

Mobile Infrastructure for Deploying M-Government - A Top-Down Perspective

1. Mobile Development and Mobile Government Implementation

1.1 E-Government and M-Government

Today, many countries are launching E-Government projects to effectively enhance the provision of governmental services. E-Government encompasses the usage of all information and communications technologies (so far mainly by using the Internet) to deliver governmental services to citizens and improve the quality of governmental activities. However, various E-Government ranking surveys show that even those countries that have succeeded in deploying E-Government projects also face a subsequent problem – the accessibility of such services by the citizens [Accenture, 2005; United Nations, 2004]. The access limitations differ from country to country and are dependent upon each country's economic development. Those differences may include availability of information relating to online governmental services, satisfaction with the quality of the services provided, citizens' proficiency in the use of personal computers, and the availability of personal computers and Internet connections. Especially, low availability of personal computers and fixed Internet penetrations are seen as the basic constraints in deploying E-Government in developing countries.

Meanwhile, mobile penetration rates are growing rapidly throughout the world. In 2002, the number of mobile subscribers surpassed the number of fixed-line subscribers on a general worldwide basis and specifically in 97 countries [ITU, 2002]. Two years later, at the end of 2004, the number of countries that had more mobile subscribers than fixed-line subscribers increased to 171, while the number of mobile subscriptions increased to 1.8 billion. **Also at the end of 2004, 144 among 215 International Telecommunications Union (ITU) members had higher mobile penetrations than Internet penetrations; and, of those 144 countries, 107 of them were developing countries** [ITU, 2005]. Such vast expansion of mobile technology is encouraging the advent of new direction in providing governmental services through mobile and wireless platforms, or deploying mobile government [Kushchu & Borucki, 2004], hereinafter referred to as “M-Government.”

Mobile communications are widely used to ensure communications and data capturing for emergency services as well as for utility services in various sectors, such as housing, civil engineering, drainage and postal delivery services. In these fields, mobile technology has been used for a long time, but the advent of the term “M-Government” is related to public services that are provided to citizens via handheld terminal equipment. Such services may include security alerts, emergency announcements, notification to citizens of not paying their fines and rents, confirmation of the accuracy of tax returns, reminders and notifications of licenses renewal, extension of “borrowing period”, receiving results of medical examinations, bus schedules, ticket purchasing and others.

The attractiveness of M-Government services for citizens is mobility along with ability to link to networks at any time and from anywhere. M-Government constitutes an alternative, additional channel to provide services in the last mile that in many cases E-Government has failed.

1.2 M- Government and Mobile Infrastructure

The success of M-Government implementation depends a lot on mobile infrastructure development, on the availability and affordability of mobile services as well as on the provision of advanced public services through mobile networks. Therefore together with the advancement of mobile technologies, governmental policies that facilitate mobile provisioning will benefit both mobile market development and M-Government implementation.

However designing such policies is not an easy task and can confront many difficulties in developing countries and especially in those with transitional economies, which are normally dependent on external investment resources and technologies. Elaboration of efficient policies requires deep analysis of factors that facilitated the vast market development in the last decade and the estimation of new opportunities given by such development. In spite of the recent impressive development of the global mobile market, not all countries have sufficient mobile infrastructure to provide governmental services and not all countries with high mobile penetrations have started providing governmental services through mobile infrastructure.

As witnessed in the last decade, the impressive development of the global mobile market was driven by two main factors: drastic technology advancement and deregulation of the mobile markets ¹[Hatfield Associates, 1997; ITU, 2004]. While technological change and the presence of intelligent, high-capacity networks nominally open to all countries and can be considered as external factors, regulatory interventions in any specific country are regarded as internal factors and mostly depended upon each country's underlying socioeconomics. This paper aims at making clear that in developing countries, among complex policy and regulatory interventions, liberalization and competition policies play most active and decisive roles in facilitating the development of mobile infrastructure – a firm basis to deploy M-Government. This analysis will use the case histories of mobile services development in Russia and Vietnam – two developing and transitional economies in Asia Pacific Economic Cooperation (APEC) – as examples.

