new economy. Rather, beginning with a solid understanding of information and telecommunications-related concepts, it is designed to explore the relationship between telecommunications application and regional development in general, and access to information and communications technology in the western area of China in particular. This study will concentrate on wired and wireless telephone services development and access in the western region of China. The purpose is to provide a theoretical framework useful in studying and understanding the impact of regulatory activities on regional telecommunications infrastructure development, and to offer policy analysis and recommendations for telecommunications development in regions with similar geographic and demographic features.

This thesis falls mainly into seven chapters. This introductory chapter will present an overview of the current telecommunications development in China and the disparity in telecommunications services access between the western area of the country and the eastern region of the nation. The problem will be described, and the significance of the problem will be established. Then the purpose and scope of the study will be outlined.

The second chapter involves a broad review of the basic concept of universal access, telecommunications and development, and a theoretical approach that will be utilized in this analysis. The third chapter will explain the methodology of using case studies in dealing with the issue. Research questions will be proposed and the data collection process will be broadly explained.
In Chapter Four the evolution of telecommunications development in China will be presented in a chronological manner. Telecommunications infrastructure development both in history and its current conditions in the western region of China will be emphasized. In Chapter Five, major elements in telephone infrastructure development and access to telephones in the western region of China will be scrutinized. Both internal and external impacts will be analyzed.

In Chapter Six possible elements of a new regulatory paradigm of telecommunications services provision in western China will be outlined, and policy recommendations will be presented. The final chapter will present a summary of the study, followed by the deconstruction and re-conceptualization of universal service provision. Based on the re-conceptualization a model will be developed. Finally, topics for future study will be suggested.

1.1 Information, Telecommunications, and Access Disparity

The debate over the importance of information and knowledge in economic and social development has intensified throughout the past decades. The question of what link can be drawn between information and productivity has been raised, with no absolute and agreed answers and conclusions achieved. However, the importance of information and communication technology has been acknowledged in many fields, including, for instance, geography. Peter Gould said that “Well, without [the] ‘communication’ there can be no ‘geography of’. You cannot have a geography of anything that is unconnected. No connections, no geography” (Gould, 1991, p.4). The new capital – knowledge – like its predecessor – finance capital, has to be transformed in order to become economically useful. The transformation of knowledge, as well as the transformation of information into knowledge, requires manipulation, processing, interpretation, exchange and transmission. These varied transformations are the responsibility of the information economy (Abler, 1977; Goddard and Gillespie, 1986).
Telecommunications, even if it cannot be equated with the information economy, constitutes one crucial component of information handling, namely the electronic transmission of information and knowledge. The electronic transmission of information and knowledge cannot be fulfilled without the development of telecommunications infrastructure and access. Therefore, as the backbone of the information transmission process and communication, telecommunications access, including basic voice telephony services access, becomes one of the most critical components in social and economic development. Countries around the world, both developed and less developed, are spending a steadily increasing proportion of their economic resources on communications systems and services. However, constantly changing telecommunications technologies as well as regulatory policies toward traditional telephone services and the associated market structure are causing many changes in the potential access and use of telecommunications facilities, including voice telephony. A stunning disparity between countries in terms of penetration of services, such as the telephone reflects a telecommunications access gap between countries with different Gross Domestic Product and income level. This gap exists not only at the between-country level. Researchers have concluded that in general, over the world, rural inhabitants are more than 10 times less likely than their urban counterparts to have access to a telephone (World Bank, 2002). Therefore, a gap in telecommunications access within a country can be dangerously large, causing concern to both academics and policy makers.

A steadily increasing number of studies have been designed to investigate the issue of equal telephony services provision and yet, a solution is still to be drawn (Hudson, 1994; Mueller, 1997a; Hart, 1998; Bonnett, 1999; Simpson, 2004). The difficulty in achieving a solution lies not only in the complexity of the issue, but also in the fact that each and every nation has its own unique social, economic, institutional, and cultural situation. Therefore to draw a conclusion applicable to all nations would be extremely difficult, if not impossible. This recognition has directed people’s attention to designing case studies of one particular country, or even one particular region in a country, to identify major issues, propose applicable solutions, and suggest policy revisions. In light
of this uniqueness, researchers have taken efforts to study the access issue on a case-by-case basis. In the past few years, a great quantity of literature dealing with telecommunications access has been generated (e.g., Roche & Blaine, 1996; ITU, 1998; World Bank, 2002).

Most studies conclude that the issue of uneven access to telecommunications services, including voice telephony services, has been a longstanding policy and social concern for developed as well as developing countries. While some countries have undertaken rules to guarantee equal access, for instance, a universal service requirement for basic telecommunications service providers in the United States, many other countries have not put such an obligation on their providers. The free-market and liberalization rationale, however, has recently called obligations such as that of universal service into question. Moreover, one of the most challenging issues facing communications policymakers today involves determining the scope of the services that should fall under the universal service imperative, and identifying the carrier of last resort. Technological development and convergence has made this imperative more complicated. Basic telecommunications service providers have found it impossible or unlawful to achieve universal service by subsidizing basic local telephone services and charging prices above cost to long distance carriers. The complexity of the issue has especially given rise to confusion and difficulty to achieve universal access objectives in developing countries such as China that have been undergoing telecommunications policy revisions or structural reforms.

1.2 The Case of China: An Overview

1.2.1 Telephone Infrastructure Development: From 1949-1979

Historically, China’s telecommunications development from the late Qing Dynasty (early 20th century) to the mid 20th century prior to the establishment of the People’s
Republic of China in 1949 was a struggle for national sovereignty and integrity due to its dependence on advanced technologies from western developed countries. This process was accompanied by wars and social and political instability. After 1949 the government established the Ministry of Post and Telecommunications (MPT) as the monopolistic regulator and provider of the Chinese telecommunications network. Two other major policies were also formulated in this period that would have a long-term impact on the development of China’s postal service and telecommunications. One concerned foreign involvement: driven by a long anti-imperialist tradition and concerned about national sovereignty, the Chinese Communist Party expressly stated that foreign companies were not allowed to run posts and telecommunications businesses in China (Gong, 1993). At the same time, China made an impressive effort and investment in telecommunications infrastructure development, especially in urban and strategically important areas, whereas in other areas and especially in rural areas investment in telephone systems were modest or very limited (Lee, 1997; He, 1997; Yan and Pitt, 2002; Xie and Luo, 1990).

1.2.2 Telephone Infrastructure Development since 1979: A Gradual Political and Economic Reform

Since 1979, China has undertaken gradual yet resolute internal economic restructuring and open-door policies. Specifically, having realized the strategic and economic importance of the telecommunications industry, the government adopted a series of policies which resulted in the quick takeoff and development of the telecommunications industry. The overall strategic plan has not only established the priority status of telecommunications industries, but also stipulated that the industry should focus on major cities and the economically developed coastal areas, and should avoid the pursuit of nationally balanced development. The Ministry of Posts and Telecommunications (MPT) retained its monopolistic administrative and operational role in China’s telecommunications industry until 1998, when the Ministry of Information Industry (MII) was established to replace the MPT and facilitate the transition from monopoly to competition and split the administration and operation of
telecommunications. At the same time, the industry has undergone a series of restructuring processes and outcomes, underlining a movement toward market competition and regulatory transparency (Lee, 1997; Yan and Pitt, 2002).

The “open-door” policy has resulted in a large inflow of foreign investment in the telecommunications equipment market, while the basic telecommunications service market has remained practically closed to foreign entities. The State Council of China (Chinese Cabinet) has stated repeatedly that no foreign entities should operate or be involved in basic telecommunications service management. However, China’s accession to the World Trade Organization (WTO) in late 2001 after years of application and making various commitments to opening its market in a profound fashion has provoked hopes and expectations from potential foreign competitors to enter China’s lucrative telecommunications service market. The accession to the WTO is expected to have an impact on China’s telecommunications infrastructure development. However, how much impact it will have remains to be seen. The potential impact and some non-tariff barriers to the entry of foreign investors into China’s market will be analyzed in chapter 5.

The strategic policy of preferential treatment for China’s telecommunications industry has facilitated a boost in telecommunications infrastructure construction, with financial support both from the central government and from an accumulation of expensive initial installation fees. The MII actually reported total capacity of the fixed line network at over 313 million lines by the end of 2004. A staggering 61.2 million wireless subscriber lines were added, bringing mobile network capacity to 334.8 million lines (MII, 2005). Because of the dramatic expansion in usage, China Telecom, the incumbent telecommunications service provider, has plans to add over 20 million access line per year to 2004, and projects earnings from all fixed line services to reach US$70 billion (China Telecom, 2000). Wired line growth has run between 25 and 30 per cent per year, whereas mobile growth has been between 72 and 100 per cent per year from 1998 to 2003. At the same time, thanks to the central government’s preferential policies and the dramatic inflow of foreign capital, rapid development has been achieved in special
economic zones and coastal “open” cities. The average telephone penetration rate in the coastal cities and special economic zones is far higher than the national average. In 2002, China ranked first in the world in terms of overall telecommunications capacity (MII, 2003a).

1.2.3 Unequal Telecommunications Development: Problem Statement

However, problems have arisen. Over the years, China’s telecommunications services have developed in an extremely uneven fashion. Cities have developed far faster than rural areas, and eastern regions have outpaced the rest of the country, especially western regions. Statistics show that the existing gap between the eastern areas and the western areas of China is growing, with a 17.3 per cent wired teledensity for the western parts compared with 37.3 per cent for the East. Regions and cities in eastern China, including Beijing, Shanghai, Guangzhou and the 14 open cities, represent the overwhelming share of China’s existing and prospective market (MII, 2005). This dramatically uneven telecommunications development has created and widened the already serious polarization between the developed and underdeveloped regions. Moreover, although the understanding of the relationship between telecommunications and economic growth is far from complete, quite a few studies have shown that there is at least a correlative connection between telecommunications development and the overall economy. In the case of China, for instance, Mody and Wang (1997) use panel data on the output of 23 industrial sectors for China’s seven coastal provinces during the second half of the 1980’s. They found that both transport, measured by road network length, and telecommunications facilities have been the engine of growth during this short time period from 1985 to 1989. Using panel data for a sample of 24 Chinese provinces from 1985 to 1998, Démurger (2001) found that the development of telecommunications in rural areas helps reduce the burden of isolation and has a positive impact on economic growth. In his estimation, the introduction of the number of telephones per capita, in both urban and rural areas, as a proxy for telecommunications development confirms the significant impact on growth performances and corroborates Mody and Wang’s (1997)
results on the positive effect of telecommunications growth. Wu Jichuan, the former MII Minister, said in April 1995 that “insufficiency in telecommunications capacity and shortage of services in some areas have been a major factor affecting China’s opening up to the outside world and restricting China’s economic growth” (*Financial Times*, 1995). A report within the former MPT shows that Deng Xiaoping agreed that the modernization of communications should be put before the ‘four modernizations of China’ (Gao, 1991).

**1.3 Significance of the Problem**

**1.3.1 Importance of the Western Regions to China**

The western part of China involves 12 provinces, autonomous regions, and cities, which is one-third of the country’s administrative provinces and autonomous regions, covering an area of 6.85 million square km and a population of 367 million people, making up 56 per cent and 28.8 per cent of the country’s total, respectively (National Bureau of Statistics of China, 2004). However, this vast region with some of the most densely populated areas lags economically far behind the rest of China, especially the eastern coastal areas. For instance, the average per capita gross domestic product (GDP) in the resources-rich but underdeveloped region is only half that of the eastern region.¹ Many basic and important infrastructures, including the telecommunications infrastructure, are fragmented (the development of telephone infrastructure and access to basic telecommunications facilities have been briefly reviewed in this chapter and will be explored in chapter 4). The gap is due to both geographical and historical reasons. A high population growth rate, fragile environment, low carrying capacity, poor infrastructure and low literacy, and special preferential policies toward eastern China, especially some eastern coastal areas, have held back the development of the western regions. While the past two decades have witnessed the rapid growth of the eastern regions, which have

¹ See Appendix C for the distribution pattern of GDP and GDP per capita in China.
accumulated much capital, talent, technology, and management experience, the lack of transportation, telecommunication, and other infrastructures and facilities critical to the western regions’ development and the economy has not only become an obstacle to sustainable economic development and welfare both of the region and of the nation, but also caused some concern about social and border stability in western China. The vast gap between the western regions and the eastern regions of China, if not addressed, might become a potential challenge to China’s overall reform and objectives of achieving equal welfare for the people.

1.3.2 The “Go West” Plan

The government has now recognized the impact of the uneven overall development in general and telecommunications development in particular. Reducing disparities between the eastern and coastal areas and the western and inland regions is now a core priority of the Chinese government. On March 5, 2000, former Premier Zhu Rongji pointed out in his government work report that to implement the strategy of developing the western part of China was of great significance to expanding domestic demand, promoting sustained growth of the national economy and coordinated economic development between various regions, and finally to the achievement of a common prosperity (State Council, 2000). A general program for developing the west of China, the Western Development Strategy (“Go West), was formulated in 1999 and officially confirmed by the State Council in 2000 (State Council, 2000b).

The Chinese government is taking a crucial initiative to develop the vast western areas. With efforts to develop western China underway, a new takeoff in infrastructure construction has begun in the region. The creation of a modern infrastructure is expected to be the focus of economic growth in the western regions in the coming years, and telecommunications construction is at the top of the agenda.
1.3.3 Opportunities and Challenges

There are both opportunities and challenges facing the Chinese government in implementing the Western Development Strategy. China’s accession to the World Trade Organization (WTO) marked the beginning of a new era in the telecommunications sector in China. The effect can be felt in areas including policy making, regulatory philosophy, market structure, foreign involvement, and people’s life, just to mention a few. However, specific historical, political, and economic factors in socialist China have led to a unique policy paradigm in the telecommunications sector. Whether or not the entry into the WTO will help foreign competitors enter the market and have a substantial impact on China’s telecommunications industry, policy, and development depends on many factors, including institutional dynamics and the existence of many non-tariff barriers. Still more, China is constrained by its lack of financial capital. While the government has stipulated preferential policies for foreign direct investment in the western regions, accompanied with an expected boost of foreign investment by China’s accession to the WTO, many factors have in practice added to the complexity of socialist China in its transition to a market economy, especially in terms of foreign involvement in strategic industries such as telecommunications. Policy makers in China have been painstakingly trying to redefine their role and restructure the market while at the same time retaining strategic control of the sector. The re-structuring of the market and the re-defined role of the regulator, if not appropriately planned, may become a problem rather than a motivator for the execution of the Western Development Strategy and sustainable growth of telecommunications infrastructure in the western area. Therefore, the current situation in the western part of China calls for studies that provide careful analysis of its geographic and demographic features, market, and telecommunications infrastructure development mechanism. Thus the effect both from the restructuring process of the market as well as globalization and accession to the WTO should be emphasized.

Having briefly reviewed the current situation and identified both opportunities and challenges facing China’s telecommunications sector and its western development plan,
this study will review and analyze the uneven telecommunications development, market and regulatory rationales and implementation in China in transition. Special emphasis will be given to the effect of globalization in general, and China’s accession to the WTO in particular. The issue of telecommunications access polarization of the western inland region from the eastern coastal region as well as that of mid-sized cities and rural areas from big cities will be considered in additional detail by drawing upon the universal service concept. Finally, this study will attempt to de-construct and re-conceptualize the universal service concept, based on which a framework is expected to evolve that can be used to address the issues in telecommunications development and implement universal service provision in the western part of China.
Chapter 2

LITERATURE REVIEW

The underlying assumptions of this study are two-fold: 1) a correlation exists between development (economic and social) and the diffusion of telephone; 2) a correlation also exists between telecommunications policy-making and the diffusion of telephone access. Thus, it is assumed that the diffusion of telephone access is related to a nation’s telecommunications policy-making as well as to its level of development. Furthermore, the effects of globalization and global regimes are playing an increasingly important role in the dynamics of telecommunications policy-making in a country and thus influencing the telecommunications market and telecommunications access diffusion. Having outlined the components of the research focus, this study now turns to an examination of the relevant concepts and theories. The goal of this chapter is to demonstrate that interdisciplinary theories can be usefully applied to the problem of policy analysis. In the first section concepts of the ‘information society’ will be reviewed. The next section will consist of a broad description and discussion of development theory, as well as some criticism of it. The third section will consider how globalization and the institutionalism theory might be applied to the analysis of policy-making processes. Finally, in the last part of this chapter, the universal service concept and the components of the universal service principle will be analyzed.

2.1 The Definition and Importance of Information

As more social scientists recognize the importance of information to many theories including theories of development and universal access, definitions and descriptions have
proliferated – the majority focusing on the culturally universal or commodity features of information.

2.1.1 The Post-Industrial Society

In his 1973 book, *The Coming of Post-Industrial Society*, Daniel Bell focused on the post-World War II growth of a large service sector and saw the emergence of “Post-Industrial Society”, which Bell coined and many other scholars have adopted to describe the new social structures evolving in modern societies in the second half of the twentieth century. According to Bell, society is entering a new phase of evolution from an industrial form to a post-industrial form. This move from industrial to post-industrial society represents a basic change in economic activity: the move from a goods producing economy to a service economy; and from blue-collar to white-collar employment. In addition Bell argues that the post-industrial age is marked by an increasing predominance of professional, scientific and technical groups. Bell regards a combination of economic and technical advance as leading to a change in class structure, since according to Bell, the increasing information handling requirements of business, the development of information products and the importance of scientific research will help produce a new and powerful class of workers of knowledge. In this way Bell argues that post-industrial society will be based not on the ownership of private property but on the basis of professional skill, since the singular feature of the post-industrial society is an important new principle, “the codification of theoretical knowledge” (p. 151).

However, many scholars are highly skeptical of the predictions Bell has made in his book. Schement & Curtis (1995) propose a question, “does the information society take us beyond industrial society, or is it an extension of industrial society” (p. 14), and point out that the post-industrial proposition fails to account for the historical forces that have generated the tendencies and tensions of the information society, and thus fails to account for the question of historical and social continuity. Based on a synthetic analysis of the evidence of 18 years, the authors suggest that in the United States the tendencies of the
information society grew out of the confluence of three powerful social forces – the idea of information, capitalism, and industrialization, and, “They combine to form the information economy and it, in turn, re-configured work, interconnectedness, daily life, and technology” (p.14).

Kumar (1981) also offers a powerful critique. He questions the foundations on which the concept of post-industrial society is based. Kumar’s critique may be grouped under four points:

(1) the extent to which the growth of the service sector implies that society is post-industrial;
(2) the nature of service sector employment;
(3) the validity of the term “professional”; and
(4) the extent to which post-industrial society relies on codification and the use of scientific knowledge by scientists within large scale employment circles.

Based on the critique, which questions both the concept and the evidence post-industrialists use, Kumar comes to the conclusion that post-industrial forms of analysis are unconvincing, naive and “intellectually conservative” (Kumar, 1981, p.235).

Herbert I. Schiller (1981) criticizes the post-industrial view in *Who knows: Information in the age of the Fortune 500*. He rejects any attribution of uniqueness to the changes identified by Bell, especially those involving information technology and work. He further argues that the entire information society idea can be understood within the framework of the processes that have characterized American capitalism. He emphasizes the role played by capitalist values in the transfer of information from the public sector to the private sector. Privatization of information, he argues, leads to a greater concentration of ownership among large American corporations, exerting similar impacts experienced in non-informational industries. He explains all information activities as resulting from
the forces of capitalism, implying that the idea of an information-oriented society lacks validity, and criticizing technological determinists that see the information society as primarily determined by technological innovations. Therefore, what Bell and others overlook, by holding that a post-industrial revolution emerged from an increase in the rate of change, is that capitalism is a context that encourages certain kinds of change. Industrial entrepreneurs seek wealth through the growth of firms, economies of scale in production, increased productivity, deskill labor, and mechanization, i.e., by concentrating on the process of industrialization. These same tendencies appear today in the “new” information industry. However, this is not to deny that information is key to the modern world, but to argue that the form and function of information is subordinate to long-established principles and practices of the capitalist system.

Another important scholar in the subdivision of economics that concerns itself with the economics of information was Fritz Machlup. Machlup’s pioneering work, *The Production and Distribution of Knowledge in the United States* (1962), has been seminal in establishing measures of the information society in economic terms. Machlup attempted to trace the information industries in statistical terms. Distinguishing five broad industry groups (two of which are education and media), he attempted to attach an economic value to each and to trace its contribution to gross national product (GNP). Machlup proposed this in his early study, which calculated that 29 per cent of the GNP of the United States in 1958 came from the knowledge industries, which at the time was a remarkable rate of expansion. In recent years it has become increasingly apparent that, as a former FCC commissioner has stated:

One need only casually examine our modern economy to find that it rests to a growing degree on the production, processing and dissemination of information; [and] all indications are that technical and economic advancement world-wide is in the same direction – with even greater reliance on information technologies and services. (Robinson, 1978, p. 468)
Another insightful and far-ranging documentation of this fundamental change has been accomplished by Marc Porat (1977). He has made a case that in the latter half of the twentieth century the United States’ economy has evolved from an industrial base to an information base. He supported this contention with a re-analysis of the national income accounts which estimated the information activity involved in all job classifications, not merely those traditionally classified as communications industries. Porat concluded that almost half the U.S. work force could be considered information workers. Furthermore he calculated that nearly half of the GNP was derived from information activities, that is, from the production, management and transmission of information. A very important implication was well-expressed by Porat:

The major implication is that as information technologies “invade” various sectors of the economy, old arrangements may come into conflict with the new. Applications of the new technologies may raise either economic issues or values conflicts that previously lay dormant. The seeds of tomorrow’s opportunities and difficulties are sown today. (p. 8)

2.2 Telecommunications and Social Economic Development

It is believed that the benefits that a strong and sufficient communications infrastructure, accessible to all, can produce for a country’s development are numerous. It provides a lifeline, especially for those in rural areas. For example, it is efficient in enhancing people’s communication skills, reducing transaction costs, and decreasing both physical and social isolation. In addition, it facilitates effective operation of the country’s markets, government, and organizations. It is a link to the rest of the world that is necessary to attract foreign investment. Finally, a telecommunications system can serve as a source of revenue to the government. But before this study proceeds with a discussion of the relation between telecommunications and development, especially in less developed countries, a brief review of the concept of development will be presented.
2.2.1 What is Development

According to Rogers and Svenning (1969), development was defined in terms of a social system as “a type of social change in which new ideas are introduced into a social system in order to produce higher per capita incomes and levels of living through more modern production methods and improved social organization” (p.8). Rogers and Svenning further confirmed that this definition of development was generally congruent with that of Gaplow and Finsterbusch (1964), “The process whereby a contemporary society improves its control of the environment by means of an increasingly competent technology applied by increasingly complex organizations” (Quoted in Rogers and Svenning, 1976, p.9). By this definition, development referred to a kind of adjustment from a traditional way to a modern one in which ideological change and material improvement played an important role, in other words, a “trickle-down” model of development. The assumption of “the West leads and the Third World follows” in this process of development was widely adopted.

However, things were not so simple. Triggered by the development process all over the world starting approximately from the 1960s, studies of development were conducted throughout the world in order to understand, introduce, and promote development in both developed and especially less developed countries. Less developed countries (LDCs) had been struggling for decades to promote their development and standard of living. At first glance, economic growth and nation building seemed to be the foremost goals in their process of development. Economic growth was believed to be the solution for poverty and political instability. Although some LDCs in the last few decades had made remarkable progress in economic growth, such as the Four Little Dragons in Asia, many

---

2 The “trickle down” model of economic development refers to the process whereby the economic gains from economic growth pass down throughout the entire society eventually giving rise to development. In other words, the initial benefit of growth goes to the rich first, but eventually trickles down to the poor. For more information about the model, see Lewis (1988).
failed.\(^3\) Lewis (1988) observed that some LDCs could grow very fast, but this growth varied among countries and the result and wealth was often concentrated in a few hands. Employment growth was also slow in the LDCs, making income inequality a serious problem. Kuznets’ (1995) hypothesis of wealth “trickling down” from the rich to the masses was not supported by the reality of most LDCs.

Faced with the failure of the “trickle-down” model of development, Rogers (1976) redefined development as “a widely participatory process of social change, intended to bring about both social and material advancement, including greater equality, freedom and other valued qualities, for the majority of the people through their gaining greater control over their environment” (p.133). In addition, Bal Gopal Baidya and others (2001) asserted that the concept and assessment of development involved not only material advancement and aggregate output, but also the question of how output is distributed. They believed that “a meaningful development program should have a ‘large’ social group as its target, or its evaluation should be based upon its effects on a ‘large’ social group” (p.27). Thus it was argued that the concept of development embraced at least three dimensions: economic growth, the satisfaction of basic needs, and equitable distribution.

2.2.2 Telecommunications Model of Development

Parker (1992) viewed economic growth as the core of development in less developed countries and areas. He argued that the foremost priority of a country was to create wealth. Wealth creation was not only essential to the satisfaction of basic needs and improvement of living standard, but also helpful in bridging social and ethnic gaps. Parker believed that the key to wealth creation was mobilizing the resources of the country. He identified three key factors in the mobilization process: investment in human

\(^3\) The Four Little Dragons is a term used to refer to four new industrial countries and regions in Asia that have achieved rapid and miraculous economic takeoff. These four countries are: Korea, Chinese Taipei, Hong Kong, and Singapore.
capital, investment in basic infrastructure, and institutional reform. These three factors would permit the people of a society to have access to the infrastructure and use their labor and brain power in a way that creates new wealth for the society.

Thus according to Parker, to create wealth we need to undertake various investment programs. Yet all less developed countries and areas have the problem of insufficient capital for investment. To solve this problem, they can do two things: generate capital from within the country, or borrow capital from outside through aid, joint ventures or other forms of foreign investment. To generate capital from within, people must have earnings and savings. There are three types of resources from which earnings can be derived from within: natural resources, labor, and brain power.

Parker (1992) favored the use of brain power and emphasized the importance of telecommunications infrastructure to develop brain power in the process of wealth creation. He posited that telecommunications can increase human information power and intelligence by the rapid exchange of information. The development of human brain power will help generate capital. After generating capital for investment and wealth, the goals of basic needs, higher living standards, equality, democracy, and national security can be met. The increase in wealth enables reinvestment in all sectors, strengthening the telecommunications as well as other infrastructure, and thus leading to a self-sustaining process of development.

### 2.2.3 Telecommunications and Economic Development

Although the relationship between telecommunications infrastructure and economic development is far from conclusive, quite a few studies (Hardy, 1980; Saunders et al, 1983; Parker, 1992; Rogers, 1976; Leff, 1984; Parapak, 1993; Hudson, 1997, Colleran and Gold, 1991; Dordick and Wang, 1993; Norton, 1992; U.S. Department of Commerce, NTIA, 1991) show that telecommunications development has either a positive impact on, or a positive correlative relation with the economy. The impact of telecommunications on
growth was first found by Andrew Hardy (Hardy, 1980). Hardy attempted to establish an empirical causal relationship between telecommunications and economic growth. He ran a cross-sectional time series regression analysis of telephones per million and GDP per capita of 15 developed and 45 developing countries. The results showed significant relationship between telephones and economic growth. He also found that the biggest effect of telecommunication infrastructure investment on GDP occurred in the least developed countries, and the smallest effect in the most-developed countries.

Studies have shown that most infrastructure investments can positively affect the economy in three ways. First, it can reduce the cost of production. Second, it can increase revenues. Third, it can increase employment through both direct and indirect effects (Alleman, 2002). Similar to other infrastructure investment, investing in telecommunication will increase the demand for the goods and services and thus increase employment. Telecommunications itself is a highly profitable service sector. Furthermore, the introduction of new technologies, such as optical fiber and satellite communications along with an increasing economy of scale, can lower the unit price and make telecommunications a cost-reducing industry (Saunders et al, 1983).

Telecommunication infrastructure is also a little different from other infrastructures because of the existence of network externalities, a phenomenon that increases the value of a service when the number of users increases. In an important study, Roller and Waverman (2001) found that investment in telecommunications infrastructure significantly affects the economic growth of a country once a critical mass of telecommunication infrastructure is achieved in that country (also see Onwumechili, 2001). The critical mass needed to influence economic growth, according to Roller and Waverman, is achieved when telephone penetration reaches 40 lines per 100 population. They also argue that once the critical mass level is reached, telecommunications investment has a larger impact on economic growth per dollar of investment than other
types of infrastructure investment because telecommunications infrastructure exhibits “network effects”.4

Because of the network effects, the impact of telecom infrastructure on economic development maybe more noticeable compared with other traditional infrastructure. With an improved telecommunications infrastructure, production activities can be efficiently organized and market information can be promptly delivered, thus generating more benefits (Parker, 1984). The research by Bayes and others (1999) find that in Bangladesh half of all telephone calls involve economic purposes such as discussing employment opportunities, prices of commodities, land transactions, remittances and other business items. Bayes et al. also note that the average prices of agricultural commodities are higher in villages with phones than in villages without phones. They draw two conclusions from the case study. First, pursuance of pragmatic policies can turn telephones into production goods, especially through lowering transaction costs. Second, the services originating from telephones in villages are likely to deliver significant benefits to the poor. Leff (1984) argues that firms can also have more effectively operated activities with increased telecommunications services (for instance, encourage telecommuting of their employees) and enjoy economies of scale and scope. Also, with the help of telecommunications, information is effectively transmitted, stored, and utilized, so that economic activities can be efficiently organized.

Insufficient investment in telecommunications is believed to hinder the economy. This is usually referred to as the bottleneck effect. According to Jequier (1983), the loss due to insufficient investment in telecommunications is estimated to be 2% of GNP. DeLong and Summers (1993) find a strong connection between investment in telecommunications and productivity growth in developing countries, which implies that developing countries should make progress in developing telecommunications

4 Network effects are similar to externalities and imply that the value of a network increases when the number of persons connected to that network increases. Any additional connection to the network increases the benefit of the network for all users. Also see Robert Crandall and Leonard Waverman (2000).
infrastructure in order to grow. Eggleston et al. (2002) show how basic telecommunications infrastructure can create a “digital provide” by making markets efficient through information dissemination to isolated and information-lacking locals and improving the living standards of the poor, which in turn helps growth. As the authors themselves point out, their analysis is based on references and examples, and that more careful analysis is needed in the context of developing countries.

More efforts have been made to quantify these macroeconomic benefits. For example, researchers have attempted to determine ways in which telecommunications can substitute for transportation and reduce energy consumption. One study by the Ministry of Posts and Telecommunications of China showed that 84% of business trips could be replaced by long-distance calls and 69% of commuting could be substituted by local phone calls. Improved telecommunications was estimated to be able to reduce one third of the passengers using various transportation means. With respect to energy savings, it was calculated that the energy consumption ratio between local phone calls and public bus use was 1:29; between local phone calls and taxi use was 1:504; between long-distance calls and train use was 1:90; and between long-distance calls and long-distance public bus use was 1:140 (Chen, 1994).

2.2.4 Telecommunication, Labor Division, and Employment

Marc Porat (1977) was among the first to analyze the implication of the telephone for economic development from the perspective of labor division. Porat notes two important features with division of labor: a good or a service passes through many hands rather than few hands before it is completed; and that the people who are involved in this process should somehow be able to communicate with each other. He further argues that division of labor helps engage more people in the society and encourage more mobilization and participation, as “the more hands that are involved, the more resources are mobilized. People are employed; places of production (even cottage industries or backyard furnaces) are built; more people have a ‘stake’ in the society…prices tend to go
up. More value is added to each good or service. And of course, value added is one classic way of measuring GNP” (p.78).

Porat argues that such achievements would require a communication infrastructure to facilitate such division of labor, since “the more people, the more hands that get involved in a task, the greater the strain on coordination…a region cannot organize economically without being tied internally by a communication system” (p. 80). But what kind of communication infrastructure will fit here? Porat argues that only point-to-point communication could facilitate division of labor. And the best of all point-to-point communication media available would be the telephone since:

It requires no literacy skills other than simple verbal comprehension and communication; it requires modest capital investment and modest maintenance; the energy requirements are minimal; and it generates zero time delays in the system. (p.81)

Having recognized the importance of the telephone to division of labor and to the GNP, Porat notes that the reason why point-to-point communication, especially the telephone, has not been adopted more widely is that economic planners failed to fully understand the power of division of labor in mobilizing the GNP.

Some other scholars argue that information technology innovations and application at the societal level have caused multidimensional social changes, which give rise to organizational re-structuring of social and economic institutions. One potential benefit is that the emerging information sectors and service sectors will contribute significantly to overcoming high unemployment. This is especially appealing to developing countries in social and economic transition and the urbanization process to generate employment opportunities for the previous agrarian labor force. However, other researchers are much more skeptical. They anticipate that the emerging information society will have only little impact on employment. Schement and Curtis (1995) show that the labor force related to patents, copyrights, and trademarks has grown, while with the exception of the
Great Depression, the numbers and percentage of information workers show no significant change between 1900 and 1990. Therefore “contrary to post-industrial interpretations that focus on the workforce in the 1950s and 60’s, this data shows the information workforce becoming the largest of the four work sectors just prior to 1930” (p. 38).

It is believed that to some extent introducing updated information technology to developing countries may give rise to a boost of information-and/or-service-related employment opportunities, for instance the tele-centers in some African countries. However, some are also wary that too much efficiency and requirements for the workers to acquire knowledge and skills, partially resulting from general as well as specific information technology innovations and applications, may contribute to issues of unemployment. And developing countries may be faced with even more severe unemployment problems. The reason is that most developing countries still lack a mature industrial structure to absorb the labor force, especially for big populous developing countries. Moreover, developing countries usually lack an essential element of a knowledge-intensive economy – sufficient education resources and opportunities for all the people. Consequently newly developed information sectors in the developing countries will not have the capability to absorb the labor force. Furthermore, existing social inequalities and stratification in access to education, information, technology, etc. in developing countries may be intensified as a result of uneven information and technology distribution. This, in return, contributes to the deterioration of employment (Graham and Marvin, 1996).

