

FICCI

Federation of Indian Chambers
of Commerce and Industry



Department of Telecommunications
Ministry of Communications & Information Technology
Government of India



11 - 13 December, 2008 - New Delhi, India

CONNECTING RURAL INDIA

The Untapped Growth Opportunity



Contents

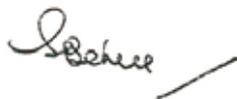
Foreword	3
<hr/>	
Executive Summary	5
<hr/>	
Macro Economic View of India	7
<hr/>	
Global Telecom Markets	15
<hr/>	
Indian Telecom Sector	25
<hr/>	
Telecommunications for Rural India	35
<hr/>	
Broadband for All	49
<hr/>	
Operator Initiatives in Delivering Low-Cost Mobile Services in India	57
<hr/>	
Value Added Services	63
<hr/>	
Telecom Manufacturing	71
<hr/>	
Regulatory and Policy Environment	75
<hr/>	
Conclusion	81
<hr/>	
About Us	83
<hr/>	
Contact Us	84

Foreword

India today offers the most exciting growth opportunities in the telecom sector. The proactive policies of the Government with active support and involvement of stakeholders have changed the face of this sector which has now emerged as the world's fastest growing telecom sector. With a base of more than 325 million mobile subscribers, India has become the second largest wireless network in the world. From a teledensity of a mere 5% in March 2003, the Indian Telecom sector has grown manifold and the teledensity is now over 32%. The gigantic size of the telecom market in India can be easily judged from the fact that we still have to provide connectivity to 70% of our population mainly in small cities, towns and rural areas and broadband connectivity to a majority of population. Connecting Rural India is thus a key focus for future growth, a challenge as well as a great opportunity.

On the occasion of India Telecom 2008, the 3rd International Conference and Exhibition, the Department of Telecommunications is bringing out this report on "Connecting Rural India – The Untapped Growth Opportunity".

Capgemini & FICCI have put in a lot of effort into compiling this report which covers the key areas of Indian telecom sector and would form a useful reference manual for telecom operators, regulators, vendors, policy makers and all those involved in this rapidly growing sector.



Siddhartha Behura
Secretary
Department of Telecommunications
Ministry of Communications and IT
Government of India
New Delhi

11th December 2008

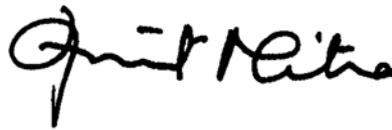
Message

The Federation of Indian Chambers of Commerce and Industry (FICCI) and Capgemini are pleased to present this report on “Connecting Rural India.” We are grateful to the Department of Telecommunications (DoT) for this opportunity to work with them as Knowledge Partner for the India Telecom 2008 conference.

The Indian telecom industry has seen strong growth on the back of a significant rise in mobile subscribers. The next phase of this growth is likely to see mobile operators spread out into the hinterlands of the country, and tap the large rural market. Emphasis in connecting the unconnected India presents the next big challenge and opportunity for operators and the Government alike.

In this report, we look at how the telecom story has panned out over the last few years in India, and how rural India is likely to leave its own imprint on the telecom sector in the coming years. The real challenge for all of us, though, lies in translating the telecom successes into a harbinger of sustainable growth across India.

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Executive Summary

Today, India is at the cusp of its next phase of growth, driven by an economy that has been growing at over 9% for the last three years. India's changing demographics, along with strong domestic markets, are attracting the attention of major global organizations, resulting in strong foreign investments in the country. Globally, telecom sector players are coming to terms with saturation in developed countries and looking at newer streams of growth from emerging countries.

In India, the telecom sector has seen exceptional growth in the last few years. This growth has largely come through a rapid rise in mobile subscriptions and makes this a key market for many global operators. One attractive proposition is the falling entry barrier, which has ensured swift uptake of mobile connections and increase in teledensity. With increasing penetration in urban circles, operators are looking to continue growth by tapping the large rural Indian markets. In doing so, all the stakeholders in the ecosystem—including operators, device vendors and the Government—are playing an active role.

With the recent issuance of guidelines for 3G and Broadband Wireless Access (BWA), broadband in India is likely to receive an impetus. In addition, the high cost of wireline infrastructure is bringing wireless broadband services into focus. The advent of 3G services is likely to result in a rise in data usage, along with innovative service launches from operators. Over the years, delivering mobile services in India has been a tricky business for operators to date. The high Minutes of Usage (MoU) clubbed with low Average Revenue Per User (ARPU) has meant that operators have had to innovate in their service delivery. In doing so, operators have initiated activities such as network outsourcing, network sharing, and micro-prepaid schemes that have enabled them to work around the limitations of the Indian market in an innovative manner.

India's mobile markets have thus far been largely focused only on voice services. However, with the advent of advanced devices and a strong marketing push from operators, uptake of value-added content services has been steadily increasing over the recent months. In driving this growth of content, operators would do well to take the examples of Japan and South Korea, where content ARPUs are some of the best in the world.

Growth of telecom services in any country is, to a large extent, determined by the regulations that drive it. Telecom regulatory bodies in India, along with the Government, have ensured that through a series of initiatives, past and present, the interests of the Indian consumer are upheld whilst ensuring a competitive marketplace.



Macro Economic View of India

The emergence of a global contender

India's GDP Growth	8
Growth of Foreign Direct Investment in India	10
India's Changing Demographics	12

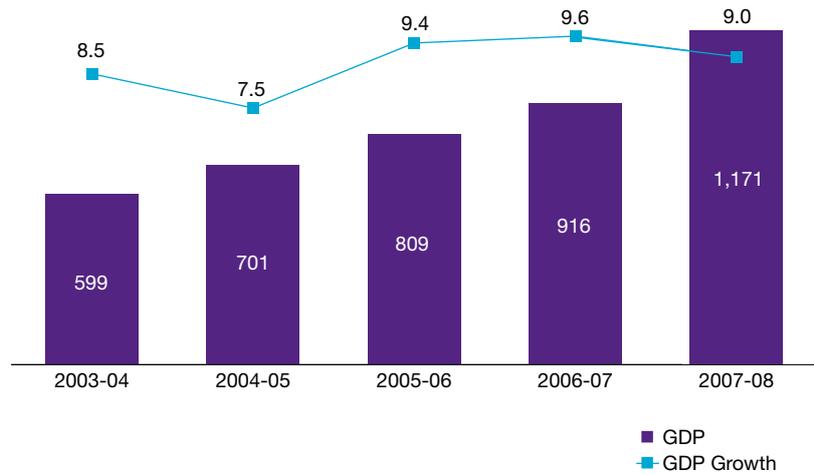
India's GDP Growth

India's economy has been experiencing a strong period of growth in the last few years. Today, the Indian market represents one of the fastest growing economies in both the emerging and the developed world. India's GDP grew by 9% in FY 2008, the third consecutive year in which growth has been above 9% (see Figure 1). Despite a global slowdown, growth is expected to remain strong at around 7-8%

In recent years, India's GDP growth has been led by the services sector which contributes a significant portion. In 2007-08, it is estimated that over 56% of India's GDP growth was contributed by the services sector. The services sector includes sub-sectors such as hospitality, financial services, and transport among others. The industry and agriculture & allied sectors contributed around 27% and 18% respectively (see Figure 2).

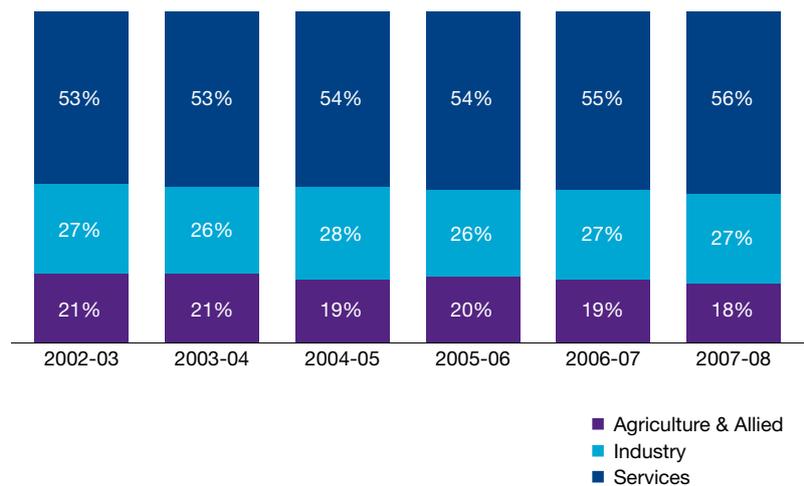
A comparison with similar emerging markets around the world reveals that India is currently one of the fastest growing markets. Apart from China, which is currently experiencing similar growth, India represents one of the largest opportunities for growth (see Figure 3).

Figure 1: India's GDP in US \$ Bn and YoY Growth in %, 2004-2008



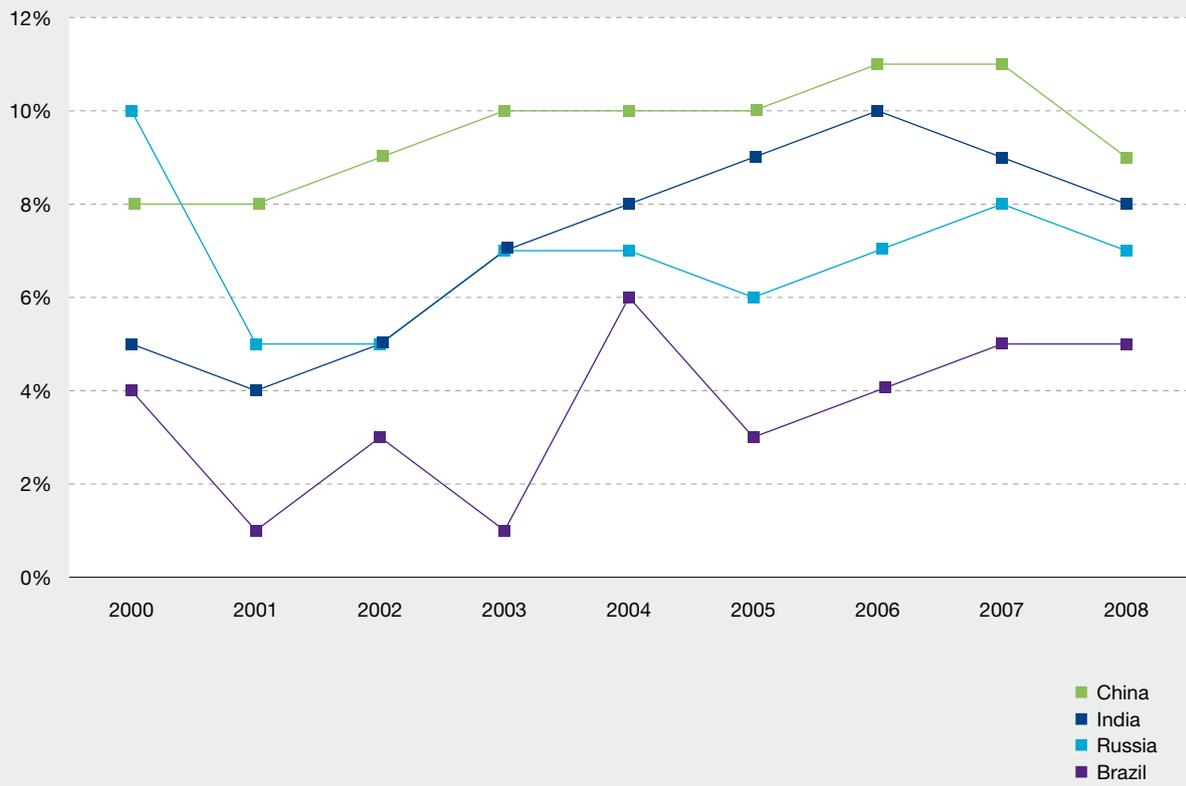
Source: Capgemini Analysis; Exim Bank, "India's Macroeconomic Indicators", Sept 2008

Figure 2: Sector Contribution Towards GDP, 2003-2008, (%)



Source: Capgemini Analysis; Exim Bank, "India's Macroeconomic Indicators", Sept 2008

Figure 3: Real GDP Growth Rate in Select Countries, 2000-2008, (%)



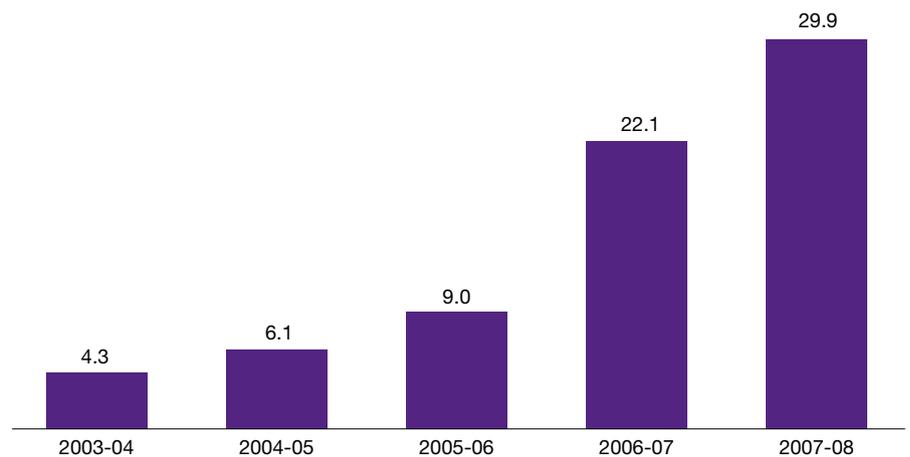
Source: Capgemini Analysis; IMF, "World Economic Outlook", April 2008

Growth of Foreign Direct Investment in India

India's high levels of growth in the recent past have meant that the country has needed a constant inflow of resources from global companies and institutions. Aided by the increasing globalization of the Indian economy, and the positive steps taken by successive Governments, foreign institutions have made a beeline for investments in the country. With the Government liberalizing most sectors, and allowing up to 100% ownership by foreign investors, many FIIs (Foreign Institutional Investors) and large global companies have invested significantly in India in the recent past. While initial Foreign Direct Investment (FDI) had focused on low value-added and labor-intensive industries such as textiles and food processing, over the years industries with higher value-add such as electronic components and automotives have started to see significant benefits of FDI. Most of these investors came to India looking for the cost arbitrage that the country's labor markets offered, but have since expanded their presence, buoyed by the high quality of the skills and products.

The large growth in FDI in recent years (see Figure 4) has helped India's economy in multiple ways. FDI inflows into India have helped generate employment, increase the FOREX (foreign exchange) reserves through exports, and have expanded the overall supply and availability of goods. Many global corporations, which had used India initially as a base for exporting, are increasingly looking to target the domestic market whose consumption is fast scaling up. India's per capita consumption has been constantly

Figure 4: FDI in India, 2004-2008, US\$ Billion



Source: Capgemini Analysis; Department of Industrial Policy & Promotion, FDI Fact Sheet, June 2008

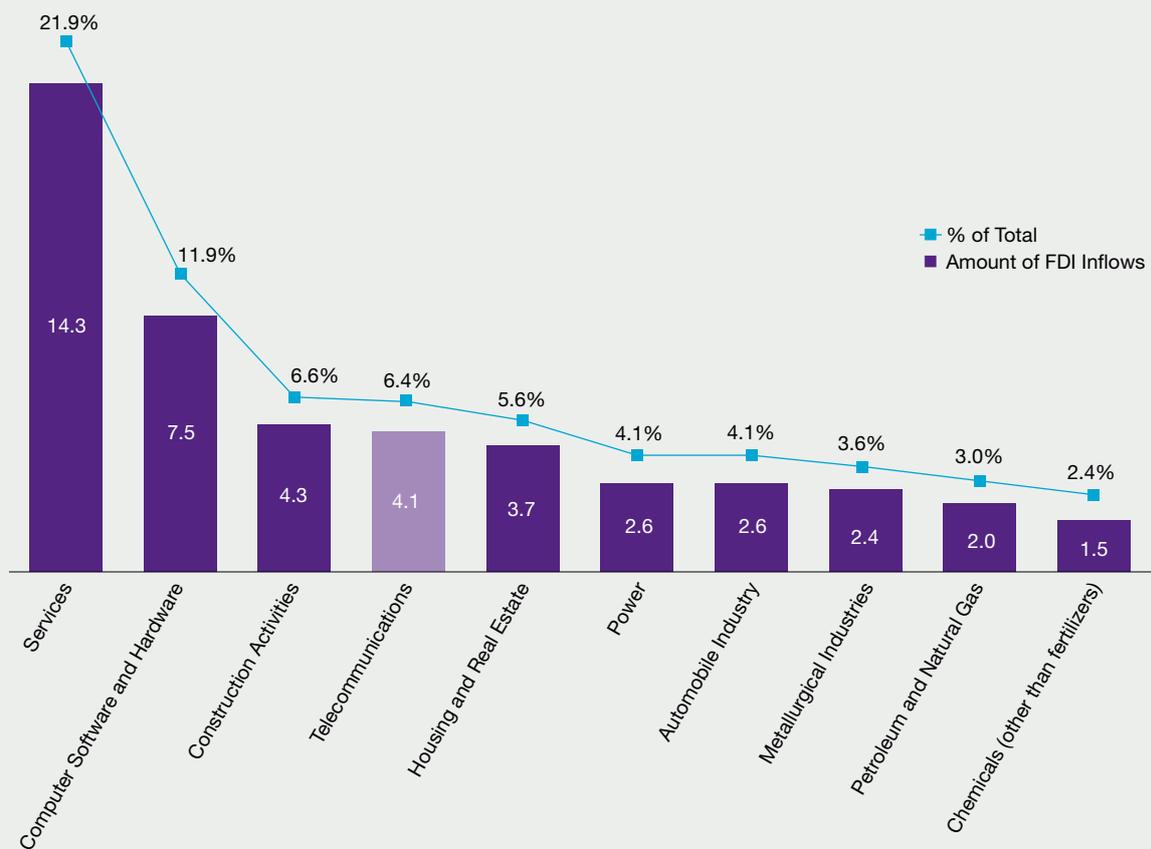
rising over the past few years. For instance, the consumption growth rate was pegged at 5.1% during FY 2004 to FY 2008 and estimates for 2008-09 are at 5.3%.

