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*Ringíng ín the Rents:  
Policy Drivers ín Indian  
Telecom*

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Thesis Submission for the degree of PhD in  
Economics

2015

Department of Economics

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## Declaration for SOAS PhD thesis

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## Abstract

The growth of mobile telephony in India from its inception in 1995 has been remarkable considering the inconsistent policy directions and the high levels of corruption inherent in the sector's development. Current analyses of the sector characterize the sector's growth as having taken place in spite of poor and inconsistent policy choices. As a result, policy prescriptions focus upon appropriate auction design, to ensure that the correct market value of spectrum can be discovered, or upon regulatory independence, to ensure that the extraction by the state is curtailed to within levels that do not adversely affect the sector.

This thesis argues that viewing the income streams in the sector from the perspective of rents generated through the creation of property rights in spectrum and using the analytical lens of a political settlement to study the rent distribution and outcomes can better explain the choice of policy as well as its impact on the sectors growth.

This analysis allows us to draw conclusions that explain the underlying structural dynamics of the industry, as well as the evolution of policy. First, it indicates that the primary source of rents in this industry, spectrum scarcity, is itself policy driven. Second, the persistent domination of the three big telecom providers is a consequence of their access to differential rents from early access to better quality administratively allocated spectrum. Third, the seemingly inconsistent policy and high levels of corruption are better explained as arising in the context of a particular political settlement and then reinforcing or modifying the political settlement as an outcome of the rent streams they generate. Further, the analysis helps identify potential future directions of development of the political settlement and the impact these may have on policy effectiveness in the sector.

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## List of Abbreviations

Abbreviation	Expansion
2G, 3G, 4G...	Second Generation, Third Generation, Furth Generation...
ADAG	Anil Dhirubhai Ambani Group
AIADMK	All India Anna Dravida Munnetra Kazgham
ARPU	Average Revenues per User
AUSPI	Association of Unified Service Providers of India
BBC	British Broadcasting Corporation
BICP	Bureau of Industrial Costs and Prices
BJP	Bharatiya Janata Party
BOP	Balance of Payments
BSC	Base Station Controller
BSNL	Bharat Sanchar Nigam Limited
BTS	Base Tower Station
BWA	Broadband Wireless Access
CAG	Comptroller and Auditor General
CAPEX	Capital Expenditure
CBI	Central Bureau of Investigation
CDMA	Code Division Multiple Access
CEO	Chief Executive Officer
CEPR	Centre for Economic Policy Research
CMTS	Cellular Mobile Telephone Service
COAI	Cellular Operators Association of India
CPP	Calling Party Pays
CVC	Central Vigilance Commission
DEL	Direct Exchange Lines
DFID	Department of International Development
DLD	Domestic long distance
DMK	Dravida Munnetra Kazgham
DoS	Department of Space
DoT	Department of Telecommunications
DTH	Direct To Home
EANIC	East Asian Newly Industrialized Country
EBIT	Earnings Before Interest and Taxes
EBITDA	Earnings before Interest, Tax, Depreciations and Amortization

EDGE	Enhanced Data GSM Environment
EPABX	Electronic Private Automatic Branch Exchange
FCC	Federal Communications Commission
FDI	Foreign Direct Investment
FDLTE	Frequency Duplexing LTE
FDMA	Frequency Division Multiple Access
FIR	First Investigation Report
FYP	Five Year Plan
GATT	General Agreement on Trade and Tariffs
GDP	Gross Domestic Product
GPRS	General Packet Radio Service
GSM	Groupe Systeme Mobile
GSMA	Groupe Speciale Mobile Association
H-H Index	Herfindahl-Hirschman Index
HEL	Hutchinson Essar Telecom
HFCL	Himachal Futuristic Communications Ltd
IAMAI	Internet & Mobile Association of India
ICT	Information and Communications Technology
IDBI	Industrial Development Bank of India
ILD	International long distance
IMEI	International Mobile Equipment Identity
IMF	International Monetary Fund
IRR	Internal Rate of Return
IT	Information Technology
ITU	International Telecommunications Union
LAO	Limited Access Order
LTE	Long Term Evolution
MMS	Multimedia Messaging Service
MNC	Multi National Corporation
MOU	Minutes of Usage
MSC	Mobile Switching Centre
MTNL	Mahanagar Telephone Nigam Limited
NCE	Neo Classical Economics
NDA	National Democratic Alliance
NDTV	New Delhi Television Limited
NIE	New Institutional Economics
NRA	National Regulatory Authority



NTP	National Telecom Policy
NWW	North, Wallis and Weingast
OAo	Open Access Order
OEM	Original Equipment Manufacturer
OFCOM	Office of Communications, UK
PAT	Profit After Taxes
PBG	Performance Bank Guarantee
PBT	Profit Before Taxes
PMO	Prime Minister's Office
POI	Point of Interconnection
PS	Political Settlements
RCom	Reliance Communications
RIL	Reliance Industries Ltd.
ROCE	Return on Capital Employed
SAA	Simultaneous Ascending Auction
SACFA	Standing Advisory Committee on Frequency Allocations
SBC / SBN	Subscriber Based Criteria / Subscriber Based Norms
SIM	Subscriber Identification Module
SMS	Short Messaging Service
SRSP	Framework for Spectrum Pricing
TDD-LTE	Long-Term Evolution Time-Division Duplex
TDLTE	Time Duplexing LTE
TDMA	Time Division Multiple Access
TDSAT	Telecom Disputes Settlement Appellate Tribunal
TEC	Telecom Engineering Centre
TN	Tamil Nadu
TRAI	Telecom Regulatory Authority of India
TSP	Telecom Service Providers
UASL	Universal Access Service License
UL	Unified License
UPA	United Progressive Alliance
USL	Universal Service Licenses
VAS	Value Added Services
VCG	Vickrey-Clarke-Groves
VSNL	Videsh Sanchar Nigam Limited
WLL	Wireless in Local Loop
WTO	World Trade Organisation

# Part I

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# Chapter 1: Introduction

*“It is a narrow mind which cannot look at a subject from various points of view.”*

George Eliot, *Middlemarch*.

India’s command economy, which was based on socialist ideals and which characterized the first 4 decades of growth after Independence in 1947, was blamed for its lack-lustre growth performance (labelled the ‘Hindu’ rate of growth). Academics and policy makers suggested that India’s policies of import-substitution and the numerous industrial policy restrictions of the planned economy stifled competition and innovation, created excessive monopoly rents for a few firms, and bred inefficiency and rent-seeking<sup>1</sup> (Panagariya 2004, Bardhan 1984, Rodrik and Subramanian 2004, Nayar 2006, Jha 1980).

The liberalization of the economy introduced gradually from the late 1980s was seen as a cure-all for the ills that plagued the economy. Liberalization, along with its hand-maiden privatization, would remove state-created rents and the attendant corruption, and bring in competition that would drive efficiency and innovation. While it was not an easy ideological shift to sell politically (Chowdhary 1998), the government slowly began the process of opening up the economy. One of the first sectors to be targeted for liberalization was telecommunication.

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<sup>1</sup> Note that there was an alternative perspective that argued that the state-led, import substituting planning phase helped India develop the nascent industries that could drive growth after liberalization (Khan 2000) (Basu 2004, Kohli 2006).

Indian telecommunication in the early 1990's was the picture of a moribund state-run sector, beset by inefficiency. Until 1990 telecommunication was not listed as a priority sector for the government and the country had no telecommunication policy that explicitly listed increasing tele-density<sup>2</sup> as a priority (Athreya 1996). The service – fixed line telephony and national and international long distance calling, was provided by a state-run Department of Telecommunications (DoT), created by splitting from the Department of Posts and Telegraph in the 1980s. Innovations in telephony – mobile phones, radio paging, texts, voicemail, that were beginning to be introduced in other markets had not yet made their way into India.

The service was slow, inefficient, expensive and entirely inadequate to meet the growing demand. In 1948, the waiting lists for telephones numbered 20,000. In 1990, 423,000 new connections were provided in the year but the waiting lists for telephones had gone up to 1.7 million. By 1995 it was 2.5 million and by 1997, 3.3 million (Chowdhary 1998). Robin Jeffrey and Assa Doron (2013: 28) estimated that at Independence in 1948, there were a total of 100,000 phone connections in the country – one phone per 3400 people. By 1991 the number of phones had risen to 5 million, but this still meant 165 people to a phone! In 1996, India had a tele density of just 1.54 phones per 100 inhabitants in comparison to the UK's tele density of 53, USA's of 64, and Brazil's of 9.75 (Dash 2006).

The state of the sector in India in the 1980's was reflective of the widening gap between the developed and developing world in terms of telecom development. The Maitland Report (1984) had emphasized the importance of telecom growth for economic development and the need for the developing world to prioritize this sector in order to catch up with technological advances in the developed world. This view of telecom development as essential for broader social and

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<sup>2</sup> Tele-density is the number of phones per hundred people.

economic development gained currency (Wellenius 1977) and has been characterized as the 'Telecom for Development' view (Chakravartty 2004).

As part of policy prescriptions to developing countries, the World Bank began to recommend telecom sector liberalization and private sector participation. Wellenius et al (1993) from the World Bank suggested that the preferred route to telecom growth in developing countries was privatization, and lowered barriers to entry combined with effective regulation. This would lead to increased competition that would drive innovation and consumer value. When India turned to the International Monetary Fund (IMF) to finance a deficit in the 1990s this set of policy prescriptions was attached to the loan. India was encouraged to liberalize the sector, usher in private sector competition against the state-run incumbent and reap the beneficial effects of market driven growth. Liberalization and privatization, it was hoped, would drive sectoral growth and improve efficiency (Chowdhary 1998).

In the 1980's, mirroring the changing world view of the importance of telecommunication in the process of economic and human development, India too had begun to prioritize telecommunication development. The biggest problem it faced in this endeavour was opposition from the Department of Telecommunications (DoT) which was the incumbent operator of fixed line telephony as well as the policy making body in the sector. Going against the DoT's 450, 000 unionized employees (and their links into the wider pool of all public sector employees) was a politically difficult move. As a first step the state decided to privatize the mobile telephony sector in 1995 as it was seen as a smaller luxury good that would not affect the operation of the DoT. Partial competition from the private sector was also planned for fixed line services. Athreya (1996) saw this as a bold move – a "paradigm shift" in the way the sector and the wider state was viewed. I will argue through this thesis that this

was a limited explanation for the growth that took place and that it can be better explained by considering the rents created in the sector.

Barring some initial hiccups, telecom liberalization was a resounding success in modernising the sector and driving growth primarily through mobile telephony. By 2001 there were 37 million phones in the country or a phone for every 28 people. By 2011, there were 900 million phones, almost as many phones as there were people in the country (Jeffrey and Doron 2013). The vast majority of these were mobile phones: India, like many other countries in the developing world, seemed to have bypassed the growth of fixed line telephony for the cost and access advantages of the mobile phone. The resounding success of the telecom sector made it the poster boy for arguments favouring liberalization and the dismantling of state run companies in other sectors of the economy too.

Before we evaluate the explanations for telecoms' success it is pertinent to cover a brief history of the key milestones in the sectors development. A more detailed history of the sector from the perspective of the analytical framework used in this thesis is covered later in Chapter 6. This thesis will cover the period between 1995 and 2014. This period has been divided into six phases of the sector's development that correlate to significant breaks in policy, and these breaks will continue to be used throughout this analysis. I will later show that analysing these breaks from the perspective of the changing role of formal and informal rents in the sector is a better explanatory for the evolution of the sector. However, the description here only seeks to underline the significant policy shifts.

### **Phase 1: 1995-1999:**

Based on the roadmap envisaged for the sector in the National Telecom Policy (NTP) 1994, mobile telephony was launched in India with the auction of licenses linked to spectrum, first for the metros areas - Delhi, Mumbai, Kolkata and Chennai and then for the rest of India (split into state-wise divisions called 'circles'<sup>3</sup>). There were some irregularities in the licensing process, with the government needing to change policy along the way and allegations of graft against the telecoms minister. Two private sector licenses were awarded in each state, creating a duopoly.

While service provision began and the market slowly began to grow, it was hobbled by policy decisions in the sector. The Department of Telecommunications (henceforth DoT), which decided policy in the sector, chose to keep the license fees and the charges on the sector high in order to benefit its own incumbent fixed line business. The private sector telecom service providers (TSPs), suffering from high costs per call and depressed market demand, soon found that they were unable to meet their license fee obligations to the state. Pervasive defaults on license obligations and the threatened bankruptcy of the telecom service providers (TSPs) forced the DoT to reconsider its policies.

The revised telecom policy NTP 1999 agreed to revise license fees to a revenue sharing agreement with the sector as long as the existing licensees allowed to let the DoT rescind its duopoly policy and allow two more entrants – one, the incumbent state corporation and another, a private licensee in each circle.

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<sup>3</sup> A map of India showing the circles is given in **Section 3.2.2 of Chapter 3**.

The phase also saw the establishment of an independent regulatory body, the Telecom Regulatory Authority of India (TRAI), although its actual authority was weak (Desai 2006).

### **Phase 2: 1999-2003:**

The change in policy marked a significant turning point for the sector. The change to revenue sharing and the subsequent re-balancing of charges on the sector provided relief to the private sector service providers (TSPs). The increased competition and the pricing adjustments pushed down the costs of calls and gave the market a much needed fillip.

However phase two is characterized by another development – that of the entry into mobile telephony by some fixed line licensees through a subjective interpretation of license rules. A couple of the big business houses and the state incumbent entered mobile telephony through the use of their fixed line spectrum using an alternative technology<sup>4</sup>. The existing licensees objected and took the DoT to court.

The sector then saw several rounds of litigation and counter-litigation until the DoT changed policy once again to establish a Universal Access Service License (UASL) in 2003 that was technology neutral and migrated both existing service providers (on a technology platform known as GSM) and the new entrants (who had originally only been licensed for the fixed line sector but operated a mobile service on a technology platform known as CDMA)) to a uniform policy regime. The DoT had again done an about-face on licensing policy in the sector and had implicitly expanded sector competition by allowing CDMA operators

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<sup>4</sup> Called Wireless in Local Loop or WLL, this system used a different technology, CDMA, to the GSM technology that mobile service operators had been mandated to begin service with. The differences in technology will be explained in detail in the next chapter, **Chapter 2, Section 2.2.2** of this thesis.



to compete for the same subscribers. There were also murmurs that the DoTs policies unduly favoured a certain private sector operator of the CDMA service.

### **Phase 3: 2003-2007**

After the regularising of the industry with UASL, the sector saw a period of uninterrupted growth and high profitability for both public and private sector Telecom Service Providers (henceforth TSPs). Prices of mobile handsets and the prices of the service dropped, leading to an explosion of the market. The period also saw the consolidation of the category with many of the smaller regional players selling out to the bigger ones and the establishment of a national presence by the six biggest players in the market. It was only at this stage that competitive pressures drove growth and investment in the sector.

### **Phase 4: 2007-2009**

From 2007, under the leadership of a new telecom minister, policies governing the sector changed again. Additional spectrum that was awarded to existing operators based on subscriber numbers was stopped. Instead an auction was announced, avowedly to increase competition, in what was, by international standards, an already crowded sector.

The auction was conducted in a highly irregular manner, and there were allegations that the auction procedures had been manipulated to benefit particular firms. The administratively set price for the spectrum was absurdly low, set at the level it was at six years previously, when the market was a fraction of its current size. The auction saw the entry of a surprising set of new firms into the sector, some with little or no prior experience in telecom. Some of them went on to bring in foreign equity partners at a significant profit. While it seemed obvious from the beginning that the auction process had been

irregular and that significant rent seeking was involved, it took two years before the details emerged in the public domain and this round of spectrum assignment began to be referred to as the '2G Scam'.

### **Phase 5: 2009 -2012**

The government again changed its policy of spectrum assignment in 2010 when it auctioned 3G<sup>5</sup> spectrum in 2010. This time around the auction was conducted in a transparent manner based on clearly defined auction rules and managed by external agencies. The auction was deemed a resounding success as the spectrum sold at rates significantly higher than had been achieved during the spectrum assignment in 2008.

Meanwhile the details of the 2G scam had begun to emerge. It was suggested that the irregular process of assignment had cost the government exchequer a purported loss of \$39 billion, a staggeringly large figure. It also became clear that a number of the new entrants had not met the eligibility criteria for the licenses. Ruling that the entire process had been invalidated, the Supreme Court cancelled all 122 licences that had been issued on the 2008 round of licensing. The new entrant firms had to reapply for licenses and repurchase spectrum if they wanted to continue operation in the sector. A number of these firms withdrew from the market.

### **Phase 6: 2012-2014**

After the cancellation of the 2G licenses the sector entered a new phase in terms of policy. First, the state delinked the licensing process from spectrum,

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<sup>5</sup> 3G spectrum refers to spectrum in the 2100 MHz band that could support an advanced generation of technology from the previous rounds. **Section 2.2** in the next chapter explains the different generations of technology in mobile telephony. The majority of the Indian market operates on 2G spectrum, although 3G is slowly gaining importance.

requiring firms to renew licenses and repurchase spectrum separately. Large, formal and transparent online spectrum auctions have become the method of choice for spectrum assignment. In conjunction, the state has begun to view spectrum auctions as a means of raising substantial funds to meet fiscal deficits. While competition in the sector has once again consolidated around the top few firms in the sector the government is not making any attempt to increase the number of sector participants. The top three firms in the sector accounted for 71% of its revenue market share at the end of 2014 although there is credible threat from one new entrant to the sector in 2010, which has expanded its footprint in 2014.

The history of the sector shows that while the sector has seen explosive growth in the last two decades since the inception of mobile telephony, it has also seen some downturns and several changes in terms of policy since liberalization and also evident throughout the sector's history (Athreya 1996, Purkaysatha 1994, McDowell and Lee 2003, Sinha 1996). Further the levels of rent seeking have not come down in the sector but have actually increased. In fact, as Singh (2000) points out, it is unclear whether the growth is **due to** or **in spite of** the reform process (emphasis added). It is a coherent and robust explanation of these frequent policy changes and their impact on the development of the sector that is the primary focus of this thesis.

A number of studies have used cross country data to establish the benefits of privatization and the introduction of greater competition in telecom (Ariff, Cabanda, and Sathye 2009, Fink, Mattoo, and Rathindran 2003, Li and Xu 2004, Curwen and Whalley 2008). Curwen and Whalley's (2008) study of telecommunication liberalization in Africa and Latin America suggested that liberalization expanded the involvement of foreign telecom players and brought in a greater degree of competition. However other studies have been more qualified on the benefits of privatization, suggesting that privatization is not

necessarily the best solution for service provision in all circumstances (Levy and Spiller 1996, Singh 2000). Biancini (2011) undertook an empirical analysis of the Indian telecom sector to suggest that competition seemed to stimulate development in the more developed areas but had no effect on the less developed circles. Dokeniya (1999) argued that privatization alone would not be effective unless backed by credible regulation.

Unable to see the promised beneficial effects of privatization on the sector in India from 1995 to about 2003, a number of authors explored the role of regulation in the development of the sector. Levy and Spiller (1996) identified regulation as a critical component of the sector's growth. Laffont et al (1998a, b) suggested that an effective regulatory framework is required for two reasons: first, it can ensure price competition by regulating behaviour in output markets and second, it curtails the monopoly of the incumbent to ensure that new entrants are allowed in. While the first of these benefits - that of competition on pricing - had been well established and not just in the telecommunications sector, it was the second - the curtailment of incumbent monopoly powers - that has received the most attention in studies attempting to explain India's telecom trajectory. Two interlinked attributes of regulation received the most attention in these studies - regulatory credibility and regulatory independence. Regulatory credibility focussed on the stability of policy and the regulators' ability to implement it. Dokeniya (1999, 2000) puts the initial lack of development in the sector down to the lack of "credible commitment" on the part of the regulator. Jain (2006) argued, based on India's attempts to regulate interconnection pricing,<sup>6</sup> that the regulator not only needed independence, it needed powers of enforcement in order to be effective. Samarajiva (2000) contended that stable and enforceable regulation was essential to curb

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<sup>6</sup> Interconnection is the price paid by the originating network on a call to the terminating network on the call. Interconnection pricing can act as a barrier to entry for new entrants as it tends to favour incumbents with the largest number of subscribers on their own network.

incumbent power in order to reap the benefits of competition in Sri Lankan telecom development.

Studies that focused on regulatory independence as the explanatory variable for policy performance in India were interested in the areas of interest group influence and processes of bargaining or conflict that this engenders. Studies from the early phases of the sector's development came from the Institutionalist perspective and centred on the relationship between the regulator and the state run firm cum policy making body, the DoT. For Dokeniya (1999) the conflict in the sector from 1995-1999 was caused by the shift away from the high discretionary powers of the state to an independent regulator. Sinha (1996), Athreya(1996) and Singh (2000) all explore the relationship between the DoT (and the political powers that ran it) and the TRAI. Kathuria et al (2003) point out that doing away with the statutory guarantee of a 5 year term for the members of the TRAI in 1997 made them vulnerable to political influence. For all of these authors the problem was the absence of institutional safeguards against predatory politics. The solution lay in somehow providing the institutional structures that would help the regulator withstand pressure on its policy making, although none of the authors address exactly how this could be created.

At an extreme, Smith and Wellenius (1999) contended that given weak regulators and uncertain governance in developing countries, regulatory risk would best be mitigated by bypassing the regulator and government as much as possible and setting up a framework that reduces the need for agency decisions. Similarly a report by the International Telecommunications Union (ITU 1999) suggested that the telecom industry will probably end up being regulated most efficiently by the market. These represent the strongly market friendly view that dominated the development policy discourse in the 1990s within International Aid Organisations such as the World Bank and the IMF. This view

has since been tempered by the more nuanced view of the limits to market-led growth and the recognition of market failures.

In more recent years a couple of studies are noteworthy in that they take an expanded view of interest group politics and their influence on regulation in the sector. The first is an excellent book by Desai (2006) that explores the policy decisions of the sector and possible influences on them in a detailed manner. He traces the changing contours of the DoT - TRAI relationship and their relationship, in turn, with private players in the sector. He does not however explore the income flows that shape these relationships, and are the underlying cause of influences on policy. He also fails to explore the influence of the private sector on the process.

While the telecom sector is predicated on the creation of rights of use in radio spectrum and therefore all licensing policy in the sector is the process of right creation similar to property rights, only Singh (2000) explicitly considers spectrum rights in his analysis of the Indian sector. He claims that property rights in the sector need to be “impartial, inclusive, transparent and enforceable” (ibid: 872) but does not address how to get there, and why spectrum right assignments may not often meet the stringent conditions he imposes upon them.

McDowell and Lee (2003) widen the scope of their analysis beyond predatory political interests by examining different attempts at licensing policy as “a political and regulatory bargain among interested and powerful groups” (ibid: 372). They also explicitly examine allegations of crony capitalism associated with ministers of telecommunication in India. They refer to the need to balance public objectives of generating high receipts from the sector with the need to provide sufficient investment incentives to private providers. While not

explicitly stated, they are referring to rents that the state could provide to the private players through policy to overcome market failures such as regulatory uncertainty or technological risk. They also suggest that these rents, in order to be effective, should be conditional on performance, a view of rents that this thesis concurs with. They do not however, address why this does not often transpire in the Indian context.

Rohit Prasad and Varadarajan Sridhar (2007, 2008a, 2008b, 2009, 2014, Prasad and Kathuria 2014) have written extensively on the issues of spectrum assignment and pricing. While they explore the role of regulation in spectrum management, their key focus remains spectrum assignment pricing and mechanisms rather than the income flows that are determined by these. Their latest book (Prasad and Sridhar 2014) explores the relatively new area of spectrum commons. While, in the conventional view of the sector, it needed definition of rights over use in order to efficiently use spectrum, advancing technologies obviate the need for exclusivity in use, make effective sharing of spectrum between users a possibility in the future. Prasad and Sridhar explore the implications that this will have for the pricing of spectrum and spectrum right allocations in the sector in the context of existing legacy systems of spectrum assignment. Their analysis is internally consistent and detailed, and provides a fascinating perspective on possible future directions of development of the sector. However, their perspective does not attempt to link the policies that create rights in the sector to income or rent flows from the policy or to the underlying web of interests that aim to influence the policy and thereby the distribution of benefits from it. In this sense, it is a micro-economic analysis of spectrum as an economic good but treats as exogenous the influences that affect the allocation of the good.

The mobile telephony sector uses radio spectrum to transmit signals. The bands of spectrum that can be used in mobile telephony are finite and the use

of the spectrum by one party does not preclude its use by another (within limits). An excessive number of users at the same time on a band of spectrum does however cause congestion. Therefore the good is partially rivalrous. The nature of the technology at present is such that if free access were permitted, it would cause interference in signals or require an intractable amount of coordination between providers of the service. Therefore, in practice, spectrum is an excludable good, where exclusions are created by restricting access within specified spectrum frequencies to licensed service providers. However, in defining access rights to spectrum, the policy creates income streams that accrue to the holder of the right. These income streams are effectively economic rents that flow from the definition of use rights in the sector. Rents here are defined as policy induced income streams.