It is, however, extremely difficult and complex to calculate the impact of the emerging information society on employment. The debate on this question has raged over the last two decades. Although during the 1980s many studies on different countries and industries were made, this has yet to generate a clear-cut answer (Castells, 2000). Therefore it is important to differentiate between direct and indirect employment effects of modern information technology on job markets in developing countries. The creation
of new jobs for producing and delivering new products and new services can be seen as the main direct effect, while the indirect effects are in other areas. This differentiation makes it very difficult to compare the balance of job increase and job decrease for developing countries in this increasingly information-intensified world.

### 2.2.5 Telecommunications and Rural Economy

#### 2.2.5.1 Developing Countries’ Rural Economy

Traditionally, telecommunications has not been a very visible sector in developing and rural economies. However, there is evidence that communications can contribute significantly to rural economic development. This evidence consists primarily of case studies which demonstrate the usefulness of telecommunications for rural communities’ health, education, and links between suppliers and markets for agriculture and manufacturing, and services (e.g., Hudson et al., 1981; Schmandt et al., 1991; Baidya et al., 1998; Hudson, 2001). Kaul (1978) has conducted research on telecommunications in general and telephony in particular as an input in economic sectors of a rural economy. He summarizes the arguments into three hypotheses:

1. telecommunications permit improved cost-benefits of rural social service delivery such as health services and disaster relief and education project management;
2. telecommunications permit improved cost-benefits for rural economic activities such as marketing information, logistics, consumers, expert advice for rural economic activities, and tourism;
3. rural telecommunications permit more equitable distribution of economic

---

5 Baidya et al. view agricultural development very narrowly as consisting of increases in the value of crop yields only. The limitation is due to the measurement and analytical difficulties that arise when one assesses the impact of telecommunications on agriculture output.
benefits.

As to the general assumption that the introduction of telephones in rural areas will increase the productivity of business, Kaul also indicates that telephone communications are most important in tertiary industries and least important in primary sector industries. Hudson (2001) attempts to identify the developmental benefits of rural telecommunications and the conditions for these benefits to be derived from telecommunications investments. Hudson (2001) further suggests these hypotheses be tested in field settings so that a simple model can be developed. The model thus can help developing countries and rural economies decide how much of their limited resources should be devoted to telecommunications, in which regions and/or sectors the telecommunications investment should be concentrated, and what criteria to use in planning these systems.

2.2.5.2 Developed Countries’ Rural Economy

The impact of telecommunications on developing Third World countries has been extensively studied during the last 20 years (e.g., Saunders et al., 1983; Parker and Hudson, 1992; Hudson, 1995; Gabe and Abel, 2002). However, the potential that telecommunications holds for rural areas in industrialized countries such as the United States is not well understood. Parker & Hudson (1992) think that upgrading telecommunications infrastructure is necessary to improve the depressed rural economy in their study of the relationship between economic indicators and telecommunications improvements in the United States as a whole, and within two states, Washington and Oregon. They use the unemployment rate as an indicator of rural economic health and find a causal link between economic quality and improvements in telecommunications.

Jurgen Schmandt and others (1991) have conducted a study on how changes in telecommunications and innovation in telecommunications technology can influence rural revitalization in the United States. While discussing larger issues such as the
information age, structure change, or social equity, they pay more attention to the micro-level analysis. Based on 37 case studies of public and private institutions that either deliver social services, run businesses, provide telecommunications services, or promote economic development in rural areas in the United States, the study has documented and confirmed the potential that telecommunications has for rural areas in a highly industrialized nation. But they have also made it clear that the realization of this potential is far from being universally achieved. It will take the collective efforts of all actors – telecommunications providers, policy makers, rural businesses, and public service providers, and the local government – to establish strategies that are appropriate for local circumstance.

### 2.2.6 Social Effects of Telecommunications

In addition to economic benefits, information technology is believed to be able to make contributions to effectiveness in social services and social development. One point is that two-way information and telecommunication technology will encourage freer debate and greater access to various forms of administrative information, thus having an impact on the functioning of democracy (London, 1995). There is, in addition, a discussion regarding differential access (Ling, et al. 1998; Karunaratne, 1981). Karunaratne wrote:

...telecommunications specifically meets the requirements of participatory democracy with its scope for two-way communication between planners and the planned. Cost-effective telecom can make “grass-roots” level planning a reality and can remove one of the major stumbling blocks that vitiated top-down planning, namely, the lack of two-way communication under the trickle-down strategy. (p. 174)

Thus access to the two-way interactive approach of communication such as telephony, instead of one-way mass media, becomes a prerequisite for participation.
Another social impact some studies have investigated is the way telecommunications facilitates bureaucracy. Technology and bureaucracy have had a long association with each other (Beninger, 1986). This history includes the typewriter, automatic telephone switching, tickertape machines, duplicating machines, the mainframe computer and of course the personal computer (Beninger, 1986). From the perspective of the organization, technology often has the potential of streamlining information movement and retrieval. Mobile phones can enhance the efficiency of communication and reduce the time needed to reach people, particularly those who do not stick to a location. Thus, it is often seen as a positive contribution to the functioning of the bureaucracy. Manning (1996) has provided an analysis of the interaction between mobile telephony and a specific type of bureaucratic organization. In his work he has examined the impact of mobile telephone adoption within police departments. The adoption facilitates various formal and informal communication activities as well as their adaptability to new technologies.

One important social effect information and telecommunications technology may have is believed to be in education. Ling (2000) has conducted a survey to study the impact of mobile telephone use in Norway on the education system. He found that the use of the mobile telephone has facilitated more interaction among students. Many others have emphasized the role telecommunications technology can play in providing education that is otherwise unavailable to developing, remote, and rural countries and regions (Hudson, 1997). Hudson collects data from some African countries and finds that information technology has been used for educating target populations including women and children. Moreover, information technology for distance learning is expected to reduce student’s dropouts and facilitate education in remote and interior location. In addition, other potential benefits of telecommunications include health care delivery in developing countries via providing advice to rural health workers or directly to isolated patients.
Parapak (1993) summarizes eight roles of satellite communications in national development. Based on the previous review, these roles can be conceived as telecommunications’ contribution to development:

1. **Accelerating national development** – Availability of high-quality telecommunications systems improves less developed countries’ global competitiveness.

2. **Modernizing and integrating society** – Telecommunications provides easy access to information. Such access is important for industrialization, education, commerce, and socio-cultural development.

3. **Improving efficiency and productivity** – Timely availability of information and a speedy response to social demands are made possible by modern telecommunications.

4. **Enhancing equitable distribution** – Telecommunications make rural and isolated areas more attractive to investment.

5. **Conserving energy** – Good communication decreases the need for traveling and improves the speed of decision making. Travel reduction means conservation of energy.

6. **Eliminating isolation of remote areas** – Telecommunications provide a fast and economical means to link remote areas with a nation’s business, political, and cultural center.

7. **Expanding market opportunities** – Global networks facilitate service expansion and the introduction of new products. Decentralized corporate management is then possible.

8. **Attracting capital for infrastructure** – Good telecommunications attract capital flows and investment through global linkage.
2.2.7 Criticism on the Telecommunications - Growth Studies

Despite the empirical evidence that suggests that telecommunications development causes economic growth, several criticisms have been made of these studies. The first and foremost concern is believed to be that of measurement. For instance, one research estimates that one per cent growth in telecommunication services generates three percent growth in the economy (Gupta, 2000). But we know that increases in purchasing power (contributed by increased telecommunications services) also increase demand for such services. Chatterjee et al. (1998) point out that income patterns decide the disposable income levels, i.e., purchasing power, for telecommunication services, and in turn the growth of services. Hardy (1980) also shows in his study that the causality is two-directional. He cautions that his language of causal inference refers to a “facilitating” or “contributory” cause rather than a “sufficient” or “necessary” cause (Hardy, 1980, p.285). Therefore, economic growth might be the cause of telecommunications development and hence a reverse causal relationship may exist. This reverse causality has also been investigated by Cronin et al. (Cronin et al., 1991). Cronin et al. (1991) note the existence of a feedback process in which economic activity and growth stimulates demands for telecommunication services. As the economy grows, more telecommunications facilities are needed to conduct the increased business transactions. Roller and Waverman (2001), using data for Organization for Economic Cooperation and Development (OECD) countries, also confirm the validity of the hypothesis of reverse causality. Acknowledging the importance of telecommunications, they also note that for the process of economic growth, there is no conclusive evidence on whether or not telecommunication can be treated as a single independent variable in the process of production.

Another assessment-related criticism comes mainly from economists like Lamberton (1981), questioning the conceptualization and execution of the orthodox approach to analyzing economic factors and determinants, including information related activities. Lamberton (1981) wrote:
…attempts have been made to analyze the role of some components of the information sector – that is, the aggregation of information production and distribution activities – such as education, R&D, and STI (scientific and technological information). These efforts have not met with great success. Three classes of explanation might be offered. First, as Thompson (1973, p. ix) points out, analyses of the industrial revolution lack “cohesion and conviction”. They tend to ask “Was this factor the prime cause? Was it indispensable?” No such list of “indispensables,” he argues, can substitute for the synthesis that would illuminate the process of industrialization. Has not the understanding of “information” been plagued by the same problem? (p. 54)

The second criticism is related to some scholars’ conviction that most of the studies on telecommunications and economic growth tend to ignore the negative impact of telecommunications development. For instance, advanced infrastructure in urban areas will result in neglect of the rural underdeveloped areas that lack a valuable resource. Over-emphasis on economic efficiency resulting from advanced telecommunications technologies may have some negative effects on the economy of developing countries, especially those with a huge population and a very low per-capita resource standard. A further concern that has stimulated heated debate is related to the fact that most advanced information technology (as well as other technologies) is innovated by developed industrial countries and distributed by multinational corporations. Heavy dependence on information technology introduced from leading developed countries and multinational corporations may lead to developing countries’ technological dependency. Considering the increasing market concentration of information technology, it will be very difficult for developing countries to enter into the market and gain bargaining power. Related to this and the socio-economic developmental feature of information technology some scholars raise another concern about the relation between development, poverty, and equality of technology diffusion both at inter-country and intra-country levels (Smith, 2002). Drawing upon the dependency approach, arguments call for concern that smaller, less powerful, and less economically and technologically advanced countries (peripheral countries) are more dependent than others on international political, economic, and technological forces (core). Moreover, the inequality in power and technology leads to
wealth concentration and non-balanced distribution of information technology that may cause further domestic inequality and poverty.

In addition, the studies on the relationship between telecommunications and economic growth fail to pay enough attention to examining the conditions under which developing countries should invest in telecommunications. Even if a conclusive causal link can be made between telecommunications and socio-economic development, little has been concluded so that an “informed” decision can be made regarding when, where, why, and how a developing country such as China with limited financial resources should invest in telecommunications to address issues such as domestic uneven telecommunications development. A related criticism of telecommunications and socio-economic development studies lies in their tendency to overlook the mechanisms through which telecommunications exerts its effects on economic growth.

2.3 Globalization and International Regimes

The process of globalization is changing the world to be a more interdependent system (e.g., Mayer, 1997; Scholte, 2000; Friedman, 2000; Keohane and Nye, 1989). This interdependence has brought new challenges to the use of power in networks of states and cooperation at national, regional, and global levels. It also has the capability in influencing a country’s domestic policy-making process and regulatory conducts. The section will briefly review the concept of globalization, institutionalism, and the international regime theory.
2.3.1 Globalization: The Concept and Definition

Various definitions of globalization have been developed. According to Baran and Davis (2000), globalization refers to “the establishment of social organizations that span geographic, political, and cultural boundaries” (p.347). Those social organizations include multinational governmental organizations, multinational corporations, and worldwide nongovernmental organizations. Another definition reads like “the shrinkage of distance on a world scale through the emergence and thickening of networks of connections – environmental and social as well as economic” (Keohane and Nye, 2000, p.1). Some neo-liberal scholars define globalization as “a process of removing government-imposed restrictions on movements between countries in order to create an ‘open’, ‘borderless’ world economy” (Scholte, 2000, p.16, also see McDowell, 1997). One of the most important insights that these theories and definitions share is the emphasis on globalization as a process of transcendence of territorial geography. Anthony Giddens (1990) has thus developed “time-space distanciation” and defined globalization as “the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa” (p. 64). However, these definitions cannot fully account for the diverse and subtle social, economic, institutional, cultural, and geographic differences among different countries and regions.

It is widely agreed that the common driving forces of globalization are the accelerating “rate and cost of technological advancement”, which has “speeded up the internationalization of production and distribution of manufacturing and products”, and “increased capital mobility”, which has made this “dispersion of industry easier and speedier” (Strange, 1992, p.2). Other causes are transnational communications and money, as McQuail said, “the most immediate and enduring driving forces behind globalization have been economic” (McQuail, 2000, p.217). Garrett also argues “where states were once the masters of markets, now it is the markets which, on many crucial issues, are the masters over the governments of states” (Garrett, 1998, p.146).
2.3.2 New Institutionalism

The new institutionalism emphasizes non-market economic performance and human interaction, and seeks to understand how organizations and governance play a role in either facilitating or prohibiting certain economic activities (North, 1990; Bates, 1995; Koelble, 1995; Yeager, 1998). North (1990) notes institutions are the rules that society establishes for human interaction and for reducing the uncertainty involved in human interaction by giving the people patterns for their behavior (North, 1990; Yeager, 1998). North further points out that institutions “typically change in incrementally rather than in discontinuous fashion” (North, 1990, p.6). This is a result of the

“…imbeddedness of informal constraints in societies. Although formal rules may change overnight as the result of political or judicial decisions, informal constraints embodied in customs, traditions, and codes of conduct are much more impervious to deliberate policies.” (North, 1990, p. 6)

New institutionalism also emphasizes the enforcement mechanism. Institutions often are ineffective if they are not enforced. For this North particularly highlights the role of enforcement,

“…although the rules are the same, the enforcement mechanisms, the way enforcement occurs, the norm of behavior, and the subjective models of the actors are not. Hence, both the real incentive structures and the perceived consequences of policies will differ as well.” (North, 1990, p. 101)

Thus new institutionalism puts important emphasis on the dynamic execution of institutional structures. As is briefly reviewed above, the new institutionalism not only recognizes the importance of institutions in forming organizational structure and economic development, but also emphasizes that the process takes place in a gradual rather than abrupt way. Thus decisions and activities are shaped collectively by
organizations that “bear tracks of their own history” (North, 1990, p.114) and a political process that is structured by constitutions, political institutions, state structure, state-interest group relations, and policy networks. Therefore for new institutionalism, history matters. This is closely associated with the concept of path dependence, a term that has come into common use in both economics and law. Path dependence can mean just that: What we are today is a result of what has been in the past.

Some studies on telecommunications sector reform have been conducted in light of new institutionalism theory. In a cross-country study on the telecommunications industry, Levy and Spiller (1996) find that the institutional endowment of each country has constrained regulatory governance and incentives, and consequently plays a role as important determinants of effective sector policy reform and industry performance. The institutional endowments, especially for the formal institutions, are believed to play a critical role in shaping the national telecommunications regulatory policy. This sheds insightful light on the fact that performance and regulatory outcomes vary across country even though the pressure and tendency is similar. Abdala (2000) uses the same conceptual approach to examine regulatory outcomes in a single country – Argentina. He notes that Argentina’s institutional characteristics are rather dynamic, determining a variety of government choices for regulatory incentives and therefore producing unique regulatory outcomes.

---

6 The concept is mostly an economic item drawing on intellectual movements that arose elsewhere. In physics and mathematics the related ideas come from chaos theory. One point of the non-linear model of chaos theory is sensitive dependence on initial conditions and determination by small, insignificant events. Levi’s (1997) study provides a detailed explanation of how the term is used in social science.

7 Levy and Spiller (1996) studied telecommunications sector based on cross-country analysis. For similar comparative studies see Petrazzini (1995).
2.3.3 International Regime Theory

One of the world polity’s key elements, as Meyer et al. (1997) explain, is a general, globally legitimated model of how to form a state. Guided by this model, particular states in widely different circumstances organize their affairs in a surprisingly similar fashion. Because world society is organized as a polity with an intensifying global culture, new organizations are built to enact its rules. These organizations then help to build and elaborate global governing principles and rules. As Keohane and Nye (1989) illustrate, globalization produces a more complex system of interdependent states in which transnational rules and organizations have gained influence. States pursuing their interests are still a major force. But in an interdependent system, new organizations besides states critically influence world politics, and no clear hierarchy of issues common to all states exists.

Based on the above convictions some scholars have developed an international regime theory. Krasner (1983) defines international regimes as “sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors’ expectations converge in a given area of international relations”, and

“…principles are beliefs of fact, causation and rectitude. Norms are standards of behavior defined in terms of rights and obligations. Rules are specific prescriptions or proscriptions for action. Decision-making procedures are prevailing practices for making and implementing collective choice.” (p.3)

Furthermore, Robert O. Keohane (1995) argues that international regimes are institutions with explicit rules, agreed upon by governments, which pertain to particular sets of issues in international relations. Arguably international regime theory draws on institutionalism. Some studies assess the effect of international regimes, such as the

---

8 See North (1990) and Coase (1960) for the origin and the initial ontological development of the new institutionalism.
World Trade Organization (WTO), on domestic development and policy choices as well as the implementation of the rules and principles of the regime. Fredebeul-Krein and Freytag (1997) assess the WTO telecommunications agreements Reference Paper and argue that apart from the many exemptions, the regulations laid down in the WTO agreement are neither specific nor comprehensive enough to ensure open market access. And because there is in most cases a lack of clear definition as to the meaning and conditions of the regulatory terms, there is a great possibility that governments might nullify the commitments by abusing the regulatory requirements. Other studies have been conducted in demonstrating the differences in institutional systems with regard to the WTO rule of telecommunications (Aronson, 1997). These studies show that the member countries’ domestic institutional mechanisms, structures, and especially regulatory thinking react to international regimes, which will give rise to heterogeneous implementation of international regimes rules.

2.4 Universal Service

2.4.1 Universal Service: The Concept and Definition

2.4.1.1 Universal Service

Universal service has been described as the “foundation of information policy for most of the 20\textsuperscript{th} century” (Schement, 1995, p.477), and as “one of the most commonly cited principles of telecommunications policy” (Mueller, 1993, p.352). The universal service concept was first introduced to the US telecommunications industry in the early 1900s as the reason to support the interconnection of competing networks. Mueller (1993) explores the history of the concept and concludes that it was originally implemented in 1907 as a business strategy by AT&T’s Theodore Vail, to promote
connection to AT&T’s network. As early as 1919, state regulatory commissions recognized that “the use of the telephone is a business and social necessity, and the efforts of a great telephone company…ought to be directed to some extent toward the idea of encouraging the use of the telephone rather than discouraging that use” (Horwitz, 1989, p.135). From then on over the past century universal service has been a dynamic concept, changing significantly depending on the environment. The ability to make and receive calls on the public-switched telephone network (PSTN) is viewed as a necessity for full participation in modern society. The goal of universal access was expressed in the Communications Act of 1934 and in the Telecommunications Act of 1996, which states that the Federal Communications Commission (FCC) shall pursue the same objective for new “advanced telecommunications services” that reached high levels of penetration (Neuman et al, 1998; Leighton, 2001). Similar statements have been made by the European Union\textsuperscript{9} and the government of Japan\textsuperscript{10}.

The commonly held concept of universal service thus includes providing telephone services to everyone regardless of how remote or how poor they are, “in essence, universal service is equated with ubiquitous geographic coverage, universal household penetration and proactive government subsidies to achieve these goals”, wrote Mueller (1993, p.353). Consequently, universal service policy is aimed at high penetration rates using a subsidy mechanism that lowers rates in order to avoid drop-offs from the network. More recently, the Telecommunications Act of 1996 enlarged the scope of the universal service concept to the fields of education, public library services and healthcare and included access to advanced information services and technologies. Regardless of the specific technologies or services, the underlying rationales for universal service are generally quite consistent. The primary reason for policymakers’ emphasis on universal


service involves the importance of fast, effective, and convenient information for all citizens. The social benefits of universal service are well-expressed by Schement (1995):

Universal service derives its significance from a promise rooted in the nature of the political system. All Americans are assured equal access to basic channels of communication because the citizens of a democracy need to be able to communicate in order to avail themselves of the information necessary to make reasoned political choice. And, given the communication orientation embedded in that conception of democracy articulated by the founding fathers, the pledge of equal access is not only logical, but absolutely necessary to the conduct of a free and open society. (p. 484)

Lock (1999) argues that three factors are associated with the concept of universal service and regulators should take them into account. These three factors are: cost-based rates and nondiscriminatory access; a sufficient record of evidence; and flexible regulatory policies with monitoring mechanisms. It has been acknowledged by many researchers that universal service must include two conceptual components: nondiscriminatory access; and reasonable costs or affordability. Non-discriminatory access means that groups of users are treated alike in terms of price and provision of service quality. Reasonable costs or affordability are, however, a more subjective concept relating the comparative cost of the service and the relative purchasing power of the user (World Bank, 2000).

Crandall and Waverman (2000) claim that there are now two definitions of universal service: ordinary available and affordable voice telephony for citizens of all incomes; and a new meaning of ‘availability of innovative services to all potential users’, and that this second definition may be extended to the promotion of new services that are below the network provider’s average cost, or even its marginal cost, because of network externalities. Should universal service be confined to basic voice telephony services or should it be extended? One would assume, of course, that the following kinds of things would be included: minimum quality of service, nondiscrimination, subscriber
directories, operator assistance and directory enquiry services, public payphones, access to emergency services, and provision of services to those with special needs.

2.4.1.2 Difference between ‘Universal Service’ and ‘Universal Access’

Schement and Forbes (1999) propose definitions for ‘universal service’ and ‘universal access’ respectively. They write that in traditional telecommunications policy terminology, universal service constitutes an idea and a goal to provide households with functional telephone service. And universal service policies typically target individuals who are unable to pay for existing telecommunications services. On the contrary, universal access measures the availability of a telephone to a given individual or household. In universal access technology is publicly available. The charges arise at the point of purchasing, and the user has little or no choice in determining the service. For example, in OECD countries, with residential penetration typically above 75 per cent, households without a telephone are considered to be disadvantaged. Hence advanced countries’ governments and regulators are concerned with policy instruments for achieving universal service – service to every home. In low-income countries, however, the only realistic objective is to achieve ‘universal access’ whereby every citizen would be able to access a public phone in every community, village, or area. Therefore, access strategies for low income countries are important to address the problem of low affordability.

Two types of universal access gap need to be differentiated in developing countries, according to Navas-Sabater et al. (World Bank, 2000). One is the market efficiency gap; and the other is the access gap, per se. The market efficiency gap refers to “the difference between the level of service penetration that can be reached under current plans and conditions, and the level one would expect under optimal market conditions” (p.19). This gap can be closed without public financial aid, through sound market-oriented policies in which the private sector plays a leading role in investing in the network and providing services, markets are liberalized, telecommunications operators enjoy a stable regulatory
environment, and entrepreneurs are free to profit from providing public services. The other access gap per se refers to the access disparity due to low income and backward development that needs to be addressed with approaches different than those to the market efficiency gap.

2.4.2 Measurement, Basic Access Indicators, and Causes

Having acknowledged the existence of a telephony access gap, some scholars are concerned about finding an effective assessment approach, as it is believed that measuring the existing telecommunications policies and subsequent progress of a universal service program is critical. As Schement and Forbes (1999) note, measuring the demand for service and the communications technology penetration level is key to improving the status quo. The above-mentioned World Bank Report identified several basic access indicators via which universal access may be assessed: teledensity (telephone lines, or Direct Exchange Lines, per 100 people); residential penetration; affordability; and urban-rural gap. The NTIA’s research publications echoed this tradition. The universal-service paradigm was profoundly concerned with household access (defined in binary fashion), with special concern for inequality between rural and urban areas (a salient distinction due to both the challenging economics of rural telephone service and the bipartisan appeal of programs that assist rural America) (Hall 1993;

11 The ITU publishes regulatory curves showing a fairly predictable relationship between teledensity and national income. Most of the data is accessible through www.itu.org.

12 In their World Bank report, Navas-Sabater et al. (2000) argue that it is more meaningful to separate business and government penetration from residential lines and calculate residential telephone penetration in terms of lines per 100 households. This, according to the report, more accurately describes the level of penetration reached among the general population, as it takes the socio-cultural factor of average household size into consideration.

13 Navas-Sabater et al. (2000) in their study remind that with the liberalization, tariffs are usually ‘rebalanced’ to reflect costs more closely. Local call charges tend to rise while long distance and international charges reduce.

14 Navas-Sabater et al. (2000) argue that providing telephone access to rural areas poses more challenge to the regulator than for the urban poor.
Schement & Forbes 1999). The telephone paradigm’s influence is evident in the NTIA’s first study of the digital divide (NTIA, 1995). The report’s authors carefully framed their attention to the Internet as continuous with existing policy, noting, “At the core of U.S. telecommunications policy is the goal of ‘universal service’ – the idea that all Americans should have access to affordable telephone service. The most commonly used measure of the nation’s success in achieving universal service is ‘telephone penetration’…” (NTIA, 1995, p.1). It begins with the introduction to the nation’s universal service database, and then identifies the “have-nots” groups, using the data from the database. Some findings related to telephone access are:

1. The poorest households in central cities have the lowest telephone penetration.
2. Rural and central city minorities have lower telecommunication penetration.
3. The youngest and oldest householders in rural areas are the most disadvantaged groups in terms of access to telecommunication.
4. The fewer the number of years of education, the lower the telephone, computer, and computer-household modem penetration.
5. The lowest telephone and computer penetration is in Northeast central cities, plus central city and rural areas in the South.

Schement (1999) has also conducted multiple studies analyzing the demographics of the telephone gap in the United States in detail. He notes that a review of the factors contributing to nonsubscribership indicates that households without phones comprise multiple but overlapping groups. These groups include minorities, African Americans and Latinos in particular; low-income people, women, youth, unemployed, families in multiple unit housing and in rental housing, and etc. He also indicates that geography may confound the influence of income and penetration rates very dramatically from state to state. The telephone penetration gap between the majority and minorities at the national level gives way to significant variations when one focuses down to the level of
the counties. This finding is echoed in the World Bank report (World Bank, 2000), in which the authors enunciate that the geographic challenge reflects the ratio of remote and challenging rural areas compared with the total surface area of the country.

### 2.4.3 Policies and Solutions

The universal service goal gave rise to comprehensive government regulatory schemes including government ownership of the system (in most countries) or heavily regulated private monopolies (in the United States). In all countries, the government has set rates for service that have forced some customers (usually business and urban customers) to pay more than the cost of delivering the service to them in order to make the service available to others (rural and residential customers) at prices lower than the cost of delivering service to them (subsidy). However, as monopolies are no longer thought to be the most efficient way to provide communication services, governments are encouraging competition in order to bring the benefits of a market economy to this sector, and at the same time putting demands on competing service providers to deliver service to certain customers at or below cost. Policy experts from many countries have attempted to find some acceptable middle ground but without much success. Some analysts have asserted that the two goals are not of equal weight,\(^\text{15}\) but for the purposes of this paper both are assumed to be important public objectives.

But the question is, can any government scheme provide for competition and government promotion of universal service? The universal service debate can be characterized as a classic case of choosing between equity and efficiency. On one hand, government seeks equity for its citizens through a politically mandated pricing structure and level of service, while, on the other, it seeks to exploit the power and efficiency of a free market that will make decisions about price and service based on rate of return to

\(^{15}\) See Grand (1991).
investors. This section will review studies conducted by many scholars in many different countries and contexts in order to throw some light on approaches to universal service policy in telecommunications.

2.4.3.1 Universal Service Reform in a Competitive Context

The FCC has historically implemented rules and policies to make telecommunications service affordable to all individuals through a combination of implicit and explicit subsidies available to incumbent local exchange carriers (ILECs). For some time, economists have criticized the idea of providing direct subsidies to the companies serving these high-cost areas because it provides an insufficient incentive for them to improve operations and lower costs. Mueller (1995) asked, “But as long as the rural telecos are collecting universal services subsidies, why should anyone bother to develop and deploy radically different, more efficient ways to serve these areas?” (p.228). In the 1996 Act Congress directed the FCC to replace the existing universal service support mechanisms with “specific, predictable and sufficient Federal and State mechanisms to preserve and advance universal service.”

Bonnett (1999) believes that the old regime of employing rate averaging and subsidy is the conventional approach. As the regime is forced to change, there is a need to re-design the system by abandoning rate averaging and subsidy; and by using a rate rebalancing approach to achieve competitive neutrality among all carriers in the network system.

The criticism from Blackman (1995) on the restructured telecommunication sector proves to be harsh. He writes that universal service is a revealed theme of myth and an ideological concept which has been used and manipulated by different parties to support their own case for special treatment. For example, it has been widely argued for many years that monopoly provision of plain old telephone service (POTS) has largely been

---

responsible for the wide penetration of telephones and that, therefore, restructuring the telecommunication sector will have a detrimental effect on universal service. Many other researchers believe that the loss of subsidized telecommunications service could be a serious blow to efforts at rural economic development in some areas of the United States. To balance the criticisms from both sides and to maintain a universal service fund in order to offer universally accessible telephone service to the public, an NTIA Infrastructure report proffers the idea that all providers of the service to be subsidized must contribute to any pool of money made available to promote access to the service. Alternatively it endorses a proposal to charge all business and residential subscribers a surcharge to fund this pool (Wenders, 1987), because such a charge would do least damage to economic efficiency and be borne by the broadest spectrum of telecommunications users. This report also recognizes the importance of interconnectivity and interoperability in the universal service puzzle, because these standards will help bring competition to the local exchange and make it possible to share infrastructure.

Navas-Sabater et al (World Bank, 2000) indicate that even when the monopoly operator is capable of reaching its targets, introducing competition has always shown that it can improve the efficiency of line rollout and bring prices closer to the actual costs of service provision, thus improving service affordability and better enhancing access to services throughout the country. Blackman (1995) shows evidence that competition in telecommunications does not necessarily threaten universal service. Indeed, where competition has been introduced, costs have fallen and penetration has risen. A report conducted by the Hudson Institute (Pitsch and Teolis, 1994) rejected the argument that rural markets are natural monopolies in which competition would be counterproductive and asked that competition should be allowed to flourish where it can, with other means used only in areas where competition does not take hold. It suggested that the overall level of universal service subsidies be reduced and that subsidy schemes be both retargeted to achieve greater efficiency (e.g., tying subsidy to income level rather than to geographical location) and reorganized to collect money from all customers or providers. The report recognized that the industry is in transition and that close monitoring by
government is critical, as are transitional measures, such as a “bulk billing access plan,” which would collect support from outputs such as interexchange services rather than from inputs such as access charges.

Eli Noam (Noam, 1994), writing about the problem of funding universal service in an open, competitive marketplace, recognized that a funding mechanism must have participation from all firms that compete to sell the services included in the definition of universal service. Noam called the criteria he developed for any new funding mechanism the seven neutralities and the five “friendlies”. Furthermore he proffers the idea of NetTRANS account. The idea behind the NetTRANS account embodies a creative attempt to get everyone under the same tent, while, at the same time, recognizing that demands for contributions toward universal service goals may come from more than one government entity. Essentially the NetTRANS account taxes all telecommunications channels on the basis of revenues they collect to carry messages in the channel (including both transmission and switching functions) and gives the tax to an independent administrative body to distribute.

Some case studies about universal service policy and outcome in various countries have appeared recently. Crandall and Waereman’s (2000) study analyzes demand for residential telephone service, calling patterns and telephone expenditures across several industrialized countries. They focus primarily on the US, Canada and the United Kingdom. They also develop an estimate of the social cost of universal service policies for the United States, pointing out that most industrialized countries have some sort of implicit subsidy program for universal service. The authors address what they call ‘the (new) universal service’, the requirement to provide discounts to schools, libraries, and rural health centers for high speed access under the 1996 Telecommunications Act.

Not only has universal service policy involved financial guarantees, but other conceptual components also need to be inserted in the policy making process. Schement and Forbes (1999) have identified the Informed Choice Model (ICM) of Universal
Service, emphasizing the three basic tiers of universal access. Noticing the absence of choice in the basic and advanced tiers currently in use around the world, they propose to insert choice at the three levels of universal access by moving availability and connectivity away from location-dependent technology. Under the old concept, universal service simply represented an intent to wire a nation. They suggest that the welfare of the people may be better achieved if people actively choose the configuration of their access. While some individuals in these groups may simply lag behind majority adopters due to lack of opinion leadership; adherence to traditional patterns of technology; or delayed market forces (Rogers 1995, Compaine 1997), it is more likely that it is the systemic barrier that often prevents the adoption of a communications technology.

The Organization for Economic Cooperation and Development (OECD) has undertaken studies in the regional development experience of OECD countries. It has found that policies based on redistribution mechanisms involving direct assistance to enterprises, technocratic approaches to heavy infrastructure, or support to declining economic activities do little to stimulate growth and employment in the regions concerned and may even be costly. Setbacks or partial setbacks some countries have experienced include:

1. the inadequacy of pouring massive amounts of assistance through bureaucratic channels into lagging regions;
2. artificial interventions;
3. launch of major infrastructure projects without taking regional demand into account; and
4. maintenance of direct assistance to declining sectors in order to protect local economic activities.