FDI growth in India's economy has been led by the services sector, a reflection of the larger contribution of services to the country's overall GDP. However, other sectors have also started to see significant investments in the recent years (see Figure 5).

In the telecom sector, the Government allows up to 74% FDI for fixed and cellular services. Taking advantage of this policy, multiple global companies have entered India over the years. The Government has also allowed 100% FDI through the automatic route

for promoting telecom equipment manufacturing in India. Taking advantage of this, multiple global Original Equipment Manufacturers (OEMs) and Electronics Manufacturing Services (EMS) providers have set up shop in India with a view to export, as well as serve the booming domestic market. For instance, global majors such as LG, Motorola, Nokia, Ericsson, Flextronics and Hon Hai have set up telecom manufacturing operations in India.

Figure 5: FDI Investment by Sector, 2000-June 2008, (US\$ Bn, %)

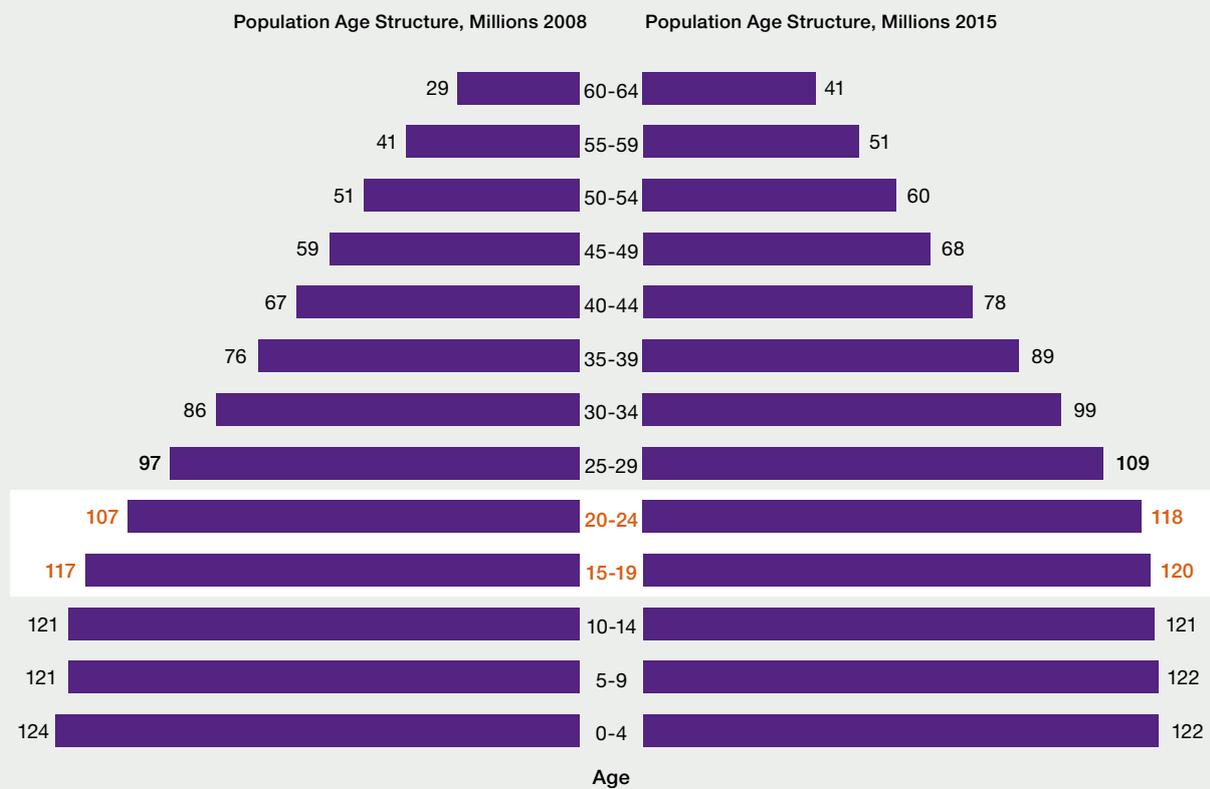


Source: Caggemini Analysis; Department of Industrial Policy & Promotion, FDI Fact Sheet, June 2008

India's Changing Demographics

The demographic nature of India is changing rapidly. Post 1970, India's demography has shifted to a more favorable ratio of working to non-working population. This translates to India having one of the most work-friendly populace in the world (see Figure 6). Demographic changes are an important parameter for future growth as consumer consumption and savings are closely linked to it. Other countries around the world such as Ireland and Japan have exhibited a strong positive correlation between favorable demographics and rise in GDP.

Figure 6: Changing demographics of India, 2008 & 2015



Source: Capgemini Analysis; Euromonitor International from National Statistics, August 2008



Global Telecoms Markets

The changing landscape of opportunity

Introduction	16
Trends in Global Markets	18

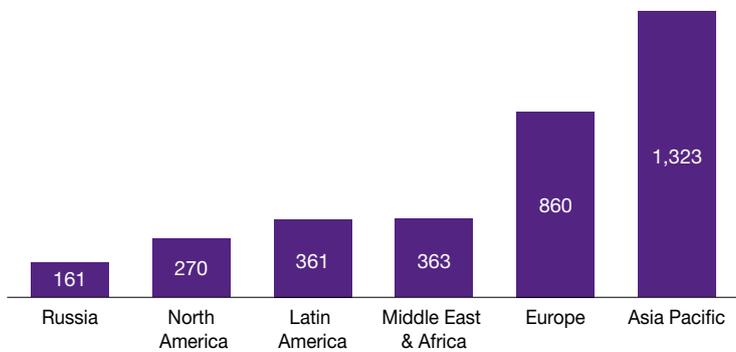
Introduction

The global telecom industry has been growing steadily, both in terms of subscribers and revenues. By the end of 2007, global mobile subscribers had already crossed 3 billion. The current growth in subscribers is being led by mobile operators from Asia, and in particular, India and China. These two countries have been accounting for the bulk of net additions of subscribers following the saturation of developed markets in Western Europe, the US and Japan. Asia Pacific now accounts

for over 50% of all mobile subscribers in the world, while Africa and the Americas together contribute close to 40%. Going forward, Asia Pacific is likely to be the driver of growth.

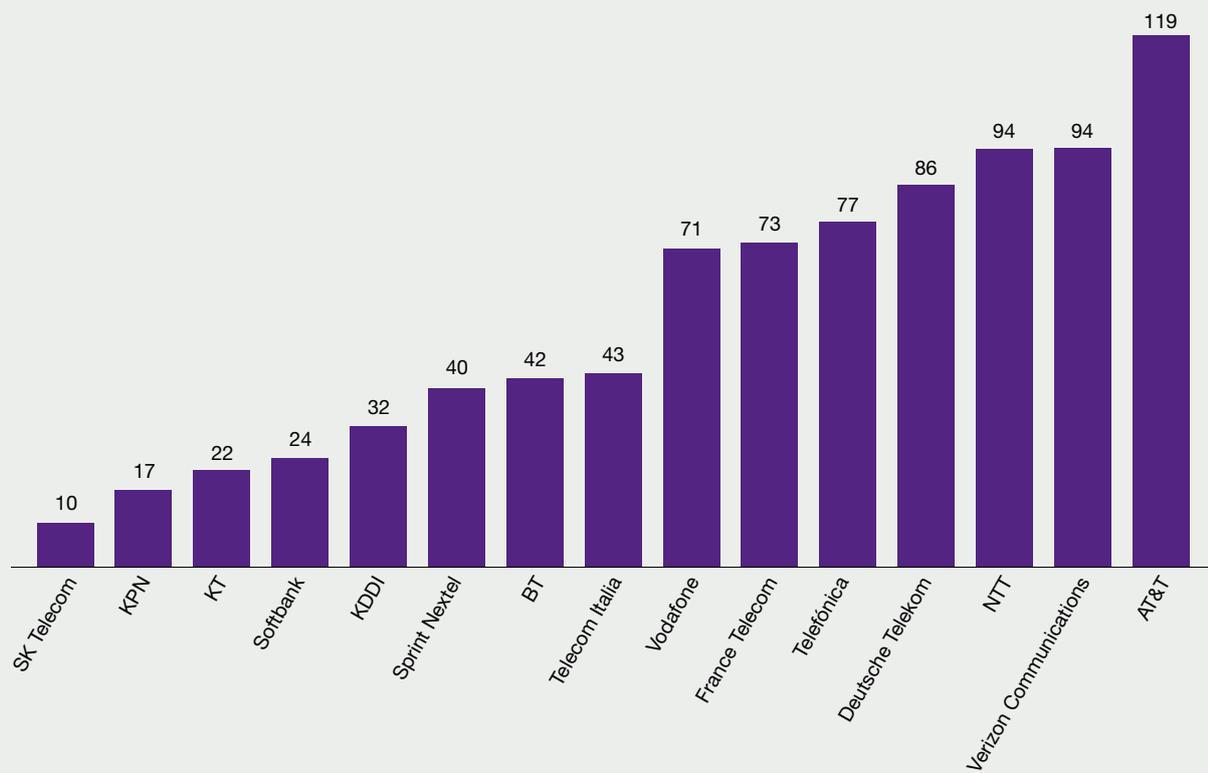
The strong growth of subscribers has resulted in operators witnessing a significant increase in their revenues (see Figure 8). In 2008, it is estimated that industry revenues are likely to top €1 trillion.

Figure 7: Mobile Subscriber Base in Different Geographies, 2007, Millions



Source: Capgemini Analysis; Digiworld 2008 Yearbook

Figure 8: Revenues of Major Telecom Operators in the World, FY 2008, US\$ Bn



Source: Capgemini Analysis; Cellular News, "SK Telecom, KT Freetel and LG Telecom Q2 2008 Results", Aug 2008; Mobile Burn, "Japan's NTT DoCoMo begins phasing out its 2G network", Aug 2008; Communications Direct, "Subscribers Run from Sprint while T-Mobile Meets Trend as Net Additions Fall in Q2", Aug 2008; Fortune, "Global 500 :2008 Rankings", Jul 2008; Company websites

Trends in Global Markets

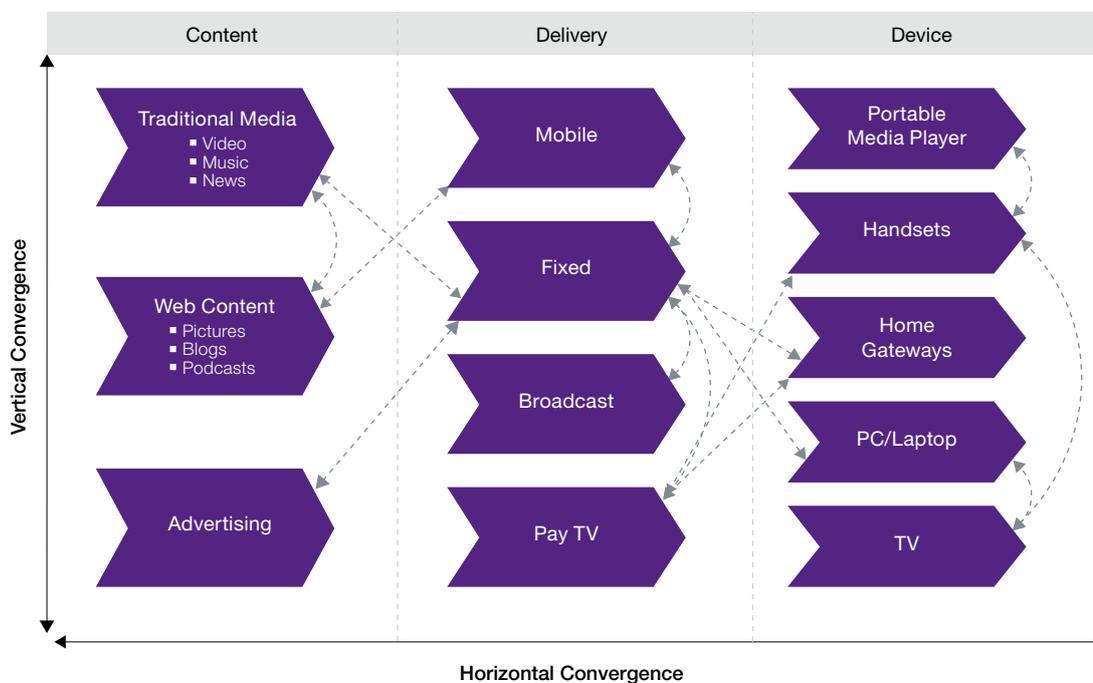
Convergence

One of the key areas where operators, equipment vendors and value added service providers in the industry are focused is the rising importance of convergence and its impact on consumer spending patterns. The pace at which device development has progressed in the last few years has enabled the rise of a new class of devices, and enabled a new set of

services that were hitherto impossible to deliver on the mobile handset. For instance, over the last few years—feature phones with the capability to play music, take pictures and tell a user’s location—have become available in the market. In ensuring that consumer uptake of these services is high, players in the mobile ecosystem have built multiple business models that are creating challenges for traditional service providers. For instance, today,

major device vendors such as Nokia, and Sony Ericsson, have combined music services with their mobile handsets, and in doing so are directly reaching out to consumers, thereby bypassing the mobile operators. Companies in the telecom, media and entertainment space are increasingly coming to terms with the new found reality that they need to extend their presence across the content, delivery, and device value chain.

Figure 9: What is Convergence?
Convergence is both a threat and an opportunity for players



Source: Capgemini Analysis

Shift in Technologies

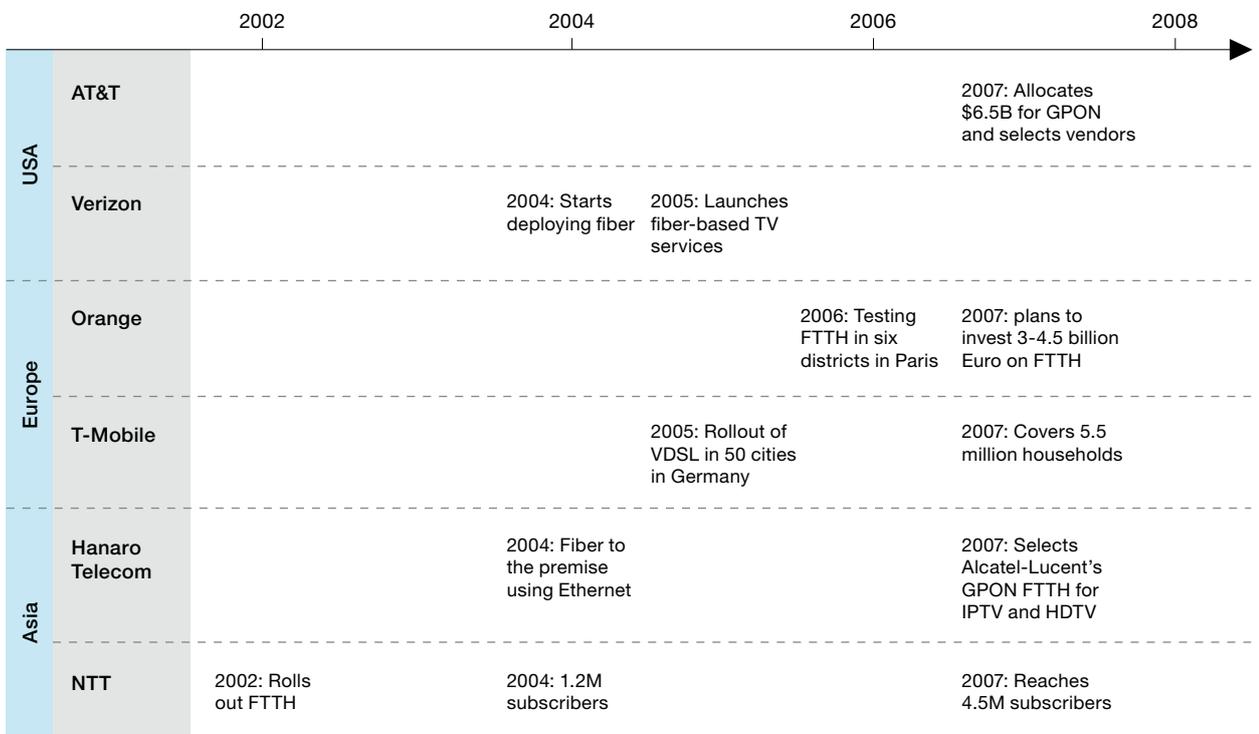
Over the past few years, there has been a slow but steady shift in technologies that have been typically used for delivering fixed and mobile services. These technologies promise to bring a significant change in the service delivery experience for consumers, and bring in additional service capabilities for operators.

Fixed Line Operators: Fixed line operators across the world are increasingly realizing that their last mile copper connectivity is not going to be useful to them in the coming years. With a rapid increase in multimedia rich applications, and increasing usage of the Internet to deliver content-rich services such as high definition IPTV/Internet TV,

fixed line operators around the world are re-evaluating the capabilities of their copper line network. In doing so, most operators have embarked on an expensive, but future-proof rollout of fiber networks. Operators have adopted multiple strategies in delivering these fiber networks, with options varying between fiber to the node, fiber to the curb, fiber to the building, and the most expensive option being Fiber To The Home (FTTH). These options differ in the extent of rollout of fiber network, and its distance from the consumer's home. Operators across the world have adopted differing approaches in deploying these networks (see Figure 10). For instance, while Verizon in the USA is adopting a FTTH approach, rival AT&T is deploying Fiber To The Node (FTTN) networks.