In New Institutional Economics, within which much of the literature reviewed above can be situated, it is recognized that spectrum right definition is required in the telecom sector due to the scarcity of the resource and the need for harmonization in order for it to be used efficiently. In this context, as in the case for natural resources, the prevailing view is that the spectrum right definition that restricts free access to the resource performs a useful function in the sector and adds to the social value of the good. Therefore the rent flows that arise from it are necessary for efficient use of the spectrum. However the rents create incentives for rent seeking, which in turn influence the types of rights created and their allocation.

The auction is seen as the most efficient method of spectrum assignment since it awards the spectrum to the party that values it the most and is therefore willing to bid the highest for it. The price of the spectrum is then decided by the market through the auction process. This assumes of course that the buyers of the good (the spectrum), the Telecom Service Providers (TSPs), have perfect information and are able value the spectrum accurately. If the spectrum is



under-priced in comparison to its true market value and the TSPs are able to retain implicit rents for themselves, this is the fault of poor auction design that was unable to discover the true price of spectrum or extract a sufficient portion of the rents created. If on the other hand, the spectrum is overpriced, and the government extracts too high a share of the TSPs' rent, it affects the viability of the TSPs and this too could be blamed on poor auction design or faulty regulative structures.

So current academic and policy work in the sector focuses on two areas in particular – that of appropriate auction design, to ensure that the correct market value of spectrum can be discovered and the rights go to the operators that value them the most, and that of regulation and governance, primarily through the establishment of an independent regulator, to ensure that the extraction by the state and rent seeking by those who aim to capture a share of the rents are curtailed to within levels that do not adversely affect the sector.

This thesis argues that the above perspectives miss an essential link that helps explain both the evolution of policy and the economic outcomes associated with the policy better, and this is the process of rent creation in the sector and the political settlement that sets the context in which the rent creation and allocation are taking place. Policies that assign use rights over spectrum give rise to rent streams as a consequence of that right. These rent streams have become more significant as the size of the Indian telecom market has grown and the spectrum becomes more valuable. The rights that give access to these rents have thus become more fiercely contested. The processes of spectrum right creation are therefore influenced by the contestation over rights.

In order to deconstruct these influences on policy, we use the concept of a political settlement. Political settlements (henceforth PS) may be understood as

the structure of power within which institutional decisions are made and political compromises between powerful groups shape institutional and policy choices. Agencies and organisations in the political settlement attempt to influence the formulation of policy in such a way that the distribution of rents benefits them, but they are constrained by their power relative to other organisations. Over time, the distribution of rents from the policy is likely to reflect the relative power of the agencies and organisations in the political settlement. If the distribution of benefits is consistent with the distribution of power, the political settlement remains relatively stable. When the distribution of benefits differs from the distribution of power in a political settlement, either the policy is contested until the rents are redistributed in line with the current PS or the process of contestation results in a change in the distribution of organisational power that reflects the new distribution of rents. This dialectic relationship between the rents that are shaped by political settlements and the political settlements that are reinforced or modified by rents is derived from Mushtaq Khan's (2000c, b, 2008, 2009a, 2010, 2011) work in the area of rents and political settlements and forms the core analytical framework that this thesis applies to the understanding of policy in the telecom sector. The application of this framework will show that rents and rent-seeking have been central to the evolution of the sector. Moreover, the configuration of forces and of the rent-seeking processes explains both the early dynamism of the sector, and some of the challenges it subsequently faced.

The application of this perspective to understand the evolution of Indian telecom policy is the original contribution of this thesis. There have been few longitudinal studies of telecom policy in India, and these have focussed primarily on the first few years of the introduction of mobile telephony. They are therefore focussed on the problems of curbing the monopoly power of the incumbent public sector firm by independent regulation. Other studies have taken a techno-economic view to address specific instances of spectrum pricing or auction design (Jain 2001, 2006, Prasad and Sridhar 2007, 2009, 2014). Jeffrey

and Doron (2013) do cover a similar time frame to this thesis, but theirs is an anthropological study that explores the pervasive influence that mobile phones have on lives in India. There are studies by telecom sector consultants and analysts that have studied sector dynamics during this period but they do not explicitly address policy formation and are not readily available in the public domain.

There is a need for a more comprehensive and robust analysis of rent creation policy in the sector from its inception to the present, and this is the gap that this thesis addresses. This thesis will first and foremost provide a framework within which to understand rent creation and the evolution of policy choices in the sector. Using this analysis it also seeks to explain structural features of the sector that have evolved through these policy choices. In doing so, the thesis also enables us to assess challenges in potential future evolution paths for the sector, inasmuch as they can be discerned from the current context. Finally, while the rents and political settlements studied herein are specific to the telecom sector and its implications cannot be transplanted to other contexts, the study nevertheless is of more general relevance as an application of the analytical framework of rents and rent-seeking in the context of evolving political settlements. The framework can potentially be used to analyse other sectors and contexts.

The rest of this thesis is structured as follows. The thesis is comprised of two parts. The first part containing chapters 2, 3, 4 and 5 seeks to establish the value of applying the analytical perspective of rents and political settlements to the case of the Indian telecom sector. The second chapter in this part will explore some of the structural features of the telecom sector. In addition to the shape of the sector and international trends in its growth, the chapter will also explain why the technology and the economics of the sector make a rent analysis a particularly relevant perspective to take. Chapter 3 lays out specific features of

the telecom sector in India that make it both rent-rich and prone to contestation over rents. Chapter 4 is an examination of the theory on rents and political settlements. Chapter 5 lays out the research method and discusses the strengths and limitations of the methodology.

The second part of the thesis applies this analytical framework to the evolution of the telecom sector from 1995-2014 to demonstrate the value that this analytical perspective can add to the understanding of the sector and its evolution. Chapter 6 is a revisionist view of the evolution of the sector from the rents perspective. It shows that an analysis from a rents perspective provides a more nuanced understanding of the effects of policies driven by rent creation incentives of different agencies and organisations, and the rent distribution arising from these policies. Chapter 7 examines the contestation over rents that take place in each phase in greater detail using a political settlements analysis. The analysis examines the evolution of the sectoral Political Settlement in Telecom that influenced the policy choices in each phase of the sectors evolution. Chapter 8 draws out some structural outcomes of the evolution of rents in the sector on the organisations in the sectoral political settlement. Specifically it interrogates the nature of spectrum scarcity in the sector and its role in policy formation by the State. It explains the consolidation and dominance of the three biggest private sector firms despite frequent attempts to introduce greater competition in the sector. Finally it examines the implications of the lack of effective consumer lobbying on the policy imperatives of the state. The final chapter concludes by drawing together the findings from part 2 and looking at the implications of these for potential future directions of the sector's evolution.

## *Chapter 2: A Note on Telecoms*

This chapter seeks to establish the specific features of the telecom sector that drive the creation of rents in it. The telecom sector is underpinned by fast changing technology that drives the contours of the sector as well as the rents it can generate. Therefore, an understanding of the sector's dynamics has to begin with an understanding of the technology that underpins it. This technology not only defines the structure of the sector, it also determines its economics. This chapter, therefore, aims to elaborate the general characteristics of telecom as a sector and explain the terminology that will be used in the rest of this thesis.

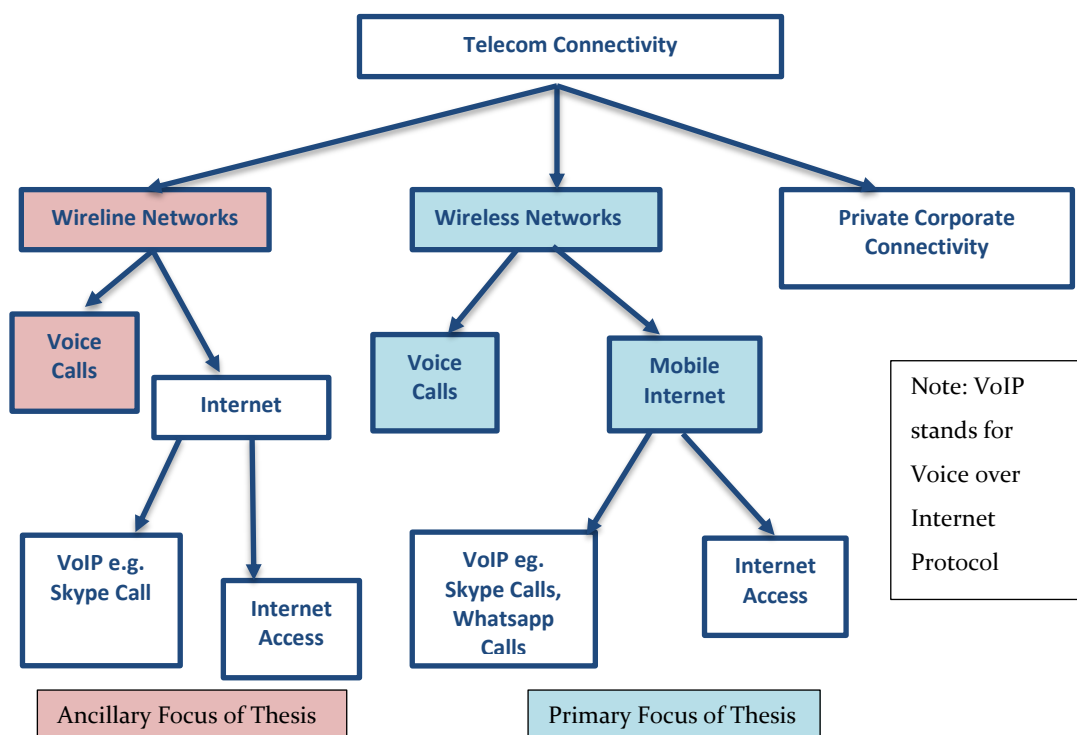
The first section will briefly describe the telecom sector and delimit the sector in terms of this discussion. The second section is a description of the technology underlying mobile communication. It describes the process of transmission of mobile signals, the infrastructure required to operate a service and the differences in generations of mobile technology. The third section lays out the economics of the sector and the factors that drive it to agglomeration. These sections will serve as a background understanding of the sector's characteristics within which to study the specifics of the Indian case.

### **2.1 Sector Boundaries:**

The telecom sector the world over can be divided into two main groups driven by the method of transference of the signal to the consumer (or in the 'last mile' as it is known) – either fixed line (also known as **wireline**) or mobile (also referred to as **wireless**) communication. In the past, the sector would be further subdivided into '**Voice**' vs. '**Data**' where the former refers to transfers

that are voice-driven (phone calls in the traditional world) and the latter are data transfers (or internet access). Today, this is an artificial division since in terms of the technology or the mode of transference there is no difference between voice transfers and data transfers. The difference usually lies in the size of the transfer and the amount of bandwidth required for the transfer – which is significantly higher in data than in voice. Both voice and data use the same channels for transmission, but data requires a far greater bandwidth in wireless and a broader ‘pipe’ in wireline than voice does. Earlier the market was largely made up of voice calls but with increasing digital content of all sorts, the demand for wireless and wireline data has increased exponentially and it is now the fastest growing part of the market. **Figure 2.1** depicts the sector.

*Figure 2.1: The Shape of the Telecom Sector*



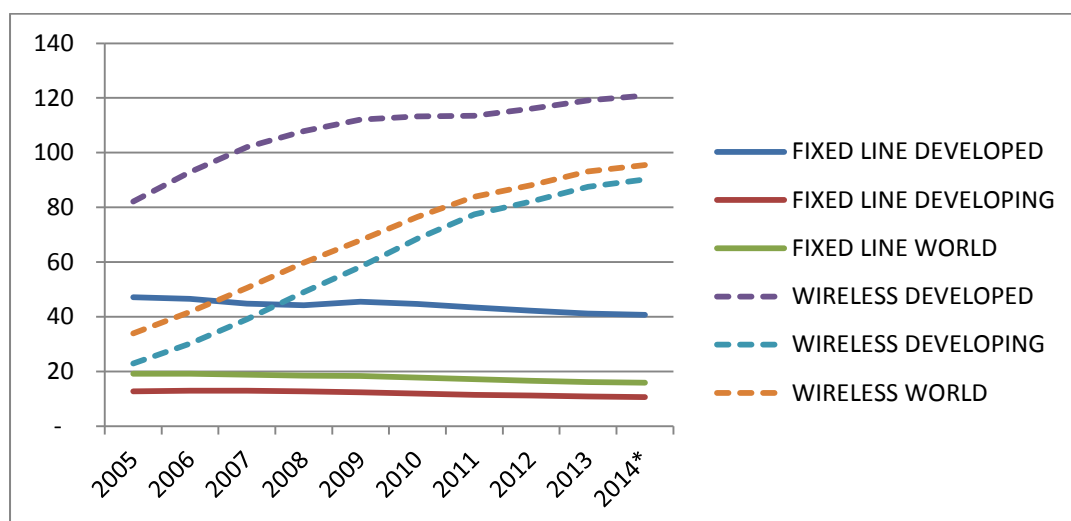
Fixed line voice was the traditional form of telephone communication in most markets. Fixed line telephone networks, also called **wire line**, were largely seen as public goods, to be provided by the state; therefore, most traditional telecom

sectors were state owned monopolies. However, with the increasing neoliberal pressure for the withdrawal of the state, many of these have since been privatized but in many cases, the incumbents (in spite of privatization) remain influential in terms of regulatory policy (e.g. BT in the UK or AT&T in the US).

Generally, the mobile telephony sector tends to be largely privatized (with notable exceptions such as China) and dominated by international players (including several of the earlier fixed line incumbents from the developed world e.g. T-Mobile (Deutsche Telecom) and Orange (France Telecom). In the developing world, the growth of mobile telephony is often advocated with messianic fervour since it tends to be a high growth category that drives market penetration at a much lower cost than fixed line. This is because it overcomes the fixed line cost barrier of what is known as the 'last mile' in access terms. The cost of laying a fixed telephone line tends to be highest in the 'last mile' – the distance from the telephone cable on the street to the individual instrument in a home, mostly because the laying of the last stretch of cable needs to allow for pre-existing built-up area. Since this last mile is transmitted by radio signals instead of wires in mobile telephony, these wireless voice calls can be cheaper, quicker to set up, less demanding of upfront investment and faster to implement in far-flung or widely dispersed markets than wireline. The chart in **Figure 2.2** compares the growth in fixed and wireless telephony worldwide.

While fixed line subscriptions have declined in all markets worldwide, wireless subscriptions have increased in both developed and developing markets. In developing markets particularly, there are nine times more wireless subscriptions per hundred inhabitants than fixed line subscriptions.

Figure 2.2: Fixed Line vs. Wireless Subscriptions per 100 Inhabitants



\* Estimated

Source: ITU World Telecommunication/ICT Indicators database.(ITU 2014)

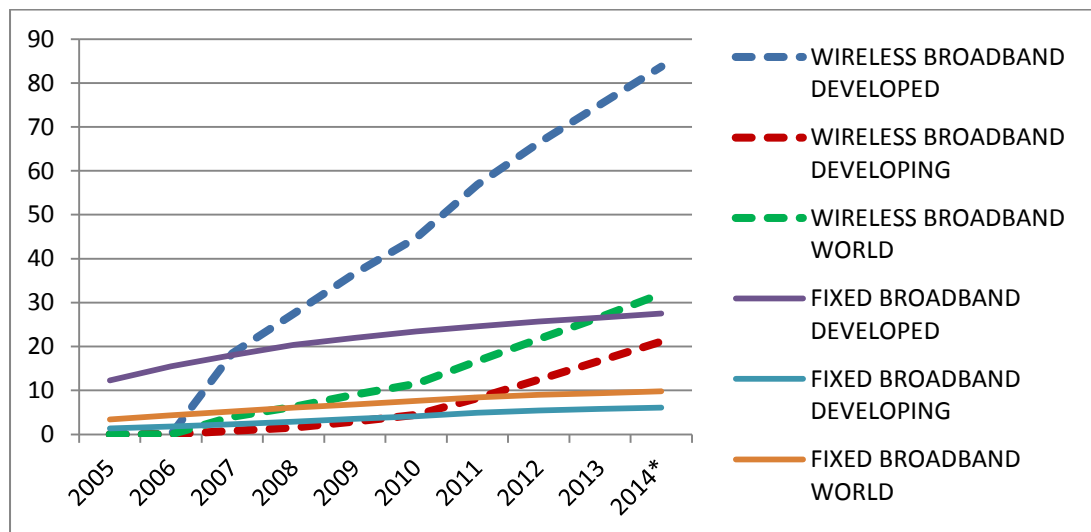
Wireless technology is also changing the way the data market operates. The delivery of data through telephone lines tended to be dominated by fixed line for technology reasons. Increasingly, however, data is being offered by mobile telephony players as a market differentiator. **Figure 2.3** below shows the steep growth of the market for data through broadband subscriptions. The wireless broadband market is most developed in mature developed markets but with dropping prices of smart phones and increasing availability of faster mobile broadband speeds, the market in the developing world for wireless broadband access through mobile phones has shown a significant upward swing since 2010.

Wireless data offers many of the same benefits as wireless voice. In the developing world, where the number of wireline connections is small, wireless data is often the only feasible way for consumers to access the Internet. The improvement of transmission technologies in the past 20 years coupled with a decline in the price of data-capable 'smart phones' has resulted in an explosion of the sector the world over, but especially in developing countries like India.



While this sector is still small in terms of size, it is a high growth category and is increasingly influencing choices made by wireless sector players.

*Figure 2.3: Fixed Line vs. Active Wireless Broadband Subscriptions per 100 Inhabitants*



\* Estimated

Source: ITU World Telecommunication/ICT Indicators database.(2014)

While four distinctive sub-sectors have been identified here, the development of technology has often blurred the lines of difference between them and most players tend to operate in more than one sector, at least between mobile voice and data. The focus of this study is on the mobile or wireless sector, both voice and data, primarily because the greatest number of changes in terms of spectrum right creation and rent generation has occurred in this sector. However, fixed line voice or wireline sectors are inextricably linked to the wireless sector for a number of reasons.

First, the same regulatory framework tends to cover both wireline and wireless regulation. Second, the firms that are significant in the wireless market tend to

have strong wireline antecedents or operate in both markets. Third, both wireless and wireline players are increasingly offering data as part of their bundle to customers and therefore data needs tend to influence preferences of market players in the contest for spectrum rights. The high bandwidth demand for spectrum in the wireless sectors is driven by data and affects the price of spectrum and the rent it commands. However, the development of data is a relatively new phenomenon and most of the initial developments in the sector took place on the basis of wireless voice being the key market. Finally, wireline services form the basis of comparison as the existing status quo from which to study the changes that mobile telephony wrought.

Therefore this study will focus on rent creation strategies in the wireless or mobile sector in India but will take account of the strategies and policy decisions of the wireline or fixed sector in terms of voice and data inasmuch as they affect the strategies and policy decisions in the wireless sector. These areas of primary and secondary focus are illustrated in **Figure 2.1**.

### **2.1.1 The Structure of the Sector**

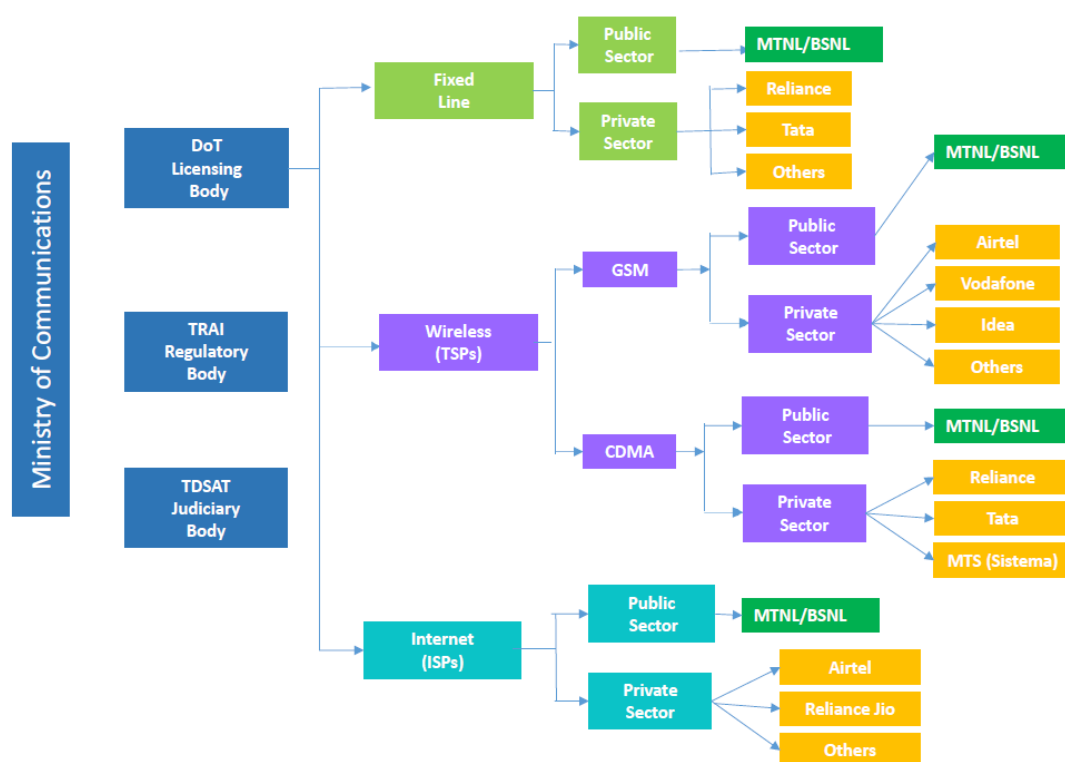
Mobile telephony is provided by **Telecom Service Providers (TSPs)**. They are assigned a particular band of spectrum within which they may operate. And they are responsible for creating and maintaining the infrastructure needed to transmit the calls that originate from a phone number on their network to another number on any network. In general, they maintain their own infrastructure. In India, due to the pressures on the margins of the TSPs, the sector has been allowed an innovation – the out-sourcing of infrastructure. Tower firms are allowed to own and operate the infrastructure and lease it to the TSPs. The TSPs are allowed to create products in terms of pricing offers and

add-on benefits for consumers that they then market in order to attract more subscribers to their base.

The hardware required to transmit the voice or data signals – mobile phone handsets, call switching mechanisms etc. are manufactured by **equipment manufacturer firms** (OEMs) e.g. Nokia, Qualcomm. These are the research hubs in terms of technology development in the sector. Since they create the technology that the sector runs on, they are influential in the direction of technological development in the sector. In addition, since the telecommunications industry requires a high degree of coordination across national borders, there are international organizations that help coordinate cross-border research and standard setting such as the International Telecommunications Union (ITU) or the Groupe Speciale Mobile Association (GSMA).

The spectrum assignment, licensing and overall policy-making takes place at a national level for the sector, by a government agency. In the case of India this is handled by the Department of Telecommunications (DoT). India also has a quasi-governmental independent regulation agency, the Telecoms Regulatory Authority of India (TRAI) and a separate tribunal to deal with legal disputes in the telecom sector, the Telecom Disputes Settlement Appellate Tribunal (TDSAT). **Figure 2.4** is a pictorial representation of the structure of the Indian telephony sector.

Figure 2.4: The Structure of the Indian Telephony Sector



Source: Authors Own

## 2.2 Technology

An understanding of what rents are created and how they are created in the telecom sector is impossible without at least a basic understanding of the underpinning technology. Technology drives the growth of the sector. It is fast-changing and often hard to predict, and this uncertainty has implications for the need for rents in the development of the sector. A comprehension of the basic science underlying the transmission of voice or data through a phone is also essential to understand the discussion of the sources of rent creation in the sector.

This section will attempt a brief and very simple discussion of the technology and the component parts of a mobile network. It will be restricted to the specific technology choices and modes of transmission common in the Indian telecom sector during the period of this study. The first sub-section deals with basic network architecture, explaining how calls are transmitted and received. It also briefly explains the key differences between the technology choices of **GSM** vs. **CDMA**, the most commonly used **technology platforms** in India today. The second sub-section gives a simple account of the differences in **transmission mechanics** of **2G** and **3G** connections, the two forms of transmission available to the Indian consumer base. This section lays out the technical terminology that will be used in the rest of this study. A basic understanding of the underlying technology also helps establish the technological constraints on the sector's operation today, and the technological possibilities that could ease constraints in the future.

### **2.2.1 Basic Network Architecture**

The mobile phone works similarly to a radio. However, unlike a radio, where a single transmission from a single source uses the bandwidth for transmission, the mobile network operates by dividing up the area to be covered by a number of cells (conventionally of a hexagonal shape) and using much lower power signals for each transmission. That way, the capacity of the network is increased since each non-adjacent cell can use the same frequency bands to carry multiple calls at the same time. It uses specified frequency channels to transmit voice and data transmissions from the sender's phone, through a local tower – a 'base station', to a switching centre and then back out through an appropriate base station to the receiver's phone. The frequency available at each cell is divided into different channels or pipes, each assigned to a particular user at any point in time.