Yet such evidence provides little guidance to national planners who must decide how to allocate limited development budgets. It also provides little assistance to development agencies which are faced with questions like what type of development;
with what other complementary infrastructure, and in what kinds of social, cultural, economic, and environmental/geographical circumstances. One more question is asked yet not answered: under what circumstances is an investment in telecommunications likely to make cost-effective contribution to development?

2.4.3.2 Developing Countries in Particular

Noticing that multiple groups of people around the world suffer from low penetration of available technologies, or experience slower diffusion than the national average, the United Nations (UN) in 1997 regarded lack of effective universal service policies as a primary reason why there is unequal access to communications technologies. Most developing countries, especially the least developed countries, are lagging behind since they lack effective policies that promote equitable access to telecommunications technologies including telephony. A carefully drafted and effectively implemented universal service policy has become the first and foremost objective for most developing countries promoting accessible and affordable telecom services for the public.

Developing countries usually have a huge rural population lacking access to telecommunications while a small population enjoys the most advanced telecommunications services. There are problems of financing that require the maintenance of a monopoly to cross-subsidize from urban to rural areas. Some would favor the strategy of attracting capital by privatization, but such a policy may bring services only to profitable areas; the government still needs to intervene to provide services for non-profitable areas (Lee, 1997). Stone (1993) thus proposed a public-private cooperation in which private enterprise provides the profitable local area network, while the government provides the non-profitable trunk links. A question raised regarding such “cooperation”, however, is why should government take the non-profitable part and the private enterprises take the profits?
There are other options for addressing the issue of unevenness in telecommunications service. The first option is called the “uplifting” strategy. It is to inject massive capital into the rural-peripheral sector to speed up its telecommunications development. The second strategy is the “engulfing” option, which is to continue to develop the urban core and only some strategic sectors in the rural periphery where the interdependent links between telecommunications and other economic activities are strong (Baumol, 1967). The “uplifting” strategy attempts to eliminate disparity by pulling up the rural periphery, whereas the “engulfing” strategy aims at eliminating disparity by expanding the urban core. With the expansion of the urban core into the rural and inland areas, disparity and unevenness between the rural periphery and urban core disappears. The rationale of the “uplifting” strategy maintains that developing countries continue to have low levels of per capita income because of interlocking vicious circles. Piecemeal attempts to promote economic growth are defeated by these vicious circles, which only a massive injection of capital on all fronts can possibly break. Uneven development is to be avoided by introducing a comprehensive and integrated program. Myint (1980), however, points out that the crucial practical question which faces the developing countries is not how to plan their development programs as if they had unlimited supply of resources, but what sort of choices they should make when their currently available resources are insufficient for comprehensive balanced growth programs.

Saunders et al (1983) suggest that in developing countries particularly where the demand for telecommunications services considerably exceeds supply, international telephone, telex, long distance telephone, and local telephone service in the larger urban areas can generate relatively large financial surpluses. In a country where development priorities lie in providing employment and necessary infrastructure in the more rural and backward areas, and in which basic sector services are integrated and provided by one (or in large countries, no more than a few) regulated but semiautonomous entities, a part of these financial surpluses can be used to initially extend at least a basic public call office service to the possibly less profitable smaller towns, villages, and semi-rural areas.
Weller (1999) proposes the use of auctions for determining which carriers should undertake a universal service obligation, and what compensation they should receive for performing this function. This would be one step short of franchising of universal service obligations, i.e. the obligation to provide service to a particular group of uneconomic users or in a particular geographic area could be opened to competitive tendering, with the bidder meeting acceptable levels of quality and proposing the lowest subsidy winning the right to provide service. Potentially the advantages of such an approach are that it facilitates market entry and exploits operators’ own valuations of the costs, revenues and other benefits of providing universal service instead of imposing an external costing method.

Falch and Anyimadu (2003) present a field study in Ghana of how tele-centers in Ghana have contributed to universal access and discuss their potential impact on rural development. Peha (1999) proposes a policy to motivate private-sector operators of basic infrastructure to expand infrastructure into previously unserved regions. The author believes it to be particularly useful when resources are transferred to the private sector, as occurs during the privatization of a state-owned telecommunications carrier, the introduction of competition, the release of spectrum, or the allocation of cash subsidies for this purpose. Onwumechili (2001) studies the universal service proposition by analyzing Nigeria’s attempts to provide telephone service since the country’s independence in 1960. The paper notes impending problems with Nigeria’s attempts to achieve critical mass, which is essential for universal access. Ultimately, it suggests various strategies that the country should use to stimulate critical mass and achieve universal access. The Nigerian telecommunication regulator requires communication investors to provide no less than 20% of their services to the rural areas (Ernberg, 1998). Similar policies have been adopted in the Philippines from companies offering cellular and international services (Hudson, 1997). This ensures that investors do not simply concentrate their services in the urban centers where services are more easily affordable. The second step is for the government to set up a Telecommunications Investment Fund, as is the case in Tanzania and Chile, with contributions from investor taxes and license
fees (Ernberg, 1998; Luhanga, 2001). Thirdly, this fund will be used to provide low-interest loans to rural residents who wish to set up local entrepreneurial tele-centers to serve their communities.

Milne (1998) proposes a framework in order to reflect the unifying theme of ‘fulfilling basic telecoms needs’, with differences in the state of a country’s network development. He identifies five main stages of universal service policy development, namely: network establishment; wide geographic reach; mass market take-up; network completion; and service to individuals. He further explores the notion of affordability and believes that it is hard to measure it.

2.4.3.3 National Institutional Constraints

In the process of policy making and implementation, institutional enforcement can be either a facilitating or a constraining factor. In 1994, Levy & Spiller (1996) conducted a study where they found evidence of the need for institutional constraints to ensure the credible commitment of regulators to increased infrastructure investment. Henisz (2002) empirically confirmed these findings for the electricity and telecommunications sector. His empirical analysis of over 100 countries demonstrated that institutional constraints on political actors that limited the potential for arbitrary policy change were positively related to increases in infrastructure growth rates, even when accounting for unobserved country-level heterogeneity. In the case of Latin America, many have questioned if most countries have indeed committed to creating and ensuring credible regulatory regimes (Noam, 1998). However, more recent evidence suggests that the provisioning of a “check and balance” in the Brazilian privatization program, by means of an independent judiciary, provided investors with safeguards against arbitrary expropriation by the government. This provided them with assurances to enter the market and invest confidently (Mueller, 2001). By contrast, Begara, Henisz and Spiller (1998) find that where veto power is held by multiple actors within an institution, there is a reduction in infrastructure investment risk.
2.4.4 Issue of Demand

While acknowledging the existence of an access gap, many researchers have raised a concurrent question of demand gap. Saunders (1982) primarily focuses on some of the more applied economic aspects of the provision of telephone service in the context of developing countries and argues that the reason for such a relatively low level of investment is not that there is a lack of demand for telecommunications services. Nor is that telecommunications entities are money losers the reason. He writes;

…while the part of the population functioning at a minimum subsistence level does not make significant direct use of telephone facilities, the opposition to investment in telecommunications in developing countries for distributional reasons appears to be at best shortsighted and in the long run could significantly retard both the level and the distribution of economic activity. (p.52)
Chapter 3

RESEARCH QUESTIONS AND PROCEDURES

This study mainly employs a combination of archival analysis and case study as the primary tools of analysis. Three techniques are utilized:

1. The evolution of qualitative and quantitative data;
2. Examination of technological, economic, and policy environments; and
3. The construction of an analytic framework.

Both qualitative and quantitative analysis will be used. Major government publications, legal sources, periodicals, statistics in published books, reports released by policy research organizations, and official as well as commercial websites will be drawn upon to understand the cause, status, and context of the uneven telephone distribution and access in China. The main focus is on the western regions of China where telephone infrastructure is far less developed than in the rest of the country. Findings from these research sources will be analyzed to offer an analytic framework and policy recommendations that can help ensure universal service and access in the western regions of China.

3.1 The Case Study Method

The case study is an ideal methodology when a holistic, in-depth investigation is needed (Feagin, Orum, and Sjoberg, 1991). Researchers have used the case study method for many years across a variety of disciplines. Social scientists and sociologists, in particular, have made wide use of this qualitative research method to examine current
issues and the application of ideas and theories. Case study research is a very useful method in giving the researcher an understanding of a complex issue. Besides, case studies emphasize detailed contextual analysis of events or conditions and their relationships. For instance, some researchers suggest that the case study might be particularly useful for investigating a contemporary phenomenon in which the boundaries between the phenomenon and its context are not clearly distinguished and the context is part of the study. Robert K. Yin further defines the case study research method as an “empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used” (Yin, 1984, p.23). This method can be especially useful for analyzing telecommunications infrastructure development in western China, as the under-development of telephone penetration in the western regions of China is both the phenomenon and the context of the study. 

Apart from a detailed contextual analysis that the case study method can facilitate, the case study is also believed to be suitable for answering “how” and “why” questions (Yin, 1984; Yin, 1994; Stake, 1995; Stake, 1998; Campbell, 1975). This makes the case study method one of the most appropriate research strategies for this analysis. How to provide universal service and equal telephone infrastructure development in western China is the focus of this study. The transition of China’s social-economic structure from a socialist central control system to a free market, quasi-capitalist system is an important contextual part in this research. How the globalization process and the global regime may affect China’s domestic telecommunications policies and why some domestic institutional structures may become a constraining force contending with the influence of globalization are also included in the study. The case study method will be helpful in analyzing and answering these “how” and “why” questions.
3.2 Organizing the Research

Many well-known case study researchers such as Robert E. Stake (1995), Helen Simons (1980), and Robert K. Yin (1984) have written about case study research and suggested techniques for organizing and conducting a case study. The method of this study draws upon their work and proposes four major steps:

- Determine the research questions and select the case;
- Determine the data gathering principles;
- Collect the data;
- Evaluate and analyze the data.

3.2.1 Determine the Research Questions and Select the Case

The first step in case study research is to establish a firm research focus to which the researcher can refer over the course of the study of a complex phenomenon or object. The researcher establishes the focus of the study by forming questions about the situation or problem to be studied and determining a purpose for the study. The researcher investigates the object of the case study in depth using a variety of data gathering methods to produce evidence that leads to understanding of the case and answers the research questions (Yin, 1984; Yin, 1994).

Many major researchers in the field including Yin, Stake, and others have agreed that case study research is not sampling research, but selecting units of analysis. In order to maximize what can be learned during the particular period of time for the study, single cases may be used to confirm or challenge a theory, or to represent a unique or extreme case (Yin, 1994). According to Yin (1994), single-case studies are also ideal for revelatory cases where an observer may have access to a phenomenon that was previously inaccessible. These studies can be holistic or embedded, the latter occurring when the same case study involves more than one unit of analysis. In case studies each
individual case study consists of a “whole” study, in which facts are gathered from various sources and conclusions drawn on those facts.

The unit of analysis in this study – the case – is voice telephony development and access in the western regions of China. Voice telephony in this study includes both wired (also wireline or fixed-line) and wireless telephony. This case is selected because it is believed that it is an important time to conduct a comprehensive study of the uneven telecommunications access in China. The underdevelopment of telecommunications access and services in the western region of China has become a big handicap in the region’s sustainable economic development and social stability. In this case, the primary interest lies in determining whether or not the telecommunications (in this case the telephone) distribution and access is even in China. Then based on an analysis of domestic factors and the global polity and economy, a framework is to be developed and used to achieve a thorough understanding of the issue and to suggest a possible solution to the problem. The study begins with a review of the literature to determine what prior studies have been conducted about this issue, and then uses the literature to define the following research questions (RQ) for the current study.

**RQ1: What is the pattern of access to telephone services in China?**

A response to this question involves examining a number of subsidiary questions. For a country whose essential telecommunications development started barely two decades ago, and in which there is a rationale that telecommunications as a strategic infrastructure should be used to facilitate the overall national strategy, it is necessary to document in great detail the geographically and socio-economically uneven level of telecommunications development. In this connection, the study will include an assessment of the unevenness of telecommunications development in China, its historic origin, geographical factors, and the policy rationales that have led to the current situation. The subsidiary research questions (SRQ) related to the first major research question thus are:
SRQ1: How is the telephone infrastructure distributed in China?
SRQ2: What is the pattern of telephone services access in China?
SRQ3: Is there a regional disparity in telephone distribution and access in China?

Based on analyses of the geographic, historical, and policy factors, the study attempts to present a thorough interpretation of the causes that result in the current telephone distribution and access pattern. Therefore the second research question will be:

RQ2: What are the causes affecting the availability of telephone service and telephone infrastructure development in the western region of China?

In a socialist country that is undergoing a period of transition from a planned economy to a market structure, especially in the post-WTO era, there is an important question of how existing telecommunications operators, in fulfilling development of the western region of China, will react to competition that is required by the WTO agreement. The subsidiary research questions related to the second major research question are:

SRQ4: How does the transition of China from a socialist central planned economy to a socialist market economy affect telephony development and access in western China?
SRQ5: What will be the effects of China’s accession to the WTO on telephony access and development in the western areas of the country?
SRQ6: What is the role of foreign investment in China’s post-WTO era in telephony access and development in the western areas of China?
The study finally attempts to develop a framework and provide policy recommendations for providing affordable telephony access in the western areas of China. The following research questions are defined.

**RQ3: What is an appropriate regulatory framework for achieving affordable telephone access and sustainable telephone development in the western areas of China?**

The Ministry of Information Industry (MII), which was established in 1998, is currently a regulator for both telecommunications operation and equipment manufacturing. The subsidiary research questions related to the third major research question are:

**SRQ7:** What, if any, constraints must the MII take into account when formulating telecommunications policy to develop telephone services access in the western and inland areas of China?

**SRQ8:** What is the role of the Chinese policy-makers and regulatory institutions in meeting the telecommunications development needs in the western areas of China under current circumstances?

### 3.2.2 Determine Data Gathering

Many researchers have discussed the question of the case study method’s validity and reliability (Yin, 1994). A single-case study can achieve validity by following some principles of data collection and evaluation. Yin (1994) suggests using multiple sources of evidence as the way to ensure validity. The rationale for using multiple sources of data is the triangulation of evidence. Triangulation increases the reliability of the data and the process of gathering it. In data collection, “triangulation serves to corroborate the data gathered from other sources” (Stake, 1995, p.41).
Apart from the multiple sources of data that assure the validity of a study, the specification of the unit of analysis is also believed to provide internal validity as the theories are developed and data collection and analysis are used to test those theories (Yin, 1994). To achieve external validity, Yin (1994) suggests researchers pay more attention to theoretical relationships, from which generalizations could be made.

It is also noted that the data gathered is normally mainly qualitative, but it may also be quantitative. Tools to collect data can include surveys, interviews, documentation review, observation, and even the collection of physical artifacts. The current study, following Yin’s suggestion, will use multiple sources of evidence to ensure the validity of the study. For documentation, press releases, newsletters, print and web publications have been obtained. For archival records, market research reports on telephone distribution in the western regions of China will be checked. No interviews will be conducted, but speeches of top executives and officials in regard to the research object will be included in the analysis. An explanation-building technique is applied and materials revealing the contextual situation are included so as to analyze the environment and telephone infrastructure development in China in general and that of the western areas in particular. Moreover, the study will be broadly open to materials explaining influence from the leadership of the State Council of China, the Ministry of Information Industry, and the Communist Party. This influence will be analyzed using the new institutionalism theory to get a thorough understanding of domestic telecommunications policymaking. Also, a situational analysis of sources regarding globalization and China’s accession to the World Trade Organization will be adopted using the concepts of international regime theory to achieve an understanding of the international circumstances of the phenomenon. All data collected will be clearly documented so as to ensure reliability.

### 3.2.3 Collection of Data

The key sources for the case study include: (1) government documents; (2) reports made by market research firms; (3) newsletters that are designed to keep subscribers up
to date; (4) conference proceedings; (5) journal articles devoted specifically to telephone infrastructure and universal service; (6) books primarily about the research subject; (7) articles in popular magazines and newspapers.

Preparation for data collection is begun by conducting a literature review on telecommunications-for-development, universal service, and telephone infrastructure development in China. The reviews contribute both to the research framework and to the collection and analysis of the desired data and materials. The literature review focuses predominantly on information available in print and on the Internet, as well as in various other forms, including recent papers and/or research (published and unpublished); major magazines and newspapers (both in English and in Chinese), and company reports.

Most of the information needed to conduct the study is in the form of published statistical reports. The study will draw a great deal on the *Yearbook of China Communications (First Issue)*, published in 2003; and the *Annual Statistical Reports of Telecommunications of China*. Both publications, compiled by the Ministry of Information Industry (MII) of China, provide specific and detailed descriptions and data of China’s telecommunications industry, including the historical and current situation of the telecommunications sector at the national, provincial, and regional level. Other important sources include the Five-Year Plans issued by the Chinese government. All those Five-Year Plans shed more light on the history of China’s telecommunications development and policy-making process. The study will also draw on the national and regional data reported in *Statistical Yearbooks of China* (1990-2002) and *A Compilation of Historical Statistical Materials of China’s Provinces and Autonomous Regions* (1949-1989) by the National Bureau of Statistics of China and data released by the Ministry of Posts and Telecommunications (MPT) (publications released before 1998) and the MII (publications after 1998) of China. These reports include comprehensive data on China’s demographic, ethnic, and socio-economic features; teledensity; telecommunications infrastructure development and distributional changes from 1960 to 2002 for each and every one of the nation’s provinces. Some data is available from the online database
released and stored by the Center of Electronic Industries of China (www.ceic.gov.cn), the statistical branch of the MII. Apart from the policy documents and statistical data that can be collected through the aforementioned sources, a great number of trade magazines and national newspapers will be added to the database including People’s Daily, Guangming Daily, China Daily, China Telecom World, Mobile Communication, Contemporary Telecom, China Data Telecom, Journal of Telecom, and many others. Most materials and data regarding telecommunications development in China will be in Chinese, whereas most materials and data regarding other countries’ telecommunications status, universal service policy and outcome, and trade issues between China and other nations will be in English.

Regional telecommunications resources distribution and access are sensitive to geographic scale, and multi-scale analysis seems to be a necessary approach in this study. On the first scale China will be divided into coastal-eastern, central, and inland-western regions, based on the long-standing coastal-interior divide, and following the measures adopted in the Seventh Five-Year Plan (1986-90). Another important scale is telecommunications distribution across provincial divisions. Based on the data and the geographical divisions of telecommunications resources and access at and above provincial level the patterns of telecommunications services access in China will be mapped. Then the principal factors that explain the identified patterns will be examined based on these collected documents and literature on historical origins, geographical locations, and policies.

3.2.4 Evaluate and Analyze the Data

“Data analysis consists of examining, categorizing, tabulating, or otherwise recombining the evidence to address the initial propositions of a study” (Yin, 1994). That the analysis of data in the case study is one of the least developed aspects of the case study methodology is noted by many researchers (Yin, 1984; Yin, 1994; Stake, 1995). The researcher needs to rely on experience and the literature to present the evidence in
various ways, using various interpretations. This becomes necessary because statistical analysis is not necessarily used in all case studies. This has also become the major weakness that has been criticized by some social scientists as being ‘unscientific’ and ‘invalid’. However, the issue of validity can be dealt with using pattern-matching. Campbell (1975) describes “pattern-matching” as a useful technique for linking data to the propositions. Campbell (1975) asserts that pattern-matching is a situation where several pieces of information from the same case may be related to some theoretical proposition. Besides, there must first be an analytic strategy, which will lead to conclusions. Yin (1994) presents two strategies for general analysis. One is to rely on theoretical propositions of the study, and then to analyze the evidence based on those propositions. The other technique is to develop a case description, which would be a framework for organizing the case study. This study will employ a combination of the two strategies. Moreover, Yin (1994) presents four principles related to data analysis and evaluation:

- Show that the analysis relied on all the relevant evidence;
- Include all major rival interpretations in the analysis;
- Address the most significant aspect of the case study;
- Use the researcher’s prior, expert knowledge to further the analysis. (pp.97-114)

The analysis of the data in this research will follow the abovementioned four principles. Besides, the raw data will be examined by using many interpretations in order to find linkages between the data and the research object and research questions. Throughout the evaluation and analysis process, the researcher remains open to new materials and insights.

As was noted, quantitative data will be collected to corroborate and support the qualitative data which is most useful for understanding the rationale, the problems, and the perspectives of telephone infrastructure development in western China. All the
evidence will be examined carefully and in many ways to avoid premature conclusions. When evidence conflicts, closer examination of the differences will be attempted to identify the cause or source of conflict. In all cases, the evidence will be treated fairly to produce analytic conclusions answering the original research questions.

The study attempts to analyze the evolution, formation, and transformation of China’s telecommunications policy and the administrative and regulatory institutions. To do so requires a qualitative interpretation and evaluation, based on limited literature. Consideration shall be taken that policy analysis should be able to show the intentions of the governmental authorities who tend to regulate telecommunications industries to fulfill political and economic purposes. The process will be demonstrated by focusing on an interpretation of Chinese characteristics that explain the policy formation and implementation process and outcomes in China. Next, by drawing upon Yin’s suggestion the research will rely on theoretical propositions and concepts, and analyze the evidence based on the data. Where the existing theoretical propositions do not fit, a case description will then be developed and an analytical framework will be suggested to fill the gap.

It has to be noted that this study, given the research object, will mainly draw upon Chinese sources of data. However, one must be cautious in regard to the validity and reliability of these data, granted that not all of them can be obtained from official authorities and established independent resources. Manipulation of data is not a very rare phenomenon in either China or other countries. As a consequence the inclusion of all major rival interpretations of the data is important. All materials and data related to the research object whether published in Chinese or in English are open to examination. However, it is noted that some questionable resources may constrain the analysis of the data and the development of an effective policy framework.
3.3 Inquiries beyond the Scope of This Study

The study will focus on the un-balanced telecommunications development in China, especially between the eastern coastal areas and the western inland regions. The literature to be reviewed and data to be used will be strictly restricted within the scope of the investigation stated above. However, it is believed that a historic review of telecommunications development in China, an analysis of the current globalization process, and an overview of the political and economic strategic transition that is taking place in China is not only helpful, but necessary for developing a useful theoretical as well as policy framework and addressing the stratification issue in telecommunications development in China. This study will also review the studies on the relationship between telecommunications and socio-economic development. There are, however, inquiries that are related to but beyond the scope of this study. Some questions that this study will not address are as follows:

- What is the relationship of telecommunications and general economic development?
- What is the relationship of telecommunications and information and social development and equality? How have information and telecommunications technologies influenced the Chinese culture and ideology?
- What is globalization? How has globalization influenced China in general? What are the cultural effects of globalization on developing countries including China?
- What is the telephone demand pattern of people in the western areas of China?
- How shall universal service be measured?
Chapter 4

EVOLUTION OF TELECOMMUNICATIONS IN CHINA

4.1 Telecommunications Development in China

According to new institutionalism, process takes place in a gradual rather than abrupt way. Decisions and activities are shaped collectively that “bear tracks of their own history” (North, 1990, p.114). In other words, history matters and what we are today is a result of what has been in the past. In order to have a thorough understanding of the current circumstances, this study begins with a review of the major historical junctures in telecommunications development in China over the past century. Then the study will proceed with an analysis of telephony services access and development in the western regions of China.

4.1.1 The Start of Telecommunications in China: Before 1949

The telephone was introduced to China in the early 1880s. It was initially controlled by businessmen from Denmark and then the Qing court took it over and began constructing some state-run facilities. From 1900 to 1906, telephone services were established in some big cities such as Nanjing, Wuhan, Guangzhou, Beijing, and Shanghai. However, the development was limited and at a very slow pace. With the overthrow of the Qing Dynasty in 1911 after its reign for nearly 300 years, China entered

---

17 The initially private telephone business in China that started telephone service in 1880s was taken over by Qing Court in 1900 that set up a Beijing Telephone Directorate General and a similar institution in Tianjin. The period from 1900 to 1906 saw a steady progress in constructing state-run telephone facilities in some big cities. For details see He (1997).
into an era of political instability. Protracted wars occurred among warlords, followed by the eight-year invasion and occupation of China by Japan, and the civil war between the Nationalists and Communists. During this period, telephone construction struggled to maintain development. From 1934 to 1936, the Nationalist government built a nine-province telephone network. By June 1936, the Ministry of Transportation, the regulator of telecommunications then, had 47,000 kilometers of long-distance open wire. After World War II, the Communists and Nationalists began a four-year civil war. It was not until the civil war ended and the new People’s Republic of China was founded that the government of China began to resume telephone construction and development.

4.1.2 Development of Telecommunications in China after 1949: A Long and Rough Buildup

However, like the Qing court and the Nationalist government, the new government did not give sufficient and necessary priority to telecommunications development and service. One reason was the limited resources and the unstable social situation after the prolonged wars. Facing threats from both the Nationalists that fled to Taiwan and international capitalist forces, the Chinese Communist government was eager to restore agriculture, heavy industries, and the military in order to stabilize the situation. Another reason was that when the People’s Republic was founded in 1949, the government inherited very little in telecommunications from the preceding government. In the entire country, there were about 260,000 telephones for about 550 million people, with a 310,000 line exchange capacity in the cities, 30,000 telephones in the countryside, and some 2,000 long-distance telephone lines. The telephone penetration rate was only .05 per cent (Gong, 1993). Most of these telephones were in cities, such as Beijing, Shanghai, and Nanjing. The majority of the “long-distance” lines did not go any further than 200

---

18 Early history of the industry is found in Dangdai Zhongguo de Youdian Shiye (China’s current posts and telecommunications industry, Beijing: China Current Publishing House, 1993), pp. 9-18.

19 Data compiled from China’s current posts and telecommunications industry, and “A history of telecommunications in China” by Zhou He (1997).
kilometers. Furthermore, most of the telephones in the countryside were for military commanders, leaving virtually no telephones for residential use. There were only 35 short-wave transmitters that served as the main means of real long-distance communication. The infrastructure was fragmented and outdated, and the facilities were incompatible (China Telecommunications Construction, 1989).

The third reason, apart from the aforementioned factors, that telephone infrastructure did not develop rapidly during the first years of the People’s Republic of China was that the newly founded government was not ready to plan, run and build up a telecommunications network in a vast and war-torn country. Most of the officials in the government came from the military and had very limited experience in managing telecommunications on a large scale. However, the government managed to form the Ministry of Posts and Telecommunications (MPT) on November 1, 1949, to supervise postal service and telecommunications (He, 1997). Soon afterward, posts and telecommunications bureaus were established at regional, provincial, and municipal levels. A major policy was formulated soon after the MPT was founded that would have a long-term impact on the development of China’s telecommunications. Driven by the long anti-imperialist tradition and concern with national sovereignty, the government declared that foreign companies were not allowed to run telecommunications businesses in China (Gong, 1993).

4.1.2.1 Early Period: The First Two “Five-Year” Plans

The Chinese government began in the early 1950s to draw blueprints for its national economic development by drafting its Five-Year Plans. Under the First Five-Year Plan (1953-1957) the government would invest RMB$8.1 billion (Renminbi [People’s Currency]) in transportation and communications. Of this amount, only RMB$361

---

20 Throughout the central planning period from the mid-1950s to the late 1970s, the exchange rate policy in China was subordinate to trade policy. The rate against US dollar varied. Since 1996 the rate against US
million went to the telecommunications and posts sector, accounting for only .08 per cent of the total national investment for the period (The First Five-Year Plan, 1955; Liu, 1988). Investment almost entirely went to construction of long-distance lines between Beijing and a handful of major cities, and installation of telephones in major cities. No new investment was made in telephone systems in rural and inland areas.

The First Five-Year Plan had a tremendous impact on future five-year plans from the 1950s to late 1970s; and set a tone for future slow development and low investment of telecommunications infrastructure. Like the First Five-Year Plan, the Second and the Third Five-Year Plans emphasized the development of heavy industry while giving only modest importance to telecommunications. Critics would later call this a result of a “misunderstanding of the role of communications in national economic development” (MPT, 1984, p.3), and confusing communication with transportation. Certainly not all leaders then would understand the importance of communications to the economy and people’s life. Also, when the communication needs of the government officials and social and political elites were satisfied and prioritized by installing a system of private networks, or “red telephones”, and preferential connections, the imperative for developing telecommunications to satisfy the need of communication for the public was not felt. Compared to crucial and heavy industries like agriculture, steel, oil, and military, telecommunications was regarded as a less important sector that should take a backseat, especially when the economy was unstable and financial resources were very limited.

Worse still, a series of droughts and a great famine hit the country in 1959 and lasted for three years, followed by the Soviet Union breaking relations with China, stopping its aid, withdrawing its advisors, and demanding payment of its loans with interest. The national economy collapsed and in 1962, the Chinese government had to cut a large amount of investment in basic construction. As a result, telecommunications development was forced into a slow growth era, especially during the period from 1963 to 1966.

dollar has been virtually fixed at RMB$8.28 (Lin, 2004). For detailed information about the exchange rate against US dollar between 1949 to 2003, see Appendix B.
However, despite the small investment, the industry managed to make some progress. Table 4-1 shows the early development of telecommunications infrastructure in China from 1949 to 1966.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment (Transportation, Posts &amp; Telecom)</td>
<td>RMB$23,310,000</td>
<td>RMB$8.1 billion</td>
<td>RMB$5.7 billion</td>
<td>RMB$870,100,000</td>
</tr>
<tr>
<td>% of National Investment</td>
<td>---</td>
<td>19.2%</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Investment (Telecom &amp; Posts)</td>
<td>RMB$39,000,000</td>
<td>RMB$361,000,000</td>
<td>RMB$771,000,000</td>
<td>RMB$137,200,000</td>
</tr>
<tr>
<td>% of National Investment</td>
<td>---</td>
<td>0.8%</td>
<td>0.6%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Telephone Switching Lines</td>
<td>310,000</td>
<td>560,000</td>
<td>970,000</td>
<td>1,100,000</td>
</tr>
<tr>
<td>Telephone Subscribers</td>
<td>300,000</td>
<td>---</td>
<td>871,100</td>
<td>1,263,330</td>
</tr>
<tr>
<td>County that had telephone connections</td>
<td>---</td>
<td>2,000</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

4.1.2.2 The Cultural Revolution and the Three Years after (1966-1979)

The Cultural Revolution broke out in 1966 and the country fell into chaos. Surprisingly, a relatively large amount of investment was put into the posts and telecommunications industry. For the 1966-1970 period, the total investment was RMB$1.37 billion. For the first time in 30 years the investment reached 1.4% of total national investment (Liu, 1988). However, where all the money went remained a mystery, as the statistics revealed that there was very modest progress in most of the important fields of telecommunications, as shown in Table 4-2. The Fourth Five-Year Plan outlined a moderate economic recovery. Despite some fluctuation in this period, some progress was made in the industry, as seen in Table 4-2. Modest improvements in telecommunications were also made during the three years after the Cultural Revolution and before the Reform Era would come, especially in long-distance telephone communication.

<table>
<thead>
<tr>
<th>Year</th>
<th>Investment* (In million RMB$)</th>
<th>Investment** (In million RMB$)</th>
<th>Long-distance network capacity</th>
<th>Long-distance telephone lines</th>
<th>City telephone sets (million)</th>
<th>Telephone penetration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966-70</td>
<td>1,252</td>
<td>187</td>
<td>3,136 lines</td>
<td>11,696</td>
<td>1.32</td>
<td>0.27%</td>
</tr>
<tr>
<td>1971-75</td>
<td>1,932</td>
<td>251</td>
<td>---</td>
<td>15,981</td>
<td>1.5</td>
<td>0.33%</td>
</tr>
<tr>
<td>1976-79</td>
<td>---</td>
<td>280</td>
<td>7,085 lines</td>
<td>22,011</td>
<td>2.8</td>
<td>0.43%</td>
</tr>
</tbody>
</table>

Sources: Data compiled from Industrial Transportation Department of State Statistics Bureau (1989).

Notes: *Investment in transportation, posts, and telecommunications sectors.
**Investment in posts and telecommunications.
During the early periods of time after the foundation of the People’s Republic of China, no or very gross data about telephone access in rural areas or the difference between the western areas and eastern regions in telephone infrastructure and access were reported, let alone detailed statistics on telephone development on a provincial or county level. It was not until the Reform Era that the importance of telecommunications would be recognized, investment would be increased, and detailed data would be reported.