Mobile Operators: While fixed operators are gearing up to deploy fiber in order to deliver the next generation of content rich services, most mobile operators across the developed world have already deployed 3G services that have been capable of delivering most of these services. However, that hasn't held back mobile operators in deploying advanced 3.5G networks. These networks include those that operate on HSPA (High Speed Packet Access) such as HSDPA (High Speed Downlink Packet Access), and HSUPA (High Speed Uplink Packet Access). Operators are utilizing HSPA networks in ensuring the uptake of mobile broadband services. As per the GSM Association, over 200 HSPA networks are currently operational in over 93 countries.

Figure 10: Status of Fiber Rollouts by Select Operators, 2002-2008

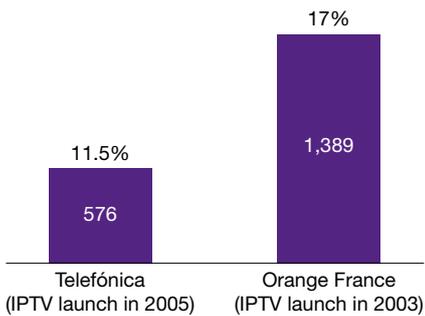


Source: Capgemini Analysis

Focus on Content: IPTV

Fixed operators around the world are increasingly looking to offer triple-play packages, combining data and voice with video services. In doing so, operators are tying up with content providers in delivering Internet Protocol Television (IPTV) services. Across the world, most of the major operators, specifically in Europe, have already launched IPTV services. While many others across Asia and other geographies are actively considering following suit. Success in IPTV has largely been determined by the strength of the content offering and the pricing of the triple play packages. France Telecom and Telefonica have successfully demonstrated the growth possibilities of IPTV (see Figure 11).

Figure 11: IPTV Subscriber Base for Select Operators as % of Total Broadband Subscribers, ('000s, %), Q2 2008



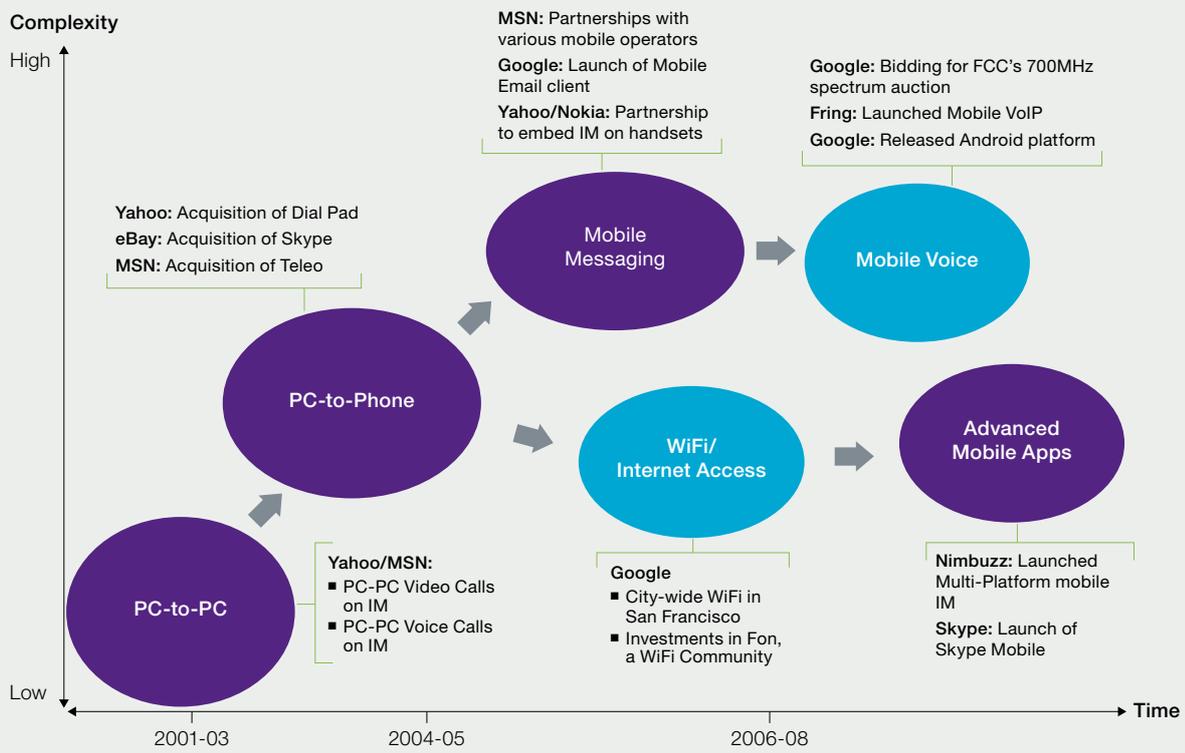
Source: Capgemini Analysis, Enders-Analysis, "Triple-Play in France"; CSMG Triple Play whitepaper; Company websites

Entry of Online Players

Of late, multiple Internet players have actively entered the domain of services traditionally dominated by telcos. Spurred by the growth in online advertising, and with an intention to grow their online audience, online players are increasingly making an entry into delivering communication services. In doing so, they aim to gain an increased share of online spend. Services delivered by online players today include instant messaging, mobile VoIP (Voice over Internet Protocol), and location-based services among others. Aided by the strength of their brands, several online players have also launched mobile versions of their services that not only directly impinge on operator-provided services, but also go a step further in interacting directly with devices and creating new business models around them. In doing so, most online players are banking on emerging open mobile ecosystems where device players, operators and online players have a level playing ground for reaching the consumer.

Internet players have built their business models around ad-supported free services. Their forays into telecom with VoIP on IM and Wi-Fi access are also guided by the same model (see Figure 12). Recent growth in the online advertising market has resurrected the online industry which had been lying low after the burst of the dot.com bubble in the early years of the decade.

Figure 12: Online Players Initiatives in the Communication Services Space



Source: Capgemini Analysis

The Shift to Emerging Markets

Emerging markets today represent the next growth frontier for telecom operators around the world. With growth saturating in developed economies, most major operators are today looking at developing economies such as India, Africa, Latin America and China for driving future growth.

The importance of emerging markets has been underscored by the fact that many major mobile operators have already stepped up their presence in emerging markets. Interest in India as a key market for global players was vindicated when Vodafone acquired Hutchison India's mobile operations for \$9.6 Bn in 2007. Most of the other major operators have evinced keen interest in entering markets such as India and China, attracted by the significant opportunities that they offer (see Figure 13).

Fixed Mobile Substitution

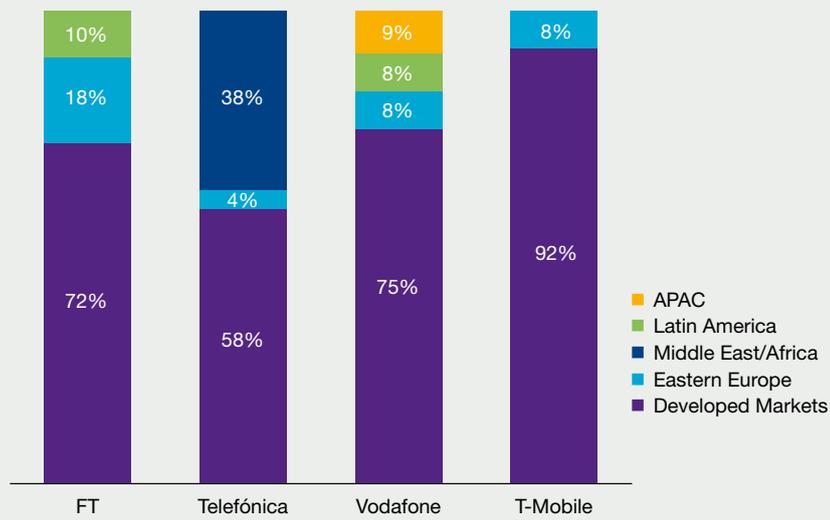
In recent years, voice usage has significantly moved to mobile phones, which are increasingly substituting landline phones as the primary means of communication. Moreover, with the growth in mobile broadband speeds, the utility of the fixed line for delivering both voice and data is increasingly getting blurred. In most developed markets, mobile operators are increasingly bundling fixed services into their mobile offerings in an effort to boost stagnating voice revenues and reduce customer churn.

Across Western Europe subscribers are increasingly replacing their landlines for mobile phones. In Nokia's homeland, Finland, this change has been most evident. By the end of 2006, 74.6% of call minutes originated from mobile phones. In Germany as well, where fixed lines have been traditionally dominant, at the end of 2006 24.3% voice traffic originated from mobile handsets.

Wireless substitution continues to increase in the US as well by 3-4 percentage points per year. At the end of 2007, 16.4 percent of USA households had abandoned their landline phone in favor of mobile phones, but by the end of June 2008, just 6 months later, that number had increased to 17.1 percent (see Figure 14).

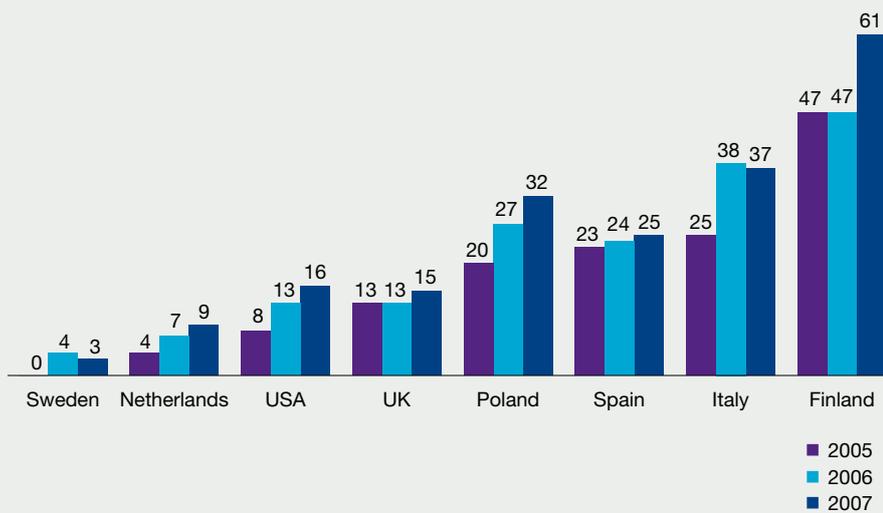
In line with this global trend, India witnessed a fall of 3.9% in the total number of wireline subscribers between September 2007 and September 2008. This figure declined from 39.58 million to 38.35 million as of September 2008.

Figure 13: Estimated % of Revenues from Emerging Markets for Select Telecom Operators, 2007



Source: Capgemini Analysis; Company websites; Company annual reports

Figure 14: Percentage of Mobile-Only Households in Select Countries, 2005-2007



Source: Capgemini Analysis; European Commission, E-Communications Household Survey, 2005-2007, AC Nielsen, "Wireless Substitution in the United States", Sept 2008



Indian Telecom Sector

A growth story of seismic proportions

Introduction	26
India's Fixed Line Market	28
India's Mobile Market	30
Future Growth Forecast	32
3G Arriving in India	32

Introduction

The telecom market in India has undergone a seismic change in the last few years. With rapidly increasing teledensity, India is set to join the league of nations that have been transformed by the availability of cheap, and yet quality, telecommunications networks. India's telecom growth story has essentially been one of two distinct halves. The first half, which panned out over 50 years, is the growth of the wireline industry; and the other half witnessed the rapid rise of the wireless industry over the past ten years (see Figure 15).

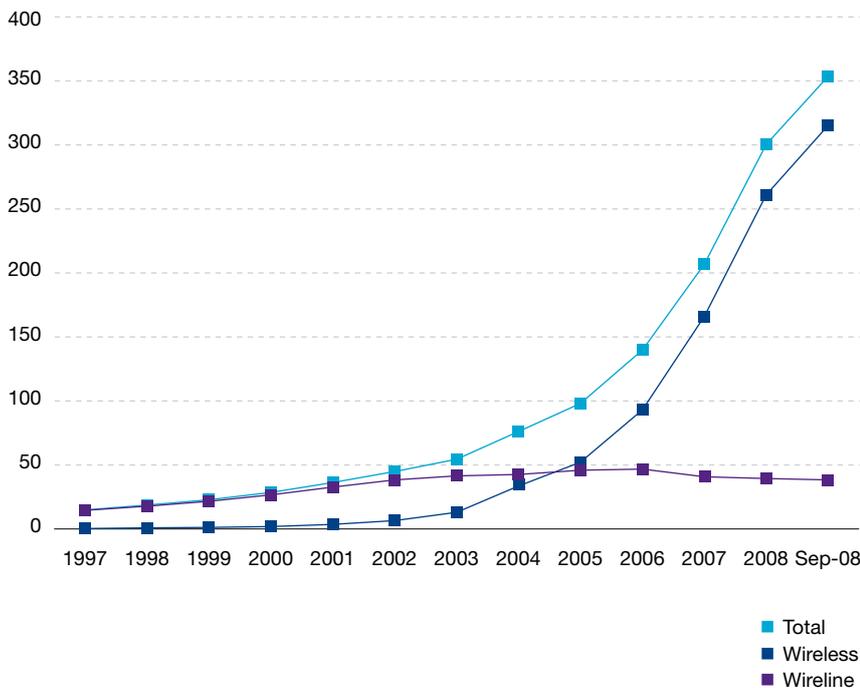
The rapid growth in mobile services can be clearly seen in the complete change in split between wireless versus wireline connections in India between 1997 and now. Mobile operators have managed to significantly drive home the advantages of a mobile phone as a communication instrument of choice for the consumer.

Faced with a saturating market in the developed countries of the world, the Indian market represents one of the last remaining pockets of growth for global operators. Even amongst

the developing countries, India's attractiveness as a country for offering mobile services is extremely high (see Figure 16).

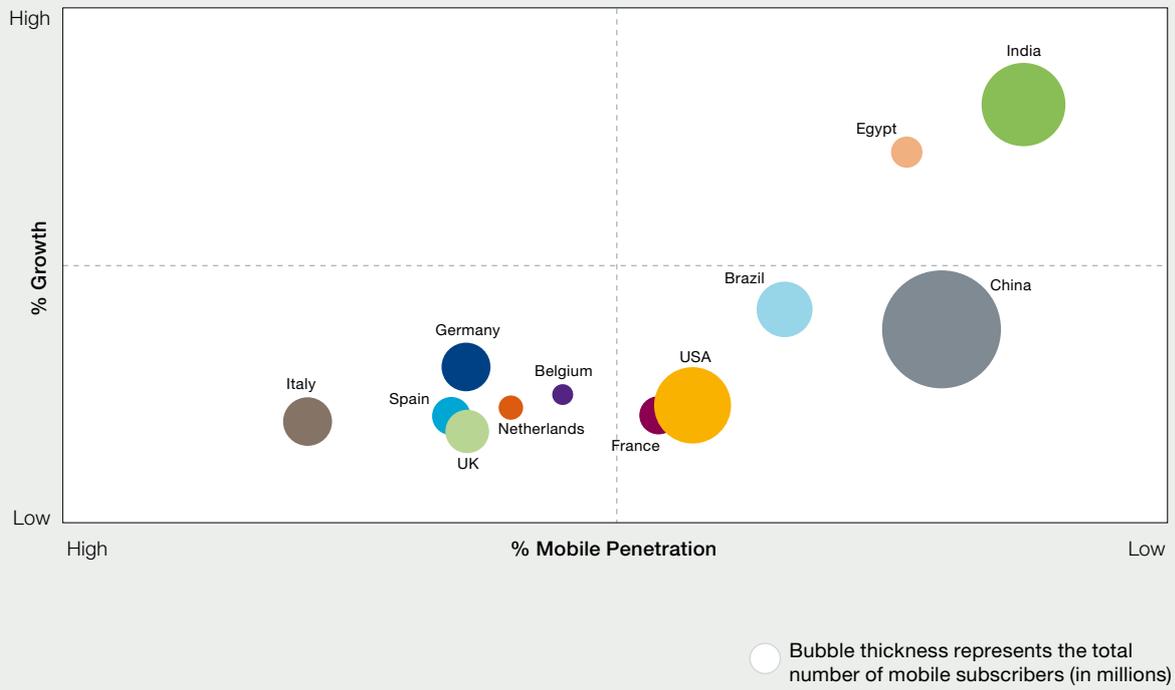
India's rapid growth in telephony services can be traced back to the significant rise of private mobile operators who have steadily increased the addressable market through a range of innovative tariffs and extended network coverage. In doing so, the industry on the whole has enabled access to communications services to a completely new set of subscribers who were hitherto untouched by the telephony revolution. Consequently, private operators have steadily increased their control over the market and their market share (see Figure 17).