Each phone is identified by the network using a unique number, its IMEI (International Mobile Equipment Identity) number that is burned onto the phone by the manufacturer, and this allows the network to direct the call to the appropriate receiver.

Each cell is serviced by its own base station (BTS in **Figure 2.5**) or mobile tower for each service provider. The size of the cell can vary from 1 sq. km to 30 sq. km, depending on the density of the population. Many standard cells cover an area of 10 sq. miles. Physically, a cell is limited by the number of calls it can simultaneously cover at a given moment. As the population density, and therefore the number of simultaneous calls increase, the cell size needs to get smaller to accommodate the calls and avoid congestion or 'dropped calls'. On the other hand, if the cell size becomes too small, or if BTSs are positioned too close to one another, the chance of signal interference increases.

Cell sizes are also impacted by the frequency being used. The lower the frequency, the longer the wavelength and therefore the longer the signal will carry. Therefore a cell defined for 900 MHz spectrum is larger than one defined for 1800 MHz spectrum. If the 900 MHz cell is too small, it will cause interference with neighbouring cells since the signals carry a longer distance. On the other hand, if a cell for 1800 MHz spectrum is too large, the signal won't carry far enough, and result in dropped calls.

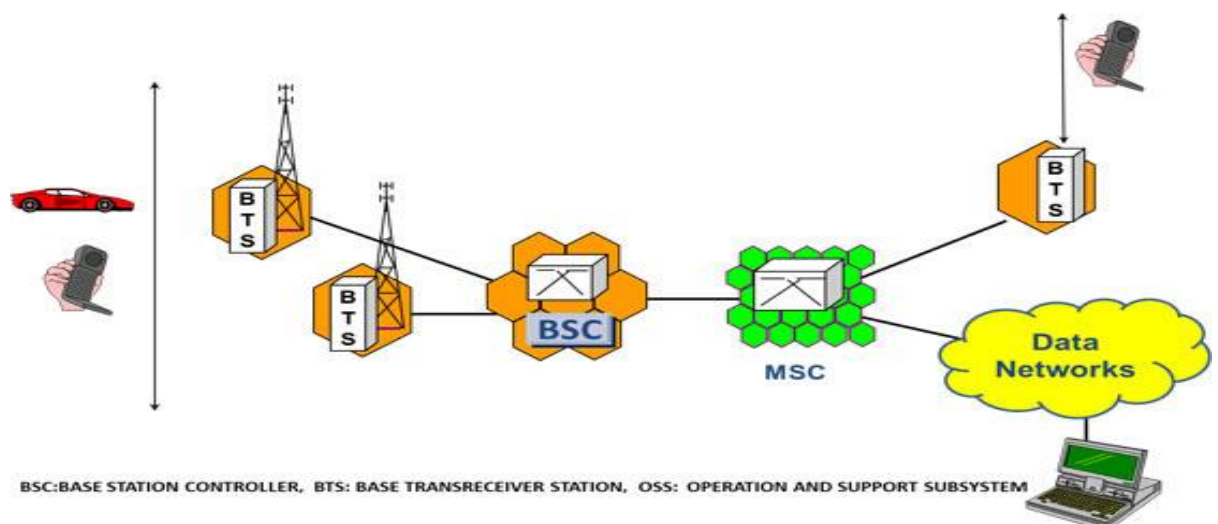
The BTS comprises an antenna loaded on top of the mobile phone tower. Each antenna can cover a 120 degree sector of the cell so most towers will have 3 antennae to cover all 360 degrees of the cell shape. Each BTS has a specific identity defining its location and contours. A number of adjacent BTSs are connected to each other and to a Base Station Controller (BSC). The BSC is a collection of transceivers, controllers, switches and routers that helps route a

call that originates within its area to the main hub switching unit, the Mobile Switching Unit (MSC).

The BSC is not only a router to the switching centre it also acts as a funnel, reducing call volume to the switching centre. If a call originates and ends within the same BSC then it can be routed directly without needing to be routed through the switching centre.

The nerve centre of the mobile network is a Mobile Switching Centre (MSC). It handles the main call routing and call switching functions. It coordinates between BSCs and other MSCs. The network requires significant and complex data handling capacities to not only deliver the signal but at all times keep track of the location of the connected instruments (mobile phones) such that if instruments move geographically across cells during the course of the call, then a channel of spectrum is made available to continue the call and prevent it from dropping.

*Figure 2.5: A GSM Mobile Network*



Source: COAI (2015)

The diagram in Figure 2.5 shows a typical GSM network. GSM networks are by far the more popular of the networks in India. However at inception, the Department of Telecommunications (DoT) chose to allow technology-neutral licenses and therefore there were a few operators who launched CDMA services instead of GSM. The systems are similar but differ primarily in the way in which they transmit the data. The following section covers the differences between GSM and CDMA networks from a technology point of view. It then looks at the differences in transmission mechanics between the various generations of technology: 1G, 2G, 3G and 4G.

### **2.2.2: Technology Choice: GSM vs. CDMA**

A key distinction in technologies in the sector is based on the way the spectrum is used to carry the signal. To increase the carrying capacity of the spectrum, it is divided into frequency bands of channels. There are 3 main ways in which these channels can be configured.

- a. **Frequency Division Multiple Access (FDMA):** this is the earliest form of mobile transmission used in Analogue systems. In this system, each user was assigned a separate channel 25 KHz wide that was used only for that call. It was not a particularly efficient system but was the only one capable of being supported by the computing power available at the time.
- b. **Time Division Multiple Access (TDMA):** This is the system that is used by **GSM** systems the world over. In this system, the channels are wider (200 kHz) but instead of being assigned to a single user, the channels are divided into time slots (8 in the case of GSM) and only one time slot is issued to a specific user at a particular time. The next



transmission on the call requires another time slot and therefore the demands made on the switching system are higher than in FDMA. This allows a single channel to carry multiple calls.

- c. **Code Division Multiple Access (CDMA):** Here, instead of dividing the available frequency into channels. The entire frequency is used by all simultaneous calls. However, each individual call is assigned a code that allows it to find the particular signal associated with that call and ignore all other simultaneous signals as noise.

Gruber explains the difference between GSM and CDMA with an analogy:

*“TDMA is like everybody speaking sequentially one after another; with CDMA, everybody speaks at the same time but with a different voice pitch that can be unambiguously captured by the receiver” (Gruber 2005: 23).*

CDMA is more efficient and more cost effective than TDMA because it can use the same frequency in adjacent cells without fear of interference.

The USA started off as a CDMA<sup>7</sup> only market, although it has increasingly moved to GSM. Europe is a GSM only market. There are a few markets that use GSM and CDMA technologies – India, Brazil and China are examples. In India’s case, the state did not specify a technology platform at the start of the sector, allowing licensees to buy separate GSM or CDMA licenses from 2001.

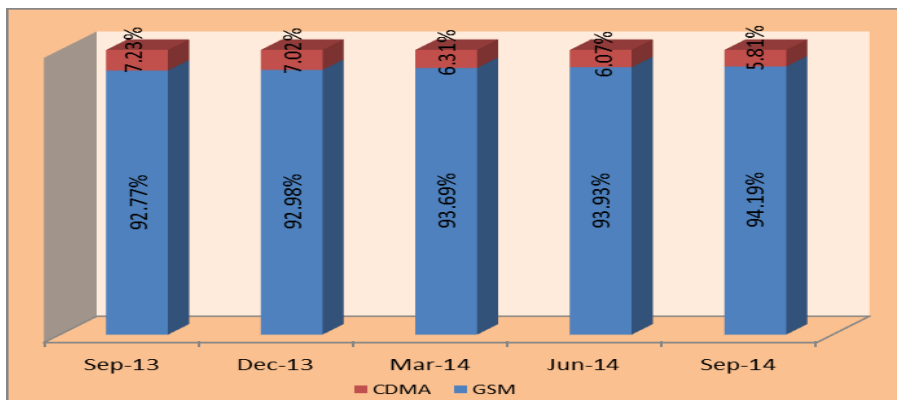
The world over, GSM is the more popular technology despite its being less efficient than CDMA. This is because GSM (Groupe Systeme Mobile) was a coordinated development by countries in Europe to generate an internationally

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<sup>7</sup> CDMA was originally developed for US Defense communication (Gruber 2005)

harmonized standard. The advantage of a harmonized standard is that handset ecosystems could be developed around such a standard in a cost effective manner. The consolidation of the handset ecosystem around the GSM standard made it the more attractive option across more markets. This is an example of what Gruber calls a “tipping market” technology. In India too, the GSM subscriber base is substantially higher than the CDMA one (Figure 2.6).

Figure 2.6: GSM vs. CDMA in India



Source: (TRAI 2014b) p.19.

### 2.2.3: Transmission Mechanics: 2G vs. 3G

The second important classification of technologies in the telecom sector is by generation - 1G, 2G, 3G and so on, that refer to how efficiently the system is able to carry the transmission - effectively transmission speeds. The 1G systems were the analogue systems that were used in the 80s in the developed world. They were usually non-harmonized and locally restricted. Also they were not very efficient on carrying capacity and could only support voice transmissions.

Digital transmission marked the start of 2G systems. Early 2G systems transmitted at low speeds and were also only able to support voice calls.

Technological advances referred to in the industry as GPRS (General Packet Radio Service) and EDGE (Enhanced Data GSM Environment) allowed for transmission speeds of up to 100 kbps<sup>8</sup> for both voice and data transmission, although the data transmission at those rates was frustratingly slow. This forms the majority of the Indian market.

The 3G systems allowed for transmission speeds of up to 3 Mbps<sup>9</sup>. 3G technology is offered in India by some of the TSPs. While the majority of the current voice market lies in 2G, 3G is better suited to data because of its superior speeds and so the ratio of 2G to 3G calls in India is about 75% 2G to 25% 3G calls but 55% of data is consumed on 3G vs. only 45% on 2G.

The fourth generation of mobile technology 4G, also known as LTE (Long Term Evolution) has been introduced in some markets across the world<sup>10</sup>. There are two principal transmission mechanisms in LTE - TDLTE (Time Duplexing LTE) and FDLTE (Frequency Duplexing LTE). The latter is more common. In India, two TSPs have 4G capability<sup>11</sup> but as of 1<sup>st</sup> January 2015, neither had launched yet.

Two factors can be held primarily responsible for the phenomenal global growth of the telecom sector. The first is the strides made by technology in continuously improving the amount and quality of transmission over the years as discussed above. The second factor that helped create relevance for the offering and its global dissemination was *international harmonization*.

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<sup>8</sup> Kilobits per second

<sup>9</sup> Megabits per second

<sup>10</sup> S Korea, for example, practically skipped the 3G phase and has almost complete 4G coverage. It operates its 4G on the 850 MHz spectrum range.

<sup>11</sup> Reliance Jio has bought 2300 spectrum and has laid fibre cable backhaul (i.e. the connection between the mobile transmission towers and the rest of the core network) in 800 cities. This will give them a significant speed advantage over other TSPs. Airtel has the capability to launch 4G on its existing 1800 MHz spectrum using FDLTE.

Instruments are designed to read particular frequency bands and work with particular technologies, so the greater the harmonization across borders the more focused the radio transmitter and handset development can be, resulting in technological advances and lower prices. This complementary group of handsets, technologies, switching hardware etc. is referred to in the industry as the *device ecosystem*. Harmonization is often complicated by the need to move existing users of the spectral bands to other bands in order to free up the right spectrum ranges for mobiles.

**Table 2.1** gives the spectrum ranges that are used for mobile operations in India. This thesis will often refer to the 900 MHz and 1800 MHz bands of spectrum that are the most heavily used bands in India as of 2014. Both of these are bands that operate under 2G technology. However technological advances have meant that with some modification of equipment, the 900MHz band can be used with 3G technology and the 1800 band can be used to run 4G systems. This has meant that the 900 and 1800 bands have continued to remain the most valuable spectrum bands for mobile telephony even with technological advances.

*Table 2.1: Spectrum Ranges Allocated for Indian Wireless Communication*

800 MHz	900 MHz	1800 MHz	2100 MHz	2300 MHz
CDMA	2G GSM	2G GSM	3G GSM	4G BWA <sup>12</sup> (TDLTE)
Reusable for				
4G GSM	UMTS 900 (3G)	4G (FDLTE)		

Source: Discussions with sector experts.

<sup>12</sup> Broadband Wireless Access

## 2.3 Economics of the Sector

The telecom sector is a network market, where the utility derived from the service by a consumer is greater with a greater number of users of the service. It displays positive network externalities, defined as the increasing utility that a user derives from consumption of a product or service as the number of other users who consume the same product or service increases (Katz and Shapiro 1985). The externalities could be caused by direct effects on value (as in the case of telecom, where the service is more valuable, the greater the number of its users) or through indirect effects on complementary products or services. The quality of after sales service for example may be affected by the size of the network. Katz and Shapiro show that network markets therefore have an internal logic propelling them to aggregation and consolidation. They suggest therefore the need to study network externalities in an oligopolistic setting.

Gruber claims that it is the constraint of radio spectrum scarcity that creates an oligopolistic structure (Gruber 2005: 3). However this is complicated by the fact that it is a network industry. The network externalities would lead to a “tipping market” where one winning technology takes the whole market (ibid: 4). GSM winning over CDMA as the more popular technology worldwide is an example of this.

This thesis argues that the nature of technology and the need to define separate spectrum bands for each operator drives individual right specification in the sector. The scarcity of spectrum and the allocation rules influence the value of rents that arise from the creation of the right. Network externalities would result in monopoly in a closed telecommunication system, but as long as the

system is allowed to connect easily with other systems, the primary network effects do not apply. In other words, the network effects operate at the level of technology but not at the level of individual service providers within a market. However, the high fixed costs required in infrastructure development create economies of scale that could result in an oligopolistic structure.

Sridhar points to economies of scale, scope and density being present in the telecom sector (Sridhar 2012). Establishing a telecom service (especially in fixed line) requires a large initial upfront investment in infrastructure that is a sunk cost (i.e. cannot be put to other use). Economies of scale arise from the much higher fixed costs and negligible marginal costs such that “it is often cheaper to provide services to the one millionth customer than the one thousandth customer” (Neuchterlain and Weiser 2005, c.f. Sridhar 2012:6).

Economies of scope arise from the efficiencies gained in offering complementary products and services. Product bundling becomes a cost effective way to gain incremental revenue from a customer while maintaining the cost of access – i.e. the marketing and distribution costs. Thus, mobile telephony firms with a well-established network have an advantage when it comes to reaching their primarily voice consumers with product bundling offers on data usage. The larger the network, the lower the costs of reaching the consumer and therefore the higher are the revenues to be made from economies of scope.

There are in the case of telecom networks (and, in fact, any network that requires the creation of physical geographical infrastructure to support it such as railways) also economies of density. The more densely populated the area is, the lower the costs of reach of consumers within it and therefore the higher

revenues that can be made from it. The impact of economies of density is particularly felt when servicing rural areas etc. where the higher the density, the more cost effective and better the coverage is likely to be. The presence of these economies of scale, scope and density drive the market towards an oligopoly.

Sridhar suggests that the most important factor that prevents the formation of a monopoly in the sector is a regulatory interconnection obligation. It allows smaller players to offer the same service as long as they are able to connect to open networks. If connection was only possible within a closed loop, only one provider could efficiently service the need to offer maximum benefit. This underscores the need for harmonization in this industry and complementary industries to a very high degree in order to provide consumer value. There are a number of international standards in the sector that direct development of technology and services in the sector. These are rooted in industry alliances where, by and large, the benefits of coalition far outweigh the negative externalities of coalition such as an increase in competition (ibid).

However there are other network effects that drive aggregation. First, the consumer tends to prefer the supplier who they judge or estimate to be likely to become the largest player. And second, because a firm has the power to charge an interconnection cost for calls that terminate on their network, the greater a firm's subscriber base, the more cost effective their offering is to their subscribers. Both these factors tend to drive greater network benefit to larger firms. Regulation therefore becomes important to ensure the limitation of oligopoly benefits in the sector. Asymmetric regulation can influence firm size and ensure that oligopoly effects are balanced. Regulation can also mandate levels of interconnection charges.

Regulation has a number of other choices to make for the establishment of the industry. For instance, the jury is still out on whether governments should regulate the choice of technology (with advantages of harmonized costs and product development) or should let the market decide (with advantages of technology innovation for efficiency) (Gruber 2005). The regulator also faces choices on number of players and spectrum assignment technique. Each of these is explored below.

### **2.3.1 Competition:**

The benefits of competition as the most efficient way for the market to bring down prices and increase consumer value drives the push to increasing competition in the sector. Mobile wireless technologies allowed the sector to part-privatize<sup>13</sup>. In contrast, there are also some studies that point to the oligopolistic nature of this market, asserting that too much competition will destroy consumer value in the sector. Gruber and Verboven (2001) assert that it was not competition but the concurrent introduction of digital technologies and standardization that drove growth in the European Union telecom markets. There have been studies suggesting the highest number of players that can be supported by the telecom sector (Prasad and Sridhar 2008b). Telecom markets worldwide tend to support between 2 and 4 large players in the market. In comparison, India's market sees a large number of players. Comparative data from telecom markets across the world indicates a higher level of overcrowding in India than elsewhere (PWC 2011: 26).

The network nature of the telecom sector is such that rapid dissemination of technological changes is beneficial to the sector as a whole. It builds scale and

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<sup>13</sup> Chapter 6 will explore the political economy behind the privatization decision worldwide and specifically in India



international markets for device ecosystems. Since technology changes are rapidly disseminated, there is often little opportunity for product differentiation and the sector tends to have a high level of price competition (Gruber 2005).

As penetration levels for the service increase, a greater number of low volume users enter the market, driving down volumes and revenue even as subscriber numbers grow. At the same time however, the increasing price competition drives down prices, increasing volumes among existing users. The balance and interplay of these two factors determines the growth of the sector.

### **2.3.2 Spectrum Assignment:**

As spectrum is the resource both essential for the operation of the telecom sector and limited in availability, the method of spectrum allocation has important effects on the dynamics of the sector. It not only determines the distribution of allocation of use rights to the sector, it is also one of the principal means whereby the state is able to extract rents from the sector. The price of the use rights, or the rents arising from spectrum sale form a significant component of the costs of telecom service providers and have also become an increasingly large and important source of rent extraction for the state. Over the last three decades, therefore, there is a growing body of research and analysis in academia and among policy makers on the process by which these spectrum rights can be most efficiently assigned.

The view on the most efficient method of spectrum assignment has changed over time. Initially, with fixed lines, the supplier tended to be a single firm, most often in the public sector. This incumbent was often the first player in the

mobile telephony space and was, in most markets, given spectrum for free or at low rates in the initial stages. Early allocations of spectrum in mobile services were, in most countries in Europe, *administratively allocated* through a tender process (called “beauty contests” in the literature). Some countries also chose to follow an *auction* method for the allocation of spectrum.

There is a wide body of literature suggesting that the auction method is better as it allows the market to self-select the more efficient firms. Importantly, from the perspective of governments, in the face of spectrum scarcity, the auction method has been better at generating larger receipts. Spectrum auctions in India have been the largest source of government receipts outside of taxes. This section maps out the developments in the theory surrounding spectrum assignment in telecoms.

Spectrum sales, in terms of the number of licenses, the size of licenses, the winners of license rights and the price of the licenses were conventionally decided by bureaucratic design. The state, as the ultimate custodian of the resource, tended to decide, in consultation with technocrats and the industry, the number of licenses to be given, their size and the price of a block of spectrum. In a pure administrative allocation the State may decide the price and size of blocks and allocate them to their preferred service provider. The service provider in many early cases was a state run incumbent in the telecom sector and the state could even charge a nominal rate for the assignment of rights to them.

In other cases, once the state set certain minimum guidelines for valuation of the spectrum, bidders were then invited from industry to demonstrate their business plans using pre-announced criteria. This process is often referred to in the literature as a “*beauty contest*”. At other times, the winning bid was

determined by lottery, where all bidders met the minimum stipulated criteria. In either of these cases, the state provided guidelines for spectrum value, but allowed the bidding process to determine final sale value. While the state did not fix the final price of the spectrum, the price benchmark set by the state did determine the price band of the bids. Peter Cramton (2009) argues, based on the US experience in the 1980s, that beauty contests as a method of spectrum allocation were slow and costly, prices were assigned rather than market determined and the lack of competition harmed innovation in the sector. Cramton does not directly address the need for rents in the sector to overcome market failures due to the risk of innovation. Under such conditions, the beauty contest may be the more efficient method of allocation.

Initial allocations of spectrum tended to be free or at a very low cost, often to state-owned companies. However, as the sectors that used spectrum became privatized and the rents that these sectors enjoyed became obvious, there has been a concerted move to extract and transfer some of these rents to either feed into state budgets or to consumers. Given the size of these rents, there is also increased rent-seeking and rent capture.

An alternative to the beauty contest was a market auction. This was perceived to be superior at allowing the market and the users of the spectrum to determine its value. More importantly, it achieved allocative efficiency by ensuring that the highest bidders got the rights. However this is a static view of allocative efficiency, and, as argued in this section, allocating the rights to the highest bidders may not ensure dynamic efficiency since no rents are left to incentivize innovation, learning, etc. In theory, the State can extract rents by directly pricing the spectrum. However, the State may suffer from informational failures in pricing the right, either over-pricing the right to extract maximum revenue from the sector, or underpricing it, resulting in a notional loss for the State. Appropriate auction design was suggested as the

best way to correct for market failures and determine optimal spectrum price. Administrative allocation was seen to be dangerous in that it may be unable to price the spectrum effectively and also be susceptible to rent-seeking. A well-designed auction was therefore the preferred route in most conventional analyses.

Ronald Coase (1959) first suggested the use of auctions in radio spectrum allocations. He argued against administrative allocation by saying that the administering authority lacked an accurate cost-benefit analysis and adequate information to efficiently allocate broadcast spectrum. He argued instead that it should be managed through a market price mechanism, as long as property rights in the allocation were clearly defined. Vickrey's (1961) research used Game Theory to suggest that Simultaneous Ascending auctions would result in the most economically efficient allocations. Auctions were adopted by New Zealand to assign wireless licenses in 1989, and began to gain popularity after their use by the US FCC (Federal Communications Commission) in 1994. This last auction raised \$20 billion in revenue, twice the expected level, and garnered significant media attention for its success (Binmore and Klemperer 2002). McAfee and Macmillan (1996) in an early evaluation of the 1994 FCC auctions, claimed that it was, by and large, a huge success, primarily for the amount of revenue it generated. Later analyses were more qualified, pointing to signs of collusion and signalling among bidders. The UK's first use of auctions instead of beauty contests came as late as 2000, with their 3G auction. India first auctioned radio spectrum in 1995 (Jain 2001) with a single stage bidding process for non-metro licenses but reverted to administrative allocation until 2010. Since 2010, all spectrum including those that have come up for renewals have been auctioned.

Since the majority of the literature on spectrum auctions proceeds from the perspective that auctions, if well-designed, can mitigate for market failure and

would be the most efficient way to allocate spectrum to the parties who value it most, the articles focus on the design of particular auction formats that yield the most efficient allocations. No market failures or special characteristics of the sector (other than prevention of monopoly and collusive behaviour) are built into the design of the auction process.

There is however some dissent on the view that auction is the best mechanism of allocation. The following two sections will review auction formats and then consider the literature that qualifies the benefits of a competitive auction.

### ***2.3.2.1 Auction Formats***

The Simultaneous Ascending Auction (henceforth SAA) or the “English” auction, the simplest form of auction design, was the basis of early recommendations for spectrum auction form. In this open auction form, all lots are auctioned at the same time. The lots have a reserve price and a high bidder. A new bid is accepted only when it surpasses the existing high bid. The auction ends when there is no further bidding on any lot. The highest bidder on the lot wins the bid and pays the maximum bid price. The Anglo-Dutch form, was a combination of the English open auction and the Dutch sealed bid auction format. Here, an open ascending auction is first conducted till only two bidders remain, and the final stage of the auction is decided by a sealed bid stage (Klemperer 2002). The Vickrey auction (or its modification for non-homogenous goods and multiple bidders, the Vickrey-Clarke-Groves (VCG) design) is a sealed bid SAA, but the winner pays the price of the second-highest bid, or in other words, the opportunity cost for the units won. The second-price format removes the incentive of a bidder to underbid and is therefore said to establish the true worth of the spectrum. It reduces the likelihood that the bidder will overpay (‘winner’s curse’) while simultaneously maximizing seller revenue (Ausubel and Milgrom 2006). Under this format, the dominant

strategy for all bidders is the bidding of true value as no bidder can individually affect the price he/she pays and goods are allocated efficiently because final prices represent social opportunity costs (Loertscher and Wilkening 2011).