4.1.2.3 The Reform Era (1980 – 2002): Rapid Development

The 1980s marked a turning point in China’s history. Political struggles were stabilized, and dramatic changes took place in the economic structure as a consequence of opening the door and introducing market mechanisms. The importance attached to telecommunications was triggered by a need for a rational and stable supply system, and by the increasing labor mobility coming with the reformed economic policies. Studies of telecommunications and their contribution to economic growth became known to Chinese officials and scholars.\(^{21}\) The Sixth Five-Year Plan (1981-1985) stated:

> Transportation, postal service and telecommunications are a conspicuously weak area in the current economy. In the Sixth Five-Year Plan period, a concerted effort should be made to reinforce the construction of these industries, to improve their management and to raise their capabilities and efficiency so that they can meet the needs for energy, drive, and stable economic growth. *(The Sixth Five-Year Plan, 1983, p. 360)*

The telecommunications industry began to take off and enter into a period of continuous and rapid development. Preferential policies formulated in the 1980s,

\(^{21}\) Andrew P. Hardy, in his “The Role of the Telephone in Economic Development: An Empirical Analysis”, indicated that a 1 per cent rise in the number of telephones per 100 population could contribute to as much as a 3 per cent increase in gross domestic product. He was later quoted by a Chinese telecommunications official, Chen Yunqian, the director of the Economic and Technological Development Research Center of the MPT. Her work was published in China Telecommunications Construction, vol.2, no. 3 (August/September 1990), pp. 4-11 (in Chinese).
improved efficiency, quickly raised capital, and the enormous telecommunications need by the public have all pushed rapid telecommunications development in China. In 1985 the Ministry of Posts and Telecommunications (MPT) submitted a fifteen-year plan for telecommunications development to the State Planning Commission. The goals were ambitious: by the year 2000, the country wanted a teledensity of 2.8 for about 30 million lines as well as about 34 million telephones (Ure, 1994). In fact, the targets were achieved far ahead of schedule; in 1996, there were about 93 million lines, and 78 million telephones (National Bureau of Statistics of China, 1996). The goal for 2000 was changed to 120 million lines and a teledensity of between 8 and 9. That was also achieved, and the growth reached a peak in 2000 (Editorial Department of Yearbook of China Communications, 2003). In 2002 China became the top country in terms of network scale and telephone subscribers (Editorial Department of Yearbook of China Communications, 2003). The development is shown in Table 4-3.
4.2 Telecommunications Development in the Western Regions of The Country

However, China’s telecommunications have developed in an extremely uneven fashion. Cities have developed far faster than rural areas, open coastal cities and eastern areas have outpaced the rest of the country, especially the western regions. This is, in part, due to physical, geographical, and historical differences, but is also a result of the state policy of opening and prioritizing certain cities and special economic zones along the coast in the east of the country while deferring the inland and western areas.

<table>
<thead>
<tr>
<th>Year</th>
<th>Investment (In RMB$)</th>
<th>Teledensity (wired)*</th>
<th>Teledensity (wireless)*</th>
<th>Wired subscriber**</th>
<th>Wireless subscriber**</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.3 billion</td>
<td>---</td>
<td>---</td>
<td>2.14</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1985</td>
<td>1.1 billion</td>
<td>---</td>
<td>---</td>
<td>3.12</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1990</td>
<td>2.3 billion</td>
<td>0.71</td>
<td>---</td>
<td>8.4</td>
<td>0.012</td>
<td>16</td>
</tr>
<tr>
<td>1995</td>
<td>99.5 billion</td>
<td>3.6</td>
<td>0.3</td>
<td>40.7</td>
<td>3.62</td>
<td>4</td>
</tr>
<tr>
<td>2000</td>
<td>222 billion</td>
<td>11.5</td>
<td>6.8</td>
<td>144.8</td>
<td>86.2</td>
<td>2</td>
</tr>
<tr>
<td>2001</td>
<td>255 billion</td>
<td>14.1</td>
<td>11.4</td>
<td>180.4</td>
<td>144.8</td>
<td>2</td>
</tr>
<tr>
<td>2002</td>
<td>207 billion</td>
<td>17.5</td>
<td>16.2</td>
<td>214.2</td>
<td>206</td>
<td>1</td>
</tr>
<tr>
<td>2003</td>
<td>221 billion</td>
<td>21.2</td>
<td>20.9</td>
<td>263.3</td>
<td>268.7</td>
<td>1</td>
</tr>
<tr>
<td>2004</td>
<td>176 billion</td>
<td>24.5</td>
<td>24.8</td>
<td>313.2</td>
<td>329.9</td>
<td>1</td>
</tr>
</tbody>
</table>


Notes: Yearly data are throughout the 2000-2004 period. Due to missing data, only data every five years throughout the 1980-2000 period are given.

* Teledensity refers to the number of telephones per 100 people.

** Wired and wireless subscribers in millions.
4.2.1 Geographic Characteristics of the Western Region of China

Development of telecommunications, including telephone infrastructure, is determined by many factors, geographic characteristics being one of them. China’s 31 provinces, autonomous regions and cities under the direct guidance of the central government are geographically categorized into three regions: the eastern region, the central region and the western region. The eastern region has 12 provinces and cities under the direct guidance of the central government: Beijing, Shanghai, Tianjin, Hebei, Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangxi, Guangdong and Hainan. The 9 provinces in the central region are: Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan. The western region has one city under the direct guidance of the central government and 10 provinces and autonomous regions: Chongqing, Sichuan, Guizhou, Yunnan, Guangxi, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang (see Table 4-4).²²

<table>
<thead>
<tr>
<th>Region</th>
<th>Administrative Divisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern</td>
<td>Beijing, Tianjin, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan</td>
</tr>
<tr>
<td>Central</td>
<td>Hebei, Shanxi, Jilin, Heilongjiang, Inner Mongolia, Anhui, Jiangxi, Henan, Hubei, Hunan</td>
</tr>
<tr>
<td>Western</td>
<td>Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang</td>
</tr>
</tbody>
</table>

²² The 31 administrative divisions, including provinces, autonomous regions, and municipalities, can be located in Appendix A: Map of China: Administrative Divisions.
4.2.2 Unequal Telephone Development

In terms of their levels of economic development, the eastern region is the most advanced, the central region is the next and the western region is the most backward. And the distribution of telecommunication infrastructure and economic development has shown obvious spatial inequality in China. Table 4-5 and Figure 4-1 demonstrate that telephone penetration rate and GDP per capita in the eastern, middle and western parts has a linear relationship.


Figure 4-1: Wired Teledensity vs. GDP per capita by Region, 2003
4.2.2.1 Disparity between Eastern China and Western China

As shown in Table 4-5 and Figure 4-1 in the previous section, uneven telephone development most obviously exists between eastern China and western China. This has not changed for the past ten years. In 1993 a disparity existed between eastern China and western China, with Guangdong having the largest number of telephones, followed by Jiangsu, Beijing, Shanghai, Liaoning, Shandong, and Zhejiang, all of them in the eastern region of China; whereas Tibet, Ningxia, Qinghai, Guizhou, Yunnan, and Xinjiang, all located in western China, were the least developed provinces – accounting for only 5 per cent. For instance, Ningxia province had a population of 4.8 million in the 1993 census, but only 23,571 urban and 1,826 rural households had telephones. For some counties, there were less than 30 telephones (Ningxia Statistical Bureau, 1993). Figure 4-2 shows that up to 2003 the disparity still existed and limited changes have been made. Most eastern provinces and cities under direct guidance from the central government (the ten bars on the left in the figure) have achieved remarkable teledensity, whereas most western provinces (the eleven bars on the right of the figure) lag far behind the eastern provinces. Most western provinces had a telephone penetration below 15 per cent. By the end of 2003, the penetration rate of telephones in China reached 25.9 per cent, the main-

Table 4-5: Wired Teledensity vs. GDP per capita by Region, 2003

<table>
<thead>
<tr>
<th>Region</th>
<th>GDP per capita (RMB)</th>
<th>Wired Teledensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern</td>
<td>15,556.87</td>
<td>31.83%</td>
</tr>
<tr>
<td>Central</td>
<td>9,101.51</td>
<td>17.40%</td>
</tr>
<tr>
<td>Western</td>
<td>6,306.84</td>
<td>14.65%</td>
</tr>
</tbody>
</table>


\(^{23}\) See Appendix C for the regional distribution pattern of GDP and GDP per capita in China in 2000.
line teledensity was 13.90 per cent, the city telephone penetration rate was 20.40 per cent, and the household phone rate was 11.55 per cent. By geography, these four rates in the eastern region were 41.47 per cent, 20.81 per cent, 21.24 per cent and 16.76 per cent respectively. In the central region the numbers were 20.35 per cent, 12.02 per cent, 18.14 per cent and 10.25 per cent, respectively. The western region had the lowest rates among all the categories. The numbers for the western region’s penetration rate of telephones, main-line teledensity, city telephone penetration rate, and household phone rate were 16.97 per cent, 9.22 per cent, 21.68 per cent, and 7.21 per cent, respectively (MII, 2003b).


Figure 4-2: Wired Telephone Teledensity by Province, 2003
Table 4-6 demonstrates clearly that the telecommunications development in the western region of China lags behind that of central and eastern China by all standards. Main line teledensity, wireless subscribers, wired subscribers, wireless teledensity, wired teledensity, and household teledensity of the eastern part of China are over two times those of the western region of China, indicating an enormous gap between the eastern and western parts of the country.
<table>
<thead>
<tr>
<th></th>
<th>Main Line Teledensity (%)</th>
<th>Wireless Subscribers (Million)</th>
<th>Wired Subscribers (Million)</th>
<th>Wireless Teledensity (%)</th>
<th>Wired Teledensity (%)</th>
<th>Household Teledensity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>20.2</strong></td>
<td><strong>334.88</strong></td>
<td><strong>312.44</strong></td>
<td><strong>25.9</strong></td>
<td><strong>24.9</strong></td>
<td><strong>19.0</strong></td>
</tr>
<tr>
<td><strong>Eastern</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beijing</td>
<td>45.3</td>
<td>13.41</td>
<td>8.47</td>
<td>92.1</td>
<td>67.3</td>
<td>44.3</td>
</tr>
<tr>
<td>Tianjin</td>
<td>34.7</td>
<td>4.24</td>
<td>4.07</td>
<td>41.9</td>
<td>41.4</td>
<td>32.0</td>
</tr>
<tr>
<td>Liaoning</td>
<td>28.2</td>
<td>11.94</td>
<td>14.72</td>
<td>28.4</td>
<td>36.2</td>
<td>29.8</td>
</tr>
<tr>
<td>Shanghai</td>
<td>45.1</td>
<td>13.11</td>
<td>8.67</td>
<td>76.6</td>
<td>57.5</td>
<td>36.0</td>
</tr>
<tr>
<td>Jiangsu</td>
<td>24.6</td>
<td>22.33</td>
<td>25.82</td>
<td>30.2</td>
<td>35.6</td>
<td>27.3</td>
</tr>
<tr>
<td>Zhejiang</td>
<td>34.0</td>
<td>23.23</td>
<td>19.75</td>
<td>49.6</td>
<td>42.7</td>
<td>29.5</td>
</tr>
<tr>
<td>Fujian</td>
<td>31.2</td>
<td>11.38</td>
<td>12.66</td>
<td>32.6</td>
<td>36.7</td>
<td>27.2</td>
</tr>
<tr>
<td>Shandong</td>
<td>23.3</td>
<td>19.09</td>
<td>24.64</td>
<td>20.9</td>
<td>27.6</td>
<td>23.7</td>
</tr>
<tr>
<td>Guangdong</td>
<td>29.7</td>
<td>53.74</td>
<td>29.62</td>
<td>67.6</td>
<td>38.5</td>
<td>25.5</td>
</tr>
<tr>
<td>Hainan</td>
<td>22.3</td>
<td>1.65</td>
<td>1.97</td>
<td>20.3</td>
<td>25.7</td>
<td>16.8</td>
</tr>
<tr>
<td><strong>Central</strong></td>
<td><strong>17.4</strong></td>
<td><strong>91.51</strong></td>
<td><strong>97.46</strong></td>
<td><strong>18.4</strong></td>
<td><strong>20.1</strong></td>
<td><strong>16.4</strong></td>
</tr>
<tr>
<td>Inner Mongolia</td>
<td>18.1</td>
<td>5.94</td>
<td>4.91</td>
<td>25.0</td>
<td>21.2</td>
<td>16.8</td>
</tr>
<tr>
<td>Hebei</td>
<td>18.4</td>
<td>15.13</td>
<td>15.55</td>
<td>22.4</td>
<td>23.5</td>
<td>19.3</td>
</tr>
<tr>
<td>Shanxi</td>
<td>19.7</td>
<td>7.54</td>
<td>7.71</td>
<td>22.7</td>
<td>23.8</td>
<td>19.8</td>
</tr>
<tr>
<td>Jilin</td>
<td>19.4</td>
<td>7.64</td>
<td>6.56</td>
<td>28.2</td>
<td>25.3</td>
<td>20.7</td>
</tr>
<tr>
<td>Heilongjiang</td>
<td>20.8</td>
<td>10.17</td>
<td>10.83</td>
<td>26.7</td>
<td>28.9</td>
<td>24.9</td>
</tr>
<tr>
<td>Anhui</td>
<td>15.5</td>
<td>8.73</td>
<td>11.97</td>
<td>13.6</td>
<td>18.7</td>
<td>16.1</td>
</tr>
<tr>
<td>Jiangxi</td>
<td>15.2</td>
<td>6.71</td>
<td>7.47</td>
<td>15.8</td>
<td>17.8</td>
<td>14.3</td>
</tr>
<tr>
<td>Henan</td>
<td>14.7</td>
<td>13.92</td>
<td>15.84</td>
<td>14.4</td>
<td>16.7</td>
<td>13.7</td>
</tr>
<tr>
<td>Hubei</td>
<td>14.9</td>
<td>11.30</td>
<td>10.74</td>
<td>18.8</td>
<td>18.8</td>
<td>13.8</td>
</tr>
<tr>
<td>Hunan</td>
<td>14.6</td>
<td>10.36</td>
<td>10.85</td>
<td>15.6</td>
<td>16.6</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>Western</strong></td>
<td><strong>12.8</strong></td>
<td><strong>69.20</strong></td>
<td><strong>62.68</strong></td>
<td><strong>18.7</strong></td>
<td><strong>17.3</strong></td>
<td><strong>13.0</strong></td>
</tr>
<tr>
<td>Guangxi</td>
<td>11.8</td>
<td>8.75</td>
<td>8.12</td>
<td>18.0</td>
<td>16.9</td>
<td>12.9</td>
</tr>
<tr>
<td>Chongqing</td>
<td>17.4</td>
<td>8.17</td>
<td>6.42</td>
<td>25.9</td>
<td>20.8</td>
<td>16.4</td>
</tr>
<tr>
<td>Sichuan</td>
<td>11.2</td>
<td>15.15</td>
<td>13.70</td>
<td>17.4</td>
<td>16.1</td>
<td>11.8</td>
</tr>
<tr>
<td>Guizhou</td>
<td>7.5</td>
<td>4.40</td>
<td>3.89</td>
<td>11.4</td>
<td>10.2</td>
<td>7.7</td>
</tr>
<tr>
<td>Yunnan</td>
<td>11.3</td>
<td>7.32</td>
<td>5.47</td>
<td>16.7</td>
<td>12.8</td>
<td>9.1</td>
</tr>
<tr>
<td>Tibet</td>
<td>7.7</td>
<td>0.40</td>
<td>0.38</td>
<td>14.8</td>
<td>14.7</td>
<td>9.4</td>
</tr>
<tr>
<td>Shaanxi</td>
<td>15.7</td>
<td>7.88</td>
<td>7.92</td>
<td>21.4</td>
<td>21.8</td>
<td>16.5</td>
</tr>
<tr>
<td>Gansu</td>
<td>12.5</td>
<td>3.58</td>
<td>4.77</td>
<td>13.8</td>
<td>18.7</td>
<td>13.5</td>
</tr>
<tr>
<td>Qinghai</td>
<td>14.1</td>
<td>1.18</td>
<td>0.94</td>
<td>22.0</td>
<td>17.8</td>
<td>13.5</td>
</tr>
<tr>
<td>Ningxia</td>
<td>15.9</td>
<td>1.59</td>
<td>1.20</td>
<td>27.3</td>
<td>22.3</td>
<td>15.7</td>
</tr>
<tr>
<td>Xinjiang</td>
<td>18.2</td>
<td>4.90</td>
<td>4.95</td>
<td>25.3</td>
<td>25.7</td>
<td>19.3</td>
</tr>
</tbody>
</table>

**Sources:** MII (2004, [http://www.mii.gov.cn](http://www.mii.gov.cn)).
Among the top ten provinces in terms of numbers of telephone sets, six provinces (Guangdong, Shandong, Jiangsu, Zhejiang, Fujian, Liaoning) are from the east of China, three provinces (Henan, Hebei, Anhui) are from central China, and only one province, Sichuan, is from west China (see Figure 4-3).


Correspondingly, among the top ten provinces in telecommunications fixed assets investment only one province (Sichuan) is from western China, seven provinces and cities under the direct governance from the central government (Guangdong, Beijing, Jiangsu, Shandong, Shanghai, Fujian, Zhejiang) are from eastern China, and two (Hebei, Henan) are from central China (see Figure 4-4).
4.2.2.2 Urban and Rural Disparity

Apart from the difference between eastern and western areas in telecommunications development, China also exhibits a serious rural-urban disparity. The gap is even bigger in western China than in eastern China. Figure 4-5 shows that in eastern China the disparity between overall main-line teledensity and urban teledensity is less than 2% for both 2001 and 2002. Central China sees a bigger gap, with a 6% difference between overall main-line teledensity and urban main-line teledensity in both 2001 and 2002. Surprisingly urban main-line teledensity (22.7 per cent) in western China was slightly higher than that of eastern China (22.1 per cent); while its overall teledensity (9.9 per cent) was much lower than that of eastern China (20.3 per cent) in 2001. With the growth of teledensity in other areas the rural-urban gap in western China has not narrowed; on the contrary, the gap has widened over time. In 2002 the difference between urban
teledensity and overall teledensity grew from about 12 per cent in 2001 to about 15 per cent.


![Graph showing regional main-line teledensity vs. urban main-line teledensity](image)

**Figure 4-5:** Regional Main-Line Teledensity vs. Urban Main-Line Teledensity

This indicates that the growth of rural telephone services in western China is not catching up with urban services. Table 4-7 shows more clearly the enormous wired telephony disparity between urban areas and rural areas in the western region of China. In 2002 the teledensity in western urban areas is 38 per cent, while that number for the rural areas in western China was only 5.6 per cent, indicating a 32.4 per cent difference between the rural and urban areas in the region. The differences between urban and rural areas in both eastern and central China are much lower. In 2002 the teledensity for urban
and rural areas in eastern China was 31.1 per cent and 18.3 per cent, respectively, indicating a 12.8 per cent difference. The teledensity for urban and rural areas in the central provinces was 26.3 per cent and 8.4 per cent, respectively, showing a 17.9 per cent difference.

### Table 4-7: Regional Wired Telephony Teledensity, 2002

<table>
<thead>
<tr>
<th>Region</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern</td>
<td>31.1%</td>
<td>18.3%</td>
</tr>
<tr>
<td>Central</td>
<td>26.3%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Western</td>
<td>38.0%</td>
<td>5.6%</td>
</tr>
</tbody>
</table>

*Source: MII (2003a).*

Such rural-urban disparity is not a problem if the degree of urbanization is high. For instance, cities like Beijing, Tianjin, and Shanghai only have a small proportion of rural telephones, yet the majority of people in these cities live in urban areas with easy access to telephone service. Up to 2002, western China, however, is still 72 per cent rural (National Bureau of Statistics of China, 2003b). And the urbanization process in the western regions of China is slower compared with the rest of the country, especially the eastern coastal regions. As Table 4-8 shows, among the 183,976 administrative villages in the western provinces of China, 39,222 villages did not have telephony services by the end of the year 2002, making up 21.32 per cent of the total number of administrative villages in western China. The number is much higher than the national average of 8.62 per cent. Compared with the western regions, there are 572 villages that have no telephone services access in eastern China, accounting for only 0.29 per cent of total villages in eastern China. The central area also sees many villages without telephone services, indicating a moderate lack of telephone services.
Table 4-8: Administrative Villages without Telephone Services by Region, 2002

<table>
<thead>
<tr>
<th>Region</th>
<th>Total Number of Villages</th>
<th>Total Number of Villages that Have no Telephony Services</th>
<th>% of Villages that have no telephone services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern</td>
<td>197,181</td>
<td>572</td>
<td>0.29%</td>
</tr>
<tr>
<td>Central</td>
<td>243,524</td>
<td>14,025</td>
<td>5.76%</td>
</tr>
<tr>
<td>Western</td>
<td>183,976</td>
<td>39,222</td>
<td>21.32%</td>
</tr>
<tr>
<td>Total</td>
<td>624,681</td>
<td>53,819</td>
<td>8.62%</td>
</tr>
</tbody>
</table>


Figure 4-6 indicates more clearly that almost three quarters of all the administrative villages that do not have telephony services in China are located in the western region, implying an enormous gap between the western regions of China and the other areas of the country.

Chapter 5

CAUSES OF THE TELEPHONE ACCESS DISPARITY

Substantial disparity in regional telephone access is a reality in every geographically large country, for example, the Appalachians in the United States, and the western areas in China. The causes of the disparity are numerous and complex. Infrastructure construction, including telephone distribution, is location and policy sensitive. Some research has been conducted to examine the role of geography in economic development and infrastructure construction. For instance, some studies indicate that geography (i.e., access to the sea and elevation/slope) accounts for both economic performance and infrastructure development (Démurger et al, 2002; Démurger, 2001). A steep landscape raises the costs for transporting goods, hence affecting the construction and maintenance of infrastructures, making the work expensive. The coast-interior dichotomy also highlights the importance of transportation costs in determining a country’s infrastructure construction and maintenance. A robust result in one of the studies is that the “flatness” of land within a province is an important factor in provincial income determination. Also, an average slope of over 10 degrees would make infrastructure development difficult and expensive (Démurger et al, 2002). In order to have a deeper understanding of the growing gap between the eastern regions and the western regions of China in both teledensity and teledensity growth rate, the distinct roles of geography and policy should be explained. While in this chapter the role of geography will be briefly explained, more emphasis will be given to policy transitions in China and how the transitions have caused the current telephone access pattern and the underdevelopment of telephone infrastructure in the western areas.
5.1 Geography of Western China

Physically, China resembles a three-step staircase running downward from west to east. It begins with the 4,000-meter-high Qinghai-Tibet Plateau in the west, proceeds to the highlands and basins in the center that are about 1,000 to 2,000 meters above sea level, and ends with hilly regions and plains that are less than 1,000 meters high (Zheng, 1992). The combination of higher precipitation, a warmer climate, and access to navigable rivers and the sea have made the central and eastern provinces more conducive for farming and trade; hence these areas became the population centers of China.

In contrast, western China is characterized with a vast region far from the sea, occupying over 1/2 of the country. Much of this area occupies the two upper steps of the topographic staircase: the Qinghai-Tibetan plateau, sometimes known as the “roof of the world” with average elevations above 4000 meters and the second step running from Inner Mongolia in the northeast to the Yunnan-Guizhou plateaus of southwestern China. Much of the region is occupied by mountains and plateaus. The northwestern provinces of Shaanxi, Ningxia, Gansu, Qinghai, Xinjiang, and Tibet are more isolated. The general lack of water and arable land makes it the least populated region in China. The southwest, compared with the population density of 46 persons per square kilometer in the northwest, has 126 persons per square kilometer (National Bureau of Statistics of China, 2000). This can be explained by the rainfall condition and arable land in Sichuan, Yunnan, Guizhou, and Guangxi, the four provinces composing the southwestern region. However, the southwest also suffer from being too mountainous. Table 5-1 shows the average elevation of the southwestern part of China is 1,428 meters. The average slope of the region is 5.2 degrees; and 14 per cent of the land has a slope of greater than 10 degrees. Even the Sichuan Basin in southwestern China, known as the “Basin of Paradise”, is surrounded by high and difficult mountains. A saying in Chinese, “difficult is the route to the heaven; yet more difficult is the route in Sichuan” vividly pictures the mountainous situation in western China.
Table 5-1 indicates that western China (here divided as northwestern China and southwestern China) has a population density much lower than the average, a distance from the coast (1383 km and 656 km, respectively) and an average elevation (1927 meters and 1428 meters, respectively) much higher than the average number. The topographic features and hilly geographic conditions resulting in difficult transportation (both via land and sea) have made all construction, including telecommunications infrastructure construction, difficult and costly.

Table 5-1: Geographical Characteristics by Regions

<table>
<thead>
<tr>
<th>Region</th>
<th>Population density (Person/kilometer²)</th>
<th>Distance from the coast (In kilometer)</th>
<th>Slope &gt;10 (1% of the area)</th>
<th>Average slope (%)</th>
<th>Average elevation (In meter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>138</td>
<td>380</td>
<td>2.2</td>
<td>1.6</td>
<td>314</td>
</tr>
<tr>
<td>Central</td>
<td>264</td>
<td>492</td>
<td>2.7</td>
<td>2.4</td>
<td>428</td>
</tr>
<tr>
<td>Coast</td>
<td>333</td>
<td>86</td>
<td>2.6</td>
<td>2.4</td>
<td>267</td>
</tr>
<tr>
<td>Northwest</td>
<td>46</td>
<td>1383</td>
<td>5.0</td>
<td>2.8</td>
<td>1,927</td>
</tr>
<tr>
<td>Southwest</td>
<td>126</td>
<td>656</td>
<td>14.1</td>
<td>5.2</td>
<td>1,428</td>
</tr>
<tr>
<td>Total</td>
<td>290</td>
<td>547</td>
<td>4.3</td>
<td>2.7</td>
<td>804</td>
</tr>
</tbody>
</table>


Notes: Slope>10 measures the percentage of area within a province with a slope greater than 10 degrees.
Northeast = Liaoning, Jilin, and Heilongjiang.
Coast = Hebei, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan.
Central = Shanxi, Anhui, Jiangxi, Henan, Hubei, and Hunan.
Northwest = Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang (Tibet is excluded due to missing data).
Southwest = Sichuan, Guizhou, Yunnan, and Guangxi.
5.2 Policy Transitions and the Impact on Telecommunications Development

5.2.1 The Role of the State

China’s telecommunications development can be understood through the perspective of Statist Theory. This theory focuses on the state as a decision-making entity that is analytically separable from its constituent parts. In Statist Theory telecommunications and broadcasting are assumed important to the state because they help to maintain social cohesion (Gilpin, 1981; Krasner, 1995). Noll (1986) argues that all nations exercise considerable political control over the communication sector, as communications technologies are important both for national security and economic growth. Statists consider it natural for the government to protect the sector against domination by foreigners or potentially disruptive internal groups.

Statist Theory stipulates that the state pursues its ‘interest’ and designs policies that require a trade-off between purely economic values (both national wealth and distributional equity) and objectives related to power, security and stability. The objectives of the government are threefold:

1) To assure that the telecommunications sector does not become a barrier to the development of other favored economic activities;
2) To promote developments that support the state’s overall economic and political objectives;
3) To ensure that the use of the communications network is consistent with the goal of promoting the state’s social and cultural interests (Noll, 1986).
5.2.2 A Brief History of the Evolving Organization of the MPT in the Pre-Reform Era

The Ministry of Posts and Telecommunications (MPT) was established in 1949 when the People’s Republic of China was born. Its responsibility was to carry out administrative duties including human resources, finance, planning, etc., in posts and telecommunications. Each province established a Posts and Telecommunications Bureau (PTB), and a similar organization was also set up at city and county levels. Therefore a three-level hierarchical administrative structure was formed with the MPT at the central government level, and PTBs at provincial and county/city levels.

In 1980, the State Council decided to put provincial PTBs under the dual leadership of the MPT and local governments, with primary duty assigned to the MPT. Provincial governments had the right to plan the development of local telecommunication systems and manage local posts and telecommunications enterprises; e.g. they could decide the rate of installation fees and surcharges in their provinces. This management framework lasted for 17 years until 1998 when the MPT was abolished (Ministry of Posts and Telecommunications, 1996a). The dual leadership system, where the posts and telecommunications administrations and enterprises reported simultaneously to the local government and the central MPT, had the advantage of providing a means to reconcile business and development objectives, and mobilize investment resources in the pre-reform era.

5.2.3 National Strategy and Policy before 1980: the Pre-Reform Era

During the period between 1949 and 1980, the telecommunications industry in China adopted a classical posts and telecommunications administration approach, with the Ministry of Post and Telecommunication (MPT) being the operator and the regulator.
Telecommunications including telephony services took a back seat in national planning when the government gave priority to basic and heavy industries construction and development. Investment in telecommunications was included as a small proportion in the investment of transportation, posts, and telecommunications, with transportation having the lion’s share of the investment. Though considered one of the best for its design and implementation, the First Five-Year Plan set a bad precedent for proportionally low investment and slow development of telecommunications infrastructure and service. It scarcely mentioned telecommunications when stipulating investment in transportation and posts services, and so did all the following five-year plans before the reform era began in the early 1980s. There was no telecommunications policy or law stipulating universal service and access to the telephone and other telecommunications technologies for the public. Therefore the number of telephones overall grew very slowly and almost all new installations, though limited in number, were in big cities such as Beijing and Shanghai or administrative and military institutions in strategically important areas. Telecommunications development was mainly driven by the concern of national security (State Council & Military Commission of Central Party Committee, 1986). No remarkable regional disparity was believed to exist before the reform era started in the early 1980s.

24 The First Five-Year Plan and the Second Five-Year Plan were published by the People’s Publishing House. The complete Third Five-Year Plan is available at homepage of the People’s Daily (www.people.com.cn). For readers, especially Western readers, that are unfamiliar with China’s ‘Plans’, it might be difficult to understand the meaning and significance of the five-year plans. However, the plans are important documents as they establish official national targets, priorities, and policy concerns and directions.

25 For instance, the State Council issued a regulation concerning the safety and security of telecommunications infrastructure in 1982, which was one of the limited major telecommunications regulations until early 1980s. The regulation is available on the Ministry of Information Industries website: http://www.mii.gov.cn/regulations.
5.2.4 Defense Considerations and Telecommunications Growth in Selected Western Regions in Early Periods

The new republic saw national security and defense as its top priority after its foundation in 1949. The growing military presence of the United States in Vietnam convinced the leaders of China that regional economic self-sufficiency was key to China’s being able to engage in a protracted defense of its territory. Mao envisaged three lines of defense (coastal, central, and western), and the Chinese government decided in 1964 on a massive construction of military industrial complexes in western China, the third line of defense, popularly translated as the “Third Front” (Ministry of Foreign Affairs, 2000). The First Five-Year Plan (1953–57) allocated 56 per cent of state investment to the interior provinces, and the Second Five-Year Plan (1958–62) allocated 59 per cent. As the concern for national security grew in the early 1960s, the Third Five-Year Plan (1966–70) allocated 71 per cent of state investment in the interior provinces, with the bulk of it in Sichuan, Hubei, Gansu, Shaanxi, Henan, and Guizhou, most of them being western provinces.26

Telecommunications, though growing very slowly at the national level, had a chance to develop gradually in selected areas in western China that were regarded as important for the “Third Front”. For instance, Shaanxi, a western province, experienced an above average growth in telecommunications from the early 1950s to the late 1970s. Shaanxi enjoyed a rate of central investment considerably higher than the national average. Between 1950 and 1983, 83.2 per cent of public investment in basic infrastructure in Shaanxi came from the state, and the proportion reached as high as 99.3 per cent at its peak. The urban regions of Shaanxi possessed higher teledensity than the national average throughout the 1960s and 1970s. For instance, the national teledensity was 0.2 per cent in 1958 as compared to 1 per cent in Shaanxi. Besides, rural teledensity also

26 Due to the Great Cultural Revolution that lasted from 1966 to 1976, some of the five-year plans are not available to the public.
revealed a marked increase in the 1960s. It rose from 0.095 per cent in 1959 to 0.19 per cent in 1960. The average central contribution to its total investment was 79.1 per cent (Li, 1988; Zhao and Zhang, 1988). Shaanxi’s economy in the pre-reform era had been described as a ‘transfusion economy’ since its development relied on a constant transfusion of capital from central government in Beijing (Zhao and Zhang, 1988).

However, from 1972 to 1978, China reduced its discrimination against investments in the coastal provinces and increased its economic interaction with the capitalist economies. This policy shift occurred because the government realized that China’s economy and technological capacity was falling further behind the rest of the world. If this negative trend was not reversed, China might not be able to defend itself. Furthermore, because the Soviet Union was quickly becoming a bigger threat than the United States, an invasion through the traditional land route by the Soviet Union had become much more likely than a coastal landing by armed forces supported by the United States (The Ministry of Foreign Affairs, 2000). The national security justification for the third-front industries was hence undermined. Instead, economic modernization required the import of foreign technology. China chose to increase its export earnings and economic activities in eastern coastal areas where trans-border trade was a tradition. Entrepreneurship was easier to produce in eastern coastal areas, where most foreign citizens of Chinese origin came from.

---

27 The presence of US military on the Taiwan Strait after the foundation of the People’s Republic of China in 1949 threatened the eastern coastal areas of China where it was likely to be attacked and become the battleground if the Nationalists who fled to Taiwan decided to fight back with the help of the United States. Thus military and industrial constructions were rarely scheduled in the eastern areas during the period from 1949 until early 1970s; and many strategic and industrial factories were moved to the central and western regions that were considered far away from the potential threat.
5.2.5 From 1980 to 1994: The First Phase of the Reform Era

When the Fifth Five-Year Plan period ended, a new era unfolded in China – this was an era of economic reforms. The “Four Modernization” drive became the imperative and official goal of the country. The door was open to the outside world, market mechanisms were introduced into the country, and dramatic economic growth was generated. The telecommunications sector experienced a quick takeoff during this period. The causes were numerous. Preferential policies made by the Chinese government played an important role in facilitating the rapid telecommunications development in China.