Figure 15: Number of Telephone Connections in India, FY1997-FY2008, Millions



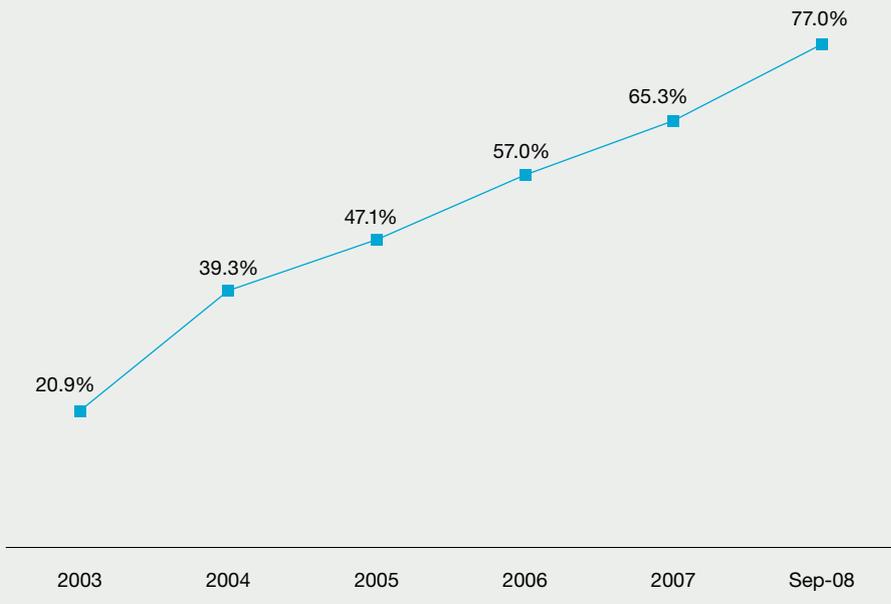
Source: TRAI
 Note: CAGR from March 1997 to September 2008

Figure 16: Attractiveness of the Indian Telecom Market Measured With Respect to Growth and Mobile Penetration, June 2008



Source: Capgemini Analysis; TRAI. Credit Suisse European Factsheet 2008. CTIA. Various Regulator Websites

Figure 17: Market Share of Private Operators (%), 2003-September 2008



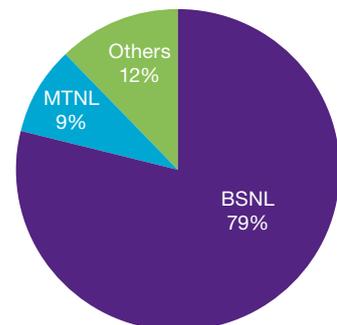
Source: TRAI

India's Fixed Line Market

India's fixed line market has historically been dominated by the incumbent operator Bharat Sanchar Nigam Limited (BSNL) in the entire country, except for Mumbai and New Delhi where Mahanagar Telecom Nigam Limited is the Government operator. However, fixed line growth in India has been slow due to the expensive nature of last mile rollouts. Growth of fixed lines has been steady over the years until around 2004. Thereafter, the strong growth of mobile telephony has meant most new consumers to the telecom market preferred to opt for a mobile connection rather than a fixed line connection. In fact, with

fixed mobile substitution setting in, there has been negative growth in fixed line connections since 2004. However, if we were to take a look at the overall growth of the market in the past decade, fixed lines have grown from around 14 million to over 38.3 million by the end of September 2008. From two fixed line operators in the past, the Indian market has grown to accommodate five new entrants in the recent years. BSNL continues to have the lion's share of the market in fixed lines (see Figure 18).

Figure 18: Market Share of Fixed Line Operators, September 2008, (%)



Source: TRAI



India's Mobile Market

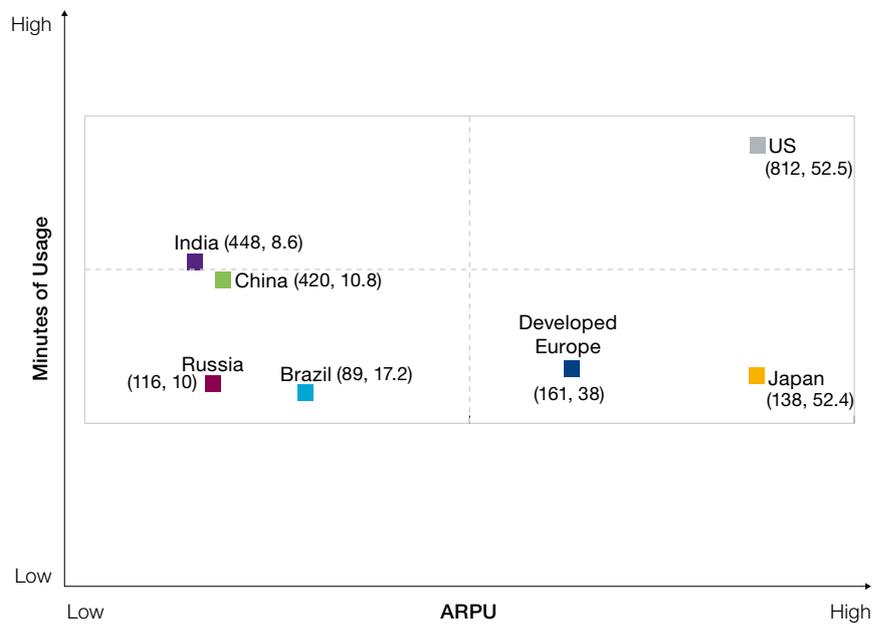
The mobile telephony market in India has paved the path for the strong rise in teledensity that India is currently experiencing. From a mere 0.3 million subscribers in 1997, the market has grown to over 315 million subscribers at the end of September 2008. India today has the world's second largest wireless subscriber base after China. The rapid rise in India's mobile market can be attributed to a host of factors, but most importantly to the regulatory action of opening up the market to private operators. Operators and equipment vendors have also contributed to the rapid rise through innovative tariff structures and attractively priced handsets. The interesting part about India's rapid growth in mobile telephony is the fact that this growth has come in a market where Average Revenue Per User (ARPU) is the absolute lowest in the world, and Minutes of Usage (MoU) among the highest in the world (see Figure 19).

Growth of India's mobile market has been led by the prepaid segment. Operators have constantly focused on reducing the entry barriers towards owning a mobile connection, and in the process, this has skewed the ratio of the prepaid to postpaid subscriber mix (see Figure 20). Additionally, Indian middle class consumers have traditionally preferred to have control over their monthly expenditure on mobile communications,

and consequently, a prepaid connection appeared more attractive. Operators have also strived to innovate by introducing offers such as prepaid with lifetime validity at low costs. Such initiatives have ensured that prepaid has become the preferred mode of connection for most Indian subscribers.

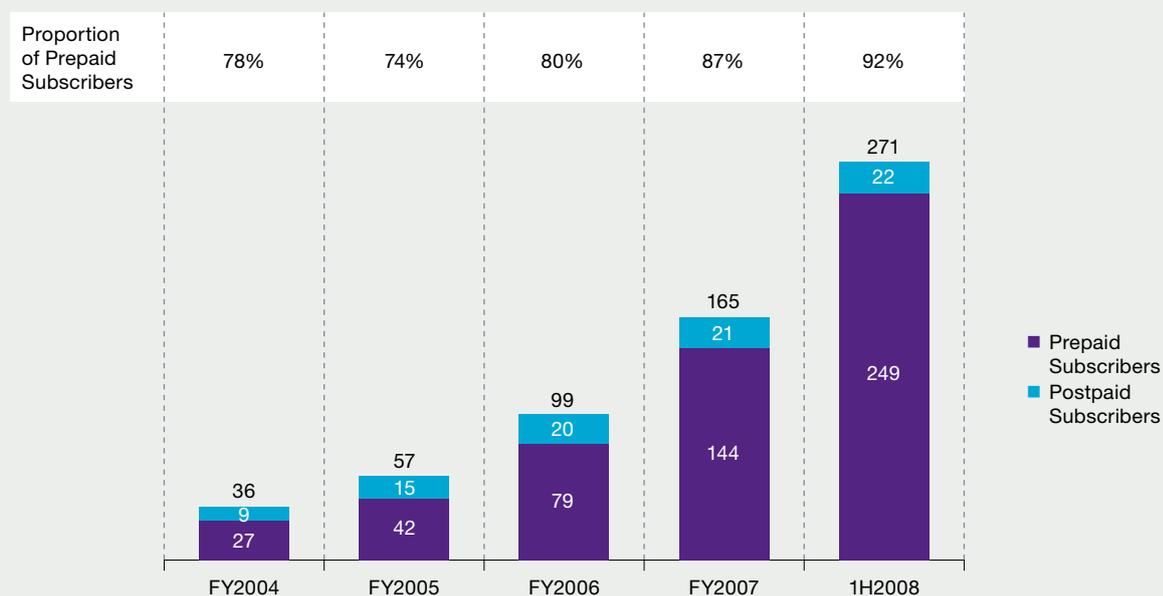
Call rates for voice calls in India are among the lowest when compared to other emerging telecom markets. As a result of a series of regulatory and competitive developments, call rates, when compared to cost of living, are quite low in India (see Figure 21).

Figure 19: Minutes of Usage (MoU) and Average Revenue Per User (ARPU) per month, June 2007, minutes, US\$



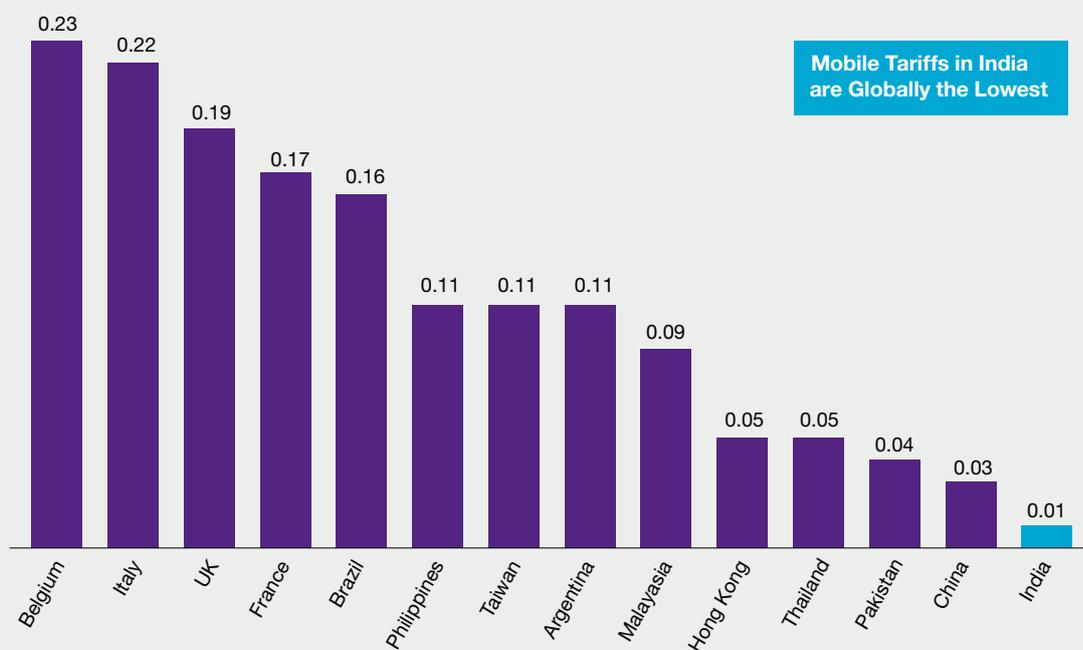
Source: Capgemini Analysis; Fitch Global Wireless Review 2008. Various Broker Reports

Figure 20: Subscriber Split by Payment Mode, FY 04- H1 08, Millions



Source: TRAI

Figure 21: Revenue Per Minute, December 2007, US\$



Source: Department of Telecommunications

Future Growth Forecast

The Indian mobile market has been growing at an extremely strong pace over the past few months. In March 2008, net additions topped 10.37 million subscribers, which is considered to be the highest ever additions by any country in 30 days. As recently as September 2008, India added over 10.07 million mobile subscribers indicating that the pace of growth has not slowed. However, it has to be noted that growth in urban India is fast reaching saturation. In most metros, mobile penetration today stands at over 80%. Future growth will have to come from the significantly under-penetrated rural markets of India. There have been

multiple forecasts of the Indian market, in terms of future mobile subscriber growth. The Government of India has kept a target of reaching 650 million subscribers for mobile and fixed telephony by 2012.

The fixed line subscriber base in India is likely to remain stagnant, with falling net additions. Fixed operators are looking to make attractive bundled offers by offering triple-play services. With the Government of India recently issuing the guidelines for IPTV services, fixed operators are looking to expand their share of the household spend on voice, data and video.

3G Arriving in India

The 3G spectrum auction process opens the door for a whole new set of entrants into the Indian mobile space. Operators who have missed out on the voice-led growth in the past few years are keen to capitalize on this opportunity and launch services targeted at capturing the strong potential of data services that 3G services offer. The Government, through a set of initiatives, has enabled foreign telcos to participate in the auction process. The entry of players through the 3G route injects a new competitive dimension into the Indian telecom market. In the search for new subscribers, this move is likely to galvanize competition and expand network coverage into the hinterlands of the country. Existing operators, if

successful in the 3G spectrum auction, are likely to use the spectrum to reduce their network congestion while simultaneously launching rich data services with which they can migrate their high ARPU users.

Similarly, the regulator has recently made public the recommendations for allowing Mobile Virtual Network Operators (MVNOs) in India. Once MVNOs are allowed to operate in India, targeted mobile service launches by niche players in banking, retail and other sectors are likely to receive a boost. Moreover, the MVNO route is also likely to be adopted by some of the international telecom operators that have thus far stayed away from the Indian market.





Telecommunications for Rural India

Rural reach: The next phase

Fixed Line Telephony in Rural India	36
Growth of Mobile Telephony in Rural India	36
Key Barriers Towards Development of Telecom Services in Rural India	38
Stakeholder Initiatives to increase Growth of Telecom in Rural India	39
Success Stories in Rural Telecom	44
Potential for Telecom Services in Bridging Economic Divide	46

Fixed Line Telephony in Rural India

India's rapid growth in mobile subscribers has been quite lop-sided. While urban subscribers have been growing significantly year-on-year, similar growth has not been seen on the rural front. The divide between urban and rural teledensity has been rapidly widening, and it is in recent years that all the stakeholders involved in the telecom industry have realised the significant growth opportunity that the rural markets offer. While urban teledensity has touched nearly 75%, rural teledensity is around 13%. In fact, in most of the major cities in India, teledensity has crossed over 90% (see Figure 22).

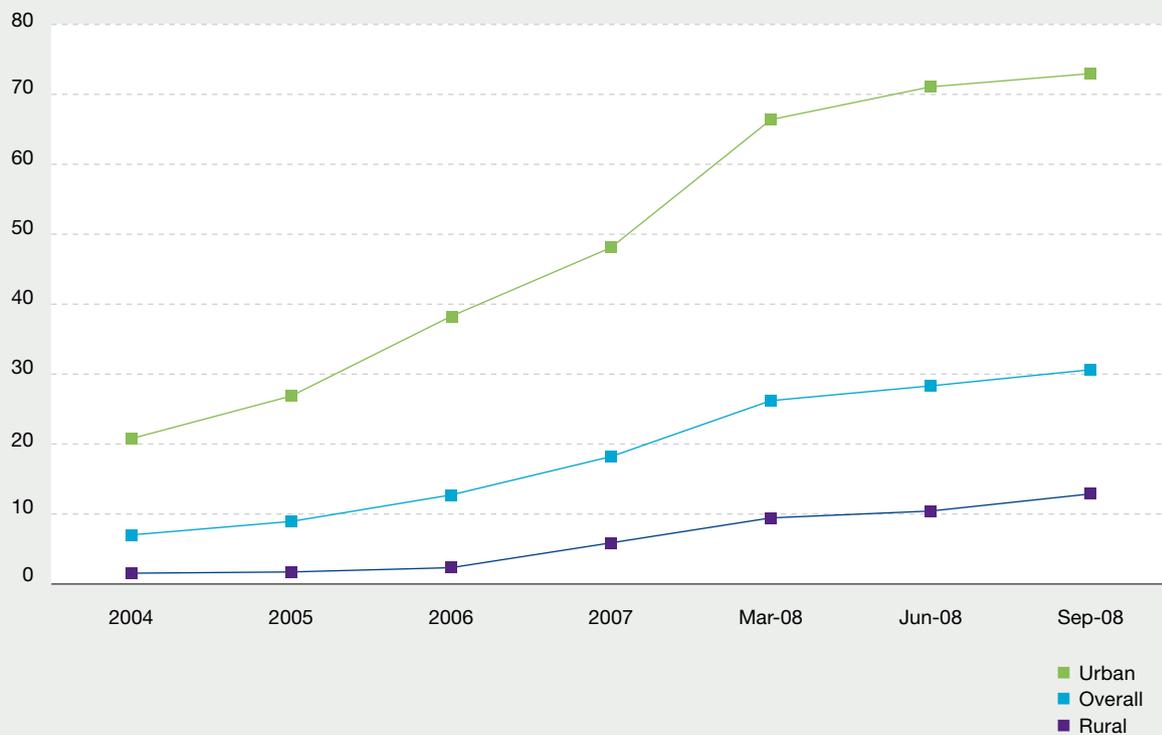
Growth in the rural telecom market has historically been driven by fixed line deployments that were undertaken by the incumbent operator, BSNL. However, with the rapid network deployments undertaken by some of the private mobile operators, there appears to be a clear fixed mobile substitution scenario happening in the rural markets (see Figure 23).

Growth of Mobile Telephony in Rural India

Growth in teledensity in rural India has been led by a strong uptake of mobile telephony services. Falling entry barriers, led by lower handset and per-minute calling costs, have ensured a rapid uptake of mobile telephony in rural India. Today, the mobile phone has become the first communication device for many rural subscribers who are skipping the traditional step of a fixed connection.

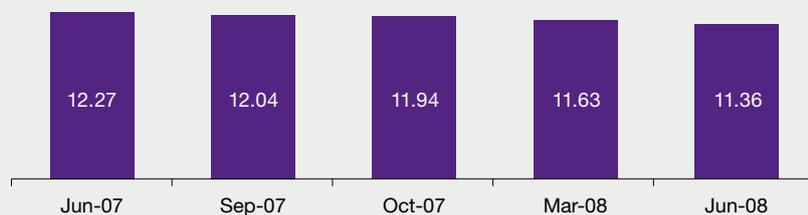
The Indian rural markets offer significant opportunities for telecom operators. Considering that over 70% of India's population is resident in rural and semi-urban India, these markets offer an extremely strong potential for growth. While average income levels might be significantly low in comparison to urban markets, these rural markets offer significant potential for profitable growth, as has been demonstrated by operators such as Grameen Phone and others across the world. Today, operators who have made early moves into the rural markets of India are reaping the fruits of their investments, and are looking eagerly forward to the next phase of growth when these markets take the lead that has hitherto been with urban India.