2. Mobile Development in Transitional Countries: the Case of Russia and Vietnam

2.1. Outline of Transitional Economies

Transitional economies are those that had implemented and experienced central planning mechanism for decades, but currently are in the process of changing from that system to a market system. **In the central planning economies, a basic economic rule – balance between demand**

¹ The term “deregulation” is often used to refer both to the process of opening entry into a market and to the process of reducing controls over pricing and profits

and supply – was not put into practice and it was supplanted by central governmental orders. In the central planning mechanism, all goods and services were manufactured and provided based on contracts between the central governments and the provisioning factories, companies and service providers. Those contracts were set forth exclusively by governmental will and without consideration of the users` demand side. After decades of such fiscal control, the central planning mechanisms began to exhibit the typical weaknesses and disadvantages often linked with such restrained economic policy. In the late 1970s and 1980s, economic reform was initiated in almost all affected countries. However, each country chose its own reform direction. There are two main transitional directions that countries undertaking economic reform can steer:

1/ Swinging to a fully market economic mechanism (this choice was chosen by most of the Eastern European countries, including Russia). This strategy assumed shifting to a market-based economy through what may be called shock therapy policies, i.e. attempting to change rapidly the structure of the economy through privatization and liberalization; or

2/ Transferring to a market based-economy under **socialist orientation** (which is being applied in China and Vietnam). This strategy proposed a more gradual process of reforms. The supporters of this strategy argued that there are large costs associated with very rapid adjustments before certain institutional changes such as legal infrastructure, including corporate governance laws, and laws of financial infrastructure have been put into effect [Godoy S. & Stiglitz J., 2005].

The two directions strongly affect to the creation of policy and regulatory interventions in transitional countries, and they further impact the development of the economies as a whole and the mobile markets in particular. After decades of transition, recent findings suggest that the countries that followed the gradual strategy succeeded more in institutional development and in the emergence of the rule of law [Rodrik D., 2003, Hoff.K & Stiglitz J., 2004]. Considering the latter, this paper studies the impacts of policy and regulatory intervention to the development of mobile infrastructure under the two different transitional directions.

2.2. Policy and Regulatory Interventions in the Mobile Markets

Before the Soviet Union collapsed in 1991, the telecommunication industry in the country was quite under-developed. Investments in advanced technologies were made mainly in order to strengthen defense capabilities. This resulted in investments in telecommunications being significantly lower than what was required for modernizing, expanding and updating the telecommunications networks. The situation began to change in 1991 when Russia started its transition to a market-based economy. Telecommunication sector reforms in Russia were initially introduced in the form of general legislation, including privatization, price-liberalization, antimonopoly and pro-investment policies. In 1992, a decree was enacted that permitted any state or private enterprise to set up and operate a telecom network in Russia.

The First Communication Law was adopted in 1995 and was applicable to general telecommunications provisions. This law was replaced by a Communication Law that was approved by the Government Decree of December 4, 2003. Both these laws allowed full

liberalization and competition in establishing mobile networks and providing mobile services and set no restriction on foreign and private investment into the mobile market.

On the other hand, after decades of implementing the central planning economic mechanism, Vietnam began reforming its economic system in 1986, allowing foreign and domestic participation in many of the industrial and services sectors. In 1991, Vietnam proclaimed that the country would develop a market economy with a socialist orientation in which the state-owned entities would hold dominating roles [VCP, 1991]; this direction was further confirmed in 2005 [VCP, 2006]. Additionally, telecommunications service provisioning is considered one of the most important services sectors since it directly affects the national security. This policy affected the formation of many of Vietnam's telecommunications legal documents, including the Law on Foreign Direct Investment (FDI), Decree on Posts and Telecommunications 1997 and finally the Ordinance on Posts and Telecommunications 2002, in which foreign and private participations in the mobile market were rigidly controlled.

The detail policy and regulatory interventions in Russia and Vietnam from 1991 to 2005 with respect to some typical aspects of mobile communications, including ownership structure, licensing, frequency allocation, interconnection and tariff are briefly shown in the Appendix 1.

2.3. Comparative Analysis

The economic policies respectively pursued by Russia and Vietnam have strongly affected the shape of the legislative and regulatory environments pertaining to mobile communications in the two countries.