Several evolutionary enhancements have been made to the basic design to deal with specific weaknesses, but the durability of the design, according to Cramton (2009), reflects its many strengths. The simplicity of the auction process and the transparency of price discovery are key strengths of the SAA. To encourage price discovery, most auctions have an activity rule that demands that bidders can only bid on lots on which they have been active for a specified number or percentage of bidding rounds in order to prevent 'bid sniping' – where the bidder waits until the end of the auction to reveal his true demand. Pre-determined reserve prices are also often a feature to prevent under-bidding. However, the SAA is susceptible to various collusion strategies by bidders (Ausubel and Milgrom 2002, Cramton 2009, Cramton and Schwartz 2002).

The key problem with the Vickrey design for spectrum auction, however, is the limited substitutability that it allows, since lots are bid for individually. The VCG design can theoretically allow for package bidding but allowing the market to determine the packages would result in an infinitely large number of options and complicate the auction process considerably. This requires the regulator to determine auction lots, which in turn requires the regulator to be in a position to make decisions on lot sizes which may then constrain the technology options available to bid winners. A design modification to allow technology neutral auctions is the Package Clock Auction or the Combinatorial Clock auction. Here, the auctioneer begins with a Clock auction, where he/she names a price for each product and the bidders respond with their preferred package. After this process of package and price discovery, the bidding follows on the combinations with excess demand and each bidder is allowed to submit top-up bids on the packages that interest them. The design is further simplified

by specifying generic lot sizes (e.g. the UK 3G auction specified generic 5MHz lots)(Cramton 2006).

However, this design is not without its flaws either. Cramton (2009) argues that, especially in network industries with oligopolistic structures, incumbents have an incentive to protect their oligopoly rents by blocking competition. Thus, even with an auction, incumbents tend to be the winning bidders since the value of the bid for them incorporates the additional value of preventing competitive entry. This lack of competition will have detrimental effects on the level of innovation fostered in the sector.

Finally, Milgrom (2000) questions whether the form of auction design is at all important if secondary trading is allowed after the completion of an auction. Theoretically secondary trading would allow the market to ensure optimal allocation of spectrum. However he argues that in practice spectrum allocations which are, in effect, use right allocations, are difficult to change and therefore it is important that auction sales get as close to the market optimal allocations as possible through good design.

All the above discussions of auction formats are predicated on the assumption that the auction not only discovers the true value of the spectrum, it then allows the State to extract this value from the bidders in return for the spectrum right. Since the only market failure to prevent here is that of monopoly or collusion, there is therefore no need, from this perspective, to allow some of the rent from the specification of the right to remain with the owner of the right. However, as the next sub-section argues, this ignores many other possible market failures that could exist and that may benefit from rents for their resolution.

### ***2.3.2.2 Auctions vs. Administrative Allocation***

While recent economic literature and a number of recent spectrum sales have tended to focus on the use of the auction mechanism, there have been some who have questioned the value of auctions over administrative allocations of spectrum. Even early literature that favoured auctions as the method of allocation suggested that administrative allocations may be more efficient if “the costs of relying on the market mechanism exceeded the costs of administrative allocation by a sufficient amount” (Coase 1959, c.f. (Madden and Morey 2013)) but most of this literature suggested that the advantage of administrative allocation was, in general, highly unlikely.

Colin Campbell and Dan Levin (2006) show that if the independent private values assumption is relaxed, i.e. if buyer valuations are interdependent, then auctions lead to sub-optimal allocations and perform worse than other more transparent allocation methods such as posted price. In such cases, when there is adverse selection, the competition promoted by auctions may be detrimental to efficiency. The VCG design is not sensitive to the assumptions about the interdependence of buyer knowledge but is unable to cope with the rising technological complexity of spectrum auctions (Ausubel and Milgrom 2002).

Madden and Morey (2013) claim that in terms of numbers of 3G licenses issued between 1999 and 2007, the assignment was evenly split between auctions and administrative allocation, in spite of a theoretical preference for auctions. They suggest that this is because administrative allocations allow for additional flexibility in objective setting, permitting for the inclusion of welfare objectives that a National Regulatory Authority (NRA) may have. They construct a model to empirically establish the objectives that influence regulator decisions for



administrative allocation and find that a number of social welfare objectives such as population coverage obligations, the time allowed to achieve the desired coverage and whether or not infrastructure sharing is mandated by the NRA are relevant in administrative allocation and the initial spectrum price and licence fee seem to play less of a role where the license is assigned by the NRA. In contrast, as Dykstra and van der Windt (2004, c.f. Madden and Morey 2013) argue, price is usually the only endogenous outcome of auctions. Auctions maximize price, speed and efficiency of allocation and transparency but are unable to endogenize quality.

Another article that posits a similar argument is a paper by Hazlett and Munoz (2009) that argues for the evaluation of auction design not merely on the amount of revenue raised. There are welfare impacts of auction decisions that are not effectively incorporated into the costs of the system in the analysis of auction design. Hazlett and Munoz use data on spectrum sales for wireless telephony in 28 countries for the period between 1999 and 2003 to identify the price and welfare effects of spectrum policy. They identify two welfare effects they believe are especially important in the context of wireless telephony – the time cost of unused spectrum and impact of spectrum policy on market structure outcomes. Their quantitative study suggests that the amount of allocated spectrum and the degree of market competitiveness fostered by the sale provide social welfare gains that could offset the gains from license rent extraction. Under these conditions, auction rules that focus on revenue maximization rather than ex-post market effects do not maximize social welfare. “Competitive bidding mechanisms are not exogenous to market outcomes when they alter the structure, capacity, timing or firm composition of the wireless sector” (ibid: 438). Cramton (2013) argues that one of the key challenges facing a regulator in the administrative allocation of spectrum is the ability to keep up with rapid changes in the technological environment. Note that Hazlett and Munoz are themselves not arguing against the use of auctions, they merely suggest that there are conditions under which the use of auctions

may not maximize welfare. They do however raise the important issue of the effect of auction design on ex-post market structures and, by extension, social welfare, a view also reiterated by Klemperer (2002).

Prior to the operation of the 3G auction in India in 2010, Manas Bhattacharya (2008) analysed the results of a number of spectrum auctions worldwide for learnings that could be applied to the Indian auction. He claims that auction sales have not exhibited consistent and optimistic results on a sustained basis. The FCC auctions of December 1994, while exceeding revenue expectations, were a result of collusive and gaming behaviour. The 3G auctions in the UK held in 2000 again raised revenues well in excess of expected levels but Bhattacharya (citing(Cramton et al. 2011) suggests that a number of external factors such as the fact that it was the first mover in Europe and the coincidence of a high tech stock market bubble may have had something to do with its record-breaking revenue of £22.5 billion. There is however a theory (speculative in the absence of counterfactuals) that incumbents overbid for spectrum and then delay payments and roll-out as a way of blocking competitive entry, while continuing to operate in their existing spectrum bands. A number of other auctions (the WCS auctions of 1997 in the US, the 3G auctions in Switzerland, Belgium and Denmark) did not raise the expected levels of revenue. Bhattacharya concludes that while most analyses of auction success attempt to lay the blame on specific aspects of auction design, success at auction appears to be less predictable and more influenced by extraneous factors than is normally credited.

Auctions may also be inefficient in practice rather than in design. Auction design in practice does not incorporate any understanding of political constraints faced by the regulator from lobbying, or from special interest groups (Loertscher and Wilkening 2011). This is all the more relevant when one considers that spectrum allocation represents the creation or reassignment of

use rights in a very profitable sector. The conventional argument would be that this is precisely the reason that one should use a transparent auction mechanism, to avoid opportunities for rent seeking.

However, underlying this is the assumption that the market would operate most efficiently in the absence of these rents. If instead, the sector required a certain proportion of the rents to be left on the table for the players in the sector in order to manage growth and protect against the risks (market discovery risks, technological risks and regulatory risks) of operating in a nascent telecommunications sector, this then begins to raise a set of very different objectives for spectrum allocation and auction design. Auction design would then need to focus on neither revenue maximization, nor competition maximization, but on providing some measure of rent protection to the sector.

This view that maximizes the extraction of all rents from the spectrum right assignment by the state is a static view of efficiency. It is predicated on the assumption that the provision of a competitive market will deal with most market failures and is therefore the single most important criterion for efficiency in the allocation process. However, there may be a number of other failures that this perspective does not address. The high upfront investment costs and low gestational period of the sector may involve an investment risk. Overcoming failures in credit markets or sharing/ subsidizing investment costs may be required to drive efficiency in the sector. Similarly, the speed of innovation in the sector also presents a significant risk in long term investments, especially when the sector is relatively inexperienced. Innovation (Schumpeterian) rents and rents that subsidize learning and catching up may help overcome these failures. Regulatory and policy uncertainty also result in market failures constraining investment in the sector. In a sector with pervasive market failures, maximizing the extraction of value through auctions does not lead to dynamic efficiency outcomes. Instead, allowing some rents to

remain in the sector to address market failures may lead to far greater efficiency.

What will determine the efficiency of these rents is the ability to target these rents to address the specific market failures that face the sector. Rents that are based on specific performance conditions have been used in many sectors and markets to address specific failures that constrain those markets (Khan 2000c, Chang, Rowthorn, and WIDER. 1995). However, in order that they remain dynamically efficient, these rents need to be monitored and the threat of withdrawal on non-performance needs to be credible (Khan 2000c).

The arguments on auction vs. administrative allocation need to be viewed from the perspective of dynamic efficiency. Under the circumstances, there may be conditions where the auction is not the most efficient method of allocation. The above perspective is particularly relevant in the Indian context where the state has moved from auction to administrative allocation and back to auctions for spectrum assignment. The policy since 2010 to assign spectrum only through auctions and to maximize rent extraction for the state has had implications for the evolution of the sector in India and the dynamic implications for the sector's profitability, as we will see in this thesis.

## **2.5 Summary**

This chapter has described the contours of the telecom sector and the technology that underpins it. These factors also influence the economics of the sector and its levels of competitiveness. While the market is predominantly in voice calls based on 2G technology in the 900 MHz and 1800 MHz bands of spectrum, mobile data access, mirroring worldwide trends, is becoming

increasingly important in the sector in India. With this emerging trend, 3G and 4G technologies will play an increasing part in shaping sector dynamics. There appears to be a natural tendency towards agglomeration in the sector, and the sector worldwide appears to consolidate into 2 or 3 main players in mobile telephony. Most of the work on spectrum allocations takes the view that auctions are the most efficient method of allocation since the right goes to the player who values it the most and is therefore willing to bid the highest. However this is a very static view of allocative efficiency. A more dynamic view must take into account the possible market failures such as risk or barriers to innovation and learning that need to be overcome in an emerging, fast changing and technologically advanced sector like mobile telephony. If auction design cannot be modified to ensure that these objectives are met, the more efficient system of spectrum allocation may well be administrative. Understanding the sector from the perspective of rent flows allows us to interrogate the objectives behind the allocation more robustly rather than apply an automatic assumption of static efficiency.

The following chapter will explore the specific characteristics of the Indian telecom sector. It will show that the particular dynamics of development of the Indian market make it both a greater source of rents and more intensely contested than many other telecom markets worldwide.

## **Chapter 3: India's Sector Dynamics**

### **3.1 Introduction:**

The objective of this chapter is to establish some critical dynamics of the Indian telecom sector that impact the level of rent and the intensity of contests over rent that can be seen in the sector. In the introductory chapter we have argued that the phenomenal growth of the sector is hard to explain by looking at the changing policy stances in the sector and the high levels of corruption. The Good Governance model would suggest that these policies should have been detrimental to the sector. In fact the growth of the sector is often characterized as having happened in spite of sectoral policy rather than because of it. Explaining these policy choices as a result of either incompetence or malfeasance of state officials is insufficiently robust, as attempts to improve governance do not translate into either policy stability or the removal of corruption. We have argued that viewing the development of the sector as a process affected by the rents created during the process of right definition in the sector may give us an alternative way to explain choice of policy as well as the impact of the policy chosen on the evolution of the sector. Before we explore the theoretical basis for a rent analysis of the sector in a subsequent chapter, however, this chapter will attempt to establish the characteristics of the sector that make it a rent-rich sector and how this drives contests over rent in the Indian context.

The first section of this chapter explores why some of the income flows in the sector have a rent-like nature and why these rents are not only useful but essential for the operation of the sector. We argue that policy that allots rights of use of spectrum create income flows that are rents and that these rents are

necessary since the use rights that underpin them are essential for the efficient operation of the sector. We also explore the other roles that rents in the sector may perform specifically in the Indian context. In this we have used Khan's (2000c, b) theorization on the efficiency of rents.

The next section of this chapter looks at the growth of Indian telecom in the context of the worldwide development of the telecom sector. It will show that the growth of mobile telephony in India has been extremely strong even in the context of strong growth for the industry the world over, and the lower-than-average tele-density and mobile phone penetrations are evidence of untapped market potential. While the sector generally tends to be oligopolistic with a maximum of 3 or 4 players in each market, the Indian market is unusually crowded. Also, despite the high subscriber base, the average spend per consumer in India tends to be much lower than world averages. The peculiar structure of the sector in India that developed for historical reasons has also led to greater levels of competition and a larger number of small and marginal players in the sector. This combination of factors puts pressure on service provider margins and increases the intensity of contests over rents in the sector. The size of the sector in terms of revenues gives an indication of the potential scale of rents in the sector. The revenues that flow from the sector to the state's budgets are also indicative of the size of the sector.

This chapter will also consider the economics of the service providers in this industry. A cursory glance at the balance sheets of service provider companies is enough to establish the importance of rents for the economics of operation in this business. Large parts of the costs of operation and therefore the profitability of the business is determined by factors shaped by regulation. The biggest source of rent in the sector arises from the specification of use rights through the assignment of spectrum licenses. The state also determines pricing in the sector. Pricing, and therefore firm profitability, in turn impact the level

of investment in technology and therefore impact the dynamic efficiency of the sector.

A look at the role of rents in the sector, the particular features of the Indian sector that cause high rents and intense contests for the rents, and an analysis of the economics of the firms within the sector all confirm the importance of rents in the telecom sector. It also marks the value of an analysis that begins from the perspective of rents to explain the policy shifts in the sector and their impact on sector outcomes.

### **3.2 Rents, Spectrum Rights and Policy**

An economic rent is an income “higher than the minimum that a person would have accepted, the minimum being usually defined as the income in his or her next best opportunity” (Khan 2000c: 1). While rents can arise in different contexts – monopoly, natural resources, policy, etc. – this study is particularly interested in the rents that arise from the policy that creates use rights in the telecom sector. For the purpose of this study, we are applying Khan’s (ibid) definition of policy-created rents as the income that is associated with particular institutional or policy changes or alternatively, an incremental income that would not exist in the absence of these policy changes.

The rights assigned in spectrum are not property rights in the strictest sense, as they do not assign ownership over the resource, merely the right to use it. However, the concept is analogous to property rights, and the development of the theory in terms of property rights can be applied to use rights in spectrum. This chapter will therefore consider the elements of theory that apply to property rights as applicable to our thesis.



Let us consider why these income streams have the character of rents. When a resource is finite and non-replicable, then free and open access to the resource causes a welfare loss due to the free access problem. A lake is susceptible to over-fishing and depletion of fish stock in the absence of rules governing access. Natural resources in general and non-renewables in particular are susceptible to the free access problem. To overcome the free access problem, use rights, i.e. rights that specify the access or use of the scarce resource need to be defined. In restricting access for some however, the right gives rise to income streams that accrue to the holder of the right. These income streams that arise, not from production but from the ownership of a right, are economic rents. The policy or institutional change that specified the right therefore also gave rise to rent streams.

Property rights that are defined in such a way so as to restrict the access to the resource to only one or very few recipients could give rise to a monopoly and the monopoly rights allow the recipients to make monopoly rents. These monopoly rents are the form of rents most often considered when rents are discussed in a neo-classical analysis. Monopoly rents are perceived to be inefficient since the monopolist has the market power to manipulate prices away from the most efficient price. However, in the case of natural resource rents, rights are necessary for the effective use of the resource and therefore the rents do not signal inefficiency.

The crucial resource in the telecom sector is spectrum (radio waves). Mobile telephony is restricted in terms of the wavelengths it can operate in. In order to prevent interference and so that the wavelength can be used most efficiently, the specific frequency bands within which each network transmits also need to be separate. Chapter 4 will explore in more detail the exact nature of the

restrictions on spectrum use, the market failures they arise from and the rents that the allocation of rights create, but for the purpose of our discussion here it is sufficient to note that spectrum is a scarce resource although it does not get depleted with use and is therefore renewable in that sense. The access to spectrum therefore needs to be restricted and the bands within which each network operator can transmit signals needs to be specified in order for the sector to be operable.

In other words, the spectrum can only be efficiently used through the definition of use rights in the sector that govern its access. Not specifying separate bands for each operator to transmit in is theoretically possible but would require a very high degree of coordination between the different service providers. Having a single TSP for the entire market would, in theory, minimize these high costs of coordination but the beneficial effects of competition would be lost. It would also require a high degree of regulation on the part of the state to protect against monopoly pricing and to ensure innovation and development. In the absence of the state capacity to manage this system, the preferred market structure would be one that allows a limited number of service providers to operate within pre-assigned and mutually exclusive bands to avoid interference. The service provider needs to purchase the right to operate in this band of spectrum in the form of a spectrum license from the state. The state asserts a monopoly in the allocation of spectrum as it is able to close down unlicensed transmissions. Inasmuch as spectrum allocation defines the right (of an individual or firm) to use an intangible resource to the exclusion of others, the allocation of spectrum creates use rights. Therefore the income that flows from the specification of this right can be regarded as a rent. Thus one characteristic of the spectrum rent is very analogous to the natural resource rents that are created when a free access resource like a lake or a pasture has use rights defined over it.

If spectrum licenses are rights to operate within the sector, the owner of the right has access to an income that would be absent or much lower in the absence of the exclusive right, and thereby enjoys a rent that can be shared in different proportions with the state and other stakeholders. The price of the spectrum license, which depends on the mechanism of allocation, determines the way in which the rent is split between the operator and the state, and this determination can have important effects on the strategies of investment and pricing of the operator. In addition, the determination of the rent and its allocation can be determined by the political and policy imperatives of the state, and may in turn influence the evolution of political and policy imperatives. This is particularly important given the very significant rents that the state can potentially capture through the pricing and allocation of spectrum licenses.

The access to spectrum may also need to be restricted to a few players to create monopoly rents since investment requirements in an infrastructure sector such as telephony tend to be high. While the infrastructure investment in mobile telephony is not as high as fixed line, there is nevertheless a substantial investment required to operate in the sector. Thus restricting entry to one or a few players may be necessary to create monopoly rents that justify investments in the sector. It is theoretically possible to calculate, based on technical and economic conditions, the optimal number of service providers in the sector. Worldwide, the long run tendency in most mobile telecom markets is the profitable existence of three or four big players in each market.

However, other types of rent may also be required to ensure the efficient development of the service. Khan (2000b, c, d, 2009b) explores common market failures in developing country contexts that may require rents to be allowed to producers in order to overcome these failures. In the early stages of the evolution of the telecom sector, for example, TSPs needed to make

significant infrastructural investments under a high degree of uncertainty regarding the size of the market. India's evolving policy and regulatory framework also gave rise to policy risks. The pace of change of technology also adds to the level of uncertainty in the sector. As discussed in the previous chapter, from the perspective that market failures are pervasive rather than limited to small and specific features of the market, there is a much greater role for rents in ensuring the dynamic efficiency of the sector.

As with a natural resource rent, the distribution of the rent between the state and holders of the right is determined by the leasing, sale or other policies through which the rights are created and allocated. The rents that are created from the right accrue to the holder of the right, in this case, the network operator firm in the telecom sector. However, the state can claim a share of these rents for itself, or ensure that a portion of these rents are dissipated by being passed on to consumers through a variety of rent management mechanisms such as auctioning, taxing or extorting. An auction of these rights (i.e. an auction of spectrum) is, in effect, a transfer of some of these future rent streams from the private sector to the state. Price setting and setting of interconnect charges<sup>14</sup> are other mechanisms of rent management by way of which the state ensures that the rent is either dissipated to consumers in the former or, in the latter case, is extracted by the state-run fixed line incumbent in the early stages of development of the sector (since in a nascent mobile telephony sector, the interconnect charges collected by existing fixed line networks is the highest). State policies therefore, both create rents for the sector, and also determine the share of the rents that the state extracts from the sector in 'return' for ensuring the future stream of rents going to the firms enjoying an allocation of spectrum and other rights in the sector.

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<sup>14</sup> Interconnect charge refers to the charge to the originating network for use of the terminating network or the charges that a telecom service provider firm pays other market players for the use of their network to reach one of their subscribers.

As discussed earlier, auction designs which develop from a static view of sectoral efficiency and do not take into account the pervasive market failures that the sector faces are likely to extract a larger portion of the rent for the state, leaving less on the table for producers. This could impact the development of the sector. On the other hand, rents which remain in the hands of the producers but are not necessary to overcome market failures, may add to the profitability of the sector but may imply a notional loss in terms of social benefit.

Thus an understanding of the economics of the sector and the policy options available has to begin with a discussion of the rents that characterize the operation of the sector. However, rents in telecom have not received much attention in analyses of the functioning of the sector. This is possibly due to the fact that the mobile telephony sector is largely privatized, and the competitive aspects of the sector can hide the fact that it is characterized by the presence of significant rents. It is argued here that studying the rent flows as a result of policy decisions in the sector may provide a better understanding of the reasons behind changes in policy. The following section examines the particular features of the India telecom sector that indicate not only a high level of rent creation but also a significant level of contestation over rent.

### **3.3 Sector Structure and Dynamics**

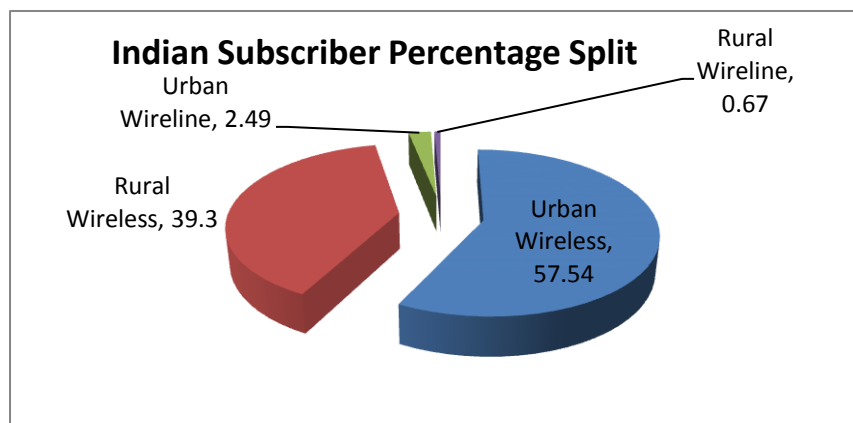
#### **3.3.1 Telecom growth metrics: Putting India in perspective**

Across the world, mobile telephony has grown since its introduction in the 1990s and has completely changed the face of telecom markets worldwide. The number of mobile subscribers has grown at 15% per year and there were 6,600

million mobile subscribers worldwide, as compared to 1,150 million fixed line subscribers at the end of 2013, and mobile tele density levels worldwide stood at 93% (ITU 2014: 6) as compared to a paltry 16% for fixed line.

The Indian telecommunication market is no different. If anything, the comparison between mobile and fixed line growth is starker (**Figure 3.1**). **Table 3.1** gives the current figures for India. At the end of March 2014, India had a total of 933 million connections with a tele density of 75%. But 97% of these connections were wireless or mobile connections. In fact fixed line connections have declined since 2005. 60% of all telephone connections are urban and 87% of all connections are private connections rather than public phones.