5.2.5.1 Policies on Telecommunications Development

1980 to 1994 saw a rapid development in the telecommunications industry including telephone infrastructure and services development in China. The government began to recognize the importance of a sufficient telecommunications infrastructure to the economy and society (Ministry of Posts and Telecommunications, 1986a). In the Sixth Five-Year Plan for 1981-1985, the government made the industry a development priority. The plan read;

Transportation and postal services and telecommunications are a conspicuously weak area in the current economy. In the Sixth Five-Year Plan period, a concentrated effort should be made to reinforce the construction of these industries, to improve their management and to raise their capabilities and efficiency so that they can meet the needs of energy development and stable economic growth. (The Sixth Five-Year Plan, 1983, p. 36)

The Seventh Five-Year Plan also positioned the telecommunications industry as one of the key strategic sectors in national economic development (The Seventh Five-Year
Plan, 1986). To ensure and implement the strategic shift, several policies and regulations were made. In October 1984, the Standing Committee of the State Council and the Secretariat of the Chinese Communist Party Central Committee issued the Six-Point Instructions after hearing a report by the Ministry of Posts and Telecommunications (MPT). The Instructions stipulated, among other things:

1) Telecommunications industry should be positioned as a priority industry, enjoying the same weight as the energy and transportation industries;

2) The industry should focus on major cities and economically developed coastal areas, and should avoid the pursuit of a nationally even development;

3) The state budget for the industry is changed to state loans to the industry, and the payment time can be extended longer than for other industries;

4) The industry can borrow foreign currency from the state and repay in Renminbi (RMB, Chinese currency);

5) The industry should be given a preferential package in taxation (Gong, 1993).

In addition, the government modified the financial strategies toward the telecommunications sector by several means. An important policy was the “Three Reversed 90%"s”. This was a policy concerning the financing of the telecommunications industry. The essence of the policy was:

1) Telecommunications industry can keep 90% of its profit, meaning that it has to pay only 10% profit tax, a rate much lower than the 55% for other industries;

2) The industry can retain 90% of non-trade foreign exchange earnings;

3) The industry is exempted from repaying 90% of the state loans (Gong, 1993).
The MPT was also allowed to charge the end user a “First Installation Fee”, or activation fee. The fee usually was between RMB$2,000 to RMB$4,000 per subscriber, a big amount of money at that time for ordinary Chinese families. The money so obtained was not counted as revenue but was deemed equity and thus free from profit tax (He, 1996). By doing so the industry successfully raised some 50 percent of the industry’s revenue (He, 1996; Zheng, 1989; People’s Posts and Telecommunications, 1998).

Furthermore, the government gave priority to the MPT on quotas of infrastructure capacity, importing foreign currency allocation and foreign government loans. Also, direct and indirect conveniences were given to the MPT in upgrading telecommunications facilities, land confiscation and waiver of the fees payable for toll roads or bridges (MPT et al., 1986).

A Sixteen Word Policy on the development of telecommunications, particularly telephone infrastructure, was first suggested by the State Council at a national conference on posts and telecommunications work in June 1988 (MPT, 1996a). It was later formalized and written into the State Council Directive No. 54 in 1990 and “A Ten-Year Plan and Outline of the Eighth Five-Year Plan for National Economic and Social Development in the People’s Republic of China”. The policy stipulated that the telecommunications industry should adhere to the principles of “central planning, vertical and horizontal coordination, management responsibility at various levels, and joint construction” (State Council, 1990, p. 2). The main idea of this policy was to mobilize all resources in society to boost the development of the telecommunications industry under the supervision of the MPT.

These treatments subsidized the development of the MPT and the overall investment during the period reached RMB$90.5 billion, representing 14 times the previous 31 years (Gong, 1993). Financing channels during this period were flexible and diversified. Sources were mainly internal funds, first installation fees, and surcharges and

28 According to Guijun Lin’s On the Exchange Rate of the RMB, at the end of 1980, the exchange rate of RMB was set at RMB$1.53/US$1.
government investment. Debt financing was obtained mainly from soft loans and supernational credits, such as those from the World Bank and the Asia Development Bank. A typical mix of the funding structure (as of 1994) is shown in Figure 5-1.

Source: Data compiled from Xu, et al. (1998).

Figure 5-1: MPT’s Sources of Funding in 1994

Another strategy was to modify the administrative structure. Although the administrative structure in the telecommunications industry remained largely a monopolistic and vertical hierarchy, some changes and challenges did occur from within and without. In 1984, the MPT granted more power to its enterprises in 12 administrative functions, including management development, use of funding, institutional setup, and personnel (Jing, 1987). In 1986, the MPT and its subordinates started an independent accounting system, in which all the enterprises operated under the concept of network revenue. Intra-city telephone networks were authorized to have a separate accounting system from the rest of the business. Under the system, they had the right to retain all
profits and telephone installation fees for further investment and development (Jing, 1987). To a certain degree, these internal changes and measures helped streamline the giant bureaucracy and improve efficiency.

5.2.5.2 Policy on Foreign Involvement

The “open door” policy and export economy orientation initiated in the early 1980s did not have much impact on China’s telecommunications market and policy. Several documents and directives were issued reaffirming that telecommunications was connected with national sovereignty and should never be open to foreign companies. In 1984, the State Council approved a report submitted by the Ministry of Posts and Telecommunications (MPT) to forbid joint ventures in postal service and telecommunications (Gong, 1993). In Directive No. 54 issued in 1990, the State Council reiterated that no foreign businesspeople should operate or be involved in the management of telecommunications (State Council, 1990). Finally, in a 1992 circular, the MPT reiterated the prohibition of any joint ventures with foreign corporations and investors in the telecommunications market (MPT, 1993a).

The prohibition of foreign investors’ involvement in China’s telecommunication development forced the government to face the problem of insufficient capital for investment. Like most developing countries, China is constrained by its lack of financial capital, which makes the option of an “uplifting” strategy in developing telecommunications and telephone infrastructure non-affordable. “Uplifting” is a strategy in promoting development in developing and under-developed countries by injecting massive capital into the rural-peripheral sector to speed up its telecommunications development. However, as Myint (1980) points out, the crucial practical question with developing countries using the “uplifting” strategy is that they usually do not have unlimited or sufficient resources for comprehensive balanced growth programs. Compared with the “uplifting” strategy, the “engulfing” option seems more affordable to
developing countries by using the model of unbalanced growth and continuing to develop the urban core and only some strategic sectors in the rural periphery where the interdependent links between telecommunications and other sectors are more peculiar (Baumol, 1967). The “uplifting” strategy attempts to eliminate disparity by pulling up the rural periphery, whereas the “engulfing” strategy aims at eliminating disparity by expanding the urban core (Baumol, 1967). With the expansion of the urban core into the rural inland areas, disparity between the rural periphery and urban core disappears.

5.2.5.3 “Engulfing” Strategy and Its Impact on Telephone Disparity

Thus, China seemed to have adopted the “engulfing” strategy from the early 1980s by developing urban and strategic areas, such as the five Special Economic Zones, the fourteen Open Cities, and Yangtze River Delta region. Almost all are located in eastern China. Table 5-2 shows the timeline and the location of China’s regional preferential policies from 1979 to 1994. During the fifteen years western China only had one provincial area – Xinjiang, and two cities – Beihai and Chongqing, located in Guangxi and Sichuan, respectively – approved as opened zones enjoying preferential policies. 29

29 Details on the different preferential policies applied in these zones can be found in Yang (1997), and Wang and Hu (1999).
<table>
<thead>
<tr>
<th>Year of Approval</th>
<th>Number and type of opened zone</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>3 Special Economic Zones</td>
<td>Guangdong</td>
</tr>
<tr>
<td>1980</td>
<td>1 Special Economic Zone</td>
<td>Fujian</td>
</tr>
<tr>
<td>1984</td>
<td>14 Coastal Open Cities</td>
<td>Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, and Guangxi</td>
</tr>
<tr>
<td></td>
<td>10 Economic and Technological Development Zones</td>
<td>Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Zhejiang, and Guangdong</td>
</tr>
<tr>
<td>1985</td>
<td>1 Economic and Technological Development Zone</td>
<td>Fujian</td>
</tr>
<tr>
<td></td>
<td>3 Coastal Open Economic Zones</td>
<td>Pearl River delta, Yangtze River delta, and Fujian</td>
</tr>
<tr>
<td>1986</td>
<td>2 Economic and Technological Development Zones</td>
<td>Shanghai</td>
</tr>
<tr>
<td>1988</td>
<td>Open Coastal Belt</td>
<td>Liaoning, Shandong, Guangxi, and Hebei</td>
</tr>
<tr>
<td></td>
<td>1 Special Economic Zone</td>
<td>Hainan</td>
</tr>
<tr>
<td></td>
<td>1 Economic and Technological Development Zone</td>
<td>Shanghai</td>
</tr>
<tr>
<td>1990</td>
<td>Pudong New Area</td>
<td>Shanghai</td>
</tr>
<tr>
<td>1992</td>
<td>13 bonded areas in major coastal port cities</td>
<td>Tianjin, Guangdong, Liaoning, Shandong, Jiangsu, Zhejiang, Fujian, and Hainan</td>
</tr>
<tr>
<td></td>
<td>10 major cities along the Yangtze River</td>
<td>Jiangsu, Anhui, Jiangxi, Hunan, Hubei, and Sichuan</td>
</tr>
<tr>
<td></td>
<td>13 Border Economic Cooperation Zones</td>
<td>Jilin, Heilongjiang, Inner Mongolia, Xinjiang, and Guangxi</td>
</tr>
<tr>
<td></td>
<td>5 Economic and Technological Development Zones</td>
<td>Fujian, Liaoning, Jiangsu, Shandong, and Zhejiang</td>
</tr>
<tr>
<td>1993</td>
<td>12 Economic and Technological Development Zones</td>
<td>Anhui, Guangdong, Heilongjiang, Hubei, Liaoning, Sichuan, Fujian, Jilin, and Zhejiang</td>
</tr>
</tbody>
</table>

*Source:* Editorial Board of The Practice of the Open Policy after the Foundation of the People’s Republic of China (2002).
Also, the Six-Point Instructions issued in 1984 concerning telecommunications development stipulated clearly that the industry should focus on major cities and economically developed coastal areas, and should avoid the pursuit of a nationally even development (Gong, 1993). The “engulfing” strategy and preferential policy for eastern areas’ development has had a tremendous impact on telephone distribution in China and telephone penetration disparity between the eastern and western regions. Figure 5-2 shows that up until around 1985 the disparity between western China and eastern China was very limited. In 1987, there were about 0.95 times as many phones in western China as in eastern China. However, the difference has gradually and steadily grown from the late 1980s when economic reforms and preferential policies for special regions started to be implemented at national level. In 1995 there were about 3.2 times as many phones in eastern China as in western China. It demonstrates a correlation between the implementation of the policy and reform, and differential regional telephone development rate.


Figure 5-2: Development of Telephones in Eastern and Western Areas, 1985-1996
The policy formulated during the 1980s set a precedent for the following decades. No remarkable change was made during the past several years. Time series data show that from the year 1999 until the year 2002, 50 per cent of telecommunications investment went to the eastern areas of China, while only about 22 per cent went to the western regions (Figure 5-3). Obviously, this low investment and low policy priority has been a root cause of western China’s slow and uneven telecommunications development.

**Source:** Editorial Department of Yearbook of China Communications (2003).

---

**Figure 5-3:** Ratio of Regional Telecommunications Fixed Assets Investment in National

The strategy of developing special and strategic zones, however, has its limitations. First of all, telecommunications investment by the state is directed more to the profitable urban, developed areas and special zones. Inland regions that already lag behind in
telephone infrastructure are encouraged to find their own financial resources, making the disparity between western China and eastern China in telephone access and services wider. Secondly, the “engulfing” strategy may accelerate the rural-urban migration up to a point where the expanding urban areas cannot sustain it. The resources in rural areas will flow to urban areas, making the rural areas even poorer. A study on migration labor patterns in Anhui province in 1999 showed that 94 per cent of the migrants are below the ages of 20-40, and more than one third of them have received upper-secondary education (Wang and Li, 2001). Underdeveloped rural areas have to face the drifting-away of talents and resources, while the demands of rural immigrants for facilities in urban areas may be at some point beyond the urban areas’ resources. Thus, the over-grown urban areas and special zones that have attracted capital and labor may be unable to sustain long-term development projects in such a huge country.

5.2.6 From 1994 to 1997

During this period, the development of telecommunications and its funding in China underwent enormous changes. There were immense changes in taxation, fiscal and monetary regulations and the entire Chinese economy was moving more and more towards a market economy. The internal funding mix analyzed in the previous section changed. As the telecommunications sector had basically just started up, the government abolished the “Three Reversed 90%” preferential policy. At the same time, the Organization for Economic Cooperation and Development (OECD) declared that the telecommunications sector was economically viable and thus halted all international soft loans to China. Consequently external funds were diminishing and there was less and less regional investment. The free government appropriation was shifted to loans at market interest rates and was diminishing. First installation fees were decreasing and some were changed to customer deposits.
This period was also characterized by major changes in the industry with rapidly increasing domestic demand and a growing feel of foreign influence. The increasingly felt need for accessing the World Trade Organization (WTO) and the demand for a competitive telecommunications market resulted in a series of gradual reforms in both the industry and institutions. China Unicom Corporation was set up in 1994 to compete with the monopolistic telecommunications provider, China Telecom. Faced with the abovementioned increasingly tough situations in financing telecommunications development, however, both China Telecom and China Unicom had to find new solutions. In March 1997, China Telecom and Telpo, an affiliate of the Ministry of Posts and Telecommunications (MPT), jointly established a branch in Hong Kong – China Telecom (HK). In October 1997, China Telecom (HK) sold its US$2.6 billion shares in Asia, Europe and North America, and was listed on the Hong Kong and New York stock markets. The capital thus collected was to be used for development of its mobile communications system in the coming years (Capital, 1997). Another form of foreign involvement was called CCF (China-China-Foreign) mode where a foreign corporation invested in a China-Foreign joint venture in China, which in turn invested in specific infrastructure development projects of a Chinese telecommunications company, such as China Unicom. Although not an encouraged practice, the CCF mode was adopted and enabled telecommunications service providers to raise capital, which was critical for China’s capital-scarce telecommunications infrastructure projects.

Growing demand, rapid development in urban areas and special zones, and successfully raised capital enabled the government to initiate projects to provide telephone service to rural and inland areas. In the early 1990s, the monopoly provider of China’s telecommunications industry – China Telecom – set the goal of “providing telephone connection to every administrative village”. It was mainly funded by the telephone installation fee and tax on long distance calls (China Telecom, 1999). From 1992 to 1999, China Telecom spent RMB$100 billion on new construction and RMB$50 billion on maintenance annually, of which 5 billion and 3 billion were in the category of universal service (Editorial Department of Yearbook of China Communications, 2003).
With such large inputs, the number of villages with phone connections increased by 10 per cent every year. However, the proportion of investment in telephone infrastructure development in western China has been small. No policy was made specifically addressing the lack of telephones in the western provinces of China.

### 5.2.7 From 1998 to the Present

In order to join the World Trade Organization (WTO), the central government began to take a proactive approach in launching institutional as well as sectoral reforms since 1998. These drastic reforms were heralded by the merging of the Ministry of Posts and Telecommunications (MPT) and the Ministry of Electronic Industry (MEI) to form the Ministry of Information Industry (MII) in March 1998. After the reorganization, the MII came to oversee telecommunications, multimedia, broadcasting, satellites and the Internet in China. This institutional reorganization was a major landmark in China’s telecommunications reform because telecommunications regulation and operations were formally separated for the first time since the establishment of the People’s Republic. Meanwhile, the central government continued to support major upgrading of the advanced telecommunications infrastructure in China. However, major improvements in the telecommunications infrastructure were still mainly found in the largest metropolitan areas along the coast. Besides, in 1999 China Telecom was broken up and its business of mobile, paging and satellite were divested and became independent corporations. As a result, the market consisted of seven telecommunications service operators (China Telecom, China Unicom, China Mobile, China Netcom, Jitong Corporation, China Railcom, and China Satellite). However, without a comprehensive universal service provision mechanism, the universal service obligation was still born by China Telecom, the former monopolistic telephone service provider. Having lost its advantageous monopolistic position, China Telecom thus began to regulate its basic construction programs. In 2001 its investment in basic telecommunications infrastructure construction (including telephone installation) decreased for the first time over the years (MII, 2003a).
Universal service provision programs and telephone development in western regions were threatened to be thwarted.

The central government, in reviewing the issue, has attempted to set up a universal service mechanism in order to provide universal telephone access and service to areas that lag behind. In 2000, the State Council issued the “China Telecom Decree”, the first comprehensive telecommunications regulation in China (State Council, 2000a). The forty-fourth article of the “China Telecom Decree” stipulated that “Telecommunications operators should provide universal service under guidance;” and “The MII should formulate and submit to the State Council for ratification regulations for universal service obligation” (State Council, 2000a). Despite the attitudinal change, the lack of capital and an effective mechanism, combined with the sole role of China Telecom, have caused telephone service quality to decline in regions that have already set up some sort of universal service program. The process of setting up a universal service mechanism has been slow in regions that do not have any universal service programs. The underdeveloped telephony service in western inland China and the huge disparity between the western and the eastern parts of the country have become an obstacle to sustainable development and may become a major source of economic conflict and political tension.

5.3 The Impact of the Telecommunications Market Reform on Telephone Development in Western China

In recent decades, most countries have initiated telecommunications reforms through divergent approaches. An important reason for this lies in different motivations shaped by the individual environments of countries. For example, in the United States, the unofficial status of the AT&T monopoly made it a target for antitrust laws. In consequence, market change has been consistent, and the United States has become a leading country in telecommunications reform. Moreover, because of the dominant capacity of domestic incumbents, international competition has also been encouraged to a certain degree
(Baliga and Santalainen, 1999). In the United Kingdom, market liberalization was initiated by the government’s move to improve the performance of state-owned enterprises. Most countries in the European Union, while being weary about large foreign operators entering their markets before domestic operators were ready, and before being “satisfied” with their universal service, have preferred cautious reforms (Collins and Murroni, 1997; European Commission, 1997). In contrast, expecting to promote their economies by the fast development of telecommunications, some developing countries have adopted radical changes in telecommunications through attracting foreign capital (Petrazzini, 1995; Petrazzini and Krishnaswamy, 1998).

In an international context, China presents an interesting case study. China’s unique macroeconomic and political system has undergone a series of reforms which have thoroughly affected its telecommunications sector. Yet compared with other countries, China has adopted a special strategy in telecommunications reform. This section will present an examination of China’s economic reform in the telecommunications sector and how the reform has affected telephone access and development in the western region of China.

5.3.1 Before 1998: From Monopoly to Limited Liberalization

Although general economic reforms started in China in 1978, for more than a decade after that China’s telecommunications industry remained almost untouched. The Ministry of Posts and Telecommunications (MPT) had been both the regulator and sole service provider through its operational arm - China Telecom. However, the government gradually felt a need to introduce partial competition and reform in the telecommunications sector. In 1993, the MPT started to loosen its regulation by permitting state-owned enterprises other than those under the MPT to provide a few value-added telecommunications services (MPT, 1993b). Later on competition was extended to basic telecommunications. In order to meet increasing market demand, in
1994 with the approval of the State Council, another state-owned company, China Unicom, was formed by the Ministry of Electronic Industries (MEI) joining with some other state institutions. China Unicom was allowed to build and operate nationwide cellular networks and, in areas where the coverage or capacity of MPT’s fixed line network was limited, or in other areas as approved by the MPT, fixed local and domestic toll networks (State Council, 1994). China Telecom and China Unicom were the only two comprehensive public operators. The market structure could thus be described as a duopoly. But this duopoly was seriously unbalanced, and China Unicom and China Telecom had a great disparity in strength. China Unicom actually stayed out of wired telephone services as the incumbent, China Telecom, tended to deny network interconnection with China Unicom. This situation reflected the primary purpose of the government for forming Unicom. Based on the principle of “act after trials”, the government intended to use Unicom’s formation to test for deep market changes in the future (MPT, 1996a; Pitt et al., 1996). The unbalanced situation of the market did not change substantially for years. For example in 1998, Unicom’s income was about RMB$1.6 billion, only 1/112 of China Telecom’s (Liang & Ding, 1999; MII, 1999). Consequently, China Unicom’s business was in fact confined to mobile voice and paging and had no share in fixed line business or providing universal telephone service in the western regions. The universal service obligation was still solely bore by China Telecom.

---

30 The term “act after trials” or Deng Xiaoping’s “crossing the river by groping for stones” means that instead of initializing an overall reform by issuing new laws and completely adjusting the administrative regime, a feasible new system is found through some trails with only limited, necessary modifications on the administrative regime being made.
5.3.2 After 1998: Towards Full Competition through Market Restructuring

During the late 1990s the government began to feel increased pressure to open the telecommunications sector and introduce competition to the market in order to join the WTO (Lardy, 1999; Johnson, 1999). As a result, the central government began to take a proactive approach in reforming the industry. Aiming at a deep change, a new round of reform was launched in 1998. Having revised the proposal submitted by the Ministry of Information Industry (MII) four times, the State Council in February 1999 ordered the vertical breakup of old China Telecom into four separate parts: mobile phone, fixed-line telephone, paging and satellite telecommunication (People's Posts and Telecommunications, 1999). As a result, the entire telecommunications industry was made up of seven operating companies – China Telecom, China Unicom, China Netcom, China Jitong, China Railcom, and China Satellite. However, the universal service responsibility was still solely undertaken by China Telecom. In the meantime, the telephone installation fee was abolished and cross-subsidy was criticized for being economically inefficient. At the same time, operating revenues of the local telephone business continued to decline (Editorial Department of Yearbook of China Communications, 2003). The shortage of funding and the single responsibility by China Telecom slowed the pace of providing universal service. Therefore, the original goal that every village would have telephone connection by 2000 was not realized. By the end of 2002, the proportion of rural administrative villages with a telephone connection was 85.1 per cent, with over 60,000 administrative villages still lacking basic telephone connection. Almost all the villages that did not have a telephone connection were located in the middle and western parts of China (Editorial Department of Yearbook of China Communications, 2003).

Upon the official accession to the WTO in December 2001, China took a further step in its telecommunications reform in order to demonstrate its dedication to reform and its commitment to developing a fair and competitive market. China announced in late
2001 the split of the fixed-line monopoly, China Telecom Group, into separate north (China Netcom) and south (China Telecom) geographic entities and licensed new operators in an effort to promote domestic competition. The telecommunications market is now made up of six operating companies – China Telecom, China Netcom, China Mobile, China Unicom, China Satellite, China Railcom, and about 4000 companies that provide value added and wireless business (Hu, 2001). In terms of market share, China Mobile became the biggest operating company due to the fast-growing wireless business; China Netcom was the third, and China Unicom sank to fourth place. The remaining market was shared by China Satellite and China Railcom (Figure 5-4). However, none of these companies has a market share above 50%, a signal showing that the telecommunications industry in China is rather competitive.


Figure 5-4: The Market Share of China’s Telecommunications Industry in 2002
The increasingly ferocious competition in the telecommunications market further slowed the pace of providing universal service, especially telephone service to western regions. Interior and remote areas tend to be overlooked due to low profitability and difficult geographic locations. By the end of 2001 the proportion of rural administrative villages with a telephone connection was 85.1 per cent. The number did not change by the end of 2002. Moreover, the revenue from the fixed line telephone business gradually decreased over the years. For instance, the growth rate of subscribers to the wired network began to outpace the growth rate of wired network revenue in 1999. In 2001, the wired network revenue – for the first time since the economic reform was implemented – did not grow, indicating that revenue per subscriber began to decrease (Editorial Department of Yearbook of China Communications, 2003). China Telecom is later reported to have tightened up its investment in wired network construction after the 2001 break-up due to its smaller market share and decreasing revenue from wired telephone service operation (China Information World, 2002). In the era of monopoly, the task of universal service was carried out by the monopoly provider, China Telecom. However, in the competitive market environment, how to provide universal service in such conditions has become a pressing problem.

5.4 External Impacts of Social Norms and Values

By the mid-1990s, China’s economic reform had successfully continued over ten years. During this period, China’s Gross Domestic Product (GDP) grew at an average annual rate of about 9 per cent, or 7.5 per cent on a per capita basis (National Bureau of Statistics of China, 1999). The transition from a planned to a market economy has often been portrayed as a gradual and experimental process, or in Deng Xiaoping’s widely quoted phrase, “crossing the river by groping for stones”. The official ideology was one of “combining plan and market together”.

In the early 1990s, the mindset of the leadership started to change. The leadership seemed unsatisfied with the scale and depth of the reform. A full-fledged market system was believed to be necessary for China to further grow the economy. In the spring of 1992, Deng Xiaoping made his famous Southern Tour to mobilize local support for further and more radical reform. The big ideological breakthrough occurred afterwards at the Fourteenth Party Congress held in September 1992 when the Party, for the first time, endorsed the “socialist market system” (*China Daily*, 1993). The watershed was the historic decision of November 1993, “Decision on Issues Concerning the Establishment of a Socialist Market Economic Structure,” adopted by the Third Plenum of the Fourteenth Congress of the Chinese Communist Party (*China Daily*, 1993). The November 1993 decision is a historic document because it represents a strategic shift in the course of China’s reform. For the first time, it was decided to abolish the planning system altogether and set the goal of reform as the establishment of a modern market system to eventually incorporate international institutions. It has to be noted that the international environment was far less threatening to China in the 1990s than in the 1960s. Yet China became the first country where the ruling Communist Party has voluntarily changed its official ideology to embrace a market economy and private ownership in selected sectors. This raises a fundamental question: What brought about the change in the mind-set of the Chinese leadership? And what influence might the transition have on the telecommunications development and universal service in China in general and in western areas in particular?

Internal factors such as the aim to improve economic performance and standards of living are one aspect of the answer. External impacts coming from social norms, ideologies, and international mindset are also important in motivating China’s economic transition to a market-system and full adoption of pragmatism. Next I will briefly explain how globalization has influenced China’s policy with an emphasis on China’s accession to the WTO and its impact on universal service in the western regions of China.
The term “globalization” has quickly become one of the most fashionable buzzwords of contemporary political and academic debate in China. The debate, however, remains within the circle of Chinese academia and political leaders. In popular discourse and the media, globalization often functions as a benevolent term closely connected to efficiency and prosperity. Thanks to the media, the public gradually yet steadily abandoned the self-sufficiency and isolationism mindset that was formed during Mao’s era and became eager to embrace globalization and be embraced by the international community. Globalization was believed to be “a bridge to the modernity in the 21st century”, and “a way to economic and cultural prosperity”. Similarly, principles and laws of the free market, policies in world economics (“economic liberalization”), and the proliferation of new information technologies were made familiar to the Chinese public and regarded as the strategy for prosperity and solutions to the most pressing problems. The enthusiasm, expectation, and motivation of the public to join important international organizations and be included in the international community remained high during the late 1990s.

Ideas from economists, on the other hand, provided important intellectual inputs to the mindset change and the policy transition. Unlike most Eastern European and former Soviet Union countries, China’s reform had never relied on foreign economic advisors. China’s reform agenda was shaped by the Chinese themselves. However, the influence of Chinese domestic economists (and some foreign economists) was considerable. Throughout the 1980s, academic exchanges with the West and Eastern European countries and new economic education had enormous impact on the old, middle-aged, and young generations of economists. The so-called “western economics” in education and research had gradually replaced the Soviet-style economics and become the foundation of the economics profession in China. After more than 10 years of economic reform and academic exchanges, the body of knowledge in China on the market economy...
and reform increased impressively as compared to that in the late 1970s. During the late 1980s and the early 1990s, some Chinese economists began to call for deeper and more fundamental economic reform, emphasizing the need to join in international economic and financial organizations and actively take part in international economic activities. Some of the key research results were later collected and published in a collective volume (Wu, Zhou, Rong, et al., 1996). Among these economists many have been appointed as consultants for the State Council in making policies and strategic plans.

The economic factors combined with the political will of the leadership as well as the enthusiasm of the public (although much influenced by the media) explain the demand for the strategic shift in the mind-set of the leadership. Joining influential international organizations such as the WTO is believed to be one of the top priorities in the strategic transition from a socialist planned economy to a market-based economy and rapid integration to the world market.

**5.4.2 External Impacts from International Regimes such as the World Trade Organization**

The World Trade Organization (WTO), established in January 1995 as a result of the Uruguay Round negotiations (1986-94) and located in Geneva, is one of the world’s most powerful institutions in terms of regulating trade and services. It is the only global international organization dealing with the rules of trade between nations and at its heart are the WTO agreements, negotiated and signed by the bulk of the world’s trading nations and ratified in their parliaments (WTO, 2003). Today the organization has 144 member countries, and most of the world’s significant economies are members of the WTO.

Much has been written interpreting and assessing WTO agreements related to the telecommunications sector (Fredebeul-Krein and Freytag, 1997; Tarjanne, 1999;
Fredebeul-Klein and Freytag, 1999). In February 15, 1997 the General Agreement on Trade in Services (GATS) of the WTO concluded the negotiations on telecommunications service and 69 countries signed the agreement, opening their telecommunications markets to foreign competition (WTO, 1997). The WTO rules were stipulated in the Fourth Protocol, which required that the members treat all other members equally in terms of telecommunications market access. For market access, members should clearly indicate any limitations in their telecommunications services (basic and value-added). In addition, the Protocol prohibited members from discriminating against foreign telecommunications service providers as compared with domestic providers. Certain regulatory principles were accepted in the agreement to make reform smooth. To effectively enforce the agreement, the Reference Paper was regarded as the guideline by most members. The Reference Paper, recognizing that incumbent telephone monopolies enjoy certain advantages that enable them to minimize competition, stipulated the following principles:

1) Competition safeguards. The principle requires “appropriate measures” to be used to prevent anti-competitive practices by a dominant provider. Anti-competitive practices include cross-subsidization, exploiting information obtained from competitors, and not making available to competing suppliers on a timely basis technical information about essential facilities and other commercially relevant necessary information.

2) Interconnection. Competing telecommunications networks often need access to existing networks so that customers belonging to different providers can communicate. The WTO regulatory principles require networks interconnect with a major supplier “at any technically feasible point in the network” (WTO, 1996). Interconnection must be provided on nondiscriminatory terms, conditions, rates, in a timely fashion, at cost-oriented rates, with unbundling so that the supplier need not pay for network components or facilities that it does not require. And there must be an independent regulator with the power to resolve disputes regarding interconnection.

3) Universal service. Members of the agreement have the right to define universal service obligations, but they must be undertaken in a transparent, nondiscriminatory, and competitively neutral way.

4) Public availability of licensing criteria. Where a license is required, the country must make publicly available all the licensing criteria and the
period of time normally required to reach a decision concerning an application for a license and the terms and conditions of individual licenses.

5) Independent regulators. The regulatory body is separate from, and not accountable to, any supplier of basic telecommunications services. The regulators shall behave impartially in making decisions and using procedures with respect to all market participants.

6) Allocation and use of scarce resources. Procedures for the allocation and use of scarce resources, including frequencies, numbers and rights of way, shall be conducted in an objective, timely, transparent and non-discriminatory manner (WTO, 1997).

The members must take into account the rules and principles of the WTO while formulating domestic policies. Therefore legally binding rules of the WTO Protocol are able to influence the member countries’ domestic telecommunications policies and market.

5.4.3 Commitments to the World Trade Organization

On November 15, 1999 in Beijing, China and the United States signed “the Bilateral Agreement Between the Government of the People’s Republic China and the Government of the United States of America on China’s Accession to the World Trade Organization” (China Daily, November 16, 1999). The agreement cleared the biggest barrier blocking China’s entry into the World Trade Organization (WTO). According to the commitments that China has made to undertake, upon its accession to the WTO on December 11, 2001, China agreed to a six-year schedule for direct foreign participation in value-added and basic services, and to establish an independent and transparent regulatory authority and pro-competitive regulatory regime (US-China Business Council, 31

---

31 In order to accede to the WTO, China must negotiate with each Member of the WTO and get bilateral agreements on market access. The negotiation with the United States is believed to be the most difficult because of the strict requirements from the United States.
China’s commitments marked its first agreement to open its telecommunications sector, both to the scope of services and to direct investment in telecommunications businesses. Through these commitments, China would become a member of the Basic Telecommunications Agreement. Tariffs on information technology products, such as computers, semiconductors, and all Internet-related equipment would fall from the current average of 13.5 per cent to 0 per cent by the year 2005. China would phase out all geographic restrictions for paging and value-added services in 2 years, mobile/cellular in 5 years and domestic wired services in 6 years. China’s key telecommunications services corridors in Beijing, Shanghai, and Guangzhou, which represented approximately 75 per cent of all domestic traffic, would open immediately on accession in all telecommunications services. China would allow 49 per cent foreign investment in all other services and would allow 50 per cent foreign ownership for value added paging services in two years; for mobile services, 49 percent in 5 years; and for international and domestic services, 49 per cent in 6 years (US-China Business Council, 1999).

Internet services would be liberalized at the same rate as other key telecommunications services and foreign investment would be allowed. China had agreed that it would ensure that state-owned and state-invested enterprises would make purchases and sales based solely on commercial considerations, such as price, quality, availability, and marketability; and provide U.S. firms with the opportunity to compete for sales and purchases on non-discriminatory terms and conditions. China had also agreed that the government would not influence these commercial decisions (either directly or indirectly) except in a WTO-consistent manner. In terms of regulatory principles, China had agreed to implement the pro-competitive regulatory principles embodied in the Basic Telecommunications Agreement (including cost-based pricing, interconnection rights and an independent regulatory authority), and agreed to technology-neutral scheduling, which meant foreign suppliers can use any technology they choose to provide telecommunications services (US-China Business Council, 1999).
5.4.4 The Impact of China’s Accession to the WTO

The accession of China to the World Trade Organization (WTO) in December 2001 marks an important milestone in telecommunications regulatory and industrial structure reform in China. The telecommunications industry in China has been under close and rigid control and regulation by national governmental agencies and departments. Foreign direct investment, especially which in basic services, has been prohibited from being used in China’s telecommunications operation. With accession to the WTO, the highly protected sector has been opened to foreign competitors. China has taken several steps to demonstrate its resolution in deepening reform and in embracing a competitive free market in telecommunications. On December 21, 2001, several days after signing with the WTO, the State Council of China issued Provisions on the Administration of Foreign-Invested Telecommunications Enterprises (State Council, 2001), which had been implemented as of January 1, 2002. Consisting of 21 articles, the Decree was formulated in accordance with the relevant laws and administrative regulations governing foreign investment in order to meet the needs of opening the telecommunications industry to the outside world.