The result of shock therapy policies in Russia – i.e. attempting to change rapidly the structure of the economy through privatization and liberalization – on the development of the mobile market has been twofold. Firstly, it assured deployment and expansion of the mobile networks by attracting necessary investment capital through the allowance of private and foreign participation in the mobile market, along with tariff liberalization. This process started to promote declining prices as soon as market competition was introduced. Secondly, it gave rise to the development and implementation of a flexible legal infrastructure after the processes of liberalization and privatization took place. This point is very important to understand how the mobile market is being regulated in Russia. During the communist period, the economy was centrally planned and regulation of specific industries was effected by decrees and orders issued by a Russian bureaucracy that lacked experience in dealing with either marketplace forces, or adopting and enforcing laws to guide those forces. Thus, the first Communication Law was applicable to general provisions and assumed special guidelines and rules to provide direct regulation. Although the 2003 Communication Law provided significant detail on how to establish license and frequency application procedures, it still required a huge amount of subordinate legislation to be approved by the Parliament, and it placed far too many responsibilities with the Ministry of Information and Communications Technologies (ICT) for making of final decisions. In the resulting situation, where the law exists but doesn't work, numerous loopholes surfaced and gave rise to questions about direct actions of the law. Not only have these loopholes created

difficulties with current law enforcement, but also it is likely to continue to be a problem for many years to come.

In contrast, the quasi-market-based economic direction that has been implemented in Vietnam continues with many of the typical characteristics of the previous economic era; namely that state-owned entities must play dominating roles in building and facilitating the new national economy. Consequently, several sectors continued to be governed by administrative decisions (i.e. by the central/local governments and sectoral ministries) for a long time after the decision to pursue an alternative economic direction was announced. Initially, only a few laws were granted by the Vietnamese National Assembly, and the legislative system has been recently strengthened under pressure generated by Vietnam's WTO accession pursuit. In addition, the government considers telecommunications services provisioning to be a key infrastructural component and an integral component of national security, so that only state-owned companies can provide mobile services, and foreign and domestic private participation was partly restricted. As a result, while foreign sources invest from 3 to 4 billion US dollars yearly in the three biggest Russian mobile operators, foreigners are only being permitted to invest around 1.3 billion US dollars in Vietnamese mobile markets in the 25-year-period 1995-2020.

In Russia, although several related laws have been enacted by the Parliament in order to more properly regulate mobile services provisioning, such laws have not been prepared with sufficient scrutiny and detail to ensure effective sector regulation. The resulting laws leave too many variables to be dealt with by the responsible Ministries, e.g. the Ministry of ICT and the Anti Trust **Ministry** are responsible for defining the necessary terms and conditions applicable to mobile operators, including licensing procedures, frequency allocation plan and frequency usage fees, interconnection technical standards and interconnection negotiation procedures. Meanwhile, these responsible ministries are not capable of making decisions pertaining to these detailed authorization issues, and this inadequacy has resulted in a non-transparent regulatory mechanism and created significant conflict amongst the sector operators. In many cases, the regulator manages mobile services provisioning in a sudden inspirational manner (for example, licensed frequencies being granted to a later applicant without any feedback being provided to the first applicant, or the application of different frequency usage fees to different users of similar frequency bandwidth). As a result, the mobile market has been opened for competition since 1992, but a fair competitive environment still does not exist, and the mobile operators have had to find creative ways to by-pass the laws without breaking them.

In Vietnam, for more than a decade (from 1992 to 2003) mobile services were provisioned by a monopoly of only one state-owned corporation and the mobile market was mainly governed by administrative decisions, but not by laws. Competition in the mobile market was actually introduced in 2003, but the market has remained under the control of several state-owned corporations. Yet the responsible Ministries and governmental agencies, such as the Ministry of Posts and Telematics and the Ministry of Finance, did better than their counterparts in Russia in providing adequate legal documentations to manage mobile issues. However, those basic regulatory documents – especially interconnection regulation – are not sufficient to effectively administer today's mobile market.