*Figure 3.1: Indian Market Split by Wireless and Wireline*



Source: Indian Telecom Service Performance Indicators (TRAI 2013a) (Oct –Dec 2013)

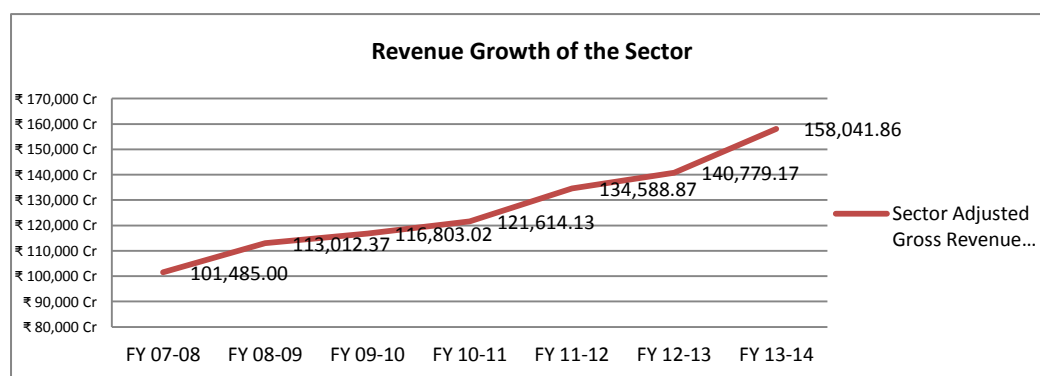
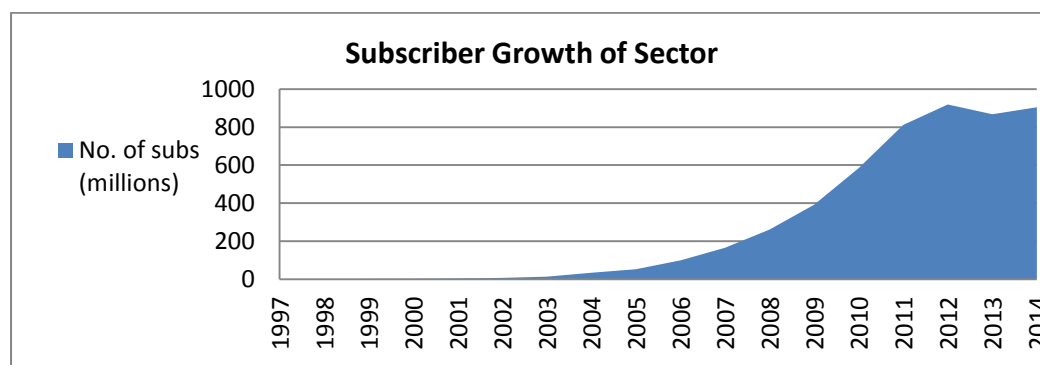
The mobile sector has grown continuously if not steadily since its inception in 1995 both in terms of number of subscribers and in terms of total revenue (**Figure 3.2**). Market penetration seems to have slowed since 2012 but the market has continued to grow strongly in revenue terms.

*Table 3.1: Indian Telecom Statistics Summary*

Sl. No.	Item	At the end of March				
		2011	2012	2013	2014	
1	Number of Telephones (in million)	Overall	846.33	951.35	898.02	933.02
2		Wire line	34.73	32.17	30.21	28.50
3		Wireless	811.60	919.17	867.81	904.52
4		Rural	282.29	330.83	349.21	377.78
5		Urban	564.04	620.52	548.80	555.23
6	Tele-density (Telephones per 100 persons)	Overall	70.89	78.66	73.32	75.23
7		Rural	33.83	39.26	41.05	44.01
8		Urban	156.93	169.17	146.64	145.46
9	%age share	Wireless	95.90	96.62	96.64	96.95
10		Public	14.89	13.69	14.49	12.87
11		Private	85.11	86.31	85.51	87.13
12	%age growth of Total Telephones-over previous year		36.22	12.41	(-)-5.61	3.90

Source: DOT Annual Report (DOT 2014) p.2. Available at [http://www.dot.gov.in/sites/default/files/AR%202013-14%20English%20%282%29\\_1.pdf](http://www.dot.gov.in/sites/default/files/AR%202013-14%20English%20%282%29_1.pdf)

*Figure 3.2: Growth of Indian Wireless sector – subscribers and revenues*

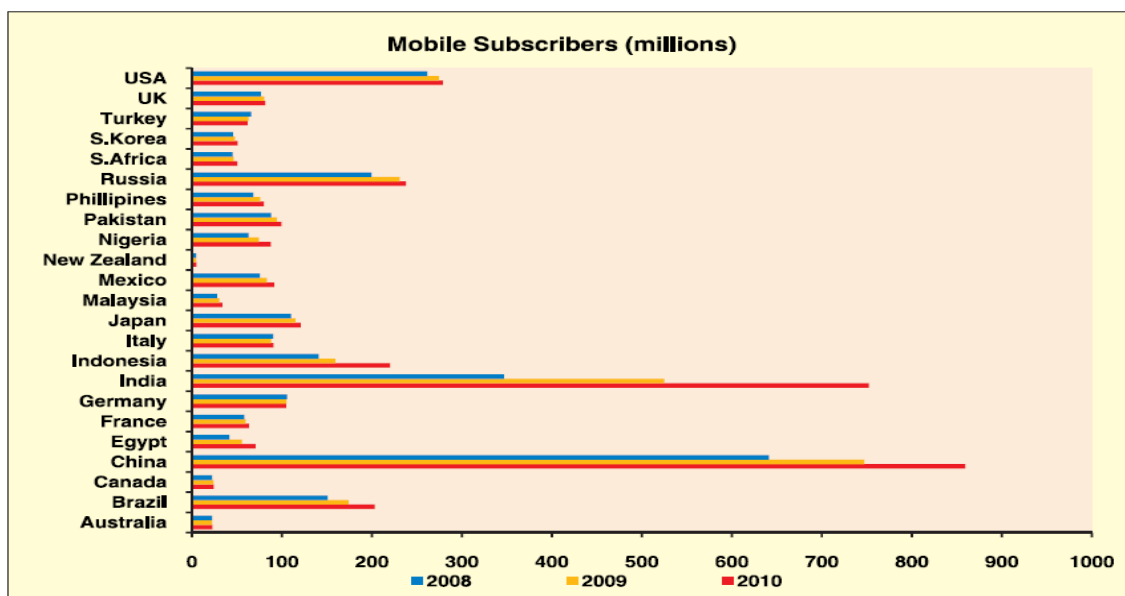


Source: Various TRAI quarterly reports. Available at [http://www.trai.gov.in/Content/PerformanceIndicatorsReports/1\\_1\\_PerformanceIndicatorsReports.aspx](http://www.trai.gov.in/Content/PerformanceIndicatorsReports/1_1_PerformanceIndicatorsReports.aspx)

In terms of number of subscribers India is now the second largest market in the world after China and is nearly three times the size of the third largest, USA.

**Figures 3.3** and **3.4** compare India with a set of 22 other countries in terms of subscriber base and tele density. Both India and China show significant growth potential from the perspective of tele density. However, urban tele density in India has been flattening in the last couple of years while rural tele density continues to grow (**Figure 3.5**). The dip in urban tele density in 2012 was due to a government regulation that imposed more stringent guidelines on proof of identity and address to apply for a new connection. This resulted in a significant drop in the number of multiple sim cards with the same user<sup>15</sup>.

*Figure 3.3: Subscriber Base - Country Comparisons*

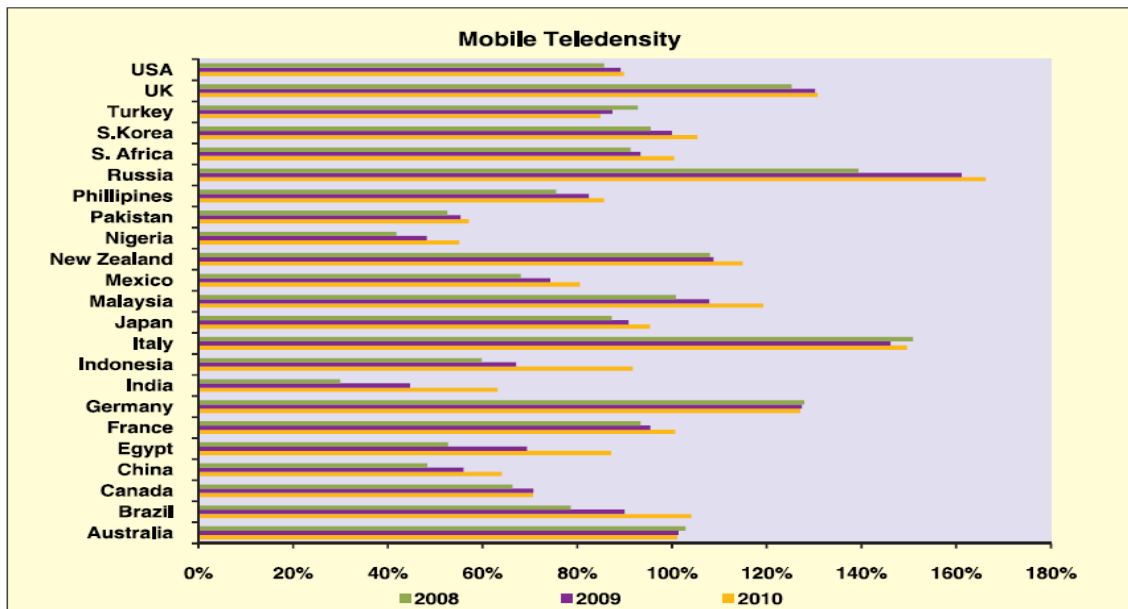


Source: TRAI Study Paper (2012b) p.6.

<sup>15</sup> In many markets, phone users tend to have multiple sim cards from multiple service providers in order to access the different benefits of product or coverage offered by them. Many modern smartphones come with a capability to hold multiple sim cards that allow the user to choose the service he wants to use for a particular call.

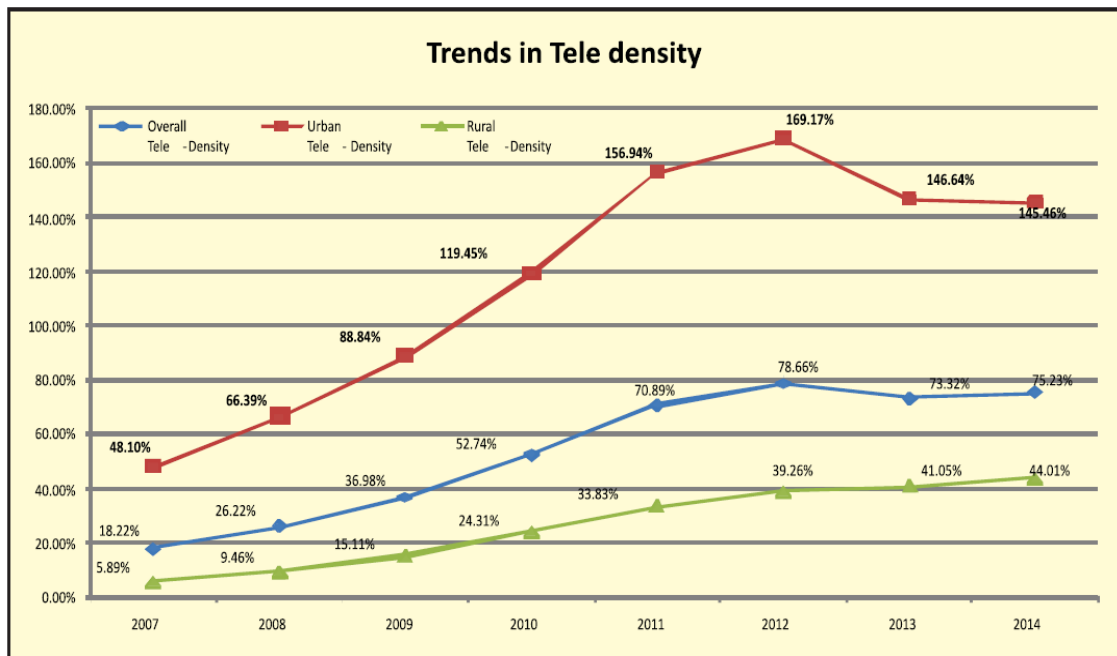


Figure 3.4: Tele-density – Country Comparisons



Source: TRAI Study Paper (2012b: 6)

Figure 3.5: India – Tele-density Trends

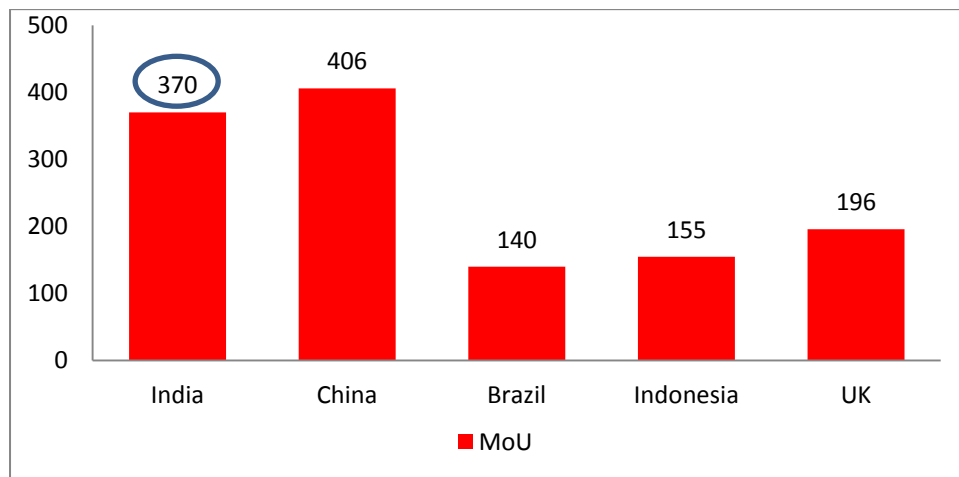


Source: DOT Annual Report (2014: 3), Available at

[http://www.dot.gov.in/sites/default/files/AR%202013-14%20English%20%282%29\\_1.pdf](http://www.dot.gov.in/sites/default/files/AR%202013-14%20English%20%282%29_1.pdf).

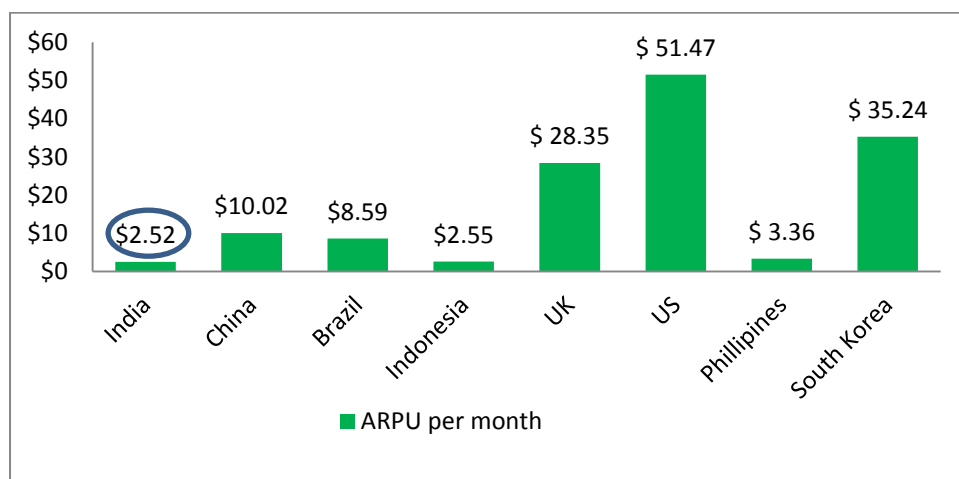
The cost of calls in India is among the lowest in the world. In terms of the number of minutes of usage (MOU)<sup>16</sup> per user per month, India is among the highest in the world (Figure 3.6). In spite of high usage, the exceedingly low cost of calls means that average revenues per user (ARPU) are very low in the Indian market (Figure 3.7).

Figure 3.6: Comparison of Minutes of Use (MOUs) across markets



Source: Data Accessed from GSMA database on mobile telephony (GSMA 2014)

Figure 3.7: Comparison of Average Revenues per User (ARPU) across markets



Source: Data Accessed from GSMA database on mobile telephony (GSMA 2014)

<sup>16</sup> Minutes of Use (MoU) is the number of voice call minutes used per user per month. Average Revenues per User (ARPU) is the average revenue received per user per month. These are commonly used comparison measures in the telecom sector.

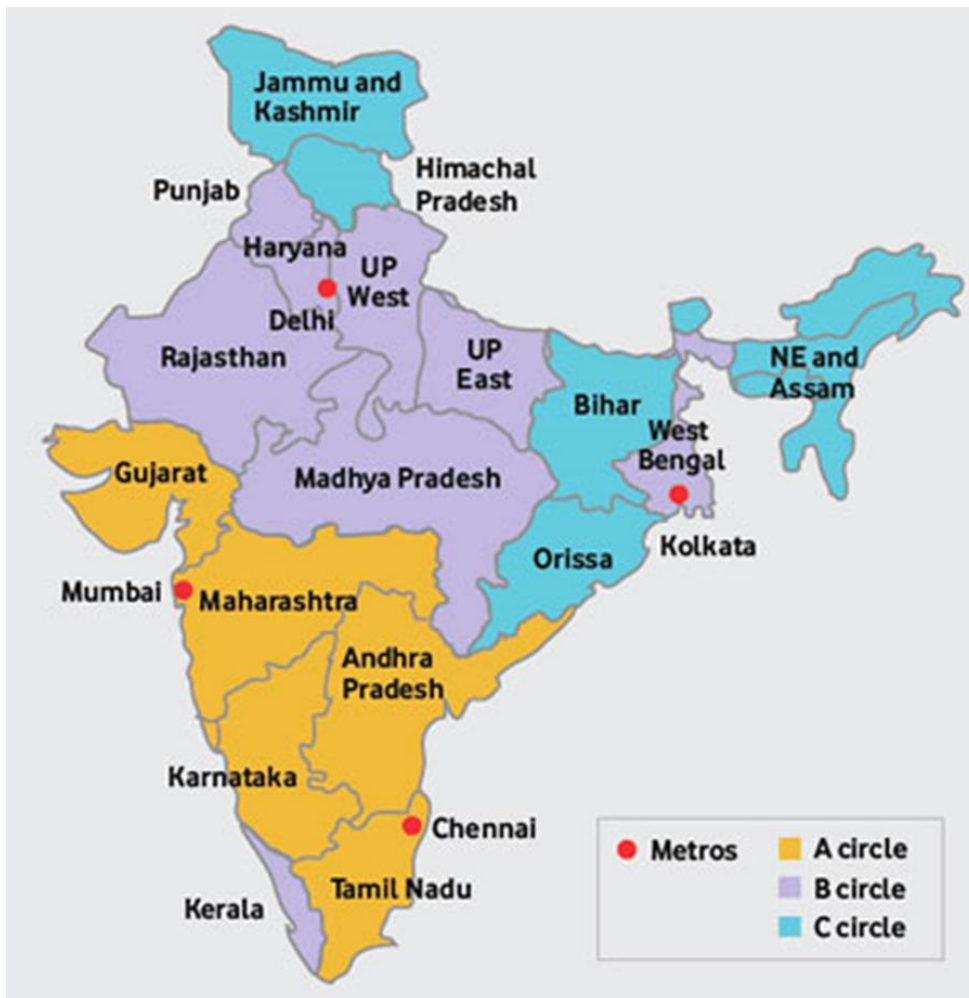
Thus while India has emerged as a key telecom market in terms of size and potential for expansion in the last decade, it is also characterized by very low levels of average spend in the category when compared to markets worldwide. The market stood at Rs.1,58,041.86 Crores (US \$ 25 Billion)<sup>17</sup> at the end of 2014. Tele densities of 75% overall and only 45% in rural areas indicate a vast untapped potential in the sector. The lack of existing wireline infrastructure makes the potential for wireless growth more attractive. The rights of use in this sector therefore constitute an extremely valuable prize. However, the spend levels in the category appear under pressure, despite high subscriber number and high usage levels because of very low costs per call reflected in low ARPUs. TSPs in the sector therefore face a downward pressure on their revenues in spite of growing market volume. This has implications for sector profitability as will be shown in a later section.

### **3.3.2 The Shape of the Market**

A peculiar feature of the Indian telecom market is that it is divided into separate markets called circles. Licenses to operate have to be bought separately for each circle and spectrum bands are assigned separately too. This section examines the consequences of this particular market structure on the dynamics of its development.

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<sup>17</sup> Conversion Rates taken at prevailing rate on 31<sup>st</sup> Dec 2014: \$1 = Rs.63.19.



*Figure 3.8: India Circle Map*

Source: COAI website. Available at <http://www.coai.com/statistics/mobile-coverage>.

The different states of the country have been classified into metro/A/ B/ C circles based on their size and market potential. India currently has a total of 19 A/B/C circles and 4 metro city circles (Figure 3.8). The Chennai metro license has been clubbed with TN resulting in a total of 22 circles. Mobile telephony licenses in India have historically been sold by circle and spectrum bands to the same operator may vary by circle.

The circle architecture that loosely corresponds to state boundaries is similar to the market system in the USA. The difference is that in India, all circles are

subject to the same rules and regulations. Circles were used in the organization of mobile telephony since fixed line networks were organized using a similar circle classification. Even the categorization of the class of circle was actually based on fixed line revenues for that region. The assigning of frequency bands also differed by circle since the same frequency bands were not available throughout. In fact one interviewee (who wished to remain anonymous) referred to the process of allocation of frequency bands in the period before mobile telephony as chaotic. Until mobile telephony, the scarcity of spectrum was not felt acutely and thus there was no focus on the efficient and orderly allocation of spectrum. The uncertainty of potential at the time of launch and the large infrastructure investment required of the first entrants to the market also made it more prudent for them to purchase licenses for specific regions rather than for all of the country.

This system of market organization has had the effect of increasing the level of competition in the sector. A number of early entrants to the sector had regional focus areas. Over time many of these have been bought out by the national players but some have transitioned to develop a national footprint themselves.

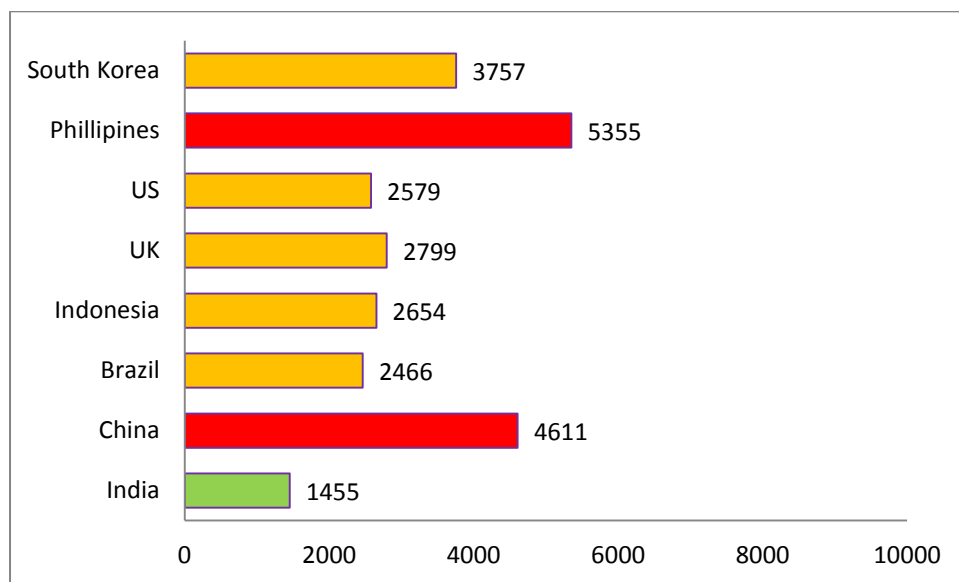
Each circle has 6 to 10 service providers licensed in each market. **Appendix 1** lists the Telecom Service Providers (TSPs) licensed by circle. Of these one is a state telecom firm (BSNL/MTNL (in the Metros)), typically one or two are CDMA operators and the rest are GSM operators<sup>18</sup>. This number of market operators is unusually high when compared to telecom markets worldwide.

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<sup>18</sup> CDMA and GSM are different technology platforms for mobile. **Section 2.2.2** covered their differences.

**Figure 3.9** uses the Herfindahl-Hirschman index (H-H Index)<sup>19</sup>, a common measure of the level of market concentration to show that the level of competition in the Indian telecom sector is higher than a number of comparative markets. The lower the index value, the higher the level of competition. India’s telecom market is the least oligopolistic of the markets compared. This is at least in part a result of the circle architecture in the sector. At various times in the development of the sector, policies have also encouraged greater participation in the sector.