Figure 22: in India, 2004-Sep 2008, Phones per 100 people



Source: Department of Telecommunications

Figure 23: Rural Wireline Market in India, June 2007 - March 2008, Million



Source: Department of Telecommunications

Key Barriers Towards Development of Telecom Services in Rural India

Telecom growth in rural India has been constrained by multiple factors, some financial and some technological:

Network Coverage

One of the most significant barriers for mobile network operators' expansion plans in India has been the large investments that rollouts in rural areas entail. With the average cost of setting up a base transceiver station crossing Rs.5 million, most operators have not been willing to expand their network coverage beyond urban and semi-urban areas.

Distribution

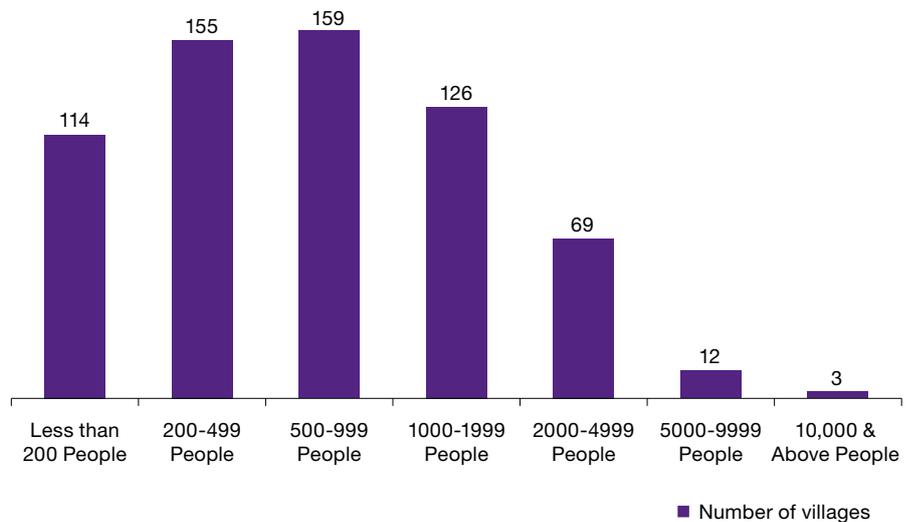
Lack of organized retail beyond major cities and towns in India is acting as a significant constraint in the expansion plans of major mobile operators. Most operators have to build their own exclusive distribution systems that

percolate down to the local retailer. In doing so, operators end up in a strong battle for acquiring influential local entrepreneurs.

Low Population Density

Population in rural India is spread unevenly (see Figure 24). There are pockets where population density is below 100 people per square km, and there are areas where the density exceeds 650. Given these wide variations, it becomes imperative for operators to pick and choose the most optimal location for their operations in a given region. In doing so, they also have to contend with the socio-economic realities of the regions, which tend to be quite different even amongst contiguous areas.

Figure 24: Distribution of Population in Rural Indian Villages, 2001, '000s



Source: Capgemini Analysis; Census 2001

Stakeholder Initiatives to Increase Growth of Telecom in Rural India

Stakeholders in the Indian telecom industry have recognized the existence of these barriers, and are now taking active steps to eliminate them.

Initiatives by the Government of India

Abolition of Access Deficit Charge

In March 2008, TRAI abolished the access deficit charge which was being paid by private operators to the incumbent for providing service to rural areas. Operators have committed to pass on the savings accrued from the ADC to the rural areas in expanding coverage.

Rural infrastructure funding from USOF

The Universal Service Obligation Fund (USOF) was started by the Government of India in April 2002. As per the guidelines issued, all telecom service providers had to contribute 5% of their Aggregate Gross Revenues (AGR) towards the USOF. This fund is to be used in delivering telecom services in the rural areas of India where teledensity was quite low. However, disbursements from the USOF have been low, leading to a large amount of unutilized funds. By end of FY 08, the unutilized fund pool has grown to over Rs.14,000 crore.

The Department of Telecommunications (DoT) has been taking multiple steps in ensuring the appropriate and timely utilization of these funds. In order to achieve this goal, the DoT announced in June 2008, that operators were free to draw funds from the USOF for setting up infrastructure in rural areas. Similarly, earlier in April 2008, the DoT allowed telcos to jointly bid for support from the USOF. These initiatives are likely to give an impetus

to rural rollouts. Keeping this in mind, the DoT has also announced rollout of phase II of its mobile expansion plans in rural areas. In Phase I, around 7,871 towers are being set up in 500 districts spread over 27 states. Rollout of phase II of this program will ensure spread of mobile telephony to all villages with over 500 people. Future phases are likely to provide over 10,000 towers in the unconnected areas of rural India.

In encouraging operators to invest more in the rural areas, the Government has also waived license fee for rural telephony (wireline) and similarly, have decided to reduce the USO fee from 5% to 3% for existing operators that have over 95% coverage compliance in their license areas.

Setting up of Telecom Export Promotion Council

In order to give a boost to the fast growing telecom equipment sector in India, the Government, in April 2008, announced the setting up of a telecom export promotion council. Along with the launch, the Government has also set a target of achieving US\$10 billion in telecom equipment exports by 2012. The export promotion council and renewed focus on manufacturing exports is likely to give a boost to domestic telecom manufacturers.

Initiatives by mobile operators to increase rural penetration

Mobile operators have recognized the fact that rural India is going to form a major part of the growth in the coming years. So much so, it is expected that over 30% of the next 250 million new subscriber additions are likely to be from rural India. In anticipation of this growth, operators have taken multiple initiatives to encourage, and benefit from, the prospective growth phase in rural telecom.

Infrastructure Sharing (Passive and Active)

Most operators in India are already quite involved in sharing their passive infrastructure. With the active involvement of the regulator and funding from the USOF, sharing of the passive infrastructure is likely to reduce operator timelines and capital expenses in rolling out coverage to rural areas.

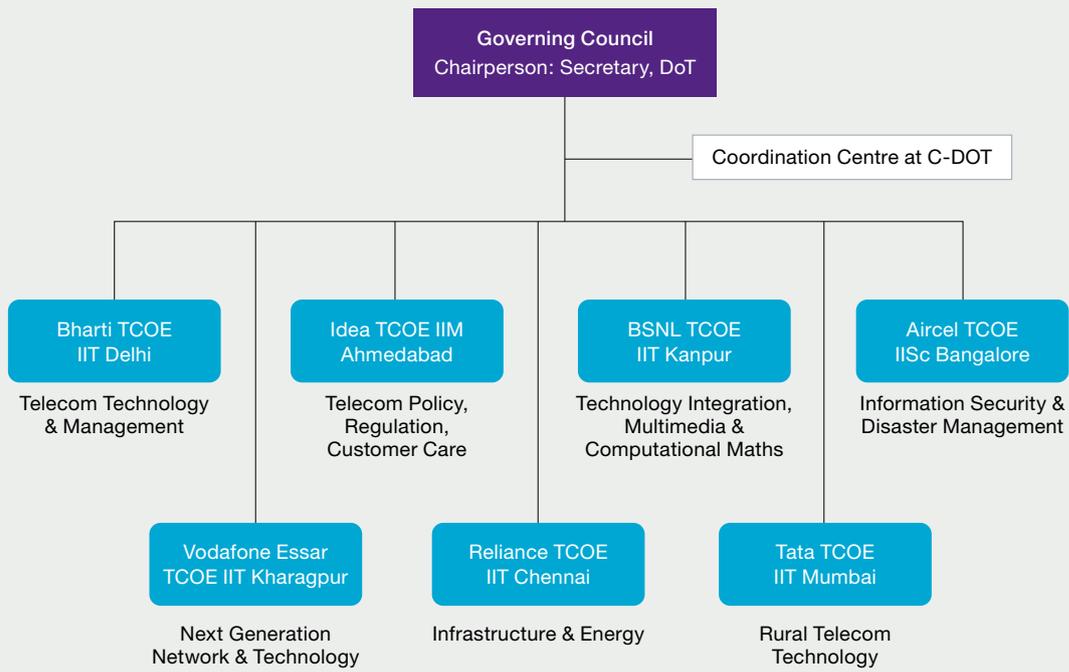
In April 2008, the DoT approved the regulator's recommendations to allow service providers to share active infrastructure. Under the terms of the guidelines, sharing of active infrastructure (limited to antenna, feeder cable, Node B, Radio Access Network (RAN) and transmission system) is permitted based on mutual agreements between service providers. However, sharing of spectrum is not allowed under the terms of the current guidelines. Moreover, in order to encourage infrastructure sharing in rural and remote parts of the country, the DoT has decided not to grant any subsidy if a newly erected tower is not shared. In realizing the true advantages of these developments on infrastructure sharing, operators have hived off their tower divisions into separate companies, or have merged their operations with the tower divisions of other operators.

These measures are helping operators reduce their capital expenditure, as well as operating expenditure. Going forward, these are likely to hasten rollout of telecom services in rural areas where low population density has meant that operators did not utilize the full capacity of their investments in previously unshared active and passive infrastructure.

Collaborative Research Centres

Operators in India, along with the Government and premier research institutes such as the Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs), have collaborated to set up seven telecom centres of excellence across India. The rapid growth of the telecom sector coupled with technological advances in telecommunications are creating significant challenges that span technical, regulatory, commercial, and socio-economic aspects. Moreover, sustaining the current growth levels will require all the stakeholders involved to tackle the challenges of increasing rural teledensity at a faster pace. The Government has initiated the telecom centres of excellence to harness available talent across multiple institutions and utilize this for the uplift of the Indian populace. These centres have been set up to aid in reaching the objectives of the Government of India for driving telecom growth in the country, and more specifically to reduce the increasing urban-rural divide in teledensity. These centres are expected to give a boost to research and development efforts in the country, and prepare the base for the next phase of growth in the market, by reducing costs and building capacities through knowledge initiatives. The details of these seven telecom centres of excellence and their collaborators are as given in the table below (see Figure 25).

Figure 25: Telecom Centres of Excellence Structure



Source: Department of Telecommunications

Initiatives by device vendors

Customized India specific handsets

Device vendors have not missed out on the India growth story, and have set up extensive operations in the country. However, most vendors have also begun to realize that the needs of consumers in India, particularly in the rural areas, are vastly different from consumers elsewhere in the world. In addressing these dynamics, mobile handset vendors have introduced models that are customized for the Indian marketplace.

India's rural markets pose several unique challenges to device manufacturers. Most areas in rural India do not have a continuous supply of electricity. Moreover, the villages of India tend to be dusty. Multiple vendors have recognized these peculiarities with respect to rural India and have taken steps to address them. For instance, Nokia designed its 1100 series phones to work around these challenges. The company incorporated a flash light into the mobile phone to help consumers find their way in times of power cuts. It also made the keypad dust-resistant and offered an anti-slip grip to the phone. Similarly, another mobile major, Motorola, introduced its low cost MotoFone which had a long battery life, electrophoretic display and voice prompts. These phones were designed with a rural market in mind, and going forward vendors that recognize the unique needs of the Indian rural handset market are likely to see success.

R&D labs in India

Major device vendors have quickly realized that the demands of the Indian consumer are different from that of other consumers globally. In addressing these specific demands, manufacturers are realizing the significant impact that having a local Research and Development (R&D) facility in the country can have. To this extent, most of the major handset manufacturers have set up research

facilities in the country (see Figure 26). These facilities not only assist the companies in understanding the Indian consumer, but also help the company in customizing their existing products to suit the Indian populace better.

Local manufacturing to reduce costs

In order to encourage uptake of local manufacturing by handset vendors in India, the Government has encouraged setting up Special Economic Zones (SEZ) which offer significant benefits to the manufacturers. A strong benefit of allowing large manufacturing companies to set up in India is the associated rise in the number of local suppliers. With most manufacturers looking to localize their component sourcing in order to minimize procurement and shipping costs, there has also been a rise in local vendors catering to these SEZs.

One of the successful examples of Government policy with regards to SEZs in the telecom space can be seen in Chennai, where multiple vendors and manufacturers have set up operations. In 2005, Nokia set up a manufacturing facility in the outskirts of Chennai. The facility was intended to manufacture mobile handsets integrating Nokia's operations with a large vendor base that was to be set up inside the industrial park. Attracted by the domestic opportunity, multiple vendors have since set up their operations inside the Nokia SEZ in Chennai. Today, the industrial park employs over 8,000 people of whom over 70% are women. Nokia and its suppliers together have invested over \$210 million in the past three years and Nokia is currently shipping over 25 million mobile handsets a quarter. Current Nokia suppliers in the SEZ include Aspocomp, Salcomp, Hon Hai, Perlos, Jabil, Laird and Wintek. The strong success of these SEZs has come through the efforts of the Government of India in encouraging local manufacturers of telecom equipment in the country (see Figure 27).

Figure 26: R&D Initiatives by Device Manufacturers in India

Device Vendor	R&D Initiatives in India
Motorola	Motorola has two R&D facilities in India, at Bangalore and at Hyderabad
Nokia	Nokia has three R&D centres at Hyderabad, Bangalore and Mumbai
Sony Ericsson	Sony Ericsson has established an R&D facility in Chennai for designing handsets customized to India market
Kyocera	Kyocera has a R&D facility at Bangalore which is also its designated innovation hub for wireless technologies
Spice	Spice has a partnership with Independent Design House, Mediatek, for designing custom handsets for India market
Onida	Onida has set up a design centre for mobile phones near Mumbai

Source: Capgemini Analysis

Figure 27: Investments in Telecom Manufacturing in India

Company	Location	Update
Nokia	Chennai	Nokia set up a manufacturing plant in Chennai and has produced over 125 Mn handsets till March 2008
Motorola	Chennai	Motorola has invested over Rs. 170 Crore in a 270,000 Sq ft plant in Chennai
Flextronics	Chennai	Leading EMS provider Flextronics has started manufacturing mobile phones in its Chennai plant
Hon Hai	Chennai	Hon Hai (Foxconn) has recently started its plant in Chennai for manufacturing mobile handsets for multiple OEM customers

Source: Capgemini Analysis

Success Stories in Rural Telecom

Around the world, success stories abound of operators who have innovatively reached out to the rural markets. Most operators, particularly those operating in the developing world, have realized that strategies that work in developed economies are

unhelpful when it comes to connecting the bottom of the pyramid. These operators have made innovation a hallmark of their rural market strategy, and in doing so, have made a successful business out of connecting the unconnected (see Figure 28).

Figure 28: Success Stories in Rural Telecom Outside India

Example	Key Strategy	Reason for Success
Bangladesh-Grameen Phone	Integrating telecom with micro-finance	<ul style="list-style-type: none">▪ Clubbed telecom services innovatively with micro-credit
Philippines-Smart Communications	Expand distribution through use of innovative approaches	<ul style="list-style-type: none">▪ Used innovative over-the-air payment solutions▪ Micro-recharges helped in reducing entry barriers▪ Smart also reduced the entry barriers for becoming a retailer
Rural Communications in Chile	Expanded coverage to ensure access to voice services to all	<ul style="list-style-type: none">▪ Proactive steps taken by the Government towards ensuring network coverage to all▪ Reliance on market forces in ensuring a fair and competitive market

Source: Capgemini Analysis

ISSUED BY THE CENTRAL GOVERNMENT

50

पचास रुपये

मैं धारक को पचास रुपये अदा करने का वचन देता हूँ।

I PROMISE TO PAY THE BEARER THE SUM OF FIFTY RUPEES

बिनाम जाति गवर्नर

Bimal Jalan GOVERNOR

4BF 387038



सम्पन्न करो

दस रुपये

मैं धारक को दस रुपये अदा करने का वचन देता हूँ।

I PROMISE TO PAY THE BEARER THE SUM OF TEN RUPEES

V. V. Khedkar GOVERNOR



MAHATMA GANDHI

भारत सरकार

पचास रुपये

THE SUM OF TEN RUPEES

Bimal Jalan GOVERNOR

मैं धारक को दस रुपये अदा करने का वचन देता हूँ।

Potential for Telecom Services in Bridging Economic Divide

Telecom is considered a key sector with a significant impact on promoting economic development. Multiple studies have validated the impact of mobile connectivity on the growth and development of a region. For instance, a study carried out by the GSM Association (GSMA) suggests that in Latin America, more than twice as many jobs are created in supporting services catering to the mobile industry than are directly employed by the industry itself. The impact of

connectivity on rural areas is much greater than it is on a consumer in the urban markets. Through connectivity, people in rural India are able to challenge the information asymmetry that they are subjected to, when they are not connected to the developed markets. As a direct consequence, spend on communication services by consumers in rural markets is often significantly higher than the spend by an urban market consumer..