Observations of both countries' administrative treatments of licensing issues – considered in both countries to be one of the barriers to market entry – indicate that neither of the telecommunications regulators is finitely capable of dealing with licensing challenges in a competitive environment. Licensing on a case-by-case basis has been the preferred method in both countries, and frequency availability has also been considered a prerequisite to obtaining permission to enter the mobile market. Whereas Vietnam has a clear and transparent spectrum allocation procedure and this scarce resource is shared equally among operators, Russian mobile operators do not enjoy such impartial treatment and are being treated unfairly: they have to lobby, or find back-door ways to obtain the necessary spectrum. Frequency usage fees are being used to finance spectrum regulatory activities in both countries, but where Vietnam utilizes this source of revenue to upgrade technical logistics of the regulator, to train human resources and effectively enforce spectrum management, Russia is unnecessarily foregoing this revenue source due to its lack of a unique mechanism to calculate and collect such fees.

The two countries have somewhat identical approaches to dealing with tariff issues, which allows operators to freely establish tariffs after competition has been established. In a full market-based economic system like Russia's, competition and privatization are allowed together with economic reform, and mobile operators have the right to freely establish tariffs when competition in the market has been achieved. On the other hand, Vietnam severely controlled tariffs when services were provided by the only operator. This scheme was made more flexible at the time new mobile service operators entered the market, and the regulator only adjusts the tariffs charged by the significant market power operators (who occupy more than 30% of a service market share in terms of generated revenue or traffic) in order to protect the development of new entrants and to prevent unfair competitive behavior.

A difference can also be perceived in dealing with interconnection conflicts. All interconnection disputes in Russia must be judged by the courts, but in Vietnam, the telecommunications regulator is responsible for the resolution of such disputes.

The differences between developmental levels in the two countries are analyzed in the Appendix 2.

3. Findings and Conclusion

3.1 Finding

The heretofore discussed policy and regulatory interventions in the mobile services developments in Russia and Vietnam illustrate that in developing and transitional economies, those that are dependent on technology and investment resources, two of the more important factors that can actively accelerate mobile market development are pro liberalization and competition policies and a non-restrictive tariff regulatory scheme. Countries that have weak economic starting points and decide to pursue transitioning to a more market-based economy will likely face a significant need of investment capital to build up and expand their mobile networks. Such an enormous capital requirement can be largely funded by allowing

investment participation of foreign and domestic private investors. In other words, liberalization and competition are decisive factors in encouraging mobile infrastructure development. The effectiveness of liberalization and competition in mobile market seems much stronger than their impact into Internet market. Many countries allow competition in Internet; however 144 ITU members had higher mobile penetrations than Internet penetration. Moreover, the penetration differences between mobile and Internet penetrations are significant in developing countries, where mobile penetrations normally are from two folds to five folds of Internet penetrations [ITU, 2005].

On the other hand, the right to freely establish tariffs also plays an essential role in facilitating mobile development, but that right must be timely authorized. The subject authorization should be granted only after the market has reached a symmetric level of competition, i.e. no operator can unduly influence the market and disadvantage new entrants by abusing the free tariff setting scheme.

The availability of a complete and transparent legal framework (such as rules and regulations pertaining to interconnection or frequency issues) does not appear to strongly affect mobile development. The mobile market in Russia matured at a very rapid pace in spite of lacking fair and predictable legal documents pertaining to these issues. Conversely, in comparison to Russia, Vietnam created considerably more favorable conditions for mobile operators to exist in the market, such as clear and non-discriminatory treatments for managing spectrum, but these factors alone were not influential enough to accelerate market development.

3.2 Conclusion

The initial reviews of the role of policy and regulatory interventions in mobile market confirm that pro-competition and privatization policies play prerequisite condition in accelerating mobile infrastructures in developing countries. Meanwhile, “lower-level” regulatory interventions, those that create fair and transparent competitive environments for mobile operators, perform only “secondary” roles in the initial process of facilitating mobile infrastructure and creating a basis to deploy M-Government.