*Figure 3.9: Comparison of Market Concentration in International Telecom Sectors using H-H Index*

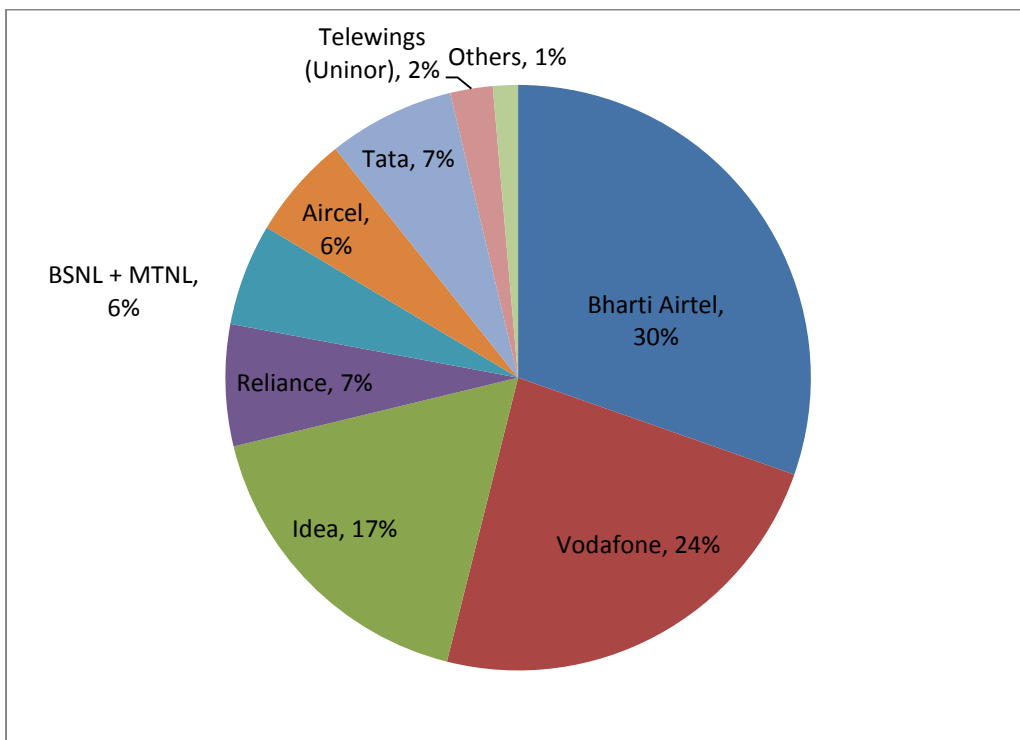


Source: H-H Index calculated using market share data from GSMA Database (GSMA 2014).

<sup>19</sup> The HHI is calculated by squaring the market share of each firm competing in a market, and then summing the resulting numbers. The HHI number can range from close to zero to 10,000. The HHI is expressed as:  $HHI = s_1^2 + s_2^2 + s_3^2 + \dots + s_n^2$  (where  $s_n$  is the market share of the  $n$ th firm). The U.S. Department of Justice uses the HHI for evaluating mergers. It considers a market with a result of less than 1,000 to be a competitive marketplace; a result of 1,000-1,800 to be a moderately concentrated marketplace; and a result of 1,800 or greater to be a highly concentrated marketplace.

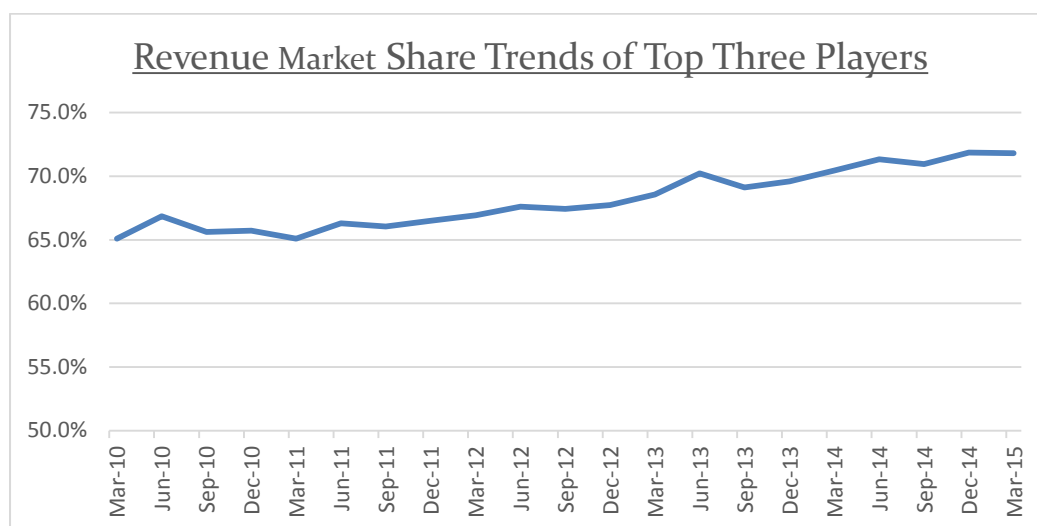
**Figure 3.10** outlines the current market share at an all-India level. While the Indian market has an unusually large number of service providers, the big three – Airtel, Vodafone, and Idea – account for a majority of the market. This is not unusual in the telecom sector worldwide. In fact, the H-H index calculated above indicated that India is less oligopolistic than comparable markets worldwide. However, as market share trends show (**Fig 3.11**), the top three firms have consolidated their position in the last 5 years, moving from a 65% share of the total market in 2010 to a 72% share of the total market by the end of 2014.

*Figure 3.10: Revenue Market Shares of all TSPs 2014*



Source: Revenue Market Shares based on Gross Revenue data for FY2014-15 Q1 TRAI(2014b) report.

*Figure 3.11: Market Share Trends of Top Three Players in India*



Note: Revenue Market Share of Airtel+Vodafone+Idea

Source: Revenue Market Shares based on Gross Revenue TRAI reports from 2010 to 2014.

The overall picture of the market that emerges is one tending to oligopoly, albeit at a far lower level of concentration than comparable markets worldwide. The structural features and the historical development of the telecom sector led to a greater number of marginal players. The higher levels of competition in the sector could imply that any rents in the sector are competed away and dissipated as lowered prices for consumer. Certainly, the low costs per call in India are indicative of a high degree of price competition in the sector.

However, the high numbers of competitors also creates a greater scarcity of spectrum and leads to intense contests for access to the scarce resource. A higher number of competitors should indicate a more level playing field in terms of market shares. Despite the unusually high number of TSPs in the Indian market however, the top three seem to control the lion's share of the market and have shown a steady growth in market share over the years. This market dominance by a few players also gives them a disproportionate power to influence policy in the sector. The source of market dominance of the top three



players will be explored by looking at their rent flows in **Chapter 8**. What the structural features indicate, however, is that there is a high degree of competition over resources in the sector, as well as a high degree of concentration of power in the sector in the hands of the three biggest players.

### **3.3.3 Sector's Contributions to National Product**

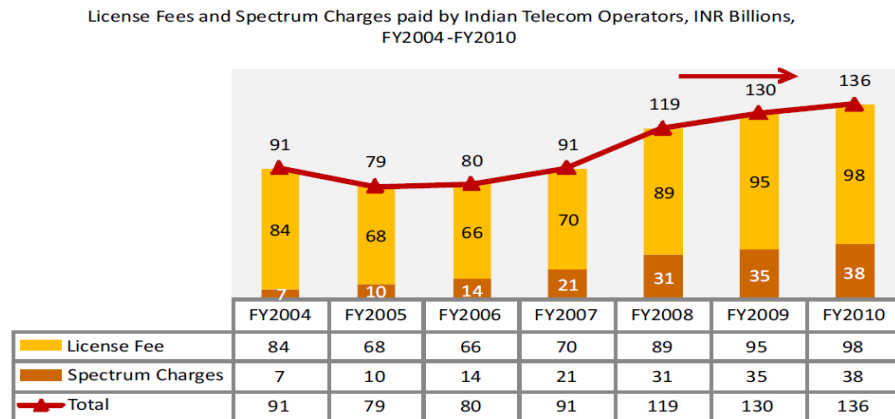
The previous section has established the presence of significant rents in the sector and the likelihood of intense competition over the rents due to the higher-than-average levels of competition and the lower-than-average returns in the sector. In this section we will explore another source of pressure on rents in the sector: that which arises from the state.

The state extracts rents from the sector through several different means. Ramachandran (2015) identifies at least nine different revenue streams that accrue to the state from the sale and use of spectrum. Apart from the sale value of spectrum at auction, the state also collects a percentage of revenue as license fee and spectrum usage charge. The license fee and spectrum usage charges collected in 2010 amounted to Rs. 136 billion (**Figure 3.12**). The state also collects service tax from the sector, estimated at around 10% of revenues (**Figure 3.13**). In 2011, Price Waterhouse Coopers (PWC) estimated that the telecom sector contributed 17% to the GDP of the Domestic IT sector.

Since a large proportion of these state extractions are revenue linked, it is in the interests of the government to maximize growth in the sector. However, since receipts from spectrum sales have become such an important source of government funds, the state also views the pricing of spectrum as an immediate source of revenue. Thus the state policy needs to manage two contradictory

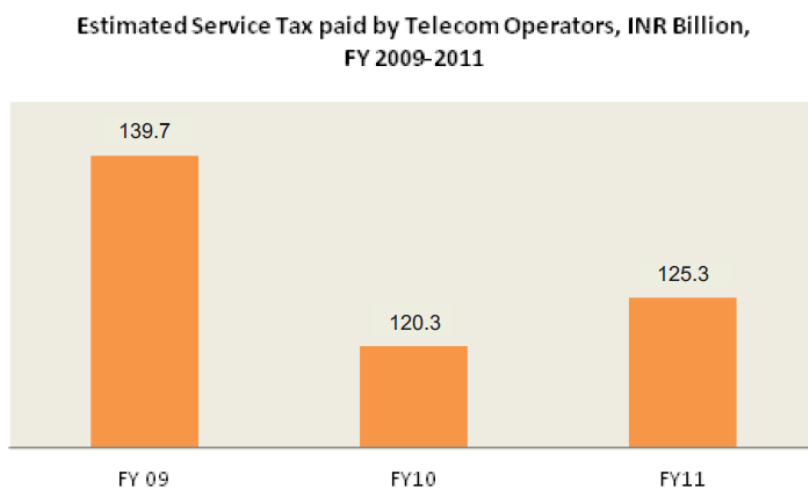
pulls – the need to maximize receipts from spectrum auctions vs. the need to ensure that pricing is such that the sector continues to maintain a healthy level of growth.

*Figure 3.12: License Fees and Spectrum Charges Extracted by the State*



Source: PWC (2011) pg. 10.

*Figure 3.13: State Extraction through Tax Revenues*



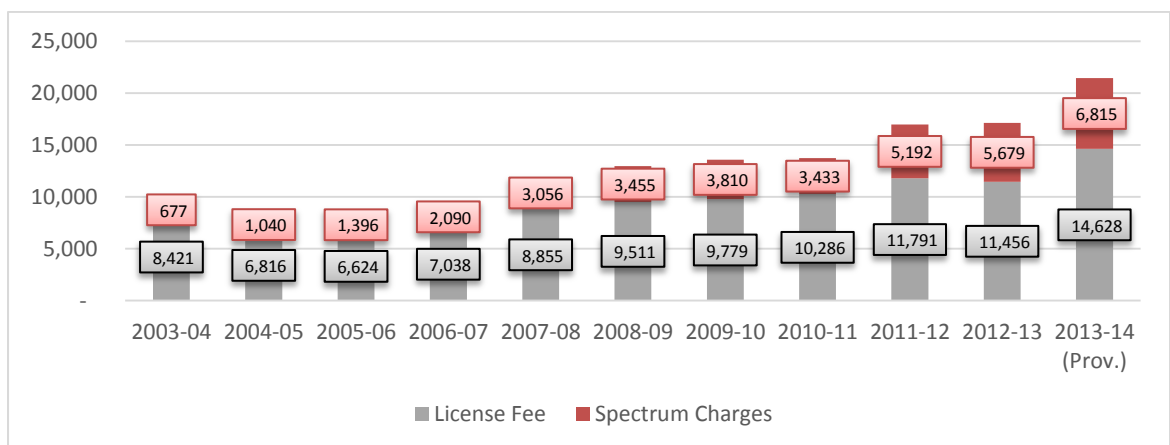
Source: PWC (2011) p.10

### 3.4 Economics of the Firm:

Firm level economics of TSPs are influenced by the particular nature of the sector’s technology and economics. The most significant feature is the structure of costs facing firms in the sector and the amount of regulatory influence on firm costs. **Appendix 2** gives selected P&L data for the top three firms in the sector today. It compares costs as a percentage of revenue for the three largest operators.

Apart from operating costs that are approximately 25% of gross revenue, the other key costs facing the sector are a regulatory license fee of 12% of revenue and some additional spectrum charges of 2–3%. These are set by the DoT and are applied to every TSP. **Figure 3.14** below shows the growth in license fees and spectrum charges over the last decade.

*Figure 3.14: License Fees and Spectrum Charges*



Source: Various Annual Reports published by DoT  
 The License Fee for FY 2003-04 includes one-time entry fee for UASL  
 For FY 13-14, the figs are based on the reports published by TRAI

TSPs have argued that license fees and charges on the sector in India are among the highest in the world. In comparison to China at 3–3.5% of sector revenues, India’s total levies and duties on the sector can add up to nearly 30% of sector revenues. (See **Table 3.2**)

*Table 3.2: Regulatory Charges Compared*

Regulatory Charges (as % of revenues)	India	China	Malaysia	Sri Lanka	Pakistan
License Fees	6% to 10%	Nil	0.5%	0.3% of Turnover + 1% of capital invested	0.5% + 0.5% R&D
Spectrum Fees	3% to 8%	~0.5%	Nil	~1.1% to turnover	Cost recovery
USOF	5% of license fees (part of licence fees)	Nil	1%	Nil	1.5%
Service Tax	10.3%	3%	5%	Telecom Levy	GST
Total	<b>19% to 28%</b>	3 to 3.5%	6.5%	1.3% turnover+ 1% invested capital + Telecom Levy	2.5% + GST+ Cost Recovery

Source: (PWC 2011) p. 19 using data from TRAI and DoT.

Total operating expenses comprise between 60–70% of gross revenue. While mobile telephony has lower fixed costs than fixed line telephony, it still requires the set up and maintenance of passive (tower maintenance) and active (electronics and switching equipment) equipment. Network operating costs comprise 25% of gross revenue. This would cover the day to day operation of mobile phone towers, including power, water, etc. A further 14–17% is the depreciation and amortization cost associated with fixed infrastructure and spectrum. In 2013, the top three companies also spent between 11 and 15% on Capex for new infrastructure.

### 3.4.1 Evolution of TSP Profitability

The different stages of sectoral evolution were briefly covered in the introductory chapter. The profitability of TSP firms has also evolved through these phases. From near collapse through to periods of greater profitability to a squeeze on margins after 2010, the viability of the sector has been primarily influenced by policy implementation. The firm's profitability in turn, affects its willingness to invest in infrastructure and its ability to compete for rents in the sector. This section will lay out the firm economics through the 6 phases of evolution defined previously. The policy drivers and the impact on the sector will be considered in greater detail in Chapter 6, which lays out the history of the sector from a rents perspective.

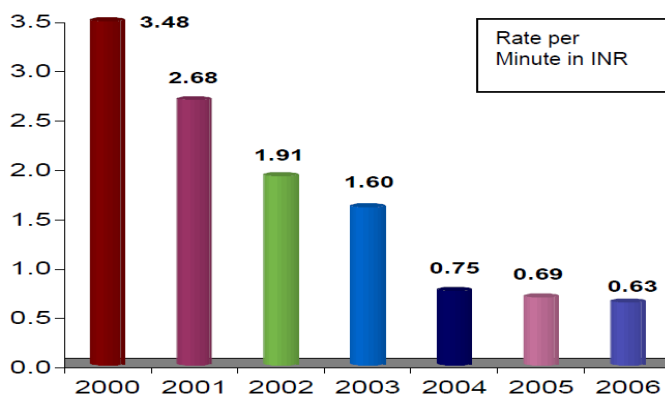
The first phase of the sector from **1995 to 1999** was a difficult one for sector operators. Burdened by high debt from the spectrum auction and investment in greenfield infrastructure, and struggling to generate revenues in the face of a nascent market, very high cost per call rates (effective cost per call rates were around Rs.14 per minute in 2000 - in comparison prices offered today go as low as Rs.0.01 per minute) and high duties and levies on the sector, most firms in the sector were defaulting on their loans by 1998. Interest on loans was as high as 27% for some firms. Even the operators in the metros, who have the highest demand and, are therefore theoretically the most profitable, posted significant losses. There is evidence from one of the studies conducted in 1998 on the sector's profitability that of all the operators in the sector in 1997-98, only Bharti Airtel made a profit (Desai 2006).

The years between **1999 and 2003** saw a reversal of fortunes for the players in the sector. By 2000, there was widespread recognition that the TSPs' profitability was so poor that the sector risked collapse. The failure of the firms

would hit the financial sector, since it had an exposure of around Rs. 100 billion (COAI 2007b) invested in debt in the telecom sector. Thus **1999–2003** was a period of course correction for the sector in terms of TSP profitability. A number of measures starting with NTP 1999 reduced the license payouts of the TSPs, increased competition and allowed them to cut down the prices of calls in order to grow the market. This phase saw an improvement in profitability of TSPs and allowed some market consolidation by key players.

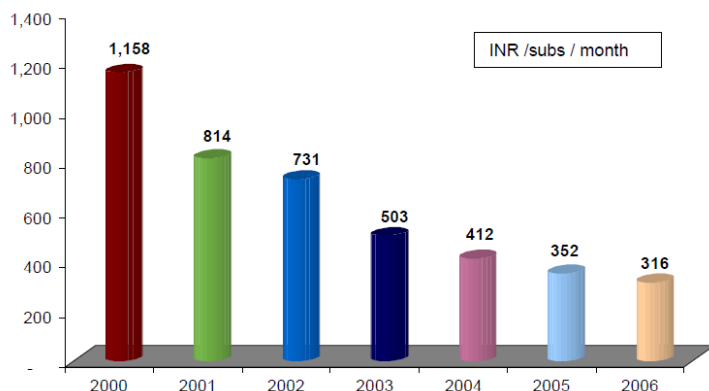
The period **2003 - 2007** has been referred to by an interviewee from a TSP as the ‘Golden Age’ of Indian telecom. The top six players in the sector consolidated market share gains. The dropping of costs per call led to a sudden explosion of subscriber numbers from 2003 onwards. Although Average Revenues per User (ARPU) were declining (**Figure 3.16**), the declining ARPUs were a function of the decline in the average cost per call (**Figure 3.15**). However ARPUs did not fall as steeply as the rate per minute, showing the benefit of a relatively good set of subscribers – the cream of the crop, the higher spenders on mobile telephony. Firm profitability increased.

*Figure 3.15: Dropping costs per call 2000-2006*



Source: COAI (2007a: 4) citing PWC Benchmarking study 2006

*Figure 3.16: Declining ARPUs but at lower rates than declining cost per call*

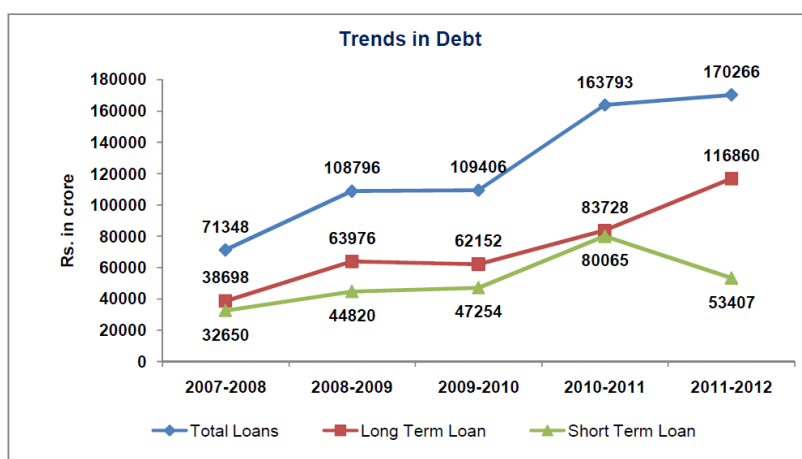


Source: COAI (2007a: 4) citing PWC Benchmarking study 2006

This picture of strong sector profitability began to change after 2007. The incumbent firms in the sector faced increased competition in the period between **2007 and 2009**, arising from new licensing in 2008. Price competition became more severe as a result. Incumbent players were pushed to increase investment in infrastructure in the face of competition, especially from the entry of international telecom firms. New entrant firms were under pressure to begin operations in the sector and were also investing in infrastructure. Debt levels in the sector increased. The number of competitors also drove greater competition for spectrum.

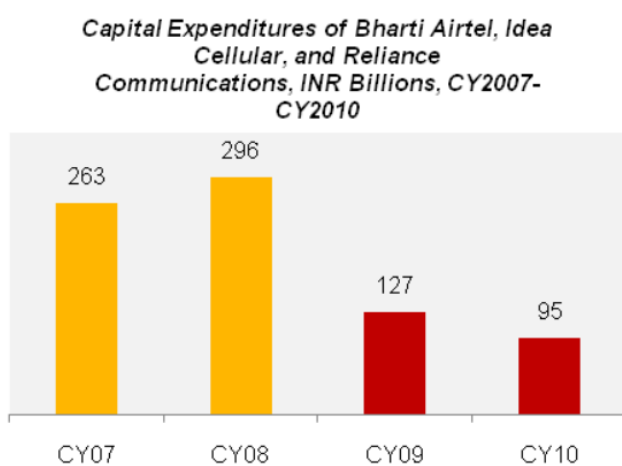
The 3G licensing in **2010** further increased debt holdings of most TSPs (**Figure 3.17**). After **2012**, although competition levels came down, the debt burdens faced by operator firms was so high the operators began to cut back on investment in infrastructure. Capital expenditures dropped as a consequence of debt pressure on balance sheets (**Fig 3.18**).

Figure 3.17: Debt Trends 2007-2012



Source: (TRAI 2013b: 12)

Figure 3.18: Dropping Capex



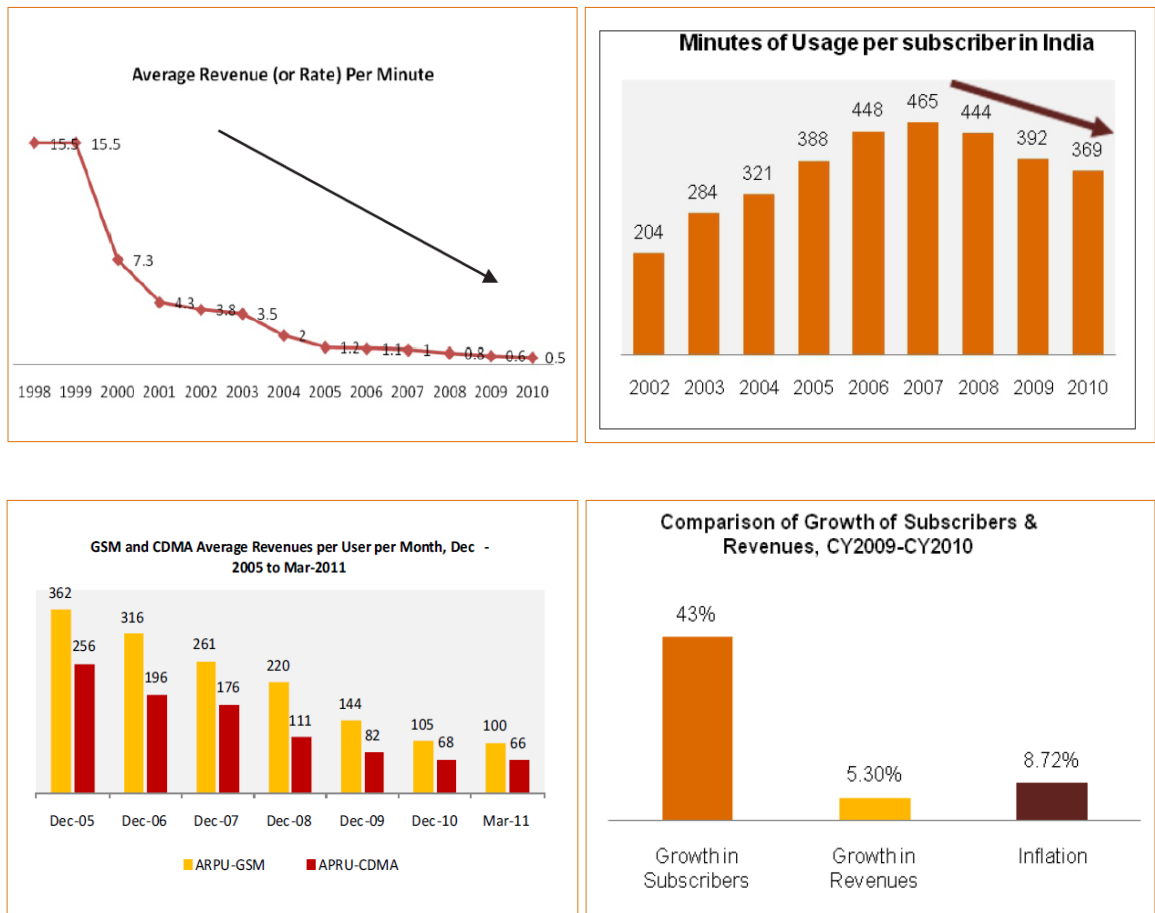
Source: (PWC 2011: 13)

As discussed earlier, the high degree of technology transfer in the industry make product differentiation difficult. TSPs in India compete on coverage (where the larger players have an inherent advantage) and price (where smaller players can undercut price more strongly but larger players may have deeper pockets). The increase in competition after the 2008 allocation had a downward



impact on revenue per minute. The continuing pressure on call prices combined with dropping minutes of use led to stagnation in ARPUs (Fig 3.19).