Broadband for All

Enhancing connectivity in India

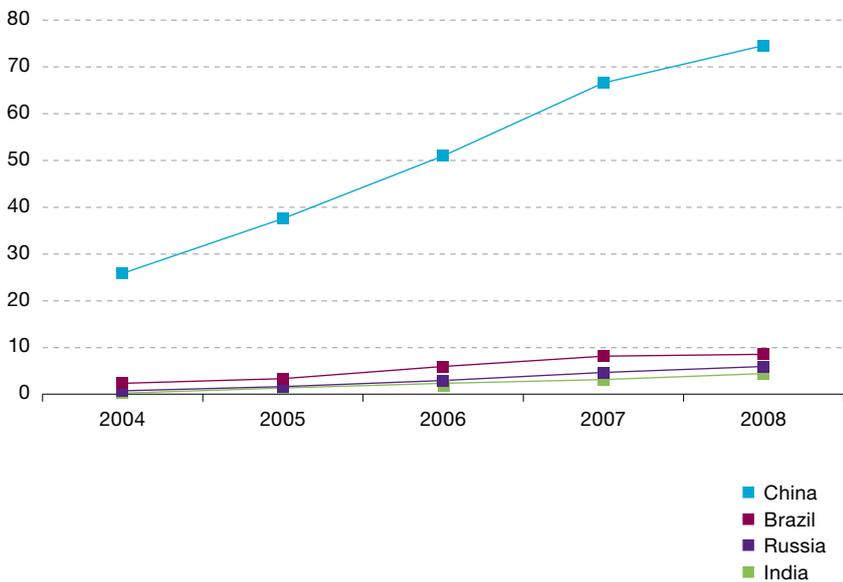
Introduction	50
Regulatory Developments	51
Case Studies of Rural Broadband Initiatives	55

Introduction

Uptake of Internet services—and broadband in particular—has been relatively slow in India when compared to other segments of the telecom services industry. While the mobile industry continues to add millions of subscribers every month, growth of broadband in India continues to lag most major indicators.

Although the Government has allowed entry of private operators from as early as 1998, the uptake has not been reflective of a competitive marketplace. Broadband penetration in India today is among the lowest in the world. In this regard, it is interesting to note the large disparity in broadband subscriber growth between China and the three other major emerging economies of Brazil, Russia, and India (see Figure 29).

Figure 29: Growth in Total Broadband Subscribers for BRIC Nations, 2004-2008, Millions



Source: Capgemini Analysis; eMarketer Broadband Subscription Data

Regulatory Developments

The Government of India has, over the years, issued a series of guidelines that were aimed at encouraging broadband growth in the country. In October 2004, the DoT accepted TRAI's recommendations on broadband and released its first national broadband policy. The policy laid out a complete mandate for broadband infrastructure and set targets for broadband growth. By early 2005, the Wireless Planning Commission had de-licensed the 2.4 GHz spectrum for outdoor usage. With the intent to ensure good quality broadband services across the nation, the "Quality of Service of Broadband Service Regulations 2006" came into effect from January 1st, 2007.

Despite these regulatory developments, growth on the broadband front significantly lags the growth that is seen in the mobile telephony sector. The total number of broadband subscribers at the end of September 2008 stood at 4.9 million indicating a penetration of 0.4%. In fact, the total number of monthly subscriber additions recorded by the mobile sector in July alone is over double the entire broadband subscriber base.

Reasons for Low Penetration of Broadband in India

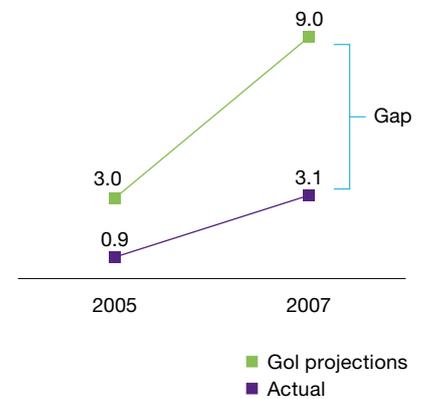
Broadband uptake has been quite limited in India for a variety of reasons. In comparison to other emerging and developed countries, India faced a number of unique challenges—both technological and commercial—that has hindered the growth of broadband to its true potential. These reasons vary from extremely low PC penetration and affordability issues due to high costs, to the reluctance of state-owned telcos to unbundle their last-mile access infrastructure and share it with private telcos.

Low PC penetration

One of the key reasons for low broadband growth can be traced to the low PC penetration (under 5%). Growth of PC sales has been quite slow in comparison to other emerging markets. A contributing factor for low PC penetration is the total cost of ownership. While hardware costs have fallen significantly over the years, the cost of software that is required for a fully-functional PC has not reduced significantly. This has been a major limiting factor in consumer uptake

of PC. Moreover, as we move into the rural markets of India, software in vernacular language becomes a major constraint in growth of PC usage. However, of late, India has been seeing some growth in sales of PCs, particularly in the urban areas. Increased awareness of the PC as a tool for increasing productivity, as well as a greater interest in Internet services is helping drive this growth.

Figure 30: Broadband Subscriber Growth, Actual vs. Projected, Millions



Source: Capgemini Analysis; Department of Telecommunications

High Price of Broadband vis-à-vis Voice

India has traditionally been a price-sensitive market. One of the key reasons for the strong uptake of mobile services has been the falling price points, both in terms of access device and of service. However, the same cannot be said of broadband in India. Broadband pricing in India continues to be one of the highest in the world.

The parity which consumers enjoy between voice and broadband services in developed markets like the UK is not reflected in the Indian market where consumers need to pay significant multiples for data, when compared to voice. For instance, while voice calls in India are quite cheap when compared with the UK, broadband rates are quite high for the service that is offered (see Figure 31). The comparison reveals that broadband rates are over twice the cost of the rental of a landline phone. Moreover, the speeds that are offered in India (256 Kbps) along with the download limits (1GB) pale in comparison to the UK, where a typical package comes with a speed of 8 Mbps and a download limit of 10GB.

In creating a true broadband revolution in the country, akin to the mobile telephony sector, all the stakeholders will have to take concerted action on multiple fronts. Device vendors will have to ensure that the cost of the consumer equipment comes down and operators will need to realize that pricing holds the key to rapid uptake of the service (a fact clearly demonstrated by the rapid uptake of mobile telephony). Moreover, operators will also have to ensure transparent pricing when it comes to metered broadband in order to avoid consumer confusion.

Current State of Broadband in India

The Indian Government named 2007 as the “Year of Broadband” and declared a goal of 20 million broadband Internet users by 2010. However, at the end of September 2008, the number of broadband subscribers in India stood at 4.9 million. Though the annual growth rate of Indian broadband subscribers in September 2008 stood at 83.5% YoY, the absolute numbers are significantly low at just

2.23 million subscriber additions over the past 12 months, implying average monthly net adds of 185,000. These low numbers are indicative of the untapped potential of the broadband market in India.

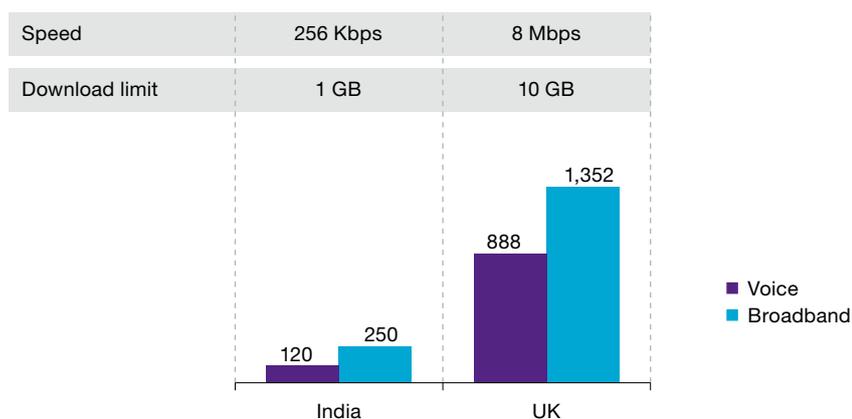
Broadband in India is currently limited largely to the metro and tier 1 cities of India.¹ Digital Subscriber Line (DSL) is the most dominant technology preferred by broadband consumers in India. However, other access technologies such as cable are also making their presence felt in select pockets across the country (see Figure 32).

BSNL by far dominates the broadband market in India. Out of 72 broadband service providers, only 13 have a subscriber base of more than 10,000 and these 13 service providers share 98.59% of the total subscriber base as of Q2 2008 (see Figure 33).

Technology Options for providing Broadband in India and their Implications

With the Government opening up wireless spectrum for broadband services, operators have a host of technology options that they can consider for serving consumers. Moreover, the low broadband penetration provides a strong opportunity for the operators to target a large potential subscriber base. Given the limited last-mile connectivity solutions in India, wireless broadband is likely to be the preferred route that many operators adopt in delivering broadband services to the masses of the country. In doing so, operators have a choice of technologies ranging from WiMAX, LTE, and HSDPA (see Figure 34).

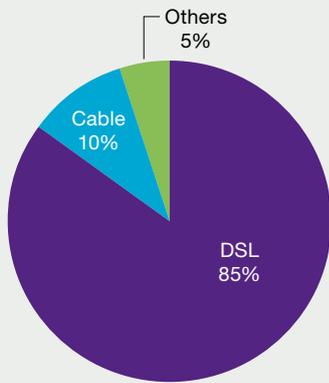
Figure 31: Cost of Monthly Fixed Voice and Broadband Rentals, 2008, INR, India and UK



Source: Capgemini Analysis; Company websites

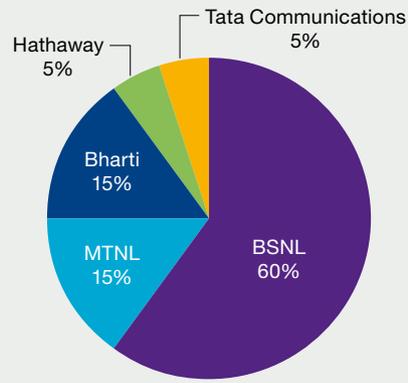
¹ Tier 1 Cities: The four metros of Delhi, Kolkatta, Chennai and Mumbai along with large cities such as Hyderabad and Bangalore.

Figure 32: Break-up of Indian Broadband Subscribers Between DSL, Cable and Other Areas, Q208, % Total



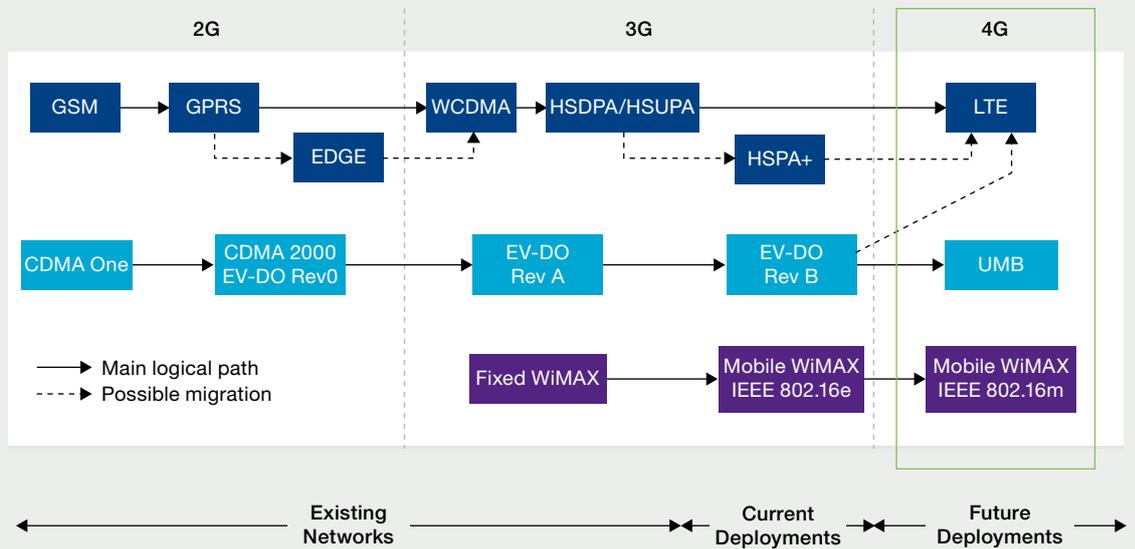
Source: Trai Quarterly Update Q208

Figure 33: Market Share of the Top 5 Broadband Service Providers, Q208, % of Total



Source: Trai Quarterly Update Q208

Figure 34: Technology Upgrade Paths from 2G to 4G

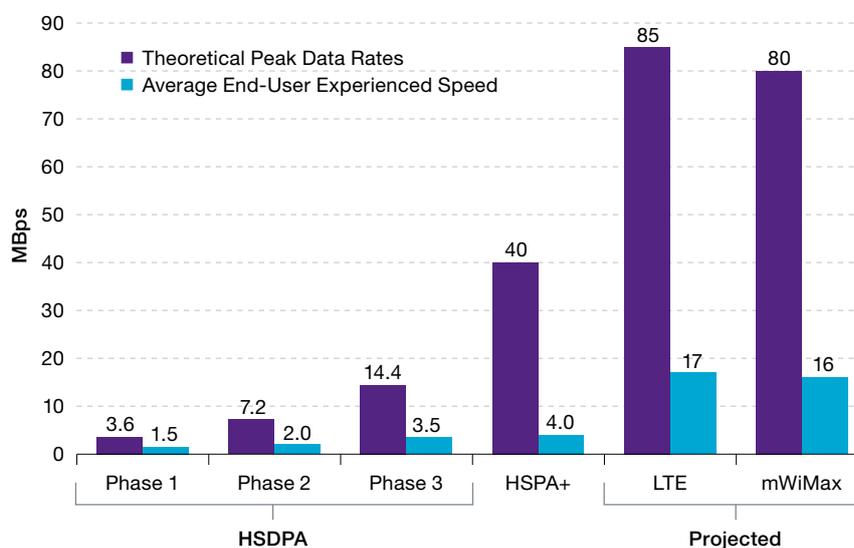


Source: Caggemini Analysis

Wireless technologies have the capability to provide widespread broadband access and are likely to have a far reaching impact on the Indian economy by creating an ecosystem that will generate employment, enhance development in semi-urban and rural areas, and lead towards true sustainability. Most importantly, wireless broadband will provide a solution to problems like limitations on bandwidth, clogged networks, low speeds and limits on download (see Figure 35). Given the added advantages of mobility, the user experience on these wireless network technologies is also likely to be as good as, if not better, than a fixed line network. For instance, the theoretical and practical data rates for technologies such as HSDPA (High Speed Downlink Packet Access) is likely to be significantly higher than those offered by current fixed line providers.

Each of these technologies come with its own set of specific characteristics that define its advantages. A comparison of the various wireless broadband technologies will help in understanding the right technology upgrade path (see Figure 36).

Figure 35: Performance Evaluation of HSPA+, WiMAX, UMB and LTE



Source: Capgemini Analysis; Vodafone, "Challenges in Future Wireless Broadband Access networks", February 2008

Figure 36: Performance Evaluation of HSPA+, WiMAX, UMB and LTE

	HSPA+	WiMAX (802.16e)	LTE	WiMAX (802.16m)	UMB
Frequency Band	900	700, 2300, 2500, 3300, 3500, 3700	700, 850, 900, 1800, 1900, 2100, 2500	Under 6GHz (TBD)	450, 700, 850, 1700, 1900, 1700, 1900, 2100, 2500
Channel Bandwidth	5 MHz	3.5-10MHz	1.25-20 MHz	5MHz-40MHz	1.25-20 MHz
Channel Throughput	DL: 28Mbps UL: 11Mbps (5MHz channel, 2x2)	DL: 23 Mbps UL: 4 Mbps (10 MHz channel, 3x1)	DL: 277 Mbps UL: 75 Mbps (20MHz bandwidth, 4x4 MIMO)	DL: > 350 Mbps (4x4) UL: > 200 Mbps (2x4)	DL: 288 Mbps UL: 50 Mbps (20MHz bandwidth, 4x4 MIMO)
Latency	50ms	<100ms	10ms	10ms	~14.3ms
Radio Technology	WCDMA	OFDMA	OFDMA	OFDMA	OFDMA
Antenna Technology	MIMO and Advanced Antenna Techniques	MIMO and Advanced Antenna Techniques	MIMO and Advanced Antenna Techniques	MIMO and Advanced Antenna Techniques	MIMO and Advanced Antenna Techniques
Core Technology	ATM/IP	Flat, All IP	Flat, All IP	Flat, All IP	Flat, All IP

Source: Capgemini Analysis; , WiMAX Forum Website; Deutsche Bank Report "Long Term Evolution - beyond3G"; Qualcomm "UMB and WiMAX Technical Comparison"; Qualcomm, "UMB Network Architecture"; IEEE, "Technical Overview of 3GPP Long Term Evolution". Qualcomm, "Evolved Packet System (EPS): An Overview of 3GPP's Network Evolution"; Mobility Group, "Mobile WiMAX: Vision & Evolution"

Case Studies of Rural Broadband Initiatives

The limited penetration of wireline infrastructure in the country does not support a widespread rollout of ADSL. Moreover, recent regulatory activity in India around 3G and wireless broadband access indicates a shift towards the creation of a favorable environment for adoption of wireless broadband technologies, which have a significant potential of taking off in India and creating both economic and social benefits.

Across India, several vendors and Government departments have initiated multiple steps to advance the growth of broadband across rural India. The details of a few such projects are given below:

Aksh Broadband

Aksh is a private data services provider that is offering a fiber based broadband network that connects over 400 village kiosks in Jaipur district in the state of Rajasthan. This service offers true broadband speeds of 2-6 Mbps and also offers a multitude of services such as IPTV, gaming, Internet access,

N-Logue Communications

N-Logue is a company set up under the auspices of the telecommunications and computer networks (TeNet) group of IIT, Chennai. The company's operations are based on a leased fiber backbone and kiosks that are connected through a last mile wireless-based solution. The company offers a range of services in these kiosks, including Internet access with local language content, video and voice telephony, agricultural and educational services.

Gramjyoti Rural Broadband Project

The Gramjyoti project was initiated in early 2007 by technology major Ericsson, to demonstrate the social and economic benefits of HSPA mobile broadband in rural India. The company deployed three HSPA macro cells that shared towers with existing GSM cells. The project targeted around 18 remote villages and three towns in Tamil Nadu and delivered a variety of valuable applications. Aided by partnerships with organizations like Apollo Hospitals, Erudite Technologies and Hand In Hand, Gramjyoti offered villagers education, healthcare and access to helpful information.