However, this latter judgment requires at least two comments. In addition to a top-down analysis of policy and regulatory interventions, a more comprehensive analysis of multiple factors that could potentially affect mobile development, including technology applications and economic variations needs to be undertaken to fully understand how to accelerate mobile market growth in a country with a weak economic starting point. **Second, inefficient and non-transparent legal procedures can negatively affect the further development of M-Government. As was earlier mentioned, initial conditions for M-Government development focus mostly on infrastructure, including mobile networks and applications. After the necessary infrastructure is developed and sufficient mobile density is reached, governments will have to deal with the more difficult task of regulating and developing legal aspects of mobile applications and use of the mobile services. This is also the problem that governments face when implementing E-Government. At this stage, “secondary” roles of legal interventions in developing mobile market can be brought to the forefront and will determine further success of M-Government initiatives. The main advantage**

of M-Government over E-Government in developing and transitional countries is that they have more advanced mobile infrastructure than Internet base. However, accessibility doesn't mean actual use of services. Citizens can mistrust M-Government services and transactions until their privacy and security won't be ensured by government. Legislation needs to be accurately developed to assure legality and legitimacy of related transactions, thus promoting wider service acceptance by citizens.

Although the current mobile infrastructures and applications in most developing countries do not allow providing intellectual public services, but it does not mean there is a lack of applicable policy. As in case of E-Government, M-Government has its development stages: one way communication, interaction and transaction [CDT, 2002]. Being at the early stages of M-government implementation process, governments should take advantage of existing second generation (2G) networks and start providing simple informational and interactive services, such as providing brief information relating to administrative procedures via Short Message Services (SMS). The transition to the transactional stage and provision of value added public services, such as providing platforms for downloading and exchanging administrative forms or doing different administrative transactions requires deployment of the next generation of mobile networks (i.e. third generation (3G) networks) that allow mobile users to access the Internet via high speed mobile connections. Deploying 3G networks is becoming a worldwide mobile trend; since May 2006, 196 cellular operators in 84 countries have launched third generation (3G) networks [www.3gtoday.com]. With the adoption of 3G services by citizens and development of contents for mobile platforms by administrative agencies, governments can start providing more effective services at less cost. In that way, M-Government strategy based on mobile infrastructures suggests more gradual development of M-Government services requiring less initial investments, as far as it relies on existing mobile networks, which will be later upgraded to 3G networks by cellular operators.

Appendix 1

Table 1. Government Interventions in Mobile Communications Markets: the Russian Federation and Vietnam

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| | <i>The Russian Federation</i> | <i>Vietnam</i> |
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| Primary Legislation | Telecommunications | Communication Law 1995 Communication Law 2003 | Posts and Telecommunications Decree 1997 Ordinance on Posts and Telecommunications 2002 |
| | Investment related | Law on Foreign Investment 1999 | Law on Foreign Investment 1988 and 2000 Law on Investment comes into effect from July 2006 |
| | Companies related | Civil Code 1995 | Law on State-Owned Enterprises 1995 and 2003 Law on Enterprises comes into effect from July 2006 |
| Ownership Structure | Domestic Restriction | Private investors can freely do business in the mobile services provisioning | - The state must hold more than 50% of the shares or the decisive shares of mobile operators - Domestic private investors can purchase equities internally and shares when the operators are listed in the Stock Exchange Market (planned to list in 2007) |
| | Foreign Direct Investment Restriction | All forms of foreign direct investment are allowed Foreign shares in the three largest mobile service providers in Russia (MTS, VimpelKom and MegaFone) are 47%, 64.5% and 42%, respectively as of June 2006. | Foreign direct investment under the form of business cooperation contract is the only allowable form. From December 2005, the US investors can invest up to 49% of the registered capital of a mobile operator under the effectiveness of the US-Vietnam Bilateral Trade Agreement |

| | | | |
|------------------------------------|---|---|---|
| | <i>Foreign Capital Absorption</i> | Capital investments of the three largest mobile operators accounts for \$3-\$4 billions yearly | Approximately 1.3 billion US dollars from 1995 to 2020. |
| <i>Licensing</i> | <i>Licensor</i> | Ministry of ICT. The Court holds the final judgment to withdraw a license | Ministry of Posts and Telematics |
| | <i>Practice</i> | Case by case and bidding | Case by case |
| | <i>Scarce Resource and Licensing</i> | Applicants had to obtain preliminary permit to use certain spectrum before applying for the mobile license. Once preliminary permit was issued, the applicant could obtain an acquisition license | Feasibility to allocate frequency and numbers was prerequisite condition to grant license |
| <i>Frequency Allocation</i> | <i>Method of Allocation</i> | The national spectrum allocation plan is under the consideration of the Ministry of ICT for approval. | Mainly first-come-first-serve and in accordance with the national spectrum allocation plan. |