5.4.4.1 Impact on Market Performance and Structure

Entry into the WTO by China is described by many as a long-term gain at the price of short-term pain. China’s telecommunications regulator, the Ministry of Information Industry (MII), however, believes that market liberalization forced by China’s WTO membership will bring more disadvantages and risks than benefits to the country’s fledgling telecommunications and information services, even though it may provide more

---

32 While joining the WTO may well have a powerful impact on China’s political and economic reforms overall, in the telecommunications sector, at least, this outcome is not likely to occur soon on theoretical or empirical grounds.
incentives for China’s information technology sector to grow (South China Morning Post, January 24, 2000). For example, the previous monopoly operator, China Telecom encounters serious disadvantages in terms of productivity and production efficiency compared to its foreign counterparts. Figure 5-5 shows that in 1997, China Telecom only accounted for 10.7% and 51.7% of NTT’s productivity and production efficiency, respectively. More seriously, Chinese telecommunications corporations’ know-how and experience about marketing and competition are very limited if not zero. This would put China Telecom and other domestic telecommunications carriers in a disadvantageous position once foreign companies enter the market.

**Source**: Compiled based on WTO (1998) Table A4, A6, and A7.

**Note**: *Productivity is defined as the ratio or revenue over the number of employees, and production efficiency as the ratio of total subscriber lines (fixed and mobile) over the number of employee.

![Figure 5-5: The Comparisons of Productivity and Production Efficiency Between China Telecom and Some Foreign Telecom Carriers (1997)*](image)

---

33 NTT: Japan’s major telecommunications services provider.
Viewing such significant gaps, the MII has had to hurriedly take actions to fix these problems. In February 1999 the State Council, based on a proposal submitted by the newly created MII, ordered the vertical breakup of old China Telecom into four separate parts: mobile phone, fixed-line telephone, paging and satellite telecommunication. The industry experienced another reform in 2001, which had fired heated debates. China announced in late 2001 the split of the fixed-line monopoly, China Telecom Group, into separate north and south geographic entities, and licensed new operators in an effort to promote domestic competition. By doing this, the MII hoped that the main domestic telecom carriers such as China Telecom and China Unicom could gain the know-how of competition so that they could effectively defend themselves against foreign competitors in the market place. However, the split was criticized for not having created competition but simply a number of small companies in different service areas. Besides, this would result, some scholars argued, in a potential price war rather than efficiency (Hu, 2001; Liu, 2001). Table 5-3 sketches the changes in China’s telecommunications market between 1998 and 1999. Because most actual regulatory changes and reforms are put into force after 1998, driven by the pressure from the entry into the WTO, the information in Table 5-3 approximately reflects the impact of the WTO on China’s telecommunications market performance and structure.

---

34 See 5.3.2 After 1998: Towards full competition by market restructure, in this chapter.

35 Ibid.
As a direct result of restructuring the telecommunications industry and the price cuts in 1999, fixed-asset investment dropped 9.7 per cent as compared to 1998. The significant reduction of telephone installation fees shrank the overall capital pool for investment. One point deserved stressing. Even though the overall changes shown in the table could not be entirely credited to the impact of the WTO, most of them were directly or indirectly related to it. For example, while price cuts directly stimulated the growth of demand, they were just part of the ongoing price structure adjustments to meet the challenge of international competition prompted by the entry into the WTO. An

Wei Wang in his book, *China’s Integration with the World Economy: Repercussions of China’s Access to the WTO*, published in Seoul, Korea, 2002, analyzed how China’s impending accession to the WTO is one major factor behind the drop of telecommunications service fees and reduction of the installation fee in China.

Table 5-3: The Impact of China’s pre-WTO entry on its telecommunications industry

<table>
<thead>
<tr>
<th></th>
<th>1998 (without the impact of the WTO)</th>
<th>1999 (with the impact of the WTO)</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed-asset investment(a)</td>
<td>RMB$168.1 billion (US$20.28 billion)</td>
<td>RMB$151.8 billion (US$18.31 billion)</td>
<td>-9.7%</td>
</tr>
<tr>
<td>Fixed-line phone installation fee (average at national level)(b)</td>
<td>RMB$1010 (US$121.8)</td>
<td>RMB$725 (US$87.5)</td>
<td>-28.2%</td>
</tr>
<tr>
<td>Mobile network access fee (average at national level)(b)</td>
<td>RMB$800 (US$96.5)</td>
<td>RMB$500 (US$60.3)</td>
<td>-37.5%</td>
</tr>
<tr>
<td>Leasing international line rate (2MBPS, for Internet Service Providers (ISPs)(c))</td>
<td>RMB$431,600 (US$52,063)</td>
<td>RMB$320,000 (US$38,600)</td>
<td>-25.9%</td>
</tr>
<tr>
<td>Fixed-line customers (million)(a)</td>
<td>87.35</td>
<td>108.8</td>
<td>24.6%</td>
</tr>
<tr>
<td>Mobile phone customers (million)(a)</td>
<td>25</td>
<td>43.2</td>
<td>72.8%</td>
</tr>
<tr>
<td>Telephone penetration (per 100 population)(a)</td>
<td>10.53</td>
<td>13</td>
<td>23.5%</td>
</tr>
</tbody>
</table>

Sources: Data compiled from \(a\)MII (1998, 1999); \(b\) People’s Daily (1999); \(c\) South China Morning Post (2000).
overwhelming amount of foreign investment in all service sectors would not likely happen immediately after China’s accession to the WTO. As indicated, the scope and depth of competition would be rather limited. Because of the significant sunk costs required and the high risks associated with an uncertain regulatory environment, foreign investors might not have great interest in China’s long-term basic telecommunications services without creditable commitments from the regulator (Levy & Spiller, 1994). Instead, they would most likely target the services with lower capital requirements and high mobility such as callback, Internet access and content services, etc.

5.4.5 Impact on Universal Service

The Reference Paper recognizes that the universal service obligation of the members should not be used as an anti-competitive instrument, and should be administered in a transparent, non-discriminatory and competitively neutral manner (WTO, 1996). Traditionally, China Telecom is responsible for the construction and operation of the national telecommunications network across the country. In 1998, it was reported that 32.9% of the rural villages had no phone facilities and no access to phone services (MII, 1998). The operational costs in the western areas of the country were exceptionally high because of the harsh natural conditions and sparse population. These factors also made revenue low in the absence of subsidies. Cross subsidies from the eastern to the western, and from wireless and long-distance services to local phone service were the chief ways of sustaining network integration and realizing positive externalities. However, this mechanism was facing a serious challenge with the 2001 breakup of China Telecom, and the coming competition in basic phone services in the post-WTO period. Research indicated that private capital from foreign competitors, when it came into a market, tended to be interested only in profitable customers and avoid investing in
underdeveloped and difficult areas\textsuperscript{37}. Fierce competition among domestic operators due to the pressure coming from foreign entries might also result in cream-skimming – when companies were interested only in more profitable areas and serving urban and developed cities and regions. The recent investment decrease in rural and western telecommunications service, especially fixed-line service, indicated such a tendency. How to prevent cream-skimming and fairly allocate the universal service obligation among the targeted telecommunications service providers was an emerging issue for the Ministry of Information Industry. Because the terms and conditions in the Reference Paper were rather broad and weak and lacked credible criteria and norms, it was an open question whether the Reference Paper could adequately safeguard the universal service obligation from being manipulated.

\textbf{5.5 National Development Plan for the Western Regions}

The improvement of basic infrastructure has a significant effect in accelerating economic growth and increasing social welfare. Compared with other infrastructures, telecommunication can create stronger positive externality. Modern telecommunications is an indispensable aid in meeting basic human needs. It can help overcome cultural barriers, reduce economic inequalities, and even compensate for intellectual disparities. It is also efficient in enhancing people’s communication skills and reducing transaction costs. In the case of China, where distances are huge and where technological progress is mainly imported rather than created by local R&D activities, this argument may apply particularly well. Recent econometric studies have found evidence of a causal link between telecommunications development and economic growth: while the telephone penetration rate of China increases by 1%, the GDP will increase by 0.5% (Hu, 2000). Hu

\textsuperscript{37} Petrazzini Ben and Theodore Clarke in their “Costs and Benefits of Telecommunications Liberalization in Developing Countries”, 1996, examined the challenges and opportunities of opening and privatizing domestic telecommunications markets in South American countries. They found that in some countries, Chile for example, teledensity actually decreased after competition and privatizing was introduced.
argues that insufficiency of basic telecommunications infrastructure indeed constrains economic development.

The lack of telecommunication infrastructure has been a big constraint to the development of underdeveloped areas; in the meanwhile, the underdevelopment of economy further reduces the consumption of telephones directly. Thus the successful development of western China must overcome the significant telecommunications access obstacles in this huge region. The government has recognized the unquestionable significance of informatization and telecommunications in national development, especially in the WTO era. The Fifth Plenary Session of the 15th Central Committee of the Communist Party of China and former Premier Zhu Rongji’s Report on Outline of the 10th Five-Year Plan at the Fourth Session of the Ninth National People’s Congress delivered on March 5, 2001 clearly pointed out that informatization is the key in promoting industrial advancement, industrialization and modernization (Report on Outline of the 10th Five-Year Plan, 2000). The MII also submitted to the State Council a detailed program and goals for the Tenth Five-Year Plan (2001-2005). According to the plan, the information and telecommunications sector would accelerate the construction of the state information infrastructure, continue the construction of wide-band and high-speed transmission networks, and put more effort into the development of high-speed Internet (MII, 2003b). Secondly, according to the plan, in order to accelerate the development of information technology and the information industry, some guiding principles should be set up. This included improvement of information-technology equipment; breakthroughs in solving the bottlenecks of integrated circuit (IC) and software development; introduction and promotion of digital technology; enhancement of technological innovative ability and upgrading of products. Meanwhile, information technology should be widely applied to all sectors of the national economy so as to reform and upgrade traditional industries, promote information technology in the national economy and social services, and promote information technology in enterprises and E-commerce (MII, 2003b).
The concern for social equity and social stability has led China’s top leaders to commit themselves to accelerating the economic growth of the interior western provinces. In November 2000, the State Council of China announced a new policy that stipulated four strategies for western regions’ development. The budgets for infrastructure investments in the poor provinces would increase substantially every year, and in March 2000 a Western Region Development Office was established under the State Council to formulate a comprehensive development strategy and to coordinate its implementation. The so-called “Go West” policy set out four strategies that comprised increased capital investment in infrastructure, favorable investment incentives, broadened scope for foreign investment, and investment in human capital. The government would provide the western regions with more preferential policies and incentives. For instance, a company with a 25% or more equity share of foreign capital in the western region would be regarded as a foreign enterprise which would be entitled to all concessions given to foreign companies (State Council, 2000b). The aforementioned Tenth Five-Year Plan by the MII also emphasized the importance of setting up a universal service mechanism, improving the service level of telecommunications and speeding up the application of information technology in China’s western region (MII, 2003b). It stipulated that to achieve the goals set in the Tenth Five-Year plan and the 2010 long term development targets, policies must be devised to create a favorable environment for the development of the information industry and to solve the existing problems faced by the industry. First of all, a universal service mechanism should be established by:

- Requiring a universal service contribution to ensure universal telecommunications;
- Service is available in areas where the cost of providing it is high or the income level of the people is low.
- Flexible taxation and investment policies to encourage the development of Telecommunications services in poor areas and villages;
• Providing government subsidies for the provision of dedicated government and Party networks, emergency communications services and the publishing of the Party’s doctrine and books for blind people. (MII, 2003b)

Furthermore, in order to bridge the gap between the western regions and the eastern provinces in telecommunications service provision and access, the Plan provides an outline to:

• Systematically plan and coordinate the development of the western region. Aim to accelerate the development of communications, strengthening economic development. Launch a large scale communications infrastructure to improve the basic infrastructure, further open up the IT manufacturing industries and the software industry in the Western region, reform the business structure and accelerate the pace of improvement;

• Develop technologically advanced industries that enjoy comparative advantage. To utilize national debt and low-interest loans from the country or from overseas to develop the basic telecommunications infrastructure and the IT manufacturing industry;

• Encourage investors from overseas or local enterprises in other provinces or cities to invest in the communications industry in the western region. (MII, 2003b)

The change of state policy and its subsequent ups and downs in telecommunications growth throughout the short history of the People’s Republic of China shows that in socialist China (especially in the planning-based system era), the state plays a prominent role in telecommunications development. Indeed when the state that possesses considerable political control over the telecommunications sector determines to promote regional telecommunications development by formulating preferential policies, investment is likely to rise, leading to faster telecommunications growth in the western regions. However, given the complexity of policy-making and institutional regulation in
China, and given that the MII’s controlling influence over the network operators has loosened with the market becoming competitive and sometimes even irrational, and especially when cut-throat prices have stripped value out of the industry, the actual role of the state beyond rhetoric becomes questionable. Associated with this concern is how to overcome the gap between the prosperous eastern provinces and the backward western provinces, and how to fund universal service for basic telecommunications services.
Chapter 6

UNIVERSAL SERVICE PROVISION IN WESTERN CHINA: SOLUTIONS AND POLICY RECOMMENDATIONS

Over the last two decades, China has been developing rapidly by most standards, particularly in the eastern coastal regions. The western inland region, however, has been left behind in many fields, including telephone services access as shown in the previous chapters. The great disparity is a result of geographic conditions, historical reasons, policy factors, and more recently, impacts from institutional and market transitions. The disparity is widening over the years since not only have the western regions had a much lower teledensity, but also the growth rate of teledensity in the western regions has been lower than that of the eastern coastal regions.

The government has recognized the importance of social and economic development in the vast western areas of China and has begun to implement a series of development plans in the area in order to address the growing regional disparity. The Western Regional Development Office within the National Development and Reform Commission was established in March 2000 under the direct command of the State Council; and declared that western regional development programs would be the most important programs in the next decade (State Council, 2000b). Among the objectives that the Western Development Strategy set were: opening up to the outside and implementing reform; developing a variety of enterprises including individual, private and foreign-funded forms of ownership and making enterprise the catalyst for development in the region; improving the investment environment; expanding the scope of foreign investment, developing an export-oriented economy and increasing foreign cooperation; reforming government; and, placing an emphasis on developing science, technology and education in the region and on attracting talented and educated people (State Council,
However, the development plan is facing many constraining factors, lack of telecommunications service being one of them. Over the years the demand for telephone access in western, especially rural areas has remained very high. For example, a survey of Sichuan peasants in 1993 showed that 64% of the peasants expressed their need for rapid production, technology, and market-related information exchange; only 6% said they did not need such information. When they were asked about their grievances, lack of information ranked fourth after heavy taxation, chaotic markets, and crime (Yang and Liu, 1994). This survey shows that improvement of information will help the peasants increase their productivity and produce products the market needs. Peasants can reach out for the information they need through the use of the telephone. Furthermore, efficient economic activities of all kinds require timely information exchange and telecommunications access. Yet it has been widely known that people in the western inland and rural areas have great difficulty in accessing wired telephony. Many people in western regions have written to the National People’s Congress, expressing their grievance over the lack of voice telephony and the adverse impact on productivity and daily activities (Guangming Daily, 2003).

Telecommunications certainly is not the only factor in national growth, yet a lack of telecommunications and information access would constrain sustainable economic development and social equality. Based on the literature review in chapter 2, some economic and social benefits that justify the provision of telecommunications service to unserved people in the western region of China include:

- improved employment, social and family benefits accruing to these customers from being in contact through telecommunications;
- economic benefits to rural or isolated areas that would not have access to telecommunications;
- benefits to callers of universal service customers; and
• social benefits of integration of customers with society in general.

It has been shown that by many standards that the successful development of west China must overcome significant telecommunications obstacles in this huge, land-locked region. The West Development Strategy has put telecommunications development and universal service provision at the top of its agenda. Yet the pressing problem of how universal service provision in the western regions shall be undertaken in a competitive market economy has not been addressed. The current system, with China Telecom and China Netcom bearing the universal service obligation, has become increasingly ineffective. The Ministry of Information Industry (MII) started the process to set up a new universal service mechanism in 2000 (People’s Daily, 2000). Yet no satisfactory agreement has been reached.

The provision of universal service in western China is a very complex and large project, and plays an important role in facilitating economic development and reducing spatial inequality. The issue will not be resolved until the situation in the western region of China and the structural re-organization of the industry is examined in detail so that adequate regulation and policy regarding universal service and access in western China can arise. This chapter will briefly analyze the uniqueness of China’s socialist market economy and its implications for universal service provision in the western region of the country. Based on the analysis in this section as well as the previous two chapters solutions and policy recommendations for universal voice telephony provision to western China will be provided.
6.1 From a Planning System to a Market Economy: the “Visible Hand” vs. the “Invisible Hand”

The analysis of the economic reform in the previous section implicates a fundamental problem confronting universal service provision in China – the incompatibility between the need to preserve universal access, and the requirement to transform to a market-based economy to ensure competitive neutrality. The contradiction between the planned economy in a socialist system and commercial viability in a competitive quasi-capitalist free market economy is both the background and the cause of the difficulty and disagreement in universal service provision in western China. In the era of state-owned monopoly telecommunications, the monopolistic operative arm of the Ministry of Posts and Telecommunications (MPT) - China Telecom - is obliged to provide universal service, and cross-subsidies are the primary way of funding universal service. Cross-subsidies imply that some users are charged prices above cost to subsidize other users who are charged below cost. For example, business firms subsidize households, long distance calls subsidize local telephone calls, and urban areas subsidize rural areas. However, cross-subsidy becomes increasingly non-efficient in a free market system, as it distorts investment and consumption decisions. Secondly, it is not transparent, being difficult to determine who receives the subsidy and where it comes from. Also, with the subsidy the firms have less incentive to reduce costs in high cost areas or provide better service to low income users. As Laffont and Tirole (2000) point out, while the distortion in price and cost may increase consumption, it decreases the supplier’s incentive to provide service.

However, given the socialist planned economy in China before competition was introduced to telecommunications in the late 1990s, the state-owned monopolistic top-down operation of universal service provision proved to have been surprisingly efficient, especially in terms of main line and base station construction in rural and remote areas. In the planned economy once the state makes a plan, the state-owned institutions are obliged to meet the requirements of the plan by any means. The “visible hand” of the state is
much more powerful than the “invisible hand” of the market in determining, mobilizing and guiding the direction of national development and investment. Besides, eastern collectivism and the values associated with socialist ideology impelled people to refrain from questioning the efficiency and transparency of the whole process, and to make sacrifices that most people would agree are necessary in serving the major goals of the nation. Universal service programs, including the “providing telephone connection to every administrative village” program, thus quickly developed.

However, with the introduction of deregulation and competition that have become the common trend of the telecommunications industry in the whole world, universal service provision in rural and western China becomes a much more pressing problem. As shown in the previous chapter, one of the side effects of a competitive telecommunications market is the lack of incentives for the provision of universal services in relatively unprofitable markets. Thus on the one hand, the funding base for the old mechanism of financing universal service has been loosened or become nonexistent; on the other hand, universal service provision is still a goal of public policy. This is particular true with western China where the lack of telecommunications facilities has greatly constrained economic and social development in the socialist market economy. The socialist market economy indicates that even though economic activities shall operate based on free market system principles and economic decisions shall be made in a decentralized, efficient, and competitive manner, the socialist foundation, belief, and leadership requires the state still play the role of being the instrument of the working class and protecting state-owned assets. While the free market “bottom-up” approach is applied to organize an economy, the public sector is supposed to still control the “commanding heights” with the state macro-managing the overall economy, mostly through economic but also administrative means. State functions in a socialist system include the accumulation and protection of state assets, ownership of infrastructural and other strategic industries, maintaining sectoral proportions and overall balance, regulating income distribution, coordinating regional economic and social development and providing human services and public commodities, among others (Stiglitz, 1996).
Therefore, an effective system that possesses the essential components of both a socialist and a free-market system requires the government balance the two contradictory systems with caution. Yet to integrate two contradictory elements in one system has proved to be a difficult task. The contradiction is precisely shown in the telecommunications sector – one of the most tightly regulated infrastructural industries in China until 1998. The open-door policy and the accession to the World Trade Organization (WTO) have forced the sector to voluntarily introduce competition to the market and assist new domestic competitors. Yet the state cannot loosen the surveillance and protection over the state asset. The decreasing revenue of China Telecom and China Netcom in the wired market has resulted in decreasing investment in the rural or unprofitable markets. In addition, wireless carriers and future foreign competitors have shown more interest in more profitable high-end markets and value-added businesses. The government is facing an increasingly pressing need to develop another strategy in order to balance the universal service provision objective and the commercial viability of state-owned big corporations in a competitive market.

6.2 Setting Up A Universal Service Mechanism

China currently provides universal service by dividing up the responsibilities and assigning them to each enterprise temporarily; that is, the six major telecommunications operating companies contract separately with provinces and cities. Yet this approach has constantly resulted in disputes among the carriers about which region they should take. Thus it is important to set up an alternative universal service mechanism that can reach the long-term universal service provision goals.

38 All telecommunications carriers, China Telecom, China Netcom, China Unicom, China Mobile, China Satellite, and China Railcom, are major state-owned corporations.
Although infrastructure investment could reduce regional disparity, the development strategy for the interior provinces has to be more creative than simply building clones of Shenzhen in the northern and southwestern provinces. There is much variability based on the local market conditions and geography, which presents a major problem for policy makers desiring to provide universal service to the areas and subscribers who really need it. Policy makers must respond to the newly emerged market situation by setting up new and flexible mechanisms for providing telecommunications service to the western region. Furthermore, geographic and demographic differences must also be taken into account. Successful development strategies of some countries and areas cannot produce the same salubrious results when implemented in other national or regional settings. For instance, when China opened some coastal pockets for foreign direct investment, these Special Economic Zones quickly developed into vibrant export platforms and created linkages with the immediate hinterland. When landlocked Mongolia turned the entire country into a free trade and investment zone in the late 1990s, however, the inflow of foreign capital was not as satisfying compared with China’s experience (Démurger et al, 2002). The specific lesson in this case is that some effective policy packages for one area are unlikely to work for another area. Adequate understanding about the specific regional condition is crucial for setting up goals and scopes of the universal service obligation and providing telephone service technologically and economically suitable for that particular area.

Under the universal service mechanism, the realization of the universal service obligation can be divided into two stages – funding universal service and provision of universal service. There are two typical methods to finance universal service. One is through the country’s general tax system, and the other is through a universal service fund. One of the problems facing China’s universal service provision is capital shortage. Financing universal service provision to western regions especially requires large amounts of investment. Therefore how to finance the mechanism is one of the most important issues in implementing universal service provision to western provinces.
Financing mechanisms should strive to be non-distortionary, inexpensive, and competitively neutral; that is, they should not distort consumption and investment decisions, should keep the cost of raising the funds low, and should not benefit one firm at the expense of others (Clarke and Wallsten, 2002). Mechanisms to support universal service are competitively neutral when one or several firms do not benefit or suffer relative to others in the industry. For example, if the incumbent firm were allowed to be in the monopoly position over certain services for the reason of maintaining universal service provision, the principle of competitive neutrality would be violated. If new entrants can choose to serve the most profitable customers without bearing the universal service obligation, it is not competitively neutral either. Furthermore, the mechanism should emphasize that there is no constraint on the technical means by which the connection is provided, allowing for wired or wireless technologies, nor any constraints on which operators provide part or all of universal service obligations.

6.2.1 Setting the Goals and Scopes of Universal Service in Telecommunications

The first step for setting up a universal service mechanism is to identify the goals and scopes of universal service provision in the target area. There is considerable ambiguity about what services should be included in the universal service package. Initially, universal service involved only basic voice, but gradually the list was expanded to include other services such as long-distance service, directory assistance, and emergency services. Recently, there have been numerous proposals to expand the definition of universal service to include new and advanced telecommunications services, such as e-mail, Internet access, or broadband Internet services (Bollier, 1997; Information Infrastructure Task Force, 1993; Intelligent Network Task Force, 1987).
However, Hart (1998) argues that the higher levels of universal service may not be introduced in all parts of a country or region simultaneously. He discusses the situation in the European Union where different levels of telecommunications development co-exist among European countries. Thus Hart proposes three different universal service classes: a basic high quality service class, a state-of-the-art service class, and a broadband-for-all class. The three different classes have different performance criteria. Countries and regions shall be placed in classes with specific performance criteria, and obligated to achieve the targets for the next higher level. Sawhney (2000) argues the uniformity of universal service might result in wastage if the user does not have use for the services. He further offers a conceptual framework that distinguishes communication mode (person-to-person interaction) from information access mode (human-machine interaction). And the level of service that is required to uniformly available should be carefully designed accordingly.

Xavier (1997) provides a group of criteria to employ in making universal service determinations. He outlines a seven-step decision-making process addressing the following factors:

1. Consideration of whether the service under consideration is an essential service of significant social importance;
2. Estimation of the degree of expected market penetration of the service;
3. Assessment of the nature and extent to which the service will not be made available by the market and why;
4. Consideration of the social and economic disadvantages incurred by those without access if there is no government intervention;
5. Estimation of the costs of intervention;
6. Assessment of the costs of intervention through universal service mechanisms versus the costs of other approaches;
7. Establishment that the benefits of intervention exceed the costs. (p.833)
The main goal of universal service in China has been to support two groups: (1) the rural and high-cost areas; (2) the low-income group (Wu, 2002). Regarding recent debate about extending universal service obligations to other advanced telecommunications services, different goals should be set for different locations in China due to their vast differences in the stages of economic development. The economic development of the eastern part of China is closer to the developed countries. Especially for those advanced areas with high penetration rates of telecommunications, access to the Internet and broadband technologies might be set as one of the goals and scopes in universal service. In contrast, the western provinces of China are much less developed, and universal service should aim at supporting basic access to the rural and high-cost areas at the current stage. In addition, according to the Information Technology Union (ITU), universal service in telecommunications has five stages as shown in Table 6-1.
Table 6-1: Five Stages of Universal Service in Telecommunications

<table>
<thead>
<tr>
<th>Stage</th>
<th>Stage 1: Network establishment</th>
<th>Stage 2: wide geographic reach</th>
<th>Stage 3: mass market take-up</th>
<th>Stage 4: network competition</th>
<th>Stage 5: service to individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>The penetration rate of firms</td>
<td>0-30%</td>
<td>20%-80%</td>
<td>70%-100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>The penetration rate of households</td>
<td>0-20%</td>
<td>5%-30%</td>
<td>20-85%</td>
<td>75%-100%</td>
<td>100%</td>
</tr>
<tr>
<td>Universal service goal type</td>
<td>Technological (acquire new technology)</td>
<td>Geographic (maintain regional parity)</td>
<td>Economic (stimulate economy)</td>
<td>Social (achieve national cohesion)</td>
<td>Libertarian (individual right to communicate)</td>
</tr>
<tr>
<td>Examples of universal service goals</td>
<td>Long distance service linking all major centers; public telephones where demand warrants</td>
<td>Telephone service available in all population centers, widespread adoption of telephony in business</td>
<td>Widespread residential take-up of telephony; meet all reasonable demands for telecoms</td>
<td>Telephone affordable to all; telephone service adaptable to special needs (e.g.: disabled)</td>
<td>Everyone can meet basic communication needs; public access to advanced services.</td>
</tr>
<tr>
<td>Typical universal service policy measures</td>
<td>License conditions on network roll-out</td>
<td>Profitable licenses subject to unprofitable obligations</td>
<td>Control speed of price rebalancing</td>
<td>Targeted subsidies</td>
<td>Identify and meet non-market demand</td>
</tr>
</tbody>
</table>

*Source: ITU, World Telecommunications Report, 1998*
With overall basic voice telephony penetration rate for households less than 20%, the telecommunications development in western China can be described as in the first stage of telecommunications access. Thus it is highly impractical to include advanced information technology in the universal service provision project for current western China where most people still lack access to basic voice telephony. Therefore, in a vast country like China where enormous regional disparity in many standards exists, different policy goals should be set up based on different social, economic, demographic, geographical conditions and users’ needs. In regard to western provinces, current universal service policy should focus on voice telephony (including households service and publicly accessible telephone service via wired and wireless technologies), aiming at spatial equality. More advanced telecommunications service, including Internet access, can be accessible in areas where basic voice telephony becomes available.

### 6.2.2 Universal Service Fund

At the adoption of competition, establishing a universal service fund for providing universal service is a common mechanism in the world. The universal service fund is a mechanism to which all operators contribute in order to finance the provision of universal telecommunications service to uneconomic areas. As it will not be necessary for every operator to provide a full range of universal services, it will be acceptable for those who do not provide to contribute to the costs of those who do. Operators who do provide the designated universal services would therefore be net recipients from the fund, while others would be net contributors. In theory, a universal service fund provides a wider tax base and reduces the potential for “cream skimming” (the firm serving the most profitable customers without universal service obligation). Besides, a universal service fund is more transparent, the cost is much lower, and it is closer to being “competitively neutral” compared with cross subsidies, as now the transfers occur in a transparent or explicit way. There are also some problems with a universal service fund. The first is
how to determine the shares of the fund collected from different firms; the second is how to use this fund.

6.2.2.1 Sources of the Fund

How to choose the source of this funding varies across countries. Regulators have been concerned that payments into a common universal service fund, for instance, should not burden any service provider unfairly vis-à-vis any other provider. Thus a universal service fund should require all the telecommunication firms in a market to make contributions and any firm which provides universal service has the right to get a subsidy. In theory, the fund should be taxed at a certain rate from firms’ profits to avoid distortion. However, because of the existence of asymmetric information between the regulator and the firms, most countries collect the fund at a certain rate based on the firms’ revenues. For example in Peru, the 1993 Telecommunications Law established the Fund for Investment in Telecommunications and stipulated that the fund derived its payment from a transparent 1 per cent tax on the gross revenues of all telecommunications companies (APEC, 2001). In Chile, the 1994 Telecommunications Law established the Rural Telecommunications Development Fund. The funds came from the annual government budget and were raised through income taxes and other sources such as revenues from providing service (APEC, 2004).

The Ministry of Information Industry (MII) of China is planning to set up a universal telecommunications service fund to help the western region, rural areas and the impoverished outreaches with telecommunications development (China Daily, 2000). Yet the process of setting up a fund has met many obstacles. First of all, the regulator has to take into careful consideration who should contribute to the universal service fund, to counter the problems resulting from funding difficulties for the incumbent in the event of cream-skimming urban entry. This study proposes that the source of this fund should come from the revenue generated from telecommunications service provision, and any
firm (entrants and the incumbent) should make contributions based on their revenue. In return, any firm that operates in the rural sector receives a subsidy from the fund. Such a fund should be guaranteed to be self-financing, so that widespread entry does not undermine the ability of the universal service provider to service the unserved market. For instance the six telecommunications service operators – China Telecom, China Netcom, China Unicom, China Mobile, China Railcom, and China Satellite – shall all make contributions to the fund. Payment should be carefully calculated based on their end-user revenues. In addition, other value-added service operators and telecommunications equipment manufacturers may also be required to contribute to the fund. However, the payment will likely bring about social welfare losses. In order to finance the funding and at the same time minimize welfare losses, payment to the fund should be made at different rates. For those services that have lower elasticity\(^{39}\), higher rates should be charged and vice versa (Zhong, 2001). Several principles to be followed are suggested:

**Transparent Principle**

- The contribution formula and contribution from each operator should be made known.
- The areas to receive funding, and the amount of funds to be allocated to these areas should be made known.

**Non-Discriminatory and Competitively Neutral Principle**

- All operators should contribute to the fund. Major suppliers should not be excluded.

---

\(^{39}\) Elasticity is a term of economics. It refers to the degree to which a demand or supply curve reacts to a change in price (Sowell, 2001). Elasticity varies among products because some may be more essential to the consumer. Products that are necessities are insensitive to price changes because consumers would continue buying these products despite price increases. Therefore a good or service is considered elastic if a slight change in price leads to a change on demanded or supplied quantity of the product.
• Contribution to the fund could be based on percentage of revenue of the operator, rather than a fixed sum.
• Management of the USO Fund should be in a transparent, non-discriminatory and competitively neutral manner.

**Not More Burdensome Than Necessary Principle**

• Universal service funds should not become a universal subsidy. The funds should only be used to support projects in areas where market mechanism is ineffective in universal service provision.

Clearly, in implementation, great care must be taken to ensure that no distortion may occur. Furthermore, in order to set up a carefully designed universal fund, more flexible tax, investment, and financing policies should be proposed based on detailed calculation and accounting research. A more detailed study of the relative costs and benefits will be necessary, and the answers will vary according to the area under consideration and its stage of development.

**6.2.2.2 Choosing the Provider of Universal Service**

The identification of the carrier of last resort is not especially challenging in the initial stages of the transition to a market-based system. The incumbent China Telecom enjoys a market advantage compared with a new entrant, making it legitimate to burden the former with carrier of last resort responsibilities. But once the transition is well underway, those advantages are lost, making carrier-of-last-resort obligations an asymmetric restriction on the incumbent’s ability to compete with new entrants. Therefore alternative mechanisms have to be used to identify carriers of last resort. To ensure competitive neutrality on the supply-side, regulators have sought to design new mechanisms for selection of primary universal service providers that do not bias the
process towards one carrier or another. Auctions, in particular, have attracted much attention.