Figure 3.19: Dropping call volumes leading to stagnating revenues per user



Source: (PWC 2011: 5-6).

Declining ARPUs and high debt impacted sector profitability up to 2012 (Table 3.3). However, the sector appears to have seen a slow recovery from 2013 to the end of 2014. In spite of profitability issues from 2007, it is interesting to note that the top three players – Airtel, Vodafone and Idea – have consolidated their position and improved profitability in the last couple of years. The annual reports of these firms for 2013–14 show that EBITDA (Earnings before Interest, Tax, Depreciations and Amortization) margins are back up above 30% for the

top three players (**Appendix 2**). There are two big reasons for this improvement. First, the withdrawal of the 2008 licenses in 2012 reduced pressure on pricing and second, the growth in the data market allowed the big players to gain revenue share from data usage. The impact of data will be considered separately in the following section.

*Table 3.3: Declining Profitability up to 2012*

<b>Statement of Revenue and Profitability of 5 Access Service Providers (Rs. in Crore)</b>					
<b>Particulars</b>	<b>2007-08</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>
Total Revenue	75,031	92,051	99,895	1,13,150	1,24,133
Opex	49,231	64,635	74,204	88,257	96,657
EBITDA	25,800	27,416	25,691	24,893	27,476
<b>EBITDA Margin</b>	<b>34%</b>	<b>30%</b>	<b>26%</b>	<b>22%</b>	<b>22%</b>
PBIT	15,838	16,536	14,376	12,264	11,886
<b>PBIT Margin</b>	<b>21%</b>	<b>18%</b>	<b>14%</b>	<b>11%</b>	<b>10%</b>
<small>Source: TRAI Analysis Five access service providers are Bharti, Vodafone, Idea, Reliance and Tata (as per table 23 of TRAI's study paper on "Shareholding pattern, financing pattern and capital structure of Indian private telecom access service providers" dated 19<sup>th</sup> November, 2013.</small>					

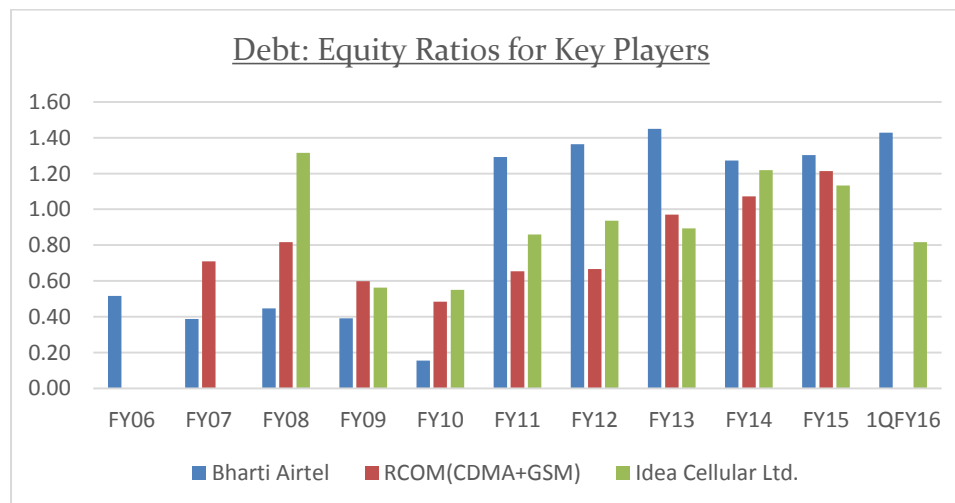
Source: (TRAI 2013b: 30) summarized from Table 23.

The establishment of 3G required renewed investment in new active and passive infrastructure. The top three firms in the sector have increased their capex since 2010, helped by better financial performance and better bottom lines.

Spectrum costs are reflected in P&L statements through amortization. Until the 3G auction of 2010, most of the spectrum that the TSPs held had been given

through administrative allocation<sup>20</sup>. Most of the initial allocation of spectrum was administratively allocated to producers rather than through a multi-stage competitive auction, in other words, the spectrum allocation was bundled free along with the purchase of a license. The auction of 1996 was a pressure on company balance sheets at the nascent stage of the industry but by 2010, the impact of spectrum debt on company balance sheets was minimal. The 3G auction however signaled to the government that spectrum auctions raised much higher receipts than administrative allocation. Since 2010, all spectrum, including the earlier administrative spectrum that has come up for renewal, has been unbundled from the license and needs to be bought at auction. Spectrum cost has therefore become a large part of producer debt and is set to continue to rise as more spectrum comes up for auction or re-auction in the coming years.

*Figure 3.20: Debt Equity Ratios of key Players*



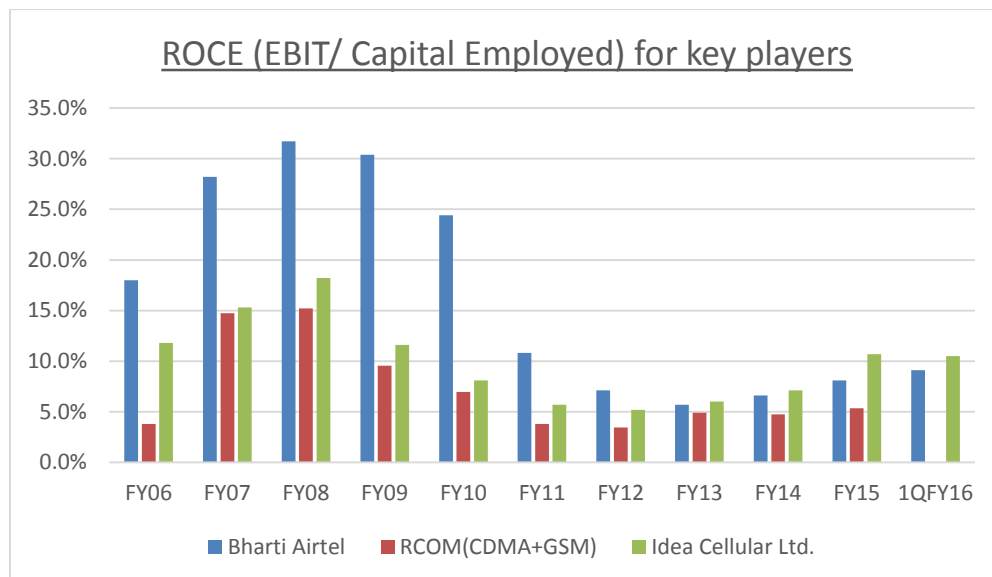
Source: Data accessed from company balance sheets. Charts authors own.

<sup>20</sup> Administrative allocation is the term used in the Indian telecom sector to refer to the spectrum that was assigned at state determined prices rather than an open market auction. All spectrum assigned until 2010 falls in this category.

The EBITDA (Earnings before Tax, Interest, Depreciation and Amortization) does not reflect the increasing cost of either spectrum or investment in infrastructure. Debt to equity ratios (**Figure 3.20**) may be a better measure of the pressures faced by telecom firms. Given the high infrastructure costs of the sector, it has traditionally enjoyed higher EBITDAs to support capital investment requirements.

The measure of Return on Capital Employed (ROCE = EBIT/Debt+Equity) shows the impact of both spectrum costs and increasing investment in active and passive infrastructure. **Figure 3.21** below shows that ROCE for the industry is declining and this remains the key challenge for the growth of the sector.

*Figure 3.21: Declining Return on Capital Employed (ROCE) for the sector*



Source: Data accessed from company balance sheets. Charts authors own.

In sum, the profitability of the firms in the sector is highly dependent on policy. Although the sector benefits from large volumes and untapped potential, the

low revenues per user and high costs of both spectrum and infrastructure investments exert a downward pressure on sectoral profitability. While profitability levels have varied throughout the sector's history, recent auctions of spectrum at very high prices have placed a high debt burden on the sector. TSPs claim that their survival requires regulatory support. The reduction in capital expenditures is a consequence of the debt levels caused by spectrum auctions since 2010.

### 3.4.2 Data

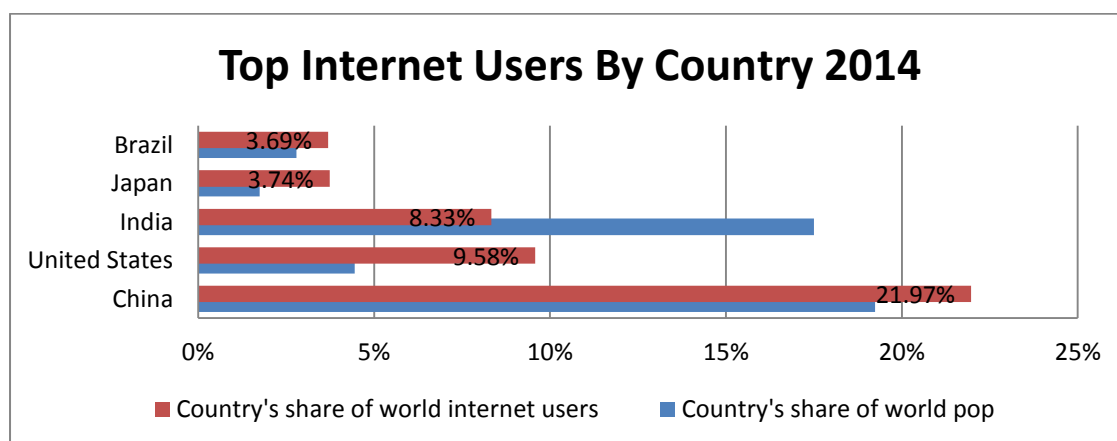
The pressure on voice revenues has been somewhat compensated in India by the phenomenal growth in data revenues. With improving technologies, data access over mobiles has become faster<sup>21</sup>. Given India's patchy network of landlines and fiber to the home and the physical breadth of distribution of population, it seems likely that India's growth in internet access and usage will come from mobile internet access rather than fixed line.

India has the third largest base of internet users. The top five internet user populations are ranked below. India has also among the lowest penetrations in this group, indicating a huge potential growth segment. (**Figure 3.22, Figure 3.23**)

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<sup>21</sup> Note that the speed of data access in mobiles is only partly governed by the technology. Transmission in mobiles is only wireless up to the tower. Between the tower and the switching centre, the transmission is carried by fixed lines. However in 2G and 3G the slowest part of the network is the wireless section and therefore the transmission technology makes a difference to speeds achieved on a mobile network.

Figure 3.22: Internet Market Potential in India



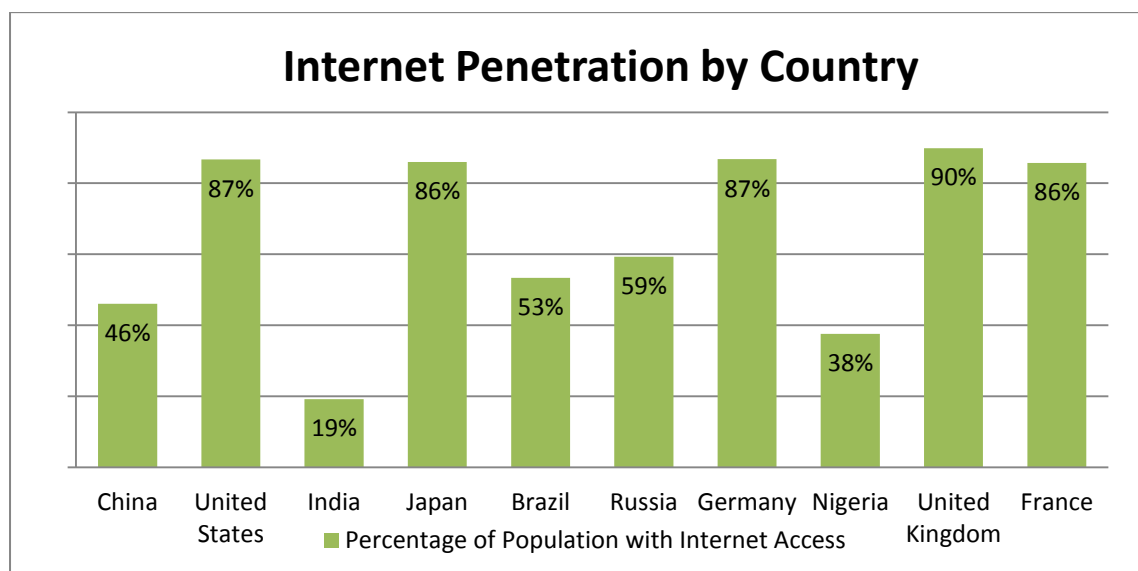
Source: **Internet Live Stats** ([www.InternetLiveStats.com](http://www.InternetLiveStats.com))

Elaboration of data by International Telecommunication Union (ITU), United Nations Population Division, Internet & Mobile Association of India (IAMAI), World Bank.

**July 1 2014 Estimate**

**Internet User** = individual, of any age, who can access the Internet at home, via any device type (computer or mobile) and connection.

Figure 3.23: Internet Penetration by Country



Source: **Internet Live Stats** ([www.InternetLiveStats.com](http://www.InternetLiveStats.com))

Elaboration of data by International Telecommunication Union (ITU), United Nations Population Division, Internet & Mobile Association of India (IAMAI), World Bank.

**July 1 2014 Estimate**

**Internet User** = individual, of any age, who can access the Internet at home, via any device type (computer or mobile) and connection.

However, in spite of the low penetration of internet use in the country, there is growing demand for internet digital content. Narasimhan (2011) suggests that

the average Indian consumer consumes 4.5 hours of digital material daily through offline channels. Much of this is through standard offline channels such as TV, DVDs, and CDs, etc. But a recent phenomenon of using a smart phone to access offline digital content that has been previously downloaded and is packaged, loaded onto phones and sold to individual consumers with no internet access is gaining in popularity in both urban and small-town India. Not only does this overcome issues of lack of digital access, it also allows the user to bypass issues such as lack of uninterrupted electricity supply (Jeffrey and Doron 2013). In fact, more than 70% of India's urban consumers already spend about \$1 a month on content and services through offline, unorganized retail channels – a market estimated to be worth more than \$4 billion annually.

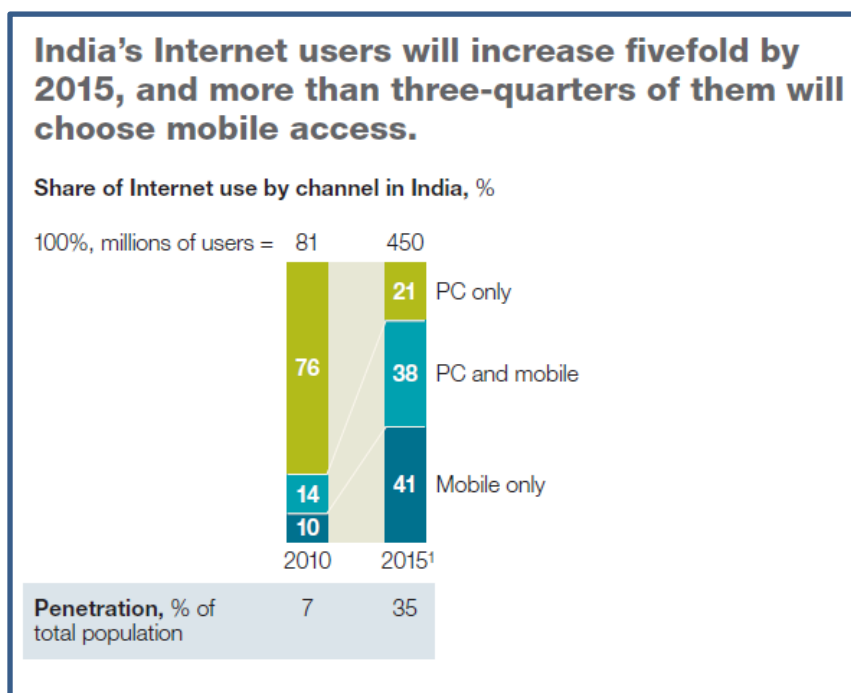
*Table 3.4: Internet Subscribers in India (in millions) (as on 31<sup>st</sup> Dec 2014)*

Category	Narrowband	Broadband	Total Internet
Wired	3.64	14.86	18.50
Fixed Wireless	0.04	0.40	0.44
Mobile Wireless	187.04	45.61	232.65
Total	190.72	60.87	251.59

Source: TRAI Data

Data revenues are thus predicted to be a big source of future growth for TSPs. Data growth also does not cannibalize voice revenues and is seen as incremental revenue in the sector. It is also currently restricted to the upper end of the urban consumer segment and is therefore less price sensitive than voice.

Figure 3.24: Wireless Internet Potential



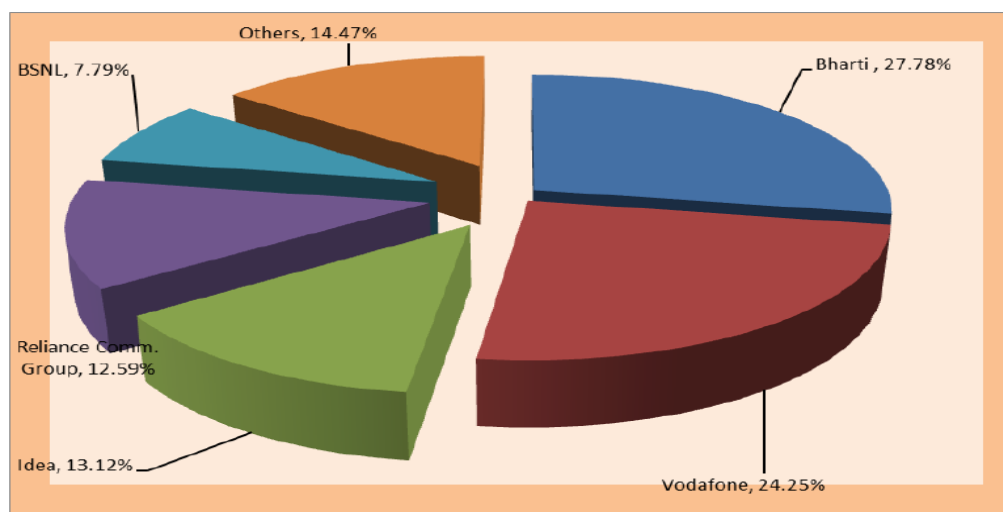
Source: (Narasimhan 2011: 3) using 2010 McKinsey Digital Survey Data, Mc Kinsey and Company research estimates.

3G technology has made data usage more attractive and the proliferation and price reduction of smart phones have made mobile data usage more accessible. The increasing demand for wireless data on 3G has also helped in the consolidation of the market since only the top 5 players in the segment have 3G capability. Only these TSPs were able to service the top-end demand for holistic products across voice and data. This has led to a weakening of the marginal players (Fig.3.25). However, data is far more spectrum hungry than voice. The data growth in the segment is therefore likely to drive up demand for spectrum and consequently, its price in the coming years.

Thus data growth in the sector has a two-fold effect. On the one hand, it improves TSP profitability, but on the other, it increases the demand for spectrum and drives up spectrum price, therefore negatively impacting TSP profitability.



*Figure 3.25: Wireless Internet Service Provision by TSP*



Source: TRAI quarterly report July-Sept 2014.

### **3.5 Summary:**

The purpose of this chapter was to establish the factors within the Indian telecom sector that impact the level of rent and the intensity of contests over rent. To this end, we examined the specific structural features and the particular policy choices that impacted the historical evolution of the sector in India and its current economic viability.

From its tentative beginnings in 1995, the Indian telecom market has grown into one of the largest and most dynamic ones around. Subscriber figures are the third highest in the world today but there is further potential to grow, evident in the lower levels of rural penetration. The very low levels of revenue per minute make the sector accessible to much of the population even with India's low per capita income levels. One of the reasons for the low cost per call is the level of competition that the sector has sustained.

While conventional wisdom on the sector worldwide sees it developing as an oligopoly, the Indian market is unusually crowded. The level of competition in the sector was a product of both the structural features of the sector as well as particular policies that drove competition by licensing new service providers, especially in 2008 (the policy of 2008 came later to be known as the 2G scam and will be considered in detail in **Chapters 6 and 7**). While the sector in India is still less oligopolistic than comparable markets worldwide, there have been clear signs of continued consolidation in the sector. Today, only the top 3 players are profitable and control more than 70% of the revenue share between them. However the sheer number of players drives up the demand for spectrum.

Profitability of TSPs has varied through the different phases of growth in the sector. From initially over-estimating growth levels in the sector to the point of collapse, to a period of consolidation, followed by a period of very profitable growth, a setback on profitability with the entry of competition and increasing levels of debt to a further consolidation and improvements in profitability, sector economics have shown as many ups and downs and arounds as a fairground attraction. What makes this particularly interesting from our point of view is the amount of impact government policy has on the growth and profitability of the sector. The state influences prices for the sector either through the setting of interconnect charges or by managing competition levels that have driven down the cost per call. The state has also set a number of duties and levies on the sector, which are at a higher level than in most other telecom markets.

However, the cost structures of the firms in the sector are also impacted by regulation in another crucial way. The costs of the sector are heavily weighted

towards spectrum costs and network operating costs, which are highly regulation dependent. The cost of spectrum licenses were earlier largely administratively set but are nowadays more likely to be auctioned. This adds to the long term debt holdings of the firms, as can be seen from low Return on Capital Employed (ROCE) figures for the sector. The levels of debt are likely to rise in the coming years as more of the administratively held spectrum comes up for re-auction and new frequencies get released for the sector and come under the hammer. There is a concern being voiced by a number of sector players that greater indebtedness will cause a reduction in investment in the network, investment that is critical to developing the quality of service, especially given the likelihood of new technology (4G) being introduced in the market in the near future. Driving rural penetration of the voice segment will also be capex-heavy as sheer distances in India need a far higher level of passive infrastructure than many other markets.

The rainbow on the horizon in terms of TSP profitability is data. With the introduction of 3G allowing data to be used in an effective way on a wireless device, the data market has shown strong growth, but more importantly, has a huge latent potential due to lack of existing wireline infrastructure in India. Unlike more developed markets in the West, it is likely that, for a greater number of users in India, wireless will become the primary means of accessing the internet. Data shores up the profitability of the TSPs by providing incremental revenue that is less price elastic than voice. Data growth has helped market consolidation around the larger players. However, data also critically impacts the demand for spectrum since it is more spectrum hungry than voice. Thus data growth could both improve TSP profitability and increase their level of indebtedness by pushing up spectrum prices.

The critical factor that will influence the direction of development of the sector comes down to spectrum. The debates in the sector today revolve around

whether the sector is spectrum-starved and whether players are utilizing the spectrum they have currently been assigned efficiently enough. The potential for growth of wireless-based applications in a country like India is immense – newspapers are filled with reports of mobile banking – an example of an extension to the services telecom firms provide today. The telecom firms in operation have moved well beyond their tentative beginnings. But the pace and scale of growth will continue to be influenced by the rents created through spectrum sales and their distribution among the various players in the sector will determine regulatory direction. It is therefore more important than ever to understand the process by which these rents are generated and the factors affecting their distribution – the task of the following chapters.

**Chapter 6** in this research will explore the history of the sector from the perspective of a rents-based analysis to explain policy choices and their impacts on the direction of development of the sector. The conflicts that arise from the distribution of these rents will also be examined to understand the influence of these distributional conflicts in shaping policy choices and ultimately the growth of the sector. Before going on to an empirical exploration of the sector's development from the perspective of rents and contests over rents, the next chapter will lay out the evolution of the theoretical debates surrounding rents. This will help us identify the theoretical streams which we believe will have the greatest explanatory power in the context of the Indian telecom sector.

# Chapter 4: Rents and Political Settlements

*“It is not .... the rent of the land that determines the price of its produce, but it is the price of that produce which determines the rent of land...”*

James Anderson 1777, (c.f. Keiper et al. (1961: 20)

*“If air, water, the elasticity of steam, and the pressure of the atmosphere were of various qualities; if they could be appropriated, and each quality existed only in moderate abundance, they, as well as land, would afford a rent, as the successive qualities were brought into use.”*

David Ricardo (1821: Section 2.16)

## **4.1 Introduction**

The evolution of the telecom sector indicates the important role played by policy in the pace and direction of development of the sector. However, policy changes in the sector have been inconsistent in terms of direction. Policies in the sector have driven increasing competition in 1995, 2003 and 2008 but, paradoxically, increasing consolidation of the sector in 2002 and 2010. The firms in the sector have demanded both increased regulation in 1999, with a strengthened independent regulator, and reduced regulatory intervention since 2007. The sector has been perceived to have been negatively impacted by high levels of corruption through a large part of its development. Policy prescriptions

to counter this trend have tended to focus on good governance issues such as a greater regulatory independence, transparency and rules-based spectrum allotment but these have gone hand in hand with excessively high prices for spectrum that have been detrimental to the sectors growth.