Akshaya

The Akshaya initiative is a Kerala Government led initiative to ensure computer literacy for every family in the state. The initiative began with one district, Mallapuram, and is now being replicated across the state. The project was delivered in collaboration with Tulip, an IT services provider which implemented a wireless based infrastructure in the entire district. Some of the key services offered by the Akshaya kiosks include streaming video for e-learning programs, Internet access and various e-governance services.



Operator Initiatives in Delivering Low-Cost Mobile Services in India

Cost optimization and innovation

Network and IT Outsourcing	58
Infrastructure Sharing	59
Micro-Prepaid Schemes	60
Examples of Innovation from Other Emerging Markets	61

Network and IT Outsourcing

Despite having significantly lower ARPUs than European and US operators, Indian mobile players exhibit similar or higher EBITDA margins compared with their western peers. Indian operators have managed to boost mobile penetration and usage without sacrificing margins by employing a number of cost-optimization levers such as network and IT outsourcing, encouraging customers to use self-service and maintaining low subscriber acquisition and retention costs. Operators are innovating not just in cost initiatives, but are also increasingly innovative in how they reach the nook and corner of the country. Identifying the fact that rural India is going to account for a large number of future additions, operators are innovating in their distribution structures and tariff packages.

A number of Indian mobile operators have outsourced the development and maintenance of their network and IT systems to large global players such as Ericsson, Nokia Siemens, Alcatel-Lucent, Motorola and IBM. Bharti Airtel pioneered the concept of large scale network and IT outsourcing deals and now many Indian operators, including Vodafone Essar and Idea Cellular, have followed suit (see Figure 37). Further, by placing large-sized network deployment and maintenance orders with equipment vendors themselves, Indian operators are able to leverage the purchase volume to influence market prices downwards. This, coupled with network outsourcing deals, lowers their capital expenditures and also the maintenance required, which is typically payable as a percentage of the total capex incurred.

Figure 37: Select Network and IT Outsourcing Contracts Awarded by Mobile Operators in India

Airtel	Airtel outsourced its IT operation to Wipro Ltd in a \$600mn deal. Wipro will manage Airtel's IT function and deploy applications such as retail billing and revenue assurance
Idea	Idea outsourced its network and build operations for Mumbai circle to Ericsson in a four year \$100mn deal
Idea	In a \$600mn-\$800mn deal, Idea Cellular outsourced its IT operations to IBM for a period of 10 years. Certain percentage of revenues has been kept under reward and risk
Vodafone	In a five year deal, Vodafone Essar outsourced its IT operations except network service platforms to IBM
Vodafone	Vodafone outsourced its network build and operate functions to Ericsson, Motorola, and Nokia-Siemens for ~\$1.8bn

Source: Capgemini Analysis

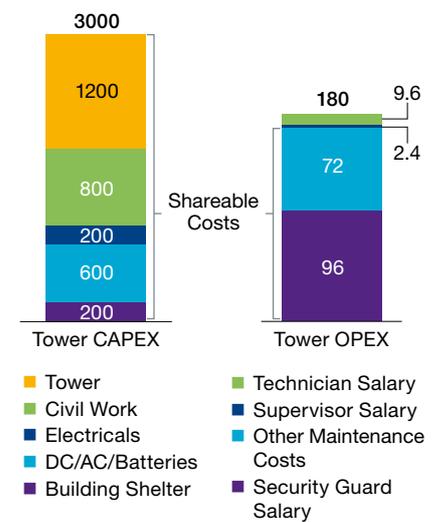
Infrastructure Sharing

Indian mobile operators have also started sharing passive infrastructure, such as physical sites, towers, buildings, shelters, air-conditioning equipment, diesel electric generators and battery backup with each other. This reduces the CAPEX and OPEX expenditures for an individual operator as they get divided among multiple players. It is estimated that about 25% of the more than 100,000 cellular towers in India are currently being shared. Cost benefits from passive infrastructure sharing agreements are estimated to be up to around 30% of capital and operational expenditures (see Figure 38).

Additionally, large operators have either carved out or are planning to separate their tower businesses into independent tower companies and share passive infrastructure with other operators. This would be a “win-win” situation as bigger players with significant passive assets would benefit from additional revenues, and smaller players would benefit from reduced expansion costs for nationwide coverage.

In recent months, the DoT has also approved sharing of active infrastructure. Under the terms of the guidelines, sharing of active infrastructure (limited to antenna, feeder cable, Node B, Radio Access Network (RAN) and transmission system) is permitted based on mutual agreements between service providers. However, spectrum sharing is currently not permitted under these guidelines. By sharing of active infrastructure,

Figure 38: Cost of Building and Annual Cost of Operating a Tower (INR '000), India, 2008



Source: Capgemini Analysis based on Economic Times and HDFC Securities Data

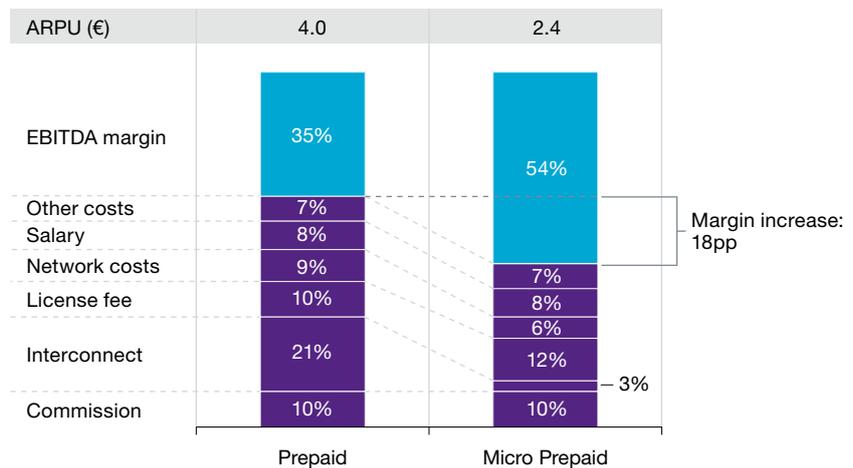
operators will be able to further reduce their capital expenditure and operating expenditure by utilizing infrastructure to its fullest capacity. These developments not only have the potential operator savings, they also are likely to give a significant boost to operator and Government efforts for increasing mobile coverage and uptake in rural areas of India, where low subscriber base has meant that operator investments on infrastructure take a long time before yielding substantial returns.

Micro-Prepaid Schemes

In India, more than 85% of subscribers use prepaid services due to their desire to control average monthly spend. Additionally, operators have introduced “lifetime validity” prepaid subscriptions starting at INR 199 (€3.1) and low value recharges at prices as low as INR 10 (€0.17) to stimulate adoption and usage among the large number of low income population. Lifetime validity packages help to lock-in a customer and offer a possible uplift of ARPUs when their mobile usage increases. These initiatives have been very effective as suggested by the growth in subscriber additions.

Prepaid schemes have helped Indian mobile operators to not only add subscribers, but also to boost profitability as the small value recharges have been priced to offer greater margins than higher value prepaid recharges (see Figure 39).

Figure 39: Comparison of EBITDA Margins from Prepaid and Micro Prepaid Recharges for Indian Operators



Source: Capgemini Analysis; Morgan Stanley, “India Telecommunications 2007”, January 2007. 1 EUR = 56.764 INR

Examples of Innovation From Other Emerging Markets

The case of Millicom in Africa

In other emerging markets across Africa, operators have strived to innovate in the delivery of mobile services to consumers. Operator innovation has spanned cost, distribution and network coverage. For instance, Millicom, an operator with services in emerging countries in Africa and Latin America, has gained significant ground in rural markets across Africa. Millicom based its services on three clear easy-to-explain principles of affordability, accessibility and availability. The operator has achieved a clear affordability tag by offering per second billing to its consumers. Such a transparent and easy to understand billing process has meant that Millicom has been able to gain a significant amount of trust among its customer base. Similarly, when it comes to extending distribution in hard-to-reach terrain, Millicom's over-the-air recharge and virtual distributor programs (where any customer can become a virtual distributor of credit) have ensured that Millicom today has reached where

it couldn't have without investing significantly in expanding physical distribution presence. The advantage of having a clearly defined strategy in serving rural markets has helped Millicom in multiple markets across Africa. For instance, in Tanzania, Millicom has been able to grow its customer base by 57% between December 2006 and December 2007 in a market that already had five mobile operators. The company was able to increase EBITDA from 4% in Q1 2007 to a strong 54% by Q4 2007, indicating that reaching the rural and low income segment need not result in sacrificing margins.

The Case of Smart Communications in the Philippines

Smart Communications is one of the Philippines's leading mobile operators. Like most other emerging countries, the Philippines is also characterized by a distinct urban-rural divide. Over 65% of the population resides in rural areas. Similar to most other under-developed countries, establishing physical distribution points and

ensuring availability of refill cards is an expensive exercise in the country. Smart Communications effectively deployed an over-the-air payment system called Smart Load, which allowed a retailer to load a customer's airtime from a specially designed retailer SIM. The company launched a series of micro-prepaid recharge options for reaching the bottom of the income strata. For increasing acceptability of mobile services, Smart reached out to consumers through use-case advertising, rather than feature-based advertising. By end of June 2008, Smart was serving over 33 million subscribers under its Smart and Talk 'N Text brands.



Value Added Services

Differentiating for penetration

India VAS Market	64
The VAS Value Chain	65
Drivers and Restraints for Growth of VAS in India	66
VAS in Rural India	67
Lessons from Japan & South Korea	68

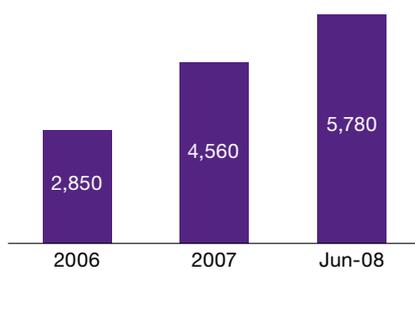
India Value Added Services Market

India's mobile industry has been growing at a rapid pace in the last few years. Growth in subscriptions has been accompanied by a rapid decline in the Average Revenue Per User (ARPU) due to the continuously falling tariffs. While most operators have deployed successful cost-mitigation strategies, the rapid decline in tariffs is likely to impact the industry going forward. A key strategy of reducing the dependence on voice for mobile operators is to increase their attention on Value Added Services (VAS). Operators are looking at VAS for bringing in the next phase of growth

and for differentiating their offering from competitive operators in the market. With over five operators in some circles, and more set to enter following the recent 2G license grant and impending 3G spectrum auction, all operators are recognizing that the days of competing on cost and coverage are slowly coming to an end. Going forward, operators will have to differentiate their service and in doing so, VAS offers them a strong platform on which to build their future growth strategy.

The increasing trust which consumers share with mobile services and devices reflects in the gradual shift in purchasing patterns of value added services. Consumers who have started with SMS services today have graduated to downloading ringtones/wallpapers/games, setting up caller ring back tones, and browsing the mobile Web. This kind of usage pattern is expected to increase with the proliferation of advanced mobile devices that offer rich multi-media experiences. Following the launch of 3G services, operators are looking to start advanced VAS services such as mobile TV.

Figure 40: Growth in Value Added Services Market in India, 2006- June 2008, Rs. Crore



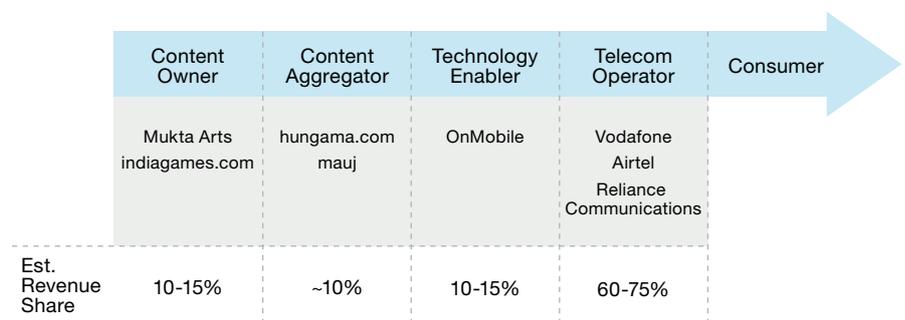
Source: IAMAI, "Mobile Value Added Services in India", Aug 2008

The VAS Value Chain

The VAS value chain in India can be divided broadly into four key entities, starting with the content owner and ending with the end-user. Each of the four constituents in the VAS value chain has differing strengths and revenue distribution accordingly (see Figure 41).

Content owners refers to the organizations that create content, either specifically for the mobile format, or otherwise. These companies invest resources in creating original content that they think would appeal to the audience. Content aggregators collate content from multiple content owners and aggregate it into common portals, which they offer to consumers directly, or to mobile operators. Some of these companies might also undertake content customization, where content sourced from owners is transformed into a format which fits the mobile phone. Technology enablers help operators and content companies by building technology platforms that enable customers to access content easily. Examples of

Figure 41: Value Chain of the India VAS Market



Source: Capgemini Analysis

such platforms include caller ring back tones, voice activated portals, etc. Telecom operators get the maximum revenue share from these services, sometimes exceeding 75%. However, going forward, this is likely to reduce significantly as the ecosystem evolves into a more open value chain where all players are compensated proportionate to their contribution in generating

revenues. For instance, in Japan, NTT DoCoMo is popular for giving over 85% of revenues to content owners and keeping less than 15% for itself. However, in the evolution to a more open ecosystem, greater transparency and trust amongst all the parties involved is mandatory.

Drivers and Restraints for Growth of VAS in India

Growth Drivers

The India VAS market is expected to grow significantly on the back of increasing penetration of mobile services. Operators have recognized the potential for VAS in India and have taken multiple steps in reaching out to consumers with details of their VAS services. Promotions for VAS today transcend the print, media and mobile channels, and going forward, it is quite likely that operators will continue to maintain their marketing spends in order to reach consumers across all strata, and with all their favored content. Introduction of 3G services is likely to provide a strong impetus to the growth of mobile VAS in India. Operators can now offer advanced data services which, when combined with the launch of compelling user devices such as the iPhone, are likely to result in an increased data usage. Entry of global operators, either through the 3G route, or by acquisition of existing

operators, is also likely to provide a significant boost to the growth and development of the India VAS market. Operators, specifically those from Japan and South Korea, bring with them a wealth of understanding in creating and delivering value added services to consumers.

Growth Challenges

One of the reasons that is restraining the VAS market from achieving its full potential, is the current revenue share scenario where the mobile operator keeps a significant share of revenues and content owners get to keep only a fraction of the amount generated. While operators need to be compensated for delivery, billing, and marketing expenses, content providers also need to be compensated adequately if the whole ecosystem is to thrive.

A key challenge for operators is the issue of obtaining localized content. While content in English, and to a certain extent Hindi, is largely available, to ensure the spread of VAS operators will need to obtain and distribute content in local languages. This is a significant challenge since it entails reformatting and repurposing local language content, the diversity of which makes it an expensive exercise.

Limited penetration and high cost of feature phones is likely to prove a stumbling block in uptake of VAS, particularly once 3G networks are in place. With limited handset subsidies being provided by mobile operators and cost of 3G phones still above \$100, consumer uptake is likely to be soft.

VAS in Rural India

Mobile operators in India are today realizing the significant impact that rural India can have on VAS uptake. However, along with the potential growth, there exists significant challenges due to the low literacy levels across semi-urban and rural India. Challenges arise in ensuring availability of content in local languages and in a user interface that can work around limitations of literacy levels.

Operators in India have already taken early steps towards addressing this significant market. For instance, Reliance Communications had recently conducted a developers' contest where it encouraged developers to build mobile applications specifically for the rural community. The focus was on creating applications that are targeted

at transportation, m-commerce, education, information, and location-based services, among others.

Similarly, Tata Teleservices, in partnership with Qualcomm and MSSRF, has launched an application targeting fishermen in coastal villages of India. Fishermen could get instant updates on opportunities, risks and market information on their mobile phones through a client application in a local language. Most operators in India have also launched voice-driven portals where consumers could subscribe to VAS applications, such as caller ring back tones and music clips, among others. Such applications reduce the barriers that exist for consumers in rural India to access value added services.

Lessons from Japan & South Korea

Japan and South Korea represent countries that have traditionally had a high uptake in mobile VAS. Mobile Internet, mobile email and mobile gaming enjoy penetration levels of over 50%. These two countries also lead the rest of the world in terms of subscriber uptake of mobile TV, mobile banking and other innovative services. For instance, NTT DoCoMo's mobile wallet service "Osai-fu-Keitai," in which mobile phones are equipped with contactless chips to make payments at participating outlets, has around 12% penetration in Japan. Similarly, in South Korea, approximately 10% of mobile subscribers use mobile banking services. Further, penetration rates of mobile location-based services from NTT DoCoMo and SK Telecom are around 18% and 10% respectively. In comparison, current penetration rates of mobile banking, mobile wallet and location-based services in Europe and US are only around 1-2%.