Nett (1998) presents a set of general operative principles for auctions. According to Nett, the incumbent provider should have the option of deciding whether or not to continue as the universal service provider. When the incumbent provider is not interested, the regulator should see whether any of other operators is willing to undertake the universal service obligation without any compensatory payment. If there are no takers, the obligation should be auctioned. Weller (1999) goes into more specifics, and recommends a single-round, sealed-bid auction that asks carriers to bid subsidy support per subscriber for universal service in a small, well-defined geographical area. Peha (1999) further suggests tradable universal service obligations. Peha argues that the obligations should be made tradable between telecommunications firms. For instance, a firm confronting problems with the implementation of a project should be able to purchase a later completion deadline, or to undertake another objective with the same deadline, or to pay another provider to undertake the whole obligation. Peha argues that a trading regime will result in a flexible universal service obligation mechanism. In general, auction proposals attempt to keep most of the essential features of the current universal service system and determine the universal service provider with a new mechanism. The underlying assumption in the auction proposals is that telecommunications operators may voluntarily serve customers in unprofitable markets without an obligation. The advantage of auctions is that they transfer the burden of determining the costs of providing service from the regulator to the firm providing the service. In addition, auctions may encourage efficient operation and management in serving unprofitable markets.

Another proposal is virtual vouchers (Bonnet, 1999). The virtual vouchers proposal attempts to redirect the subsidies from the carrier to people that live in that high-cost area. The subscriber would get an amount of voucher that is equal to the difference from the subscription price and the actual cost of service. The subscriber could choose the service
provider, and the voucher will go to the service provider of the subscriber’s choice. As the voucher payment can go to any service provider in the area, it maintains the competitive neutrality of the marketplace. Comparing the auction proposal and the voucher solution, it is believed that auctions would be more appropriate to the context and situation of the western region of China, where subscribers have few service carriers to choose from. Therefore the auctions proposal will be an effective approach in choosing the provider of universal service, especially with a carefully designed and legally enforceable obligation.

6.2.3 Interconnection

Interconnection is the linking of different networks so that the companies that enter the market have access to the current operator’s networks, and customers of different networks may call one another. The purpose of an interconnection regime is to benefit users by encouraging competition that will lower the price and improve the scope and quality of services. Furthermore, if some of the new companies cannot be connected to the existing network, they will offer a very limited service. Thus, it will be difficult for them to attract customers, both among those which do not have telephones as well as among those that have various needs apart from telephony service. Without interconnection, the network of the new firm will operate as a closed circuit for those which are connected to it. To a certain extent, an improperly interconnected new network is not dissimilar to a small isolated network, for instance, subscribers to China Railcom in some areas have complained about network failures when calling to China Telecom users (China Telecom World, 2004). Moreover, to guarantee the sustainability of universal service, new carriers’ access to the incumbent networks is critical in the context of the transition from monopoly to competition. Without a properly defined and regulated interconnection framework, the entry of new firms into the sector can be greatly restrained and hence the ability to contribute to universal service is jeopardized. In addition, enabling ‘universal choice’, that is, enabling individual subscribers to freely
choose their preferred local network operator from a pool of suppliers, will probably be a future policy component for universal service provision. In some cases, due to ineffective interconnection the market is dominated by one monopolistic operator. This may very likely affect universal service provision when the subscribers do not have alternative providers to choose in a competitive market.

Experience has shown that network interconnection is normally a protracted and difficult process. Predictably incumbent operators have little incentive to offer access to their networks to the new competitors. The reasons are both commercial and technical (He, 1998). The incumbent is concerned that customers, revenues, and market share will be lost if the competitor has access to the existing network. In addition, interconnection of incompatible networks may result in degraded service and responsibility confusion. Therefore new entrants have had difficulty in accessing the incumbent’s network. For instance, at one point China Telecom was preventing China Unicom from accessing its local telecommunication network and consequently China Unicom stayed out of the wired market (Zhou, 2001). As a result, there is a consensus among telecommunications experts and policy makers that decisive and informed guidance by regulators is required to pave the way for effective interconnection arrangements. Some regulations are made by the government to guarantee network interconnection and to support new competitors. Yet a critical issue, pricing, may become another cause of disputes. Experience in the Netherlands shows that when the rates are too low, investment will be discouraged, especially where new entrants are not subjected to investment commitment (Donegan, 2001). In China interconnection pricing is based on network usage of the entrant. Because of the special need during the initial stage of reform to support new entrants, the price for interconnection is set very low. As a result the revenue from interconnection for the incumbent China Telecom accounts for about 5%, compared with 20% to 30% of
other foreign incumbent carriers’ profit. Thus, the asymmetric regulation that has helped the development of new entrants might have made the incumbent China Telecom reluctant to provide interconnection to new entrants.

Interconnection is one of the key factors in implementing universal service provision. Solving the problems concerning technological and pricing disputes requires that the policy-maker and regulator take a scientific approach and set up a monitoring mechanism. In addition, despite the complexity of the issue, the access rate must be calculated based on reasonable interconnection pricing, so that the market is regulated in a symmetric and neutral manner. Only when the artificial obstacles to interconnection are removed and the incumbent is more willing to allow access to its network can authentic competition be achieved and universal service providers (including the incumbent and new entrants) operate efficiently to undertake the universal service provision goals.

6.3 Wireless Solution

Universal service provision has been a component of the fixed-line business for a long time, but the last few years have seen a remarkable change. Fixed line penetration is starting to decline. Wireless penetration has exceeded wired business in many countries. In China mobile penetration has grown rapidly in recent years. Figure 6-1 shows that the mobile business growth rate is much higher than fixed-line penetration. In October 2003 mobile subscribers for the first time surpassed the number of fixed-line subscribers and overtook it as the dominant means of communication in China. By the end of 2004 mobile subscribers reached 334.8 million, compared with 312.4 million fixed-line subscribers.

\[\text{---}\]

\[40\] According to Principles of Public Networks Interconnection released by the Ministry of Information Industry (MII Decree No. 9/2001) and the Agreement of Network Access between China Telecom and China Unicom, the access tariff for China Unicom to use the network of China Telecom is RMB$0.06, about 0.007 US dollar, per minute.
Statistics show that the national average ratio between mobile penetration and fixed-line penetration is 0.96. But the number varies in different areas, with the eastern region having the highest (1.09); the western region the second (0.95); and the central area the lowest (0.78). Table 6-2 shows more clearly that compared with fixed-line penetration, the mobile business has grown more rapidly in the western provinces. By the end of 2004, mobile subscribers in the western provinces reached 69.2 million, exceeding the number for fixed-line by 6.52 million. Among the ten western provinces and one city under the direct governance of the central government – Chongqing, eight provinces and cities (Guangxi, Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Qinghai, and Ningxia) have higher mobile penetration compared to fixed-line penetration. Even though the mobile penetration in most western provinces is still much lower than that of most eastern provinces, the growth rate of mobile business in western China has been remarkable. Data reported by the Ministry of Information Industry (MII) shows that the growing rate of mobile subscribers and penetration in the western provinces on average has been 55% over the past three years (from 2002 to 2004), the highest compared with eastern regions’ 36% and central provinces’ 42%.

Table 6-2: 2004 Telecommunications Development by Province

<table>
<thead>
<tr>
<th>Province</th>
<th>Wireless Subscribers (Million)</th>
<th>Fixed-Line Subscribers (Million)</th>
<th>Wireless Teledensity (per hundred people)</th>
<th>Fixed-Line Teledensity (per hundred people)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>334.88</td>
<td>312.44</td>
<td>25.9</td>
<td>24.9</td>
</tr>
<tr>
<td><strong>Eastern</strong></td>
<td>174.12</td>
<td>150.41</td>
<td>41.6</td>
<td>37.3</td>
</tr>
<tr>
<td>Beijing</td>
<td>13.41</td>
<td>8.47</td>
<td>92.1</td>
<td>67.3</td>
</tr>
<tr>
<td>Tianjin</td>
<td>4.24</td>
<td>4.07</td>
<td>41.9</td>
<td>41.4</td>
</tr>
<tr>
<td>Liaoning</td>
<td>11.94</td>
<td>14.72</td>
<td>28.4</td>
<td>36.2</td>
</tr>
<tr>
<td>Shanghai</td>
<td>13.11</td>
<td>8.67</td>
<td>76.6</td>
<td>57.5</td>
</tr>
<tr>
<td>Jiangsu</td>
<td>22.33</td>
<td>25.82</td>
<td>30.2</td>
<td>35.6</td>
</tr>
<tr>
<td>Zhejiang</td>
<td>23.23</td>
<td>19.75</td>
<td>49.6</td>
<td>42.7</td>
</tr>
<tr>
<td>Fujian</td>
<td>11.38</td>
<td>12.66</td>
<td>32.6</td>
<td>36.7</td>
</tr>
<tr>
<td>Shandong</td>
<td>19.09</td>
<td>24.64</td>
<td>20.9</td>
<td>27.6</td>
</tr>
<tr>
<td>Guangdong</td>
<td>53.74</td>
<td>29.62</td>
<td>67.6</td>
<td>38.5</td>
</tr>
<tr>
<td>Hainan</td>
<td>1.65</td>
<td>1.97</td>
<td>20.3</td>
<td>25.7</td>
</tr>
<tr>
<td><strong>Central</strong></td>
<td>91.51</td>
<td>97.46</td>
<td>18.4</td>
<td>20.1</td>
</tr>
<tr>
<td>Inner Mongolia</td>
<td>5.94</td>
<td>4.91</td>
<td>25.0</td>
<td>21.2</td>
</tr>
<tr>
<td>Hebei</td>
<td>15.13</td>
<td>15.55</td>
<td>22.4</td>
<td>23.5</td>
</tr>
<tr>
<td>Shanxi</td>
<td>7.54</td>
<td>7.71</td>
<td>22.7</td>
<td>23.8</td>
</tr>
<tr>
<td>Jilin</td>
<td>7.64</td>
<td>6.56</td>
<td>28.2</td>
<td>25.3</td>
</tr>
<tr>
<td>Heilongjiang</td>
<td>10.17</td>
<td>10.83</td>
<td>26.7</td>
<td>28.9</td>
</tr>
<tr>
<td>Anhui</td>
<td>8.73</td>
<td>11.97</td>
<td>13.6</td>
<td>18.7</td>
</tr>
<tr>
<td>Jiangxi</td>
<td>6.71</td>
<td>7.47</td>
<td>15.8</td>
<td>17.8</td>
</tr>
<tr>
<td>Henan</td>
<td>13.92</td>
<td>15.84</td>
<td>14.4</td>
<td>16.7</td>
</tr>
<tr>
<td>Hubei</td>
<td>11.30</td>
<td>10.74</td>
<td>18.8</td>
<td>18.8</td>
</tr>
<tr>
<td>Hunan</td>
<td>10.36</td>
<td>10.85</td>
<td>15.6</td>
<td>16.6</td>
</tr>
<tr>
<td><strong>Western</strong></td>
<td>69.20</td>
<td>62.68</td>
<td>18.7</td>
<td>17.3</td>
</tr>
<tr>
<td>Guangxi</td>
<td>8.75</td>
<td>8.12</td>
<td>18.0</td>
<td>16.9</td>
</tr>
<tr>
<td>Chongqing</td>
<td>8.17</td>
<td>6.42</td>
<td>25.9</td>
<td>20.8</td>
</tr>
<tr>
<td>Sichuan</td>
<td>15.15</td>
<td>13.70</td>
<td>17.4</td>
<td>16.1</td>
</tr>
<tr>
<td>Guizhou</td>
<td>4.40</td>
<td>3.89</td>
<td>11.4</td>
<td>10.2</td>
</tr>
<tr>
<td>Yunnan</td>
<td>7.32</td>
<td>5.47</td>
<td>16.7</td>
<td>12.8</td>
</tr>
<tr>
<td>Tibet</td>
<td>0.40</td>
<td>0.38</td>
<td>14.8</td>
<td>14.7</td>
</tr>
<tr>
<td>Shaanxi</td>
<td>7.88</td>
<td>7.92</td>
<td>21.4</td>
<td>21.8</td>
</tr>
<tr>
<td>Gansu</td>
<td>3.58</td>
<td>4.77</td>
<td>13.8</td>
<td>18.7</td>
</tr>
<tr>
<td>Qinghai</td>
<td>1.18</td>
<td>0.94</td>
<td>22.0</td>
<td>17.8</td>
</tr>
<tr>
<td>Ningxia</td>
<td>1.59</td>
<td>1.20</td>
<td>27.3</td>
<td>22.3</td>
</tr>
<tr>
<td>Xinjiang</td>
<td>4.90</td>
<td>4.95</td>
<td>25.3</td>
<td>25.7</td>
</tr>
</tbody>
</table>

Compared with fixed-line technology that generally serves household subscribers, mobile business targets individual users. In China 80% of fixed-line users are household subscribers. Even though some families subscribe to more than one wired line, most households have only one fixed-line service. The different nature and characteristics of mobile technology and fixed-line business help to account for the rapidly growing mobile penetration. However, more importantly, wireless technology is particularly suitable for serving rural and inland regions in western China. It is believed the deployment of mobile technology can make a great contribution to universal service provision in western China.

6.3.1 Affordability

Mobile access has proved to be increasingly affordable for low-income populations and low-end users. One indicator that mobile operators are serving low-income users is the Average Revenue Per User (ARPU)\(^{41}\). Table 6-3 shows that the ARPU dropped 33% and 24.3% in 2001 and 2002, respectively. Correspondingly the average price declined by 23.4% and 19.6% in 2001 and 2002, respectively. At the same time, in 2002 the total revenue for mobile business increased 17%, while mobile subscribers increased 42%. The statistics indicate that the newly subscribed users are more likely to be low-end users. This may be explained by the price drop during year 2002 and year 2003 due to increasing competition between the two major mobile operators, China Mobile and China Unicom. The increasing affordability has attracted more low-end and low-income users of mobile communication, while in the early stages of mobile development in China wireless subscribers were more likely to be high-end and high-income users.

---

\(^{41}\) ARPU equals Average User Communication Time Length × Average Price.
Table 6-3: Mobile Business, 2002

<table>
<thead>
<tr>
<th>Year</th>
<th>ARPU Increase Rate (%)</th>
<th>Average User Usage Increase Rate (%)</th>
<th>Average Price Increase Rate</th>
<th>Revenue Increase Rate (%)</th>
<th>Subscriber Increase Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>-33%</td>
<td>-12.4%</td>
<td>-23.4%</td>
<td>33.7%</td>
<td>71.8%</td>
</tr>
<tr>
<td>2002</td>
<td>-24.3%</td>
<td>-5.8%</td>
<td>-19.6%</td>
<td>17%</td>
<td>42%</td>
</tr>
</tbody>
</table>

*Source: Editorial Department of Yearbook of China Communications (2003).*

### 6.3.2 Cost and Construction Cycle

Another important reason that mobile communication is an optimum approach for solving telephone access issues in rural and inland western provinces is related to the cost of construction. It is known that the two main factors that restrain universal service provision in the western regions is funding and the construction cycle. Fixed-line construction requires a big amount of investment. The construction of optical fiber communications system has made great progress in China since the mid 1990s (Lin, 1997). The increase of fiber optical cable over the period between 1996 and 2004 was enormous, as shown in Figure 6-2. By the end of year 2004, the total length of China’s fiber optic cable trunks, according to the Annual Telecommunications Report made by the Ministry of Information Industry (MII), is 645,662 km, compared with 10,500 km in 1995. A fiber optic cable network has been established, which covers all provincial capital cities and medium cities and most small towns in China (MII, 2003c).
Therefore it can be seen that a lack of optical cable is not the cause of the disparity between the eastern part and the western part of China in telephone access. Table 6-4 further shows that by 2002, the total length of the fiber optical cable in western China was 160,957 km. Compared with 104,764 km of eastern China, which is about 24% of the total length, the fiber optical cable in western China makes up 37% of the total length. The data indicates that basic telecommunications backbone construction in western provinces is well developed, quite opposite to what people would generally believe. However, the development of the inter-exchange wire network in the western provinces lags behind that of eastern China. The disparity of the local loop between western and eastern provinces is even bigger. As shown in Table 6-4, the local loop length in the western provinces is 127,754 km, making up only 27% of the total length, while eastern provinces possess 215,946 km, almost double that of the western provinces.

Table 6-4: 2002 Telecom Capacity by Province

<table>
<thead>
<tr>
<th>Province</th>
<th>Long-Distance Fiber Optical Cable Length (km)</th>
<th>Inter-Exchange Fiber Optical Cable Length (km)</th>
<th>Local Loop Length (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>434,571</td>
<td>1,292,059</td>
<td>472,821</td>
</tr>
<tr>
<td><strong>Eastern</strong></td>
<td>104,764</td>
<td>395,361</td>
<td>215,946</td>
</tr>
<tr>
<td>Beijing</td>
<td>3,522</td>
<td>9,597</td>
<td>8,805</td>
</tr>
<tr>
<td>Tianjin</td>
<td>1,704</td>
<td>10,389</td>
<td>1,722</td>
</tr>
<tr>
<td>Liaoning</td>
<td>112,023</td>
<td>46,108</td>
<td>17,255</td>
</tr>
<tr>
<td>Shanghai</td>
<td>2,697</td>
<td>12,159</td>
<td>6,111</td>
</tr>
<tr>
<td>Jiangsu</td>
<td>11,695</td>
<td>65,286</td>
<td>28,138</td>
</tr>
<tr>
<td>Fujian</td>
<td>15,490</td>
<td>51,817</td>
<td>24,726</td>
</tr>
<tr>
<td>Shandong</td>
<td>16,947</td>
<td>98,736</td>
<td>49,811</td>
</tr>
<tr>
<td>Guangdong</td>
<td>22,530</td>
<td>29,878</td>
<td>42,049</td>
</tr>
<tr>
<td>Hainan</td>
<td>333</td>
<td>8,863</td>
<td>6,313</td>
</tr>
<tr>
<td><strong>Central</strong></td>
<td>151,808</td>
<td>557,553</td>
<td>29,121</td>
</tr>
<tr>
<td>Inner Mongolia</td>
<td>18,796</td>
<td>22,915</td>
<td>13,858</td>
</tr>
<tr>
<td>Hebei</td>
<td>12,238</td>
<td>101,941</td>
<td>17,822</td>
</tr>
<tr>
<td>Shanxi</td>
<td>15,148</td>
<td>41,068</td>
<td>13,549</td>
</tr>
<tr>
<td>Jilin</td>
<td>12,238</td>
<td>40,000</td>
<td>8,522</td>
</tr>
<tr>
<td>Heilongjiang</td>
<td>27,614</td>
<td>64,860</td>
<td>4,629</td>
</tr>
<tr>
<td>Anhui</td>
<td>14,337</td>
<td>58,155</td>
<td>5,608</td>
</tr>
<tr>
<td>Jiangxi</td>
<td>11,571</td>
<td>59,481</td>
<td>13,694</td>
</tr>
<tr>
<td>Henan</td>
<td>22,486</td>
<td>92,520</td>
<td>32,312</td>
</tr>
<tr>
<td>Hubei</td>
<td>17,468</td>
<td>39,783</td>
<td>23,648</td>
</tr>
<tr>
<td>Hunan</td>
<td>18,027</td>
<td>59,745</td>
<td>9,337</td>
</tr>
<tr>
<td><strong>Western</strong></td>
<td>160,958</td>
<td>339,145</td>
<td>127,754</td>
</tr>
<tr>
<td>Guangxi</td>
<td>19,399</td>
<td>33,644</td>
<td>18,691</td>
</tr>
<tr>
<td>Chongqing</td>
<td>8,524</td>
<td>31,173</td>
<td>7,939</td>
</tr>
<tr>
<td>Sichuan</td>
<td>19,669</td>
<td>82,649</td>
<td>21,734</td>
</tr>
<tr>
<td>Guizhou</td>
<td>14,356</td>
<td>24,547</td>
<td>17,198</td>
</tr>
<tr>
<td>Yunnan</td>
<td>19,104</td>
<td>40,974</td>
<td>14,804</td>
</tr>
<tr>
<td>Tibet</td>
<td>6,901</td>
<td>2,503</td>
<td>298</td>
</tr>
<tr>
<td>Shaanxi</td>
<td>12,279</td>
<td>48,203</td>
<td>15,498</td>
</tr>
<tr>
<td>Gansu</td>
<td>15,484</td>
<td>30,405</td>
<td>2,436</td>
</tr>
<tr>
<td>Qinghai</td>
<td>8,169</td>
<td>2,954</td>
<td>1,707</td>
</tr>
<tr>
<td>Ningxia</td>
<td>3,921</td>
<td>3,605</td>
<td>1,585</td>
</tr>
<tr>
<td>Xinjiang</td>
<td>14,358</td>
<td>15,600</td>
<td>12,005</td>
</tr>
</tbody>
</table>

The reason why the inter-exchange cable and local loop in western China has grown very slowly is due to both financial and geographic considerations. According to statistics, 15% of unserved villages are located within 3-5 km from the nearest exchange, 80% are located within 5-50 km from the nearest wire-line exchange facilities, and 5% of the unserved villages are located over 50 km from the nearest exchange facilities (National Bureau of Statistics of China, 2003b). Considering that 70% of the total investment needs to go to wire construction, it will be very costly to provide wired telephone services to vast, low populated, and geographically difficult western provinces. It is estimated that RMB$2000 billion (about US$250 billion) will be necessary for implementing wired infrastructure to serve unserved rural areas in western China. Furthermore, the construction cycle will last 100 years in order to serve that area even if 100,000 km cable is constructed each year (People’s Posts and Telecoms, 2003). Take Caojian County in Gansu province as an example, the 10 households that are on the waiting list for installing telephone services are located on five different hills. It will cost around RMB$100,000 to install wired telephone lines to any of the hills (Gansu Statistical Bureau, 1999). Therefore it is highly inefficient and revenue-losing for wired telecommunications carriers to serve these households. Wired local loop thus becomes the bottleneck of universal service provision in the western provinces. As a result in western provinces a large amount of fiber optic network is left idle and unused. For instance, in Yunnan province the 2002 usage rate of the backbone long distance fiber optic network, provincial fiber optic network, inter-exchange fiber optical network, and local loop is 20.6%, 42.9%, 49.6%, and 47.5%, respectively (MII, 2003a). In Gansu, another western province, the usage rate of the backbone long distance fiber optical network, provincial fiber optical network, and inter-exchange fiber optical network is 43.2%, 39.9%, and 13%, respectively, indicating a great waste of wired resources (MII, 2003a).
Compared with the costly wired service provision, a wireless access system has the clear cost advantages of low expenses and efficient investment. The base-station is a single bulk investment and costs per user decrease continually as more mobile users share the service. In contrast, wired investment can only capture the revenue of a single user. For instance, in order to provide wired service to a 5 km² 20-household administrative village, the carrier needs to invest RMB$200,000 (about US$24,000) in constructing telecommunications facilities including inter-exchange cables and the local loop. Investment doubles if cable length doubles. In contrast, a wireless carrier would need only RMB$100,000 (about US$12,000) to provide wireless access to a 20-household village even if the distance among the households increases (People’s Posts and Telecoms, 2003). Furthermore, wireless also has the advantages of low operation and maintenance costs over wired access. Yearly maintenance costs for wired operators are about RMB$400 per household, while that for wireless operators are only about RMB$50 per household (People’s Posts and Telecoms, 2003). In addition, an important advantage of wireless access over wired access is that the construction cycle of a wireless network is much shorter than a wired network construction cycle. Compared with wired construction that usually takes several years, wireless operation can be implemented within several months.

Therefore the rapid revolution of telecommunications technology has given new choices of providing universal service. For example, in some areas, using wireless technology (such as PHS, ETS, and DSC - 128-512) is proving to be more efficient than using the fixed lines. There have been success stories in Beihai district of Guangxi Province, Enshi County in Guizhou province, and Ganzi district in Tibet. For instance, with the deployment of mobile 450 MHz wireless technology, 85% of administrative villages now have telephone access in Tibet, a 53% increase within two years (China Telecommunications Construction, 2004). Thus it is expected that mobile communication will play an important role in realizing telephony provision to rural and inland western areas.
In conclusion, it is evident today that in many developing countries wireless technology is increasingly the most important substitute for traditional basic wired services and extends access to formerly unserved populations. The functionality of wireless transmission is potentially universal, just as it is for wire-line transmission. The actual functionality of wireless access (as opposed to wire-line access) is directly related to the government’s willingness to provide sufficient usable frequency spectrum so as not to limit its capacity, and, in turn, its service capabilities. The more relevant questions then become: in light of what we know about the market conditions and spectrum policies, what functionalities will various types of wireless access systems be able to provide, and what types could be cost effectively provided as opposed to wire-line alternatives? Thus to make a wireless universal access system affordable in the western provinces, more practical schemes for network and users are necessary. The MII must also make policies to stimulate investment in wireless network infrastructure. Furthermore, the government should issue cellular licenses to wired companies. The new licenses will help wired carriers to make more efficient use of their existing infrastructure. It is time for universal service priorities to move from a blanket cross-subsidy for the wired network to a more targeted approach based on the specific needs of individuals and geographical areas. Correspondingly policies and practices that were originally designed to ensure that wired operators provided universal service to western provinces should be revised to take account of very different market structure, technological changes, and geographical and demographic features.
6.4 The Role of the State and the Regulator

6.4.1 The Role of the State

From the analyses of telecommunications development in the previous chapters, it can be seen that in a developing country like China, the state plays an important role in telecommunications development. For instance, from the experiences of Shaanxi discussed in chapter 5, a conclusion can be drawn that when the state places great emphasis on national security, telecommunications will not necessarily grow in relatively well-off areas. Instead, it may grow in areas with defense values and strategic importance. These areas may be remote and deprived of resources. Therefore, the role that the state can play in promoting telecommunications development in certain areas is important in the era of planned economy.

The role of the state for a vast developing country like China in a free-market system cannot be slighted. It is still believed that even in a full-fledged market-based system, the state of China should play an important role in facilitating the development of telecommunications and services access in unserved areas. While the state exerts its influence through approaches including resource allocation and maintaining sectoral proportions in the socialist planned era, more emphasis can be paid to the state’s proactive role in setting up universal service mechanisms and providing overall supervision for universal service provision projects in areas where the telecommunications services market is not economically viable.
6.4.2 Regulatory and Policymaking Mechanism

As discussed in previous sections, for a long time China strictly adhered to a socialist regime that excluded competition. With limited public-owned economic elements as a supplement, the national economy was controlled by state-owned enterprises. Private and foreign capital was restricted. The socialist regime did not admit the role of economic law. Instead, resources were allocated and the market was regulated with administrative measures, which were formed through coordination using a centralized, fragmented administrative system (Lampton, 1992). This system had the following characteristics: different state-owned industries were under the central control of and belonged to specific governmental institutions. Such an institution had usually a title of a ministry or a national company. These institutions had two functions: taking charge of specific industries as governmental branches and carrying out the headquarters of their affiliated companies.

In the late 1970s and early 1980s China entered an era of economic reforms. The traditional socialist regime began to undergo a series of reforms towards a “socialist market economy”. Market structure has been gradually changed and the competition has been introduced. However, under the principle of “act after trials”, while market change has moved forward step by step, administrative and institutional reform has advanced laggardly and legislative processes have been carried out slowly compared with the practical need. For instance, some necessary laws like the “Competition Law” and the “Antitrust Law” are still missing. Also, China still has no telecommunications law although the government has been working on a draft for years. Recently the drafting of a Telecommunications Law was finished in China. The new Telecommunications Law would address the universal service issue. Yet until the official release of the New Telecommunications Law by the National People’s Congress, which may take another several years, China’s telecommunications market will still be governed by policies and directives issued by the State Council, the Ministry of Information Industry (MII), the
former Ministry of Posts and Telecommunications (MPT), or by local governments. The lack of a Telecommunications Law became the major handicap in resolving many issues, including the disputes about interconnection or the responsibility of undertaking universal service obligations. In addition, the establishment of a formal regulatory body authorized and directed by law has become the core requirement to not only complete China’s telecommunications regulation system, but also to supervise universal service provision.

As discussed in previous sections, for a long time the Chinese public telecommunications sector was a monopoly under the direct guidance of the (MPT). However, influenced by the planned economy employing a fragmented administrative system, the MPT did not have an exclusive power in regulating the whole telecommunications field. The State Council was involved in telecommunications regulations at the highest level, and it intervened to coordinate different authorities when necessary. The State Planning Commission was involved in tariff regulations. It directed and approved the MPT’s tariff policy. Through ministries that directly monitored different industries, the State Economic and Trade Commission was responsible for the administration of large state-owned enterprises including China Telecom and the other major telecommunications operators.

The complex and fragmented policymaking and regulatory framework has not essentially changed after the aforementioned institutional reforms were implemented. On the one hand, the Communist Party of China, the State Council, and the National People’s Congress draw and enact formal institutions in the forms of rules, orders, and decisions. These institutions are mandatory and binding for MII when formulating telecommunications policy. On the other hand, interest groups, including corporations affiliated with other ministries, can impose their influence in the form of “bureaucratic bargaining”. As argued by Lieberthal (1992), bureaucratic bargaining reflects the existence of fragmented authority to some extent and can effectively contribute to an understanding of China’s policy formulation, decision-making, and policy implementation. Lampton (1992) further points out that the bargaining is;
“...a process of reciprocal accommodation among leaders of territorial and functional hierarchies. Bargaining occurs because these leaders believe that the gains to be made by mutual accommodation exceed those to be made by unilateral action (if that were possible) or by forgoing agreement altogether.” (p.37)

In the context of China, even in the State Council, each councilor represents the interests of one or several government sectors or regions, and bargains for his/her own represented sectors and agencies. Bargaining is especially an important way to represent informal institutions in influencing China’s telecommunications policymaking and policy implementation. When the MPT was the regulator of the telecommunications industry, for example, the attitude of the MPT toward China Unicom when it was established in 1994 was hostile. For instance, MPT deliberately delayed negotiation and squeezed prices in the interconnection issue, was not willing to allocate wireless spectrum, and undercut the prices of wireless service, a core service of China Unicom (Xu et al., 1998). One likely reason was because China Unicom was a joint venture of the Ministry of Electronic Industry (MEI) and many other institutions. In 1998 the MPT merged with the MEI to form a new regulator of the telecommunications sector – the Ministry of Information Industry (MII). Interestingly, contrary to its predecessor, MII’s attitude toward China Unicom was rather different. Instead of obstructing its development, MII took the task of facilitating the quick growth of China Unicom as a priority. For instance, China Unicom was granted an exclusive right to build the Code Division Multiple Access (CDMA) network across the country.

Therefore telecommunications policymaking is rather complex and fragmented in China. The fragmented regulatory framework resulted in ineffective, uncertain, and unpredictable regulation of the sector. Asymmetric regulation has had some unexpected negative influences on the telecommunications services market as well as universal service provision programs. It distorts not only market prices, but also the operating behavior and incentives of both incumbent and new carriers. In order to address the issue,
some people argue that an independent regulatory institution like the Federal Communications Commission (FCC) of the United States should be created in China. The Reference Paper of the World Trade Organization also emphasizes the importance of an independent regulatory body. According to Stern and Holder (1999), regulatory independence can be best understood as a regulator that is free to carry out its functions in the way it thinks to satisfy its stated objectives. Its performance should be judged solely on this basis rather than anything else. The regulator should be neutral to any regulated carriers. However, in the context of China, it will be very difficult, if not impossible, for the MII to fully perform as an independent regulator, based on the above criteria regarding regulatory independence. The most significant barrier is that MII has to be fully accountable to the Party. The intervention from political institutions and interest groups will also influence the MII’s policymaking and policy implementation. More importantly, China’s socio-legal system is very different from that of Western countries, such as the United States (Li, 1996). This also becomes a constraining factor in establishing an independent regulatory agency like the FCC in China.

Therefore, instead of establishing an independent regulatory institution, it is necessary to emphasize the optimization of the MII and its regulatory policies in regard to universal service mechanism and universal service provision implementation. First of all, telecommunications legislation should be enacted to serve as a legal ground on which telecommunications policy rests. Second, undue political and administrative interventions should be avoided. Third, informal bargaining and lobbying should be replaced by transparent policymaking mechanisms. Fourth, the objectives of telecommunications policymaking should be accountable for all the participants equally without discrimination. Finally, the values and norms embedded in the telecommunications policymaking mechanisms should be clearly defined in telecommunications legislation.