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| | <p><i>Frequency License Fee and Frequency Usage Fee</i></p> | <p>Frequency license fees were determined in the 2003 law. Before 2006 no unique frequency usage fees were calculated or applied. The regulator assessed charges differently to different operators and such fees were to be approved by Anti Trust Ministry. From 2006, all spectrum users are required to pay yearly fees for frequency allocations. The 2003 law anticipated that initial unique formulas would be developed to calculate frequency usage fees in order to accelerate spectrum conversion; however, that prescription in the 2003 Law must be interpreted by a governmental order. The collected usage fees are intended to be used for radio management and spectrum conversion.</p> | <p>License and usage fees were decided by Ministry of Finance, collected by Ministry of Posts and Telematics.</p> <p>Ministry of Posts and Telematics retained 85% of fees to assist spectrum management activities; the remaining revenue goes to the national budget.</p> |
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|-------------------------------|--|---|--|
| <i>Interconnection</i> | <i>Allowed Types of Interconnection</i> | <p>Mobile operators indirectly interconnect via fixed-network to transit long distance mobile-mobile traffic. Meanwhile, the incumbent fixed operator always imposes interconnecting constraints on mobile operators.</p> <p>The interconnection situation has been resolved by using the national transit network of Multi-regional Transit-Telecom, who integrates all individual mobile operators` networks and long distance networks. MTN provides services to 146 Russian mobile operators, 89 fixed line operators and international roaming services to over 300 foreign cellular operators</p> | <p>Direct mobile – mobile and indirect mobile –and fixed-mobile interconnection</p> |
| | <i>Dispute Solving</i> | <p>Prolonged interconnections disputes were to be resolved in the regional and federal courts</p> | <p>Disputes could be solved either by the Ministry of Posts and Telematics, or by the Anti-Trust Commission.</p> |
| <i>Tariff</i> | | <p>The Ministry of ICT never regulated mobile tariffs. Mobile operators were free to decide these issues.</p> | <p>Before 2003, tariff was fully regulated by the regulator.</p> <p>Since 2003, the regulator only decided tariff provided by the dominator(s) – who are defined as operator(s) that occupy more than 30% of mobile market in terms of traffic and/or revenue.</p> |

Appendix 2

The graphs below serve to assist in answering the question of how did these policies and regulatory differences (without consideration of other intervention factors, such as technology advancement, or economic factors namely differences in consumer purchasing power) affect mobile developments in the two analyzed economies. The following figures show mobile growth rates in terms of mobile service subscriptions, mobile service penetrations and mobile annual growth rates in Russia and Vietnam from the date of mobile commencements. Figure 2 illustrates that the two countries had achieved similar mobile development in 1994, when penetration rates stood at 0.018% and 0.017% in Russia and Vietnam, respectively. However, when Russia obtained a mobile developmental growth rate of more than 200% in 1995, and then more than 100% in almost all years of the analysis, except in 1998 and 1999, Vietnam did not achieve such rapid growth rates. Vietnam's highest development rates were achieved in 1993 and 1994 (the first two years of mobile introduction), 1996-1997 (when the second mobile network became operational) and 2000 (the year that prepaid services was instituted). In the other development periods, Vietnam's growth rates were always less than 100%. Of comparative interest, from 2002 to 2005, Russia increased its mobile subscriptions by 10 million, 19 million, 38 million and 52 million, respectively; during this same time frame the largest gain in mobile subscriptions in Vietnam was approximately 4.5 million in 2005. In 2005, Russia had over 126 million mobile subscribers and an 86% penetration rate, while Vietnam had achieved approximately 9 million mobile line subscriptions and a 10.48% penetration rate.