Operators have proactively taken initiatives in encouraging uptake of mobile VAS in these countries. Some of the key steps that they have taken include:

Bundling attractive flat-rate pricing plans

Operators in Japan and South Korea have used bundling and flat-rate pricing to stimulate adoption of mobile and broadband services. For instance, KDDI in Japan started offering flat-rate plans for its 3G data services way back in 2003. By 2005, KDDI saw 81% of its 3G subscribers migrate to its flat-rate plans. The operators had

also bundled together services such as web browsing and email to drive the adoption of data services

Mutually beneficial partnerships with content providers

Content owners play a key role in completing the VAS ecosystem. By ensuring partnerships with content players across a range of mobile content, operators in Japan and South Korea have ensured that customers have access to content they would be most interested in. These operators have also gone ahead and invested in producing content directly or have taken stakes in content production companies so as to ensure they have a strong content library. SK Telecom has been quite active in building a strong content platform for its subscribers (see Figure 42). Japanese operators have also innovated in the manner in which they deal with content companies. For instance, NTT DoCoMo is popular amongst content owners for retaining only around 10-15% of revenues obtained from selling mobile games. These initiatives have ensured that operators in these countries have established a vibrant ecosystem that fuelled subscriber adoption and usage through widespread availability of relevant content.

Partnerships with device vendors

Mobile operators in these two countries have worked closely with device vendors in building handsets that are customized to operator offerings. These mobile handsets are developed locally and tailored to the preferences of domestic consumers. For instance,

NTT DoCoMo worked with NEC as early as 1999 to design Internet-enabled handsets that supported the launch of i-mode services. These partnerships have helped operators ensure timely availability of handsets that aided rapid uptake of their services.

Innovating in business models

Operators have used new services and innovative business models to drive usage and revenues of data services over broadband. For instance, after SK Telecom acquired Cyworld in 2003, it encouraged Cyworld users to buy virtual items such as "skins" and furniture for decorating their web pages. Similarly, in order to encourage the adoption of its IM service NateOn, SK Telecom integrated it with its social networking site Cyworld in 2004 and also started offering free SMS to users, whereas similar features became available on other IM services such as MSN only in 2006.

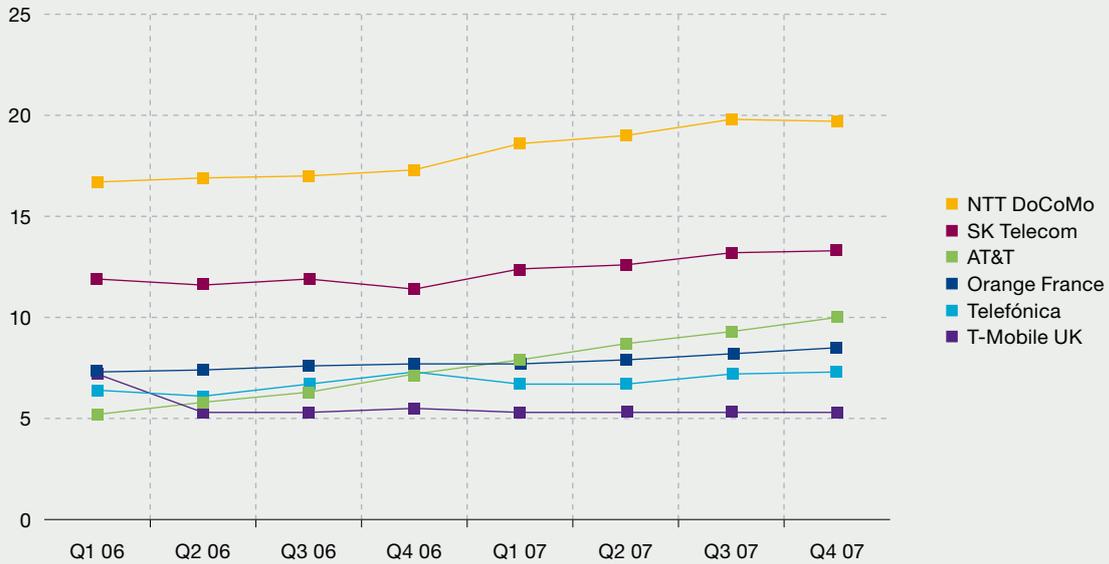
Results of such inclusive and consumer friendly initiatives designed to encourage data uptake are clearly visible (see Figure 43). SK Telecom and NTT DoCoMo today have some of the highest data ARPU numbers amongst major operators.

Figure 42: SK Telecom's Investments in the Content Space



Source: Capgemini Analysis; Telecoms Insight, "China Agrees To US\$1bn Content Facility Agreement" July 2008; SK Telecom Corporate Presentation

Figure 43: Data ARPU of Select Operators, 2006-2007, \$



Source: Capgemini Analysis; Fitch Wireless Review



Telecom Manufacturing

An ambitious target for telecom
equipment manufacturing

Telecom Manufacturing in India:
The Export Potential

72

Telecom Manufacturing in India: The Export Potential

While India has experienced tremendous growth in telecom subscribers in the past, the pace of investments and developments in the telecom hardware sector has been slow. The Government of India has recognized this as a key restraining factor and has allowed up to 100% foreign direct investment (FDI) in this sector. It has also allowed zero import duty on import of telecom equipments and components.

The telecom equipment manufacturing sector in India has been making rapid progress in the past few years. From around Rs. 23,700 crores in 2006-07, the sector has grown rapidly to over Rs. 41,270 crores during the year 2007-08. Wireless equipment played a major role in the growth of the overall category. Wireless equipment, including cellular mobile phones, contributed Rs. 28,600 crores in 2007-08, representing a 171% growth over the previous year. The growth has come largely due to the string of special economic zones (SEZs) near Chennai where companies such as Nokia and Motorola have set up operations. On the other hand, growth of wireline equipment has dropped from Rs. 13,100 Crores to Rs. 11,780 Crores reflecting the larger shift to mobile telephony by consumers.

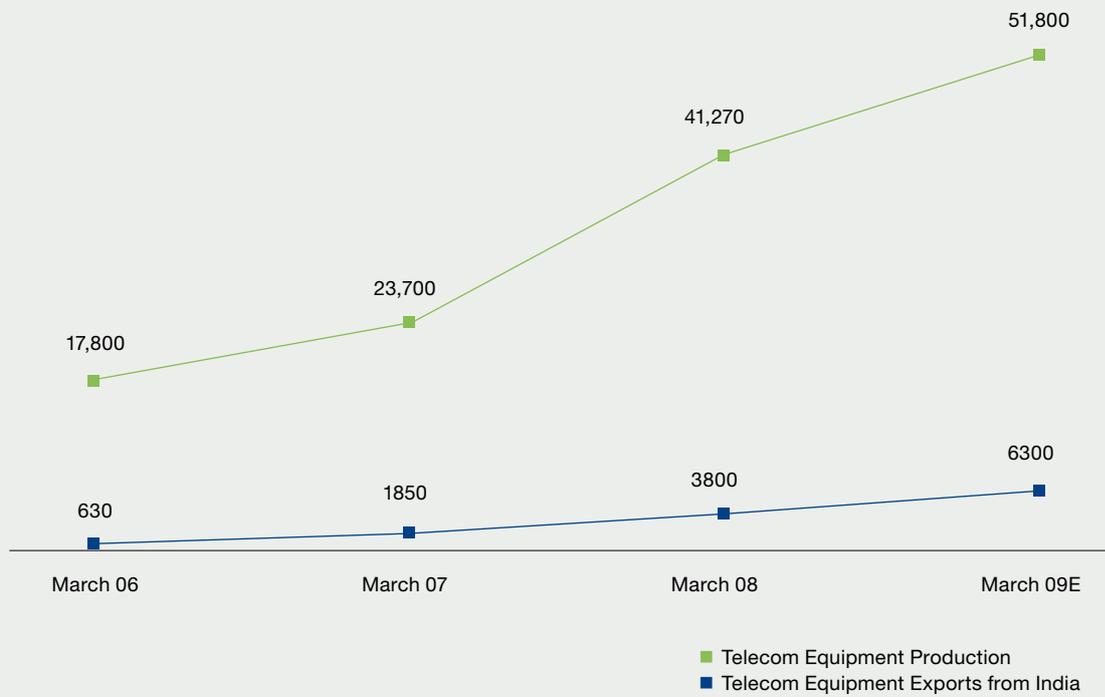
The current financial meltdown across the world is likely to have a significant impact on the production of telecom equipment in the current financial year. For 2008-09, the Telecom Equipment Manufacturers Association (TEMA) expects the telecom equipment production market to grow to Rs.51,800 crores. However, in the long-term, the telecom equipment manufacturing sector in India appears set for a strong play.

While giving support for manufacturing, the Government has also recognized the fact that exports will play a crucial role in the sector's growth in the coming years. As a way of ensuring that the export potential of this sector is utilized fully, the Government of India had set up export promotion council for Telecom Equipment & Services. The Government followed this with the launch of a dedicated Telecom Export Promotion Council in April 2008. The creation of the export promotion council has been a long standing demand of telecom equipment manufacturers in the country. The establishment of this council is expected to give a fillip to the telecom equipment export sector in the country.

Over the recent years, the exports market for telecomequipment has begun to witness strong growth, driven by the favorable policies of the Government and the booming telecommunications markets around the world. From Rs. 630 Crores in 2005-06, the exports market is expected to grow to over Rs. 6,300 Crores during the current financial year.

In order for the Government to achieve the target of 650 million subscribers by 2012, it is expected that \$84 billion of telecom equipment will be required. With equipment worth almost \$75 billion likely to be consumed in domestic demand, the Government has set a target of \$10 billion for telecom equipment exports by 2012.

Figure 44: Telecom Equipment Production Market, and Exports from India, FY '06-FY '09E, (INR Crores)



Source: Capgemini Analysis; TEMA



Regulatory and Policy Environment

Reforms for growth

Importance of Telecom Regulation	76
Regulatory Environment in India—A Brief History	76
Recent Regulatory Developments	78

Importance of Telecom Regulation

Historically, like most other countries, telecom services in India have been provided by a single Government-owned entity, BSNL (Bharat Sanchar Nigam Limited). However, with the opening up of the telecom market and the entry of multiple private players, the need for a regulator manifested in the formation of the Telecom Regulatory Authority of India (TRAI). In the period,

following the introduction of the specialized telecom market regulator, the market growth that India has experienced is something that many other emerging countries are trying to emulate. In just 13 years of wireless telephony, India has moved from a zero subscriber base to becoming the second largest market in the world.

Regulatory Environment in India—A Brief History

The Government of India announced the National Telecom Policy (NTP) in 1994 and followed it up with the NTP-99. These developments have since played a significant role in planting the early seeds for the development of the telecoms markets in India. Since then, as a result of various policies and regulations (see Figure 45), India has witnessed a steep rise in the number of subscribers and a fall in the tariffs. The Telecom Regulatory Authority of India (TRAI), set up in 1997, has played a key role in the success story of Indian Telecom. The regulator has been taking a series of steps in ensuring the upkeep of consumer interests and in ensuring a fair market place. Multiple recommendations by the regulator with regards to the telecommunications markets in India have been accepted by the DoT (see Figure 45).

These reforms have fuelled the growth of the Indian telecom sector resulting in a vigorously competitive and fast growing sector. Indian customers have embraced mobile technology in a big way as illustrated by the strong growth in mobile subscribers which have increased from 0.34 million in 1997 to 291.5 million as of July 2008. Low tariffs, which have fallen from INR 16 per minute to INR 0.5 per minute, coupled with falling handset prices have also been one of the significant catalysts of this growth.

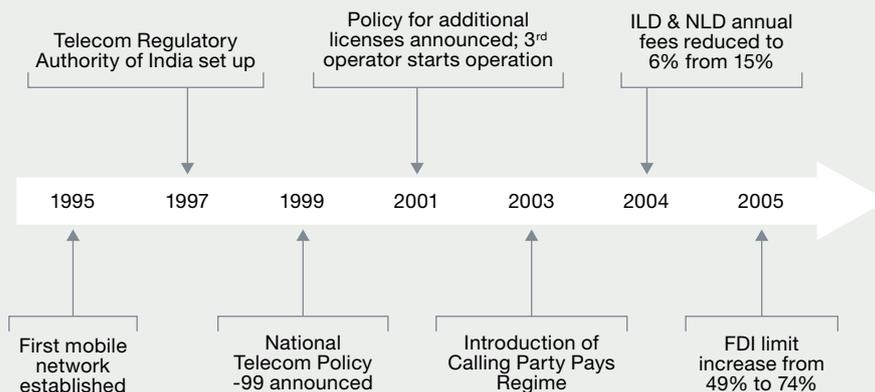
A large part of this growth has been due to the entry of private players in the telecom space. The strong performance of the private sector can be witnessed in the fact that their share of total connections increased from 20.9% in 2003 to 75.92% as of July 2008. Simultaneously, gross revenues have grown steadily at a compound annual rate of 21% and stood at US \$ 26 billion, with a 66% contribution by private players.

Figure 45: Select TRAI Recommendations on Telecommunications Accepted by DoT, Jan 2006-Sep 2008

Serial No	Accepted Recommendations	Date of Release	Key Highlights
1	Mobile Number Portability	8th Mar, 2006	<ul style="list-style-type: none"> MNP to be allowed into India Service to be launched in phased manner
2	Next Generation Networks	20th Mar, 2006	<ul style="list-style-type: none"> DoT to create awareness on NGN TEC to study global examples of NGN deployment
3	Allocation and pricing of spectrum for 3G & BWA	27th Sep, 2006	<ul style="list-style-type: none"> Partially accepted by DoT
4	Infrastructure Sharing	11th Apr, 2007	<ul style="list-style-type: none"> Recommendations on both active and passive infrastructure sharing
5	Review of Internet Services	10th May, 2007	<ul style="list-style-type: none"> Recommendations relating to ISP licenses, Internet telephony
6	Growth of Broadband	2nd Jan, 2008	<ul style="list-style-type: none"> Recommendations for increasing broadband delivery over ADSL, DTH, cable, and wireless

Source: Source: Capgemini Analysis;TRAI

Figure 46: Evolution of the Indian Telecom Industry-Important Milestones



Source: Capgemini Analysis

Recent Regulatory Developments

The next phase of growth, experts believe, will be in the country's vast rural areas which account for nearly 70% of the population. With a teledensity of just 13%, as opposed to nearly 75% in urban centers, the hinterland offers a good scope for expansion.

Over the last few months, multiple initiatives have been undertaken by the regulator in creating a base for the next phase of growth of telephony and broadband in the country. Efforts are also being made to enable incumbents to target new market segments, as well as provide market entry to new service providers. In this context, the regulator has recently come up with guidelines on 3G spectrum, MVNOs and broadband wireless access (BWA) (see Figure 47).

On 1st August 2008, the Department of Telecommunications (DoT) released guidelines for both the 3G and BWA spectrum license auctions. Further, in line with global trends where the MVNO model has experienced phenomenal growth in the 3G space, the regulator has recommended that the government allow MVNOs to enhance free market principles and contribute to the efficient use of existing telecommunication infrastructure.

Figure 47: Comparison of Regulatory Guidelines for 3G, BWA and MVNO

	BWA	3G	MVNO
Eligibility	Unified Access Service (UAS) licensees and ISP's holding category A and Category B licences	UAS/CMTS licensees with prior experience in providing 3G services and gives an undertaking to obtain an UAS license as per DoT guidelines	<i>Networth:</i> 10% of the networth specified for the MNO for the service area <i>Paid up Capital:</i> 10% of the prescribed networth for the MNO
Spectrum	<ul style="list-style-type: none"> 2.5 GHz and 2.3 GHz band in blocks of 20 MHz Spectrum in the 700 MHz and 3.3 to 3.6 GHz will be auctioned as and when it becomes available 	Spectrum will be auctioned in the 450 MHz band, 2x1.25 MHz in 800 MHz band for EVDO services and in the 1900 MHz band, depending on availability	No separate assignment of spectrum. To utilize the spectrum of parent MNO
Reserve Bid Price	<ul style="list-style-type: none"> Metro and Category A: Rs 800 million Category B: Rs 400 million Category C: Rs 150 million 	Reserve price for auction for one block of 2x1.25 MHz spectrum in 800 MHz band shall be 25% of reserve price for 2x5 MHz in the 2x1 band	One time non-refundable entry fee of 10% of MNO's entry fee subject to a maximum of: <ul style="list-style-type: none"> Metros and Category A: Rs. 5 crores Category B: Rs. 3 crores Category C: Rs 1 Crore
License Period	15 years	20 years	20 years and renewable
Rollout obligations	<ul style="list-style-type: none"> Category A, B and C: Service rollout in 50% rural SDCAs area coverage by end of 5 years from the date of allotment Metros: Service rollout in 90% of the areas 	<ul style="list-style-type: none"> Category A, B and C: Service rollout in 50% of the areas by the end of 5 years from the date of allotment Metros: Service rollout in 90% areas at the end of 5 years 	No rollout obligation

Source: Capgemini Analysis, Department of Telecommunications, Telecom Regulatory Authority of India
Note: For MVNOs, TRAI recommendations have been shown



Conclusion

The Indian market has been experiencing an extremely strong growth phase in mobile telephony. However, this now needs to be replicated across other telecom segments, such as broadband in order to maintain growth. Operators have also recognized the key role that rural markets will play in future growth and the need for communications services to address localized issues.

The advent of 3G networks is likely to provide a significant fillip to the growth of mobile broadband and advanced data services. At the same time, operators in India are continuously innovating to ensure that margins remain high in a market where Average Revenues Per User (ARPU) are continually declining. The Indian Government recognizes that a proactive regulatory and policy environment is the need of the hour, and is taking action to support the Indian telecom growth story to the next level. And this growth story is going to be led, for a change, by the vast untapped rural markets of India.



About Us

DEPARTMENT OF TELECOMMUNICATIONS (DOT), of the Government of India is responsible for telecom policy formulation, telecom licensing, wireless spectrum management, universal service obligation, promotion of International co-operation in telecommunications, promotion of private investments in telecom sector, standardization and research in the field of telecommunications and administration of:

- Indian Telegraph Act, 1885
- Indian Wireless Telegraphy Act, 1933
- Telecom Regulatory Authority of India Act, 1997.

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