42 In China it has been emphasized repeatedly that the Communist Party is superior to the state or the laws.
6.5 Geographical Solution

6.5.1 Segmentation: Regional Approach

In the monopoly era the provision of universal service prioritized order and uniformity. However, with the introduction of competition and development of alternative technologies, greater diversity in service goals, scope, and the needs of the people are increasingly seen. The situation requires a transition from the previous uniform solution to a customized solution. Economies of scale may make it difficult for the carrier to adjust according to individual customers. Yet segmenting the population to provide services that are best suitable for the particular population segments and geographic regions is a crucial feature for future universal service provision. The previous fixed and uniform universal service provision has been proved to be inefficient. Only with segmented micro-solutions can universal service be efficiently provided according to different regional and demographic features. As shown in chapter 4 and chapter 5, the difficult geographic condition of the western provinces is an important cause of the slow development of telecommunications. In order to ensure efficient and effective telecommunications service to the western region of China, specifics of geography, demographics, and demand should be determined by further comprehensive analyses based on which suitable technologies and mechanisms can be developed. Despite the fact that the overall geographic features of the western areas can be described as hilly and difficult, great variety exists from area to area in the western region of China. For instance, the largest province of China, Xinjiang, located in the northwest corner of the country, is far different from the southwestern uplands. Xinjiang is a landscape of deserts and oases. Most people from Xinjiang reside the Tarim Basin and the Jungar Basin. In contrast, ruggedness and highly eroded topography dominates and defines southwest China. This geographical feature also has helped to create numerous local self-sufficient communities and distinct ethnic groups. In addition, the abundant rainfall often causes erosion or denuded slopes. Therefore the technology and approach to providing
telephone services to Xinjiang must be different from those for southwest China. According to the classification by geographical features by the Institute of Geography, Academia Sinica, there are 13 types in west China in 5 categories (Yang, 1997):

1. Loess Plateau
   i. Central and Eastern Gansu
   ii. Southern Ningxia
   iii. Northern Shaanxi

2. Mountainous Areas between East and West China
   i. Qinling and Bashan between Sichuan and Shaanxi
   ii. Wuling between Guizhou, Sichuan and Hunan

3. Karst Terrain in the Southwest
   i. Wumeng Mountains between Guizhou, Yunnan and Sichuan
   ii. Jiuwandashan between Guizhou and Guangxi
   iii. Northwest Guangxi
   iv. Southern Yunnan
   v. Hengduan Mountain Ranges in West Yunnan

4. Qinghai-Tibet Plateau
   i. Qinghai
   ii. Tibet

5. Xinjiang
   i. West Xinjiang Arid Zone

To make a universal access system affordable in developing areas, more practical and detailed studies of local settings of west China must be carried out.
6.5.2 Urbanization

From the perspective of cost of service provision, the scale of the challenges in serving west China, especially rural areas, is much greater than that of addressing the provision problem in poor urban areas in the eastern part of the country. The urban poor, despite being largely without private telephone or information services, are not geographically isolated and can be ‘reached’ more readily through normal business approaches or access strategies. Rural areas on the other hand are perceived as carrying both higher risk and lower returns to investors. Indeed the common problems west China (especially rural west China) is facing in its industrial development are that each unit is too small and the population is too highly scattered to have economies of scale. In the vast western regions, the town density is very low, and many areas do not have central cities capable of influencing and leading in regional economic development, thus making it more difficult to construct telecommunications networks or attract investment.

As E. K. Hunt and Howard Sherman (1986) pointed out in their review of the economic history of Europe, the emergence and growth of towns and cities was a significant feature of its transition from medieval feudalism to the beginnings of capitalism. In the context of west China, the role of cities and towns as generators of markets and service appears critical in advancing west China’s economy and attracting investment to the area. Urbanization that is lagging behind has caused or aggregated some key problems in west China, including the lagging behind of telephone network construction and application. Therefore promoting carefully scheduled the urbanization seems an important means of solving the key problem in telecommunications provision in west China. The Chinese government has realized that active promotion of the urbanization process is of great importance to facilitating sustained and rapid development in the western regions, and has therefore defined it as one of the strategic priorities of China’s development plan in the western region during the 10th Five Year Plan period (Report on Outline of the 10th Five-Year Plan, 2000).
Yet the urbanization strategy should be region-based, allowing flexibility on priorities and policies according to different regional situations. Detailed studies therefore must be carried out for different regions to examine specific rural-urban linkages and strengthen the linkages for individual regions. In the context of west China, medium-sized and small cities and towns should have priority with a good basis and conditions for constructing and applying telecommunications networks and improving the investment environment. Medium-sized cities will then grow into regional economic centers that bring along immediately adjacent areas. The priority area should include populous and less developed provinces in the west such as Guangxi, Sichuan, and Shaanxi.
Chapter 7

CONCLUSIONS: THE SEARCH FOR A NEW UNIVERSAL SERVICE PROVISION PARADIGM

7.1 Introduction and Overview

Having reviewed the concept of universal service in general and the case of universal service provision in China in particular, the examination of the disparity between the eastern and western parts of China in telephone services access will now reach some conclusions and predictions. In this last chapter an attempt will be made to summarize the circumstances of universal service provision in the western region of China at this time and some likely solutions to the disparity. Also some comments will be made about the deconstruction and re-conceptualization of universal service provision in China, and a framework will be proposed. Finally, recommendations for further study will be provided.

7.2 The Case of China

7.2.1 Telecommunications Development in China

This study has conducted a case analysis of the disparity between the western and the eastern regions of China in telephone development and access. From the late 1800s to the early 1980s, telecommunications in China underwent a long and rough process of
development. The slow development was a result of not only protracted wars and unstable situations, but also of overlooking the importance of information exchange to social and economic development. Therefore from its early start to the 1980s, China’s telecommunications industry has had constant difficulty with insufficient funding – sometimes because of limited national resources, other times because of the government’s low priority in telecommunications. This did not change until the mid 1980s when the Chinese leadership finally felt the dragging impact of an insufficient telecommunications industry and infrastructure on the national economy. National plans began to position telecommunications industry as one of the key strategic sectors in the nation’s development. And several regulations and policies were made to assure that the industry had sufficient investment to undertake construction tasks. The privileged policies and investment plans have had a major impact on the industry. The 1990s and early 2000s saw a rapid telecommunications development in China. In 2002 China ranked first in the world in terms of overall telecommunications capacity. The average national wired telephone penetration rate grew from 11.5 per cent in 2000 to 24.5 per cent in 2004. Wireless telephone penetration rate grew from 6.8 per cent in 2000 to 24.8 per cent in 2004, indicating a more rapid growth.

7.2.2 East-West Disparity

However, over the years, China’s telecommunications have developed in an extremely uneven fashion. Cities have developed far faster than rural areas, and eastern coastal provinces have outpaced the western region of the country. Most eastern provinces have teledensity higher than the national average, while most western provinces lagged far behind the other areas of country. In 1993, six western provinces, including Tibet, Ningxia, Qinghai, Guizhou, Yunnan, and Xinjiang, were the least developed regions in telephone penetration (MPT, 1994). In 2003, when the national average teledensity reached 25.9 per cent, the average telephone penetration rate for western provinces was 16.9 per cent, the lowest by region. Furthermore, statistics
indicated that the gap between rural and urban telephone access was much bigger in western China than in the eastern region of the country. Compared with the narrowing rural-urban disparity in other areas, especially the eastern coastal area, of China, the gap between rural and urban areas in the western provinces has widened.

7.2.3 Geographical Conditions and Policy Factors

This disparity has stemmed from both geographical conditions and strategic considerations. Geographically, the western region of China has a population density much lower than the national average, a distance from the coast and an average elevation much higher than the average number. The topographic features and hilly geographic conditions resulting in difficult transportation (both via land and sea) have made all construction, including the telecommunications infrastructure construction difficult and costly. Moreover, strategic considerations and asymmetric policies have directly caused the under-development of telecommunications services in the western provinces of China. In the early years, it was the cities, especially the cities where the political, industrial, and commercial power was concentrated, that had the top priority for telecommunications development. In the reform era, it was the special economic zones and open coastal cities that got the lion’s share of investment. Underlying these two considerations were the limited national resources. The prohibition of foreign investors’ involvement in China’s telecommunications development due to security considerations and state sovereignty had exasperated the problem of the financial shortage. Because of the limited financial resources, the government had to be selective in granting investments and forego even development of telecommunications.

The Statist Theory can be used to explain China’s rapid telecommunications development in eastern coastal areas and the disparity between eastern and western provinces. This theory focuses on the state as a decision-making entity that is separable from its constituent parts. Also, statists believe that the state usually exercises remarkable
control over its communications industries. Despite the ups and downs and challenges from within and without, telecommunications in China has remained a sector tightly controlled by the state. From an historical point of view, state control has served several good purposes in a vast country like China. It has helped lay the foundation of a national telecommunications network, integrated local and long-distance services, standardized public networks, and made nationwide plans for the overall development of the industry. For instance, China Telecom, the state-owned monopoly operator, has undertaken the universal service obligation and constructed a national fiber optic network that reaches 98% of townships of the nation (National Bureau of Statistics of China, 2000). Moreover, China Telecom set the goal in early 1990s of “providing telephone connection to every administrative village”. From 1992 to 1999, China Telecom spent 5 billion in new construction and 3 billion on maintenance each year for the “providing telephone to every administrative village” program. The number of villages that have telephone services access increased by 10 per cent every year during that period (Editorial Board of Yearbook of China, 2003).

However, the legitimacy of state-run monopolistic operation of telecommunications has become increasingly questionable in a rapidly developing economy driven by market forces. The telecommunications administration has become a large, inefficient bureaucracy. Besides, the monopolistic operation has impeded the improvement of service quality. Moreover, the pressure to join the World Trade Organization (WTO) has propelled the government to open one of the last tightly controlled industries. The Chinese government thus began to take a proactive approach in launching institutional as well as sectoral reforms since the mid 1990s. The consideration was two-fold. One reason was to meet the requirements to join the WTO. The other was to prepare the domestic corporations’ capability in competing with foreign entrants that would likely enter in China’s telecommunications industry after the accession to the WTO. A new regulator, the Ministry of Information Industry (MII), was formed in 1998, indicating that telecommunications regulation and operations were formally separated. Moreover, China Telecom was split up twice in 1998 and 2001, respectively. The split-up and the
emerging new carriers have resulted in a competitive telecommunications market with six major service carriers. The market of telecommunications is now made up of six operating companies – China Telecom, China Netcom, China Mobile, China Unicom, China Satellite, China Railcom, and about 4000 companies that provide value added and wireless business.

The institutional reform and the re-structuring of the market have helped the improvement of service quality and efficient operation of the industry. However, the increasingly fierce competition in the telecommunications market, especially the competition between wired and wireless businesses, has further slowed the pace of providing universal service, especially telephone service to the western provinces. The revenue of fixed-line telephone businesses has gradually decreased over the years. The universal service obligations undertaker, China Telecom, is reported to have tightened up its investment in fixed-line network construction after the 2001 break-up due to smaller market share and decreasing revenue from fixed-line telephone service operation. In the era of monopoly, the task of universal service was carried out by the monopoly provider, China Telecom. However, in a competitive market environment, how to provide universal service in such conditions is becoming a pressing problem. Because of the significant sunk costs required and the high risks associated with an uncertain regulatory environment, foreign investors may not have great interests in China’s long-term basic telecommunications services without creditable commitments from a regulator (Levy & Spiller, 1994). Instead, they will most likely target the services with lower capital requirements and high mobility such as callback, Internet access and content services, etc. Fierce competition among domestic operators may also result in cream-skimming – when companies are interested only in more profitable areas and serving urban and developed cities and regions. The recent investment decrease in rural and western telecommunications services, especially in fixed-line services, indicates such a tendency. How to prevent cream-skimming and fairly allocate the universal service obligation among the targeted telecommunications service providers is an emerging issue for the
MII. Universal service provision in the western region of China now has reached a point of crisis.

7.2.4 Policy Recommendations

Based on the analysis in the previous chapters policy recommendations can be proposed and a new model can be developed to foster the development of telecommunications in the western region of China so that people in the western provinces will have the best possible and affordable telecommunications services.

1) Set the goals and scopes of universal service provision in the western region

Different goals must be set for different locations in China due to their vast differences in geography and economic development. Considering the current stage of telecommunications development in the western parts of China, universal service policy should aim at supporting basic voice telephony access to the rural and high-cost areas.

2) Choose the source of funding for universal service

It is recommended to establish a universal service fund. The source of this fund should come from the revenue generated from telecommunications service provision. All service carriers should contribute to the fund. Yet great care must be taken to ensure that no distortion may occur. Furthermore, more flexible tax, investment, and financing policies should be proposed based on detailed calculation and accounting research.
3) Choose the provider of universal service

After China Telecom was split up, the new China Telecom and new China Netcom are allowed to enter one another’s markets. The change has provided a good environment for the reallocation of the universal service obligation. However, more options, including auction, should be developed in order to determine the subsidy and the right carrier of last resort. In addition, a monitoring mechanism should be established to monitor the process of choosing the carrier of last resort and to evaluate universal service provision in selected areas.

4) Facilitate interconnection

After confirming the goals and scopes of universal service, the Ministry of Information Industry should also specify the requirements on interconnection so that suppliers can access each others’ networks. It is important that rules be established to prevent a major carrier from taking unreasonable advantage of its control over essential networks. Such rules should, however, also provide adequate incentives for ongoing investment in telecommunications services infrastructure. The policy-maker and regulator should also take a scientific approach and set up a monitoring mechanism. In addition, details such as location of points of interconnection, technological interfaces and pricing should be carefully examined. For instance, access rates should be calculated based on careful calculation and reasonable pricing. Furthermore, the government should issue cellular licenses to wired companies, and facilitate network access between wired and wireless services providers. Finally, maximum use of the infrastructures must be ensured.

5) Encourage wireless and other alternative technologies

One of the greatest weaknesses of the current universal service obligation is the widespread focus on wired telephone services, rather than on a flexible choice of
technologies. However, the rapid revolution of telecommunications technology has given new choices of providing universal service. In some areas, using wireless technologies will be more efficient than using the wired services. Given the geographic condition in the western parts of China, costly wired services construction and provision have merely become the bottleneck in universal service provision. Therefore the Ministry of Information Industry and its regional and local branches should investigate the overall situation of the whole country’s universal service, the distribution of population, geography in every city, town and village, and then decide which technology should be chosen in each area. Based on this analysis, wireless technology is highly attractive for universal service obligation in the western region of China. However, cheaper, complementary methods should be identified and encouraged once they are available.

6) Improve the Policymaking and Regulatory Mechanism

Provision of universal service is a complex project that is not only about technology and mechanism design, but also needs to consider the redistribution of interest. These steps are all correlated, and the Ministry of Information Industry should make policy to balance all aspects of these factors, and also need to take into consideration the feasibility of these steps in the real world. Furthermore, establishing an effective universal service mechanism will require improving the regulatory environment and establishing an open, transparent, and independent policy-making mechanism and regulatory institution. Therefore, more emphasis should be given to the optimization of the policy-making mechanism and the regulator. Finally, the Ministry of Information Industry should also play the role of monitoring the provision process of universal service and adjusting the policy as needed.
7.3 Deconstruction and Re-Conceptualization of Universal Service

The central theme of the previous six chapters of this study has been that the dominant paradigm of universal service provision as a concept as well as a practice in China has reached a point of crisis. This state of crisis is a necessary pre-condition for the eventual transition to a new paradigm which represents a reconstruction of the field in some fundamental way.

However the process of reconstruction and model replacement is a somewhat slippery one to pin down. First, the presence of a crisis does not necessarily lead to the rejection of the classical model. Second, even after a scientific revolution takes place, it is often not recognized for what it is. It is subject to “inevitable and legitimate” resistance and is consequently more evolutionary than revolutionary when viewed from a contemporary perspective. This section will review the conception of universal service and the dominant paradigm. Then concepts that are noteworthy as potential elements of the new universal service paradigm will be identified based on the analysis in the previous chapters. Finally proposals for re-conceptualization of universal service provision will be reviewed and a framework will be developed.

7.3.1 The Classical Model of Universal Service Provision

Traditionally, universal service is promoted through implicit and explicit subsidies. Under the system of implicit subsidies, charges to long distance carriers are priced above cost, which enables local telephone companies to maintain low access rates for basic local phone service. Thus the classical universal service provision involves cross-subsidies and rate averaging. It is important to note that a relatively small number of influential interest groups are involved in the classical model of universal service provision. Moreover, the broader revenue base (and consequent financial flexibility) of
the monopolist in the classical universal service model have made adjustments and accommodations possible, allowing rapid telecommunications development and universal service provision.

### 7.3.2 Elements of a New Model

However, potential elements of a new model evolve and provide a theoretical foundation for developing a new paradigm for universal service provision in the western parts of China.

#### 7.3.2.1 Competition

The question as to whether competition is harmful or beneficial to universal service objectives has drawn heated debates. Historical research by Mueller (1997b) suggests that competition would encourage providers to rapidly build out their networks in an effort to provide services to potential customers. Some, however, have questioned whether a competitive telecommunications marketplace can sustain the levels of telephone service penetration achieved under regulated monopoly operations (e.g., Hammond, 1996). Drawing from the experience of deregulation in the United States, Great Britain, and Japan, Hills (1993) cautioned that market competition provides no incentive for telecommunications operators to expand coverage to the poor or expand new services to less wealthy geographical areas. The analysis of universal service provision in China and telecommunications development in the western region of the country suggests a possible correlation between a competitive market of telecommunications and stalled telecommunications service provision in some areas. Thus competition becomes one of the elements that have undermined the effectiveness and legitimacy of the classical universal service model.
7.3.2.2 Alternative Technology

The conventional notion of universal service has focused on making traditional wired voice telephony available to the consumer, regardless of their geographic location or financial means (e.g., Mueller, 1993; Noam, 1997). However, recent technological advances have changed and undermined this principle. Telephony services can now be provided by non-traditional and diverse means such as wireless or Internet telephony that are not included in the concept and scope of classical universal service. For instance, wireless service providers that provide identical telephony services are not liable to undertake universal service obligations. The discriminatory and asymmetric undertaking of universal service provision not only presents a threat to universal service itself, but also undermines the capability of wired telecommunications carriers in a competitive market.

7.3.2.3 Interconnection

Historical analysis suggested that the notion of universal service as interconnection was articulated by AT&T President, Theodore Vail, who envisaged a single, interconnected network under the control of a single firm and structured as a regulated monopoly (Mueller, 1993). In a competitive telecommunications market, interconnection becomes even more important not only for effective competition, but also universal service provision. In the era of competition, one carrier will by no means have the capability to undertake the universal service obligation. Therefore more service providers should make a contribution to universal service provision goals and be involved in providing services to disadvantaged areas. This requires the interconnection of networks, for example, allowing a cellular customer to communicate not only with existing cellular subscribers but also with the fixed-line telephone customers of the incumbent operator and vice-versa so that network externalities can be fully realized. Yet in a competitive
market, incumbent carriers have strong incentives to limit competitors’ interconnection to their networks in order to maintain their dominant position in the market.

7.3.2.4 The Role of the Regulator

Beginning in the mid-1970s, a strong deregulatory trend has characterized government regulation in many industries, including communications (Horwitz, 1989). The rationale behind the thinking is that competition in telecommunications can now serve the role of operating the market in many areas more effectively than regulation. Yet researchers disagree on how liberalization should be carried out (Regli, 1997). On the one side, development organizations such as the World Bank justify competition and promotes regulation only to ensure the expansion of the telephone network and the improvement in quality (Saunders, 1983). Other researchers go even farther and say the market should be the only regulator (Huber 1997; Smith 1994). Others believe that active government involvement is necessary because it is the task of the relevant government bodies to intervene in the process and to actively encourage and promote universal service provision to where it is needed while carefully avoiding market distortion (Hudson, 1999; Parker, 2000).

7.3.2.5 The Role of the Consumer

In the era of monopolistic operation of telecommunications services and universal service provision the role of the consumer was largely ignored. In recent years there is greater awareness of the importance of information and telecommunications in the current information intensive society. Thus consumers who had no say in the previous monopolistic era now have expressed diverse concerns and needs for quality telecommunications services.
7.3.2.6 The Segmentation of the Market

Classical universal service privileges uniformity and universality. However, in recent years great diversity is increasingly seen in geographical conditions of different areas and the needs of different population segments. Regional diversity becomes an increasingly important factor. Micro-solutions for specific population segments, geographical regions and professional groups need to be developed. Marketers in other industries, e.g. television system, have for years productively employed segmentation to identify groups of customers with similar needs. Some targeted programs such as Lifeline and Link-up in U.S. have been developed for universal service provision. Yet a system that privileges diversity and flexibility has not been employed.

Therefore, as previous sections show, the competitive market structure, the dynamics between the incumbent and the new entrants, and recently developed alternative technologies such as wireless communication have pointed to a need for breaking new ground for universal service provision. Universal service has now reached the point where its goals, scopes, and concept must be re-examined.

7.3.3 Proposals

The transition from a telecommunications environment characterized by regulated monopolies to one characterized by competition has required a complete reassessment of the classical universal service conceptualization and the means by which universal service policies are implemented. Some proposals have been suggested to address the problem. Schement and Forbes (1999) proffer an Informed Choice Model (ICM) of universal service. Unlike the emphasis most universal service conceptualizations place on access to a particular technology, the ICM emphasizes the ability of individuals to send and receive information at a reasonable price through any delivery channel(s) of their
choice. It emphasizes mobility, both in terms of the ability of individuals to choose from a variety of technologies to communicate and to use that technology from anywhere. The ICM thus moves away from access from a fixed location such as a household telephone to account-based access from multiple locations. Finally, and most significantly, it emphasizes choice in services, namely, the ability of individual users to choose services they want to access. Other scholars have emphasized government support and the role of the state in improving telecommunications access for rural and disadvantaged population segments (Hudson and Pittman, 1999). They specifically discuss the role of satellite technology, targeted subsidies and creative network design in making services such as telemedicine, distance education and government access available to isolated communities.

7.3.4 Universal Service in China – Re-Conceptualization and New Dimensions

In the era of monopolistic telecommunications service provision, the universal service obligation is set up by the regulator and undertaken by the monopolistic operator. The situation changes dramatically after competition is introduced into the market. The ‘classical’ regulated monopolistic (governmental in China and trusteeship in most other countries) operation of universal service provision is no longer feasible.

While it is difficult to predict what the future of universal service in China will be, an understanding of the underlying dimensions of the current situation and scholarly debates will provide some guidance for universal service provision in western China. This section attempts to map the conceptual dimensions of current universal service and the directions of universal service provision in western China.
Figure 7-1 illustrates the new implications and dimensions of universal service provision in the phase of competition in China that has undermined the previous thinking of universal service. As discussed in previous sections, the classic universal service provision (represented as a solid square in the middle of the map) has been implemented by the regulator, and in the context of China, the regulator’s operational arm, China Telecom. The definition of universal service in the monopoly era is to provide telephone service to all administrative villages. With pressure from both within and without, competition has been introduced to the market, and the incumbent carrier, China Telecom, is no longer the operational arm of the regulator. In addition, customers begin to have a say in the process with a variety of different needs and demands. In the eastern regions, especially urban areas, basic voice telephony is available to the majority of the people. Thus the original universal service goal may no longer be effective in the foreseeable future and the implication of universal service may expand to meet the needs of high-end users. In contrast, in western provinces, basic voice telephony should be the
major objective of providing telecommunications service. Furthermore, as discussed in the previous chapter, universal service provision must also take into account the impacts on a dynamic market economy so that providers will not lose incentives to invest in universal service provision in a market where marginal profit might be lower than other market segments. In addition, technological changes have also undermined the previous assumption of universal service provision. Wired telephony has been the only technology for universal service provision. Yet with the development of alternative technologies such as wireless communication that might be more effective, the underlying definition of universal service should be refined to include alternative technologies. Yet inflexibility and uniformity should be avoided so that technologies can be applied flexibly to provide telecommunications services according to segmented population, geographic features, and market structure.

The regulator in the context of a competitive telecommunications market is very important in setting up a flexible and effective universal service mechanism that can be adjusted easily according to different situations. Indeed, as shown in previous sections, crucial factors such as interconnection and choosing universal service providers involve new regulations or re-regulation conducive to competition and efficient universal service provision. An effectively liberalized universal service provision regime requires regulation, albeit of a very different nature, as opposed to the complete absence of regulation one view supports. The role of the regulator, the Ministry of Information Industry (MII), is to guarantee non-discriminatory and competitive neutrality based on reasonable and flexible supervision. Furthermore, the universal service mechanism that the regulator is to set up should also reflect the concept of reasonability and flexibility so that local administrative institutions and carriers can find targeted micro-solutions suitable to the local settings and users’ needs.

Thus the square that indicates the classical universal service provision is enclosed with dashed lines, implying that the conceptual space of universal service provision in the context of competition shall be expanded from a uniform definition to one that is flexible
with multi-dimensions. Provision of universal service is a complex project that is not only about technology and funding mechanism design, but also needs to consider the redistribution of interests. These steps are all correlated, and the MII should make policy to balance all aspects of these factors, and also take into consideration the flexibility and feasibility of these steps in the real world.

7.4 Suggestions for Further Study

The results of this study suggest several opportunities for further research. Among these opportunities are the following:

1) Perform additional studies focused on the role of foreign investors.

The present study reviewed the history of foreign investment in China’s telecommunications services sector. The official ban on foreign involvement persisted during the 1990s despite China’s enormous demand for capital to build out its telecommunication infrastructure. With China’s access to the World Trade Organization (WTO), China opened up to foreign investment in telecommunications services. Detailed studies can be made to examine the role of foreign investment in China’s telecommunications development in general and the universal service goals in the western parts in particular. To what extent is foreign investment helpful? How might foreign service providers be encouraged to provide services to the western region of China?

2) Research the detailed demographic features of the population segments in the western parts of China.

In addition to geographic conditions, there exist other factors that are important for understanding the regional telecommunications development and service needs of people in western China. Further neighborhood and regional case studies would be able to examine more closely the local settings of the western regions at provincial, city, or
county levels. Detailed information about the education background, telecommunications technology use, income level, ethnicity, household features, employment, and location of these population segments will be helpful in developing target approaches.

3) A detailed study of the mechanism for selecting the service providers.

The present study has identified auction as an effective mechanism in selecting the service providers. Here, on one level, the regulator selects the service provider and yet, on another level, the service provider self-selects the projects it finds interesting and thereby worthy of a bid. Yet more detailed studies are necessary as to examine specifics of an auction mechanism in the context of China. Thus additional research could compare auction proposals with other possible mechanisms. In addition, more emphasis should be given to the establishment of a monitoring mechanism to supervise and evaluate the process of selecting the service providers.

7.5 Conclusion

Having brought the story of the telecommunications development and services provision in China up to date, the point has been reached in this study at which some conclusions are in order. The fundamental conclusion of this study is that a disparity in telecommunications services access exists in China between the western parts and the eastern parts of the country. More importantly, the disparity is a consequence of a contradictory jumble of regulations and unevenly enforced policies, along with historical and geographic factors. To meet the needs of telecommunications services for the western inland parts of China, the policy-makers and regulators should change the mindset, carry out detailed studies, and develop fundamental approaches and solutions to the pressing issue of providing telecommunications services to the western parts of China.
This study has also attempted to demonstrate that universal service policies are based on a paradigm or model of the proper role and function of the regulators and the regulated. When new elements emerge and change the industry’s facts of nature, the dominant and classical model becomes inadequate and outdated and the search for a new framework begins.

In the case of universal service policy such a search is already underway. The basic assumptions of the classical model of universal service provision are being challenged. Serious consideration is being given to re-writing the universal service provision. Regulatory framework and telecommunications environment has changed. More importantly, the wired telephone as an information distribution system is being threatened by new communications technologies.

This study represents an attempt to go beyond simply describing telecommunications development in China over the last century. Given the complexity of providing universal service to the western region of China, this study can only scratch the surface of the important issue. An effort has been made to demonstrate that a more complex level of analysis can be useful. If this analysis has been correct, then the present crisis in universal service policies in China is evident, not in the breakdown of regulation, but of a transition to a new regulatory and operational model which may reflect more accurately this country’s telecommunications capabilities and meet its people’s various needs.
Bibliography

English


Ling, R. (2000). We will be reached: The use of mobile telephony among Norwegian youth. *Information Technology & People*, 13(2), 102-120.


**Chinese**


Guangming Daily (2003). Difficulty in accessing telephones in the west: The voice from the public, October, 15, B3.


*People’s Daily*. (1999). Installation of second telephone lines at same home address is free. August 13.


Appendix A

MAP OF CHINA: ADMINISTRATIVE DIVISIONS
Appendix B

AVERAGE EXCHANGE RATE OF RENMINBI (RMB) AGAINST US$, 1949-2003

<table>
<thead>
<tr>
<th>Year</th>
<th>Exchange Rate: Per US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>2.3</td>
</tr>
<tr>
<td>1950</td>
<td>2.75</td>
</tr>
<tr>
<td>1951</td>
<td>2.238</td>
</tr>
<tr>
<td>1952</td>
<td>2.617</td>
</tr>
<tr>
<td>1953</td>
<td>2.617</td>
</tr>
<tr>
<td>1954</td>
<td>2.617</td>
</tr>
<tr>
<td>1955</td>
<td>2.4618</td>
</tr>
<tr>
<td>1956</td>
<td>2.4618</td>
</tr>
<tr>
<td>1957</td>
<td>2.4618</td>
</tr>
<tr>
<td>1958</td>
<td>2.4618</td>
</tr>
<tr>
<td>1959</td>
<td>2.4618</td>
</tr>
<tr>
<td>1960</td>
<td>2.4618</td>
</tr>
<tr>
<td>1961</td>
<td>2.4618</td>
</tr>
<tr>
<td>1962</td>
<td>2.4618</td>
</tr>
<tr>
<td>1963</td>
<td>2.4618</td>
</tr>
<tr>
<td>1964</td>
<td>2.4618</td>
</tr>
<tr>
<td>1965</td>
<td>2.4618</td>
</tr>
<tr>
<td>1966</td>
<td>2.4618</td>
</tr>
<tr>
<td>1967</td>
<td>2.4618</td>
</tr>
<tr>
<td>1968</td>
<td>2.4618</td>
</tr>
<tr>
<td>1969</td>
<td>2.4618</td>
</tr>
<tr>
<td>1970</td>
<td>2.4618</td>
</tr>
<tr>
<td>1971</td>
<td>2.2673</td>
</tr>
<tr>
<td>1972</td>
<td>2.2401</td>
</tr>
<tr>
<td>1973</td>
<td>2.0202</td>
</tr>
<tr>
<td>1974</td>
<td>1.8397</td>
</tr>
<tr>
<td>1975</td>
<td>1.9663</td>
</tr>
<tr>
<td>1976</td>
<td>1.8803</td>
</tr>
<tr>
<td>1977</td>
<td>1.7300</td>
</tr>
<tr>
<td>1978</td>
<td>1.5771</td>
</tr>
<tr>
<td>1979</td>
<td>1.4962</td>
</tr>
<tr>
<td>1980</td>
<td>1.5303</td>
</tr>
<tr>
<td>1981</td>
<td>1.7051</td>
</tr>
<tr>
<td>Year</td>
<td>Value</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>1982</td>
<td>1.8926</td>
</tr>
<tr>
<td>1983</td>
<td>1.9757</td>
</tr>
<tr>
<td>1984</td>
<td>2.3270</td>
</tr>
<tr>
<td>1985</td>
<td>2.9367</td>
</tr>
<tr>
<td>1986</td>
<td>3.4528</td>
</tr>
<tr>
<td>1987</td>
<td>3.7221</td>
</tr>
<tr>
<td>1988</td>
<td>3.7221</td>
</tr>
<tr>
<td>1989</td>
<td>3.7659</td>
</tr>
<tr>
<td>1990</td>
<td>4.7838</td>
</tr>
<tr>
<td>1991</td>
<td>5.3227</td>
</tr>
<tr>
<td>1992</td>
<td>5.5149</td>
</tr>
<tr>
<td>1993</td>
<td>5.7619</td>
</tr>
<tr>
<td>1994</td>
<td>8.6187</td>
</tr>
<tr>
<td>1995</td>
<td>8.3507</td>
</tr>
<tr>
<td>1996</td>
<td>8.3142</td>
</tr>
<tr>
<td>1997</td>
<td>8.2898</td>
</tr>
<tr>
<td>1998</td>
<td>8.2791</td>
</tr>
<tr>
<td>1999</td>
<td>8.2796</td>
</tr>
<tr>
<td>2000</td>
<td>8.2784</td>
</tr>
<tr>
<td>2001</td>
<td>8.2770</td>
</tr>
<tr>
<td>2002</td>
<td>8.2770</td>
</tr>
<tr>
<td>2003</td>
<td>8.2774</td>
</tr>
</tbody>
</table>

*Source:* Lin, Guijun (2004). *On the Exchange Rate of the RMB.*
Appendix C

DISTRIBUTION PATTERN OF GDP AND GDP PER CAPITA, 2000

1) Distribution Pattern of GDP of China, 2000

Source: Natural Resources Database of China

Note: Numbers in RMB.
2) Distribution Pattern of GDP Per Capita of China, 2000

Source: Natural Resources Database of China

Note: Numbers in RMB.
VITA

Feng Wu

Education

2005    Ph.D. in Mass Communications, the Pennsylvania State University, USA
2000    M.A. in Foreign Languages and Linguistics, Tsinghua University, China
1997    B.A. in Foreign Languages and Literature, Lanzhou University, China

Professional Experience

September 2003 – May 2004: Instructor, College of Communications, the Pennsylvania State University, USA
September 2002 – May 2003: Associate Instructor and Teaching Assistant, College of Communications, the Pennsylvania State University, USA
May 2002 – August 2002: Research Assistant, Institute for Information Policy, the Pennsylvania State University, USA
August 2001 – May 2002: Associate Instructor and Teaching Assistant, College of Communications, the Pennsylvania State University, USA
May 2001 – August 2001: Research Assistant, Institute for Information Policy, the Pennsylvania State University, USA
August 2000 - May 2001: Graduate Assistant, College of Communications, the Pennsylvania State University, USA
September 1997 – June 1998: Research and Teaching Assistant, Department of Foreign Languages, Tsinghua University, Beijing, China
September 1998 – June 2000: Instructor, Department of Foreign Languages, Tsinghua University, Beijing, China
June 1997 – September 1997: Intern journalist, People’s Daily, Xiamen Branch, Xiamen, China.