Figure 1. Mobile Development in Russia and Vietnam – Subscriptions and Penetrations

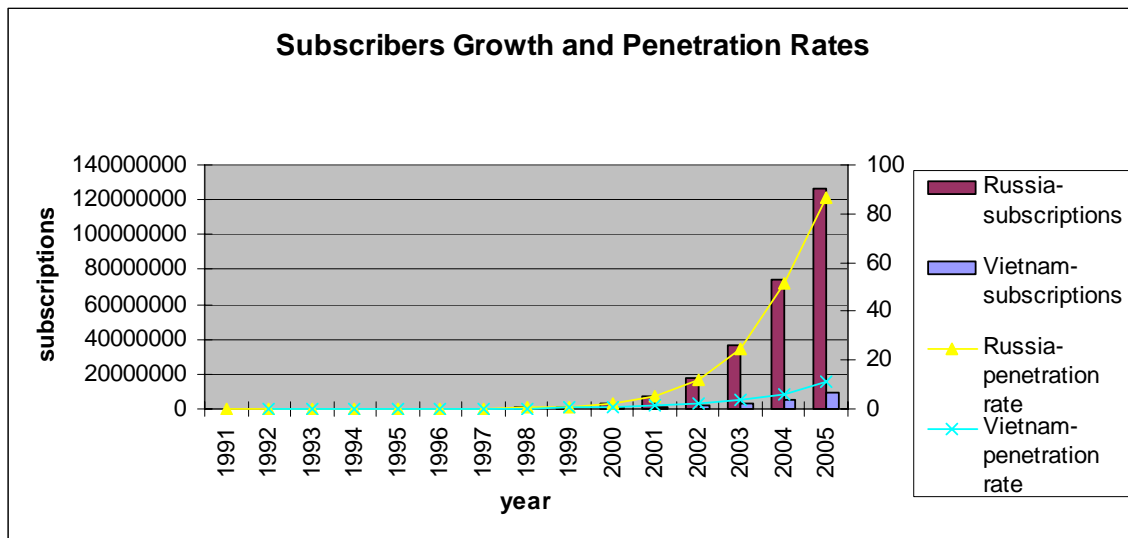
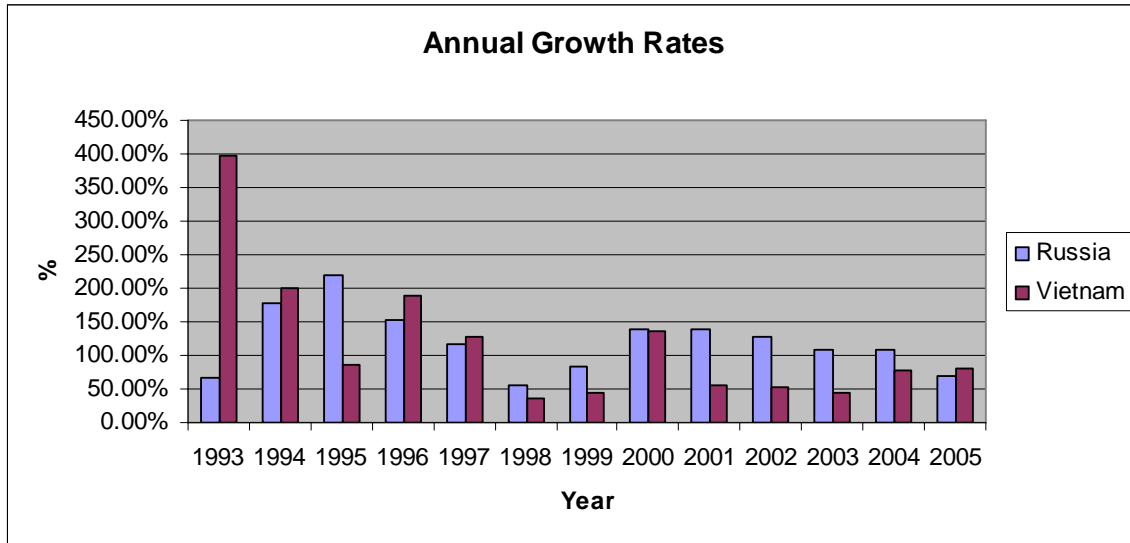


Figure 2. Mobile Annual Growth Rates, from 1993 to 2005



Source: ITU (1991-2004), MPT Vietnam (2005), IKS-Consulting (Russia 2005)

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