The conventional wisdom on the sector tends to attribute the phenomenal growth of the sector to the intrinsic value of the service. The view is that the growth has taken place in spite of the absence of features of good governance for large parts of the sectors development. I have argued that the good governance perspective does not seem to provide a way to understand the contradictory policy changes and varied rent outcomes observable in the sector. This chapter seeks to provide an alternative theoretical construct with which to study the creation and outcome of policy. All these policies have economic impacts. Therefore another way to understand particular policies is to understand the income streams that these policies create, in other words the 'rents' that these policies create.

The mobile telephony sector is characterized by significant rents because of the way in which radio spectrum for communication is allocated. These rents are analogous to natural resource rents in many ways but can also have characteristics of other types of rents such as monopoly rents, Schumpeterian rents and rents supporting investments in capability development and learning (Khan 2000c) depending on the conditions attached to the allocation of these rents. The significant rents created by the spectrum allocation process can be appropriated by the state, the producers of the service or dissipated by being passed on to consumers through lowered prices.

Where there are rents, there will be rent-seeking, as contended by Anne Krueger (1974) and Jagdish Bhagwati (1982) since rent-seekers will spend

resources to directly influence state policy-makers in their rent creation and allocation decisions. This explains the high levels of rent-seeking observable in the sector. This rent-seeking is characterized as “unproductive” (Bhagwati 1982) and inefficient. This, I have argued earlier, is a static view of efficiency that does not take into account the pervasive market failures that may need to be overcome in the development of the sector. Additionally, the sector requires the creation of use rights in order to function effectively. The rents are therefore inevitable. The distribution of these rents could tell us a lot about why policies were created in particular ways and explain their effectiveness.

Rents have been discussed in economic theory from as early as the 17<sup>th</sup> century. While originally used in the context of land, the use of rent in the economic sense has become more precisely defined, and its use broadened to cover income flows other than those from land alone. Chapters 2 and 3 have established that there are significant rents in the Indian telecom sector. This chapter seeks to assess the characteristics of rents in the telecom sector from a theoretical perspective. To do this, the historical development of rent theory is examined.

The economic theories of rents began to be developed more than a century ago, and were initially focused on rents in agricultural land. The Ricardian view of rents points to two principles, scarcity and differential quality, to locate the sources of rents. The Marxian development of the analysis of rents established the importance of considering the political economy context in which the rents arise in order to explain both their value as well as their distribution.

With the development of neo-classical economics, the theoretical analysis of rents changed. In this analysis, rents initially emerged as a signal of inefficiency, but more nuanced developments of the analysis of rents have occurred within

neoclassical economics that identify the need for rents under particular conditions of market failure.

The developmental state theorists showed how under certain conditions the existence of significant rents could be compatible with industrial growth. New Institutional Economics (NIE) approaches explored the link between property rights and rents that had remained implicit in much of the earlier analysis of rents.

The chapter then elaborates the theoretical approach that will be used in this thesis. Khan's approach begins with a neo-classical definition of rents similar to approaches in NIE, but uses a Marxian view of property right transitions combined with a more nuanced analysis of developing country contexts. Our understanding of rents in the telecom sector is impoverished if we do not consider the origin and movements of spectrum right structures within the sector. These, in their turn, can only be understood by considering the social relations and power structures that govern their creation and modification. Khan (2000b, c, 2009a, 2010, 2013, 2011) provides an expanded view of property rights, rents and political settlements that provides the analytical apparatus for these questions. I argue that this approach has the best explanatory power for an analysis of policy in Indian telecom.

To describe and examine the context in contemporary developing countries in which the policies and spectrum rights are determined that lead to telecom sector rents, the concept of the 'political settlement' developed by Mushtaq Khan will be extended to consider the political settlement at the **sectoral** level in Telecom as distinguished from the **national** level political settlement. The last section of this chapter will elaborate this difference.



## 4.2 Theoretical Perspectives on Rent

The term 'Rent' was first and, even today, most often used in the context of land rent. It originates from the French '*rente*' or Latin '*rendita*' which meant a return or a yield. For classical economists like Ricardo, land rent was a puzzle because it appeared to be a transfer to land owners without being related to any productive activity that they were doing. This is at the heart of all subsequent definitions of rents that, despite their differences, are essentially identifying income flows that are associated with specific property right arrangements.

The initial concept of land rents were further broadened to economic rents not restricted to the returns from land alone. Gemmil (1935: 80) c.f. (Bye 1940: 3) expands the definition of land in the context of rents to include "natural resources created without the assistance of labour". Under this definition, returns on the sale of radio waves would qualify as rents. Later developments in the theory of rents expanded the definition even further to include rents from other sources and denoted some form of unearned income, or returns that were greater than the recipients would get in the market in alternative activities.

Keiper et al. (1961) suggest that the historical interest in land rent as a theoretical concept has not been constant. From initial consideration by mercantilists in the 17<sup>th</sup> century and Physiocrats in the 18<sup>th</sup> century as ancillary to their primary interests, through a position of primary importance in economic theory for the 19<sup>th</sup> century classical economists, to a waning of interest again in the 20<sup>th</sup> century, the interest in rents within economic theory has suffered many fluctuations. There is less frequent mention of rent theory in contemporary economic analyses in the 21<sup>st</sup> century. However, as the authors point out in the preface to their book on the development of rent theory (ibid),

an analysis of the creation and distribution of 'unearned income' is a very powerful tool in a world where conflicts over income distribution are still sharp and persistent.

The following section of this chapter will trace the development of the theory of rents in greater detail, to establish what factors give rise to rents and what factors determine their distribution. This section will draw from Keiper et al. (ibid) to sketch the historical evolution of the theories concerning rent. While, for a large part, these theories traditionally restricted themselves to a discussion of land rents, we will explore which of these perspectives can best be used in explaining the development of the telecom sector in India.

## **4.2.1 Early Theories of Rent**

### ***4.2.1.1 Mercantilists:***

The Mercantilists in the late seventeenth century first established the concepts of land rent in their analysis, although their focus on land rents was secondary to their primary interest in establishing the broader monetary and fiscal principles associated with the establishment of nation states. Sir William Petty, in his work, a Treatise on Taxes and Contributions in 1662 (c.f. (Keiper et al. 1961)), defines rent as a net surplus that arises from land used for growing crops or raising livestock. Complementary to this view of rent as the net yield of land, Petty adds an understanding of the differential nature of land rent by recognizing that soil of better fertility, or land closer to population centres commanded a higher rent.

While Petty did not explicitly recognize diminishing returns to land, the concept of basic yield or return on land is effectively a scarcity rent. This arises from the scarcity of any capital asset that can yield income and land rent is not a unique or distinguishable source of surplus. Differential rent on the other hand, arises from the specific 'natural' properties of the land and is therefore different to rent which arises from other 'man-made' capital assets. While these two concepts espoused a different view on the nature of rent, Petty's work viewed them as complementary and internally consistent. Subsequent theorization of rents by other mercantilists, however, emphasized one or the other of these two views of rent, and more often the former or scarcity view of rent.

Nicholas Barbon (ca 1640–1698) and Sir Dudley North (c.f. (Keiper et al. 1961)) both focused on the basic yield or scarcity concept of rent and therefore asserted that land rents were identical to the return on other capital assets (all natural or "unwrought" capital assets for the former and all (natural and man-made) capital assets for the latter).

However this misses the essential difference between land and other capital assets. The supply of land is fixed and not reproducible. This distinction was made later by Ricardo. If a capital asset is in short supply and commanding a high price, it only earns quasi-rents because the supply can increase, whereas the supply of land can only be increased by moving to inferior quality land so the rent is permanent. Spectrum is therefore like land in that the supply is notionally fixed. Therefore it garners a rent arising from its *scarcity* and *non-reproducibility*. Also, since within the usable bands of spectrum for telecom, some bands are more effective and efficient of telecommunication than others they could, in addition, command a differential rent based on their specific "natural" properties.

#### ***4.2.1.2 Physiocrats:***

Composed of a heterogeneous group of economists writing in France in the mid-18<sup>th</sup> century, the Physiocrats were united by a common belief in laissez faire economics. Again, the discussion of land rents was peripheral to their central concerns, but Keiper et al. (ibid) aver that they did contribute some notable progressions in the conceptualization of land rents. Francois Quesnay, as part of his description of a wider macroeconomic system, suggests that rent is the return that accrues to a specific group in his description of the economic system, the proprietary class, as compensation for earlier and permanent improvements to agricultural land. This is significant in that it is the first discussion of the distribution of rental income.

It views rent as a composite, accruing both from the natural properties of the land but also from earlier capital investments in the land (Weldon 1988: 36). This perspective conflates rent on land with the profit arising from improvements to the land. The latter are merely returns to reproducible capital investments made in the land and therefore do not have a rent-like character. However, Quesnay's contribution of considering the distribution of rental income was recognition of the link between rents and property rights and a precursor to later explorations of rent distribution by the Classical economists.

#### **4.2.2 The Classical Economists:**

The classical economists based their theories of income distribution upon the economic and institutional reality of their times (Weldon 1988). While their work spans almost 200 years, they were analyzing economies that combined, to different extents, an industrial sector with a more traditional agrarian production system. At the centre of their analytical systems was the concept of

a surplus. Described in agrarian terms, the production of this year's crop from the seeds set aside from the previous year produced an amount greater than the inputs used up, including labour and other inputs like seeds, fertilizer and equipment, and this constituted the surplus. The amount of this surplus and the laws governing its distribution were what classical economists attempted to explain.

Essentially, the only direct claimants of this surplus were the owners of capital and land, i.e. the classes of capitalists and landowners. Thus the surplus could be divided into profit and rent. Wages, in classical economics, were an input into the production process and were predicated on the concept of a subsistence wage that was historically, socially and culturally determined and varied in time and space. Profit was thus the surplus that capitalists and landlords were able to appropriate. Rent was determined by the quality of the land and accrued to the landlord who had appropriated the land in the historical past and who therefore possessed property rights to the land and had the right to determine its use.

#### ***4.2.2.1 Adam Smith:***

Smith was the first of the classical economists to engage with the concept of land rent extensively in 'The Wealth of Nations' (Smith 1937). Smith views rent as "an unearned surplus which is appropriated by landlords through the exercise of their monopoly power" (Keiper et al. 1961: 13). Weldon (1988: 36) suggests that the term monopoly sometimes used to describe the rights of the landlord in this context can be confusing. He differentiates between the use of the term 'monopoly' to describe the unique right of a landowner to the services that his parcel of land can provide, and the more contemporary use of the term which refers to a situation when a single landowner owns the land in general.

The former is the meaning more commonly referred to by classical economists. In other words Smith is alluding to the property rights that make the landlord the *sole claimant* to the returns on the property rather than “monopoly” in the contemporary sense.

Smith suggests that a portion of the rent may be considered interest since it is the legitimate return to the landowner on improvements made to the land, but believes that this is only a small part of the rent since most improvements to the land are made by the tenants rather than the landlord. Smith here is identifying all returns to land as rent in line with its common usage in day to day English. However, in terms of our more technical definition of economic rent, interest would not form a part of rent. While there appears to be some inconsistency in his view of whether the level of rent is determined price or the other way around, he is clear that the existence of rent is predicated on the existence of demand. He mirrors earlier work in identifying locational advantages and fertility determining land rent, but adds to the analysis with a consideration of the effect of improvements in transport, which is, effectively, technological change. He contends that improving transport facilities would reduce rents near urban centres and increase rents in more far-flung areas.

He does not yet recognize diminishing returns in agriculture, a feature that is central to Ricardian rent theory that follows. However, he was the first to treat rents in a dynamic context and within a wider context of economic growth. His work was an important precursor to work by subsequent classical economists who considered land rents more centrally in their analyses of economic growth. He also clearly adds at least two dimensions to the rent creation debate – the importance of demand factors in determining rent levels and the effect of technology on rent levels, particularly on differential rent. This thesis will apply these factors in the analysis of outcomes in the sector in Chapter 8.

#### 4.2.2.2 Ricardo

Building on earlier work by Adam Smith and the Physiocrats, Ricardo first put forward a complete theory of rent in his work “Principles of Political Economy and Taxation” (1821), first published in 1817<sup>22</sup>. While Ricardo’s attempt was not merely to explain rents but to provide a wider theory of economic development, it gave rents a far more important place in economics than they had had in the past. Rent is an important analytical tool in Ricardo’s theory of economic development since a central premise of his theory was what he viewed as a historical fact –diminishing returns in agriculture.

This work, like its predecessors, primarily referred to rent in terms of land rent.

Ricardo defines rents as follows:

*“Rent is that portion of the produce of the earth, which is paid to the landlord for the use of the original and indestructible powers of the soil”*. (ibid, section 2.2, p.5).

He differentiates it from returns that arise from the application of capital or labour to production from the soil, which he defines as profit. In other words

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<sup>22</sup>Keiper (ibid, p.19-23) shows that Ricardo was not the first to put forward the differential theory of land rent that he is associated with. Thirty-five years prior to Ricardo’s seminal work on rents, a Scottish farmer, James Anderson, wrote an article on the Corn Laws proposed for Scotland, where, in a footnote to the main text, he makes the first analytical link between the diminishing returns to land and rents, as evidenced by the quote at the start of this chapter. Thirty-five years later and just days before the publication of Ricardo’s first essay exploring rent and the price of corn, another essay written by Sir Richard West, a lawyer, that linked the diminishing returns in agriculture to the rent of land was published. However, Ricardo’s attempt to explain not just rent but present a new theory of economic development, made for a more comprehensive exploration of the concepts involved, hence the contemporary referral to a ‘Ricardian theory of rents’.

rent is the surplus over the cost of production that accrues to the landowner. For Ricardo, rent was revenue transfer rather than profit.

Ricardo argues that rent arises only because of the differential quality and the scarcity of land. *“If all land had the same properties, if it were unlimited in quantity, and uniform in quality, no charge could be made for its use, unless where it possessed peculiar advantages of situation”* (ibid, section 2.4, p.5). Since land quality is heterogeneous and land quality at the margin of cultivation is inferior, the use of land of higher quality results in a differential rent being paid for that land. These rents only exist because not only is the land of different qualities, it is also limited in quantity. The differential quality of the land allows differential rents to be charged for that land. This is effectively the application of a marginal productivity principle to land rents. The differential rent that a land earns is equal to the intra-marginal differences in produce obtained from the application of equal amounts of capital and labour.

Beyond differential quality, the scarcity of the land also commands rents that could be characterized as scarcity rents. According to Ricardo, the relative scarcity of land will drive up rents conflicting with profit, until a stationary state of absolute scarcity is achieved and profits fall to zero (without technical progress). In this way, *rent is caused by scarcity but demand determines the magnitude of rents*. Note that rents for Ricardo are a feature of the inherent quality and quantity of the land and therefore emerge as a consequence of, rather than as a cause of, the price of the output.

As an economy progresses, the availability of fertile land falls, raising the rent for remaining land and requiring increasing capital inputs on existing land. Thus, with progress, the rents increase both in absolute terms and in terms of the ratio of capital employed on the land. This ever-increasing rent puts the



interests of the landowner in contradiction with the interests of all other classes, according to Ricardo. Over time, rising food prices would cause a rise in nominal wages, a rise in rents and a decrease in profits and capital formation. His schema thus contained a political attack on land-owning classes.

While the focus of the discussion was on land rent, Ricardo expanded the notion of rents to include rents from natural resources such as coal mines. *“Mines, as well as land, generally pay a rent to their owner; and this rent, as well as the rent of land, is the effect, and never the cause of the high value of their produce.”* (ibid, section 3.2). In fact Ricardo points out that *“(I)f air, water, the elasticity of steam, and the pressure of the atmosphere, were of various qualities; if they could be appropriated, and each quality existed only in moderate abundance, they, as well as the land, would afford a rent, as the successive qualities were brought into use”* (ibid, section 2.16). In other words, rent is created as long as the principles of scarcity and differential quality hold within the benefits appropriated from Nature.

It must be noted that, in this view, rents arise when Nature’s bounty is exploited. It is not earned in the same way that profits are (producer surplus can be an ‘unearned’ differential rent). It is also not dissipated by free market competition. In theory free market competition should, in the long run, dissipate any returns above the returns necessary to sustain the necessary investments to maintain the required assets. However, since rents arise from scarcity of the resource, they cannot be competed away. To Ricardo, rents were not unique to a period of time or history, nor were they restricted to a static state with technology assumed to be constant. Diminishing returns were a ‘natural’ economic phenomenon.

Historical diminishing returns rests on the underlying assumption that the supply of land is limited and that technological gains are offset by increases in population, such that the demand for produce rises continuously and puts increasing pressure on available land, forcing inferior lands into cultivation. Ricardo's theory is ultimately based on the principles of scarcity and non-replicability. Since land is scarce and "non-reproducible" increasing demand pushes lower quality land into cultivation leading to differential rents in higher quality lands. Ricardo's theory was criticized for his assumption of diminishing returns to agriculture which did not hold except at the intensive margin. Richard Jones (1831) c.f. (Keiper et al. 1961: 37-40) debated the evidence that Ricardo based his diminishing returns on, at both the empirical and analytical levels. Without diminishing returns and the possibility of no-rent lands, Ricardo's theory reduces to a statement that rent differentials can be ascribed to differential yields. However it does not explain rent that is paid even in the absence of differential land quality.

The confusion is between differential land quality explaining why some land earns a higher rent than other land and diminishing returns on any particular piece of land due to the diminishing returns on that land, which is the source of the free access problem. Ricardo puts his argument in terms of differential rents but the modern argument of natural resource rents is based instead on the free access problem as discussed earlier. In the case of natural resources, because of the non-replicability of the asset, creating rights to limit the access to the asset is socially beneficial. Thus, for natural resources and for spectrum, diminishing returns do hold. And similar to land in Ricardo's theorizing, different spectrum bands have differential effectiveness as transmission media for mobile telephony. Therefore differential rents exist in spectrum due to inalienable, natural properties of spectrum airwaves. *The differential rent is static in the sense that it exists with constant technology and is changed or even completely destroyed with changes in technology that allow different spectrum bands to come into use.*

The existence of these differential rents has been crucial in determining the structural outcomes in the Indian sector. Chapter 8 will apply the Ricardian view of differential rents to argue that the differential rent afforded on 900 MHz spectrum explains the advantage that the incumbent firms had, which allowed them to achieve market dominance.

#### ***4.2.2.3 Marx:***

In contrast to the Ricardian view, the Marxist view situated rent creation firmly within the social context of capitalism. Marx traces the development of rent to the process of the capitalist transition. During the transition, commonly held nature is transferred to private hands through the establishment of property rights. This definition of public as private property is, for Marx, the genesis of land rent and therefore rent is a manifestation of a specific underlying social relation within the capitalist transition.

Unlike for Ricardo, for Marx rent is not naturally given and universally occurring. Rent is historically specific to the capitalist transition. It therefore follows that rent could not be considered in isolation to the context of social relations in which it was situated. For Marx, the process of private property right establishment over land concentrates land ownership in the hands of a numerical minority, as against a majority that does not own the property rights to the land and need to work on it to earn a wage. Rents therefore are based on monopoly, the monopolistic rights to property held in the hands of a few parasitic landlords who could fritter away their monopolistic gains in consumption rather than invest it in improving productivity. In this, Marx has adopted and expanded Adam Smith's conception of rent that arises from an inherited monopoly over ownership.

Marx referred to this element of rent – the monopolistic gain that arose from a monopoly over the property right on the land – as Capitalist Ground Rent. The monopoly over the property right on the land allows the landlord to withhold the amount of land available for production unless the land produces a surplus over the price of production, where the price of production is the capital outlay plus an average rate of profit. Were the land in the hands of capitalist producers then they would be willing to use the land as long as it generated the price of production. This surplus that is required over the price of production in order for production to take place arises purely from the existence of landed property concentrated in the hands of a few (in general) non producers, and is what Marx terms Capitalist Ground Rent.

Capitalist ground rent is based on the social relations that produce it. In Marxian terms, *“the exchange value of the resource, in which is embedded the social relations of production and exchange, rather than the use value, determines capitalist ground rent”* (Bina 1985). The existence of rent acts as a barrier to expansion of production since it places the demand of a surplus above the price of production before production can be expanded.

It is, to Utsa Patnaik, *“inherently a highly subversive concept, subversive of the existing social order”* (Patnaik 2007: 16) since it raises the question of why the minority of land owners should benefit from the efforts of the actual investor and producers who work the soil. It suggests the need for radical land reform. In contrast, she argues that Ricardo’s conception of rent was entirely disconnected from land ownership structures. The differential quality of the land in the context of its diminishing returns gave rise to rents, regardless of

who the rents accrued to. This “*completely sanitises the discussion of rent of all socially critical content*” (ibid: 33)<sup>23</sup>.

Marx describes Ricardo’s differential rents as a surplus generated by the variable quality of capital. In other words what Ricardo calls rents, Marx would classify as varying surplus profits. Where the producer is a tenant, these varying surplus profits are extracted by the landowner. However the existence of landed property rights is not necessary for these surpluses to arise. Also it follows that the direction of utilization of the natural resource did not follow the artificially created progression from best to worst quality.

Marx’s perspective on ground rents can also be critiqued from the perspective of a modern rent analysis. According to Marx, capitalist property rights create rents through a monopolization of land. Therefore the rents are monopoly rents and do not have a social function. However, I have argued here that the property rights in the case of natural resources *do* increase welfare by preventing the free access problem. In other words the capitalist property rights are not entirely dysfunctional. For Marx however they were just another means by which capital subordinates labour.

There are examples in the literature of applications of Marxian rent theory to natural resource rents in more contemporary contexts. Ghosh, Sen and Chandrasekhar (1995) have presented an interesting analysis of the sale of natural resource as a means of primitive accumulation. They interrogate why the sale of natural resources to private hands in the current conservative ideological climate is considered desirable and efficient. The capitalist sector has always used the state as a mechanism to channel surpluses and thereby

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<sup>23</sup> This is contrary to Keiper’s (1961) view that Ricardo, in suggesting that rents would rise indefinitely, squeezing profit, was mounting an indirect attack on the landowning classes.

drive primitive accumulation to potentially fund capitalist growth. The distress sale of natural assets is a means for the rich and powerful among the capitalist class to drive accumulation. In parallel, especially where the capitalist sector is nascent, the state may also use the process to create its own capitalists or for clientelist payoffs. And finally, international capital is also often particularly interested in owning natural assets that are often non-reproducible. The authors illustrate this with reference to several distress-type sales or agreements in the minerals sector. The property right creation in natural assets as a means to drive primitive accumulation is applicable to spectrum allocations in the telecom sector as well.

Another example of Marxian analysis of natural resource rents can be seen in the work by Cyrus Bina (1985), who uses the Marxian approach in his analysis of the rents created in the oil sector. He argues that, in the same way that Marx's theory of rent was reconditioned on his theory of landed property and its social relations, a theory of oil rent also needs to be based on an analysis of property rights within the oil industry. His analysis is interesting in its mapping of power in the creation of property rights in the sector. This has similarities to the political settlements approach described later, which will be applied to the telecom case in this thesis. However Bina limits his characterization of the underlying exchange relations to Marxian categories of capitalist relations, whereas the characterization using political settlements allows for a broader conceptualization of the underlying drivers.

Marx's view of rents provides a very interesting application to understanding telecom sector rents. As in Marx's theory, the origin of the rent in the telecom sector arises from the creation of use rights in the sector, concentrated in the hands of a few powerful actors. Thus the restricted access to spectrum rights impacts the rents that can be created and sustained. By this definition, the

rents will be determined by the exchange relations (or the relations of power) in which they are embedded.

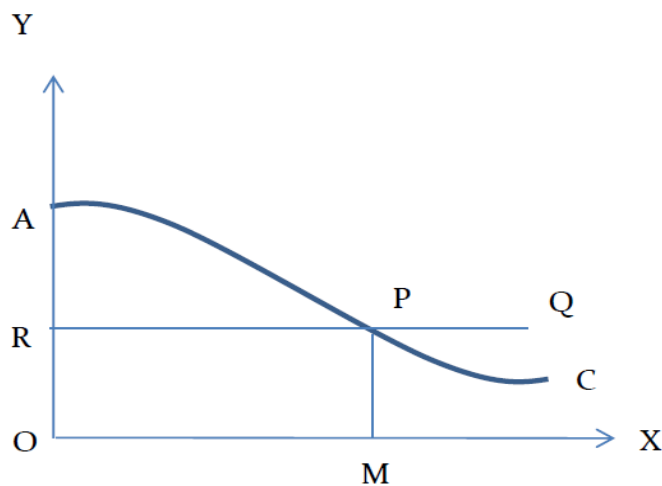
The need to understand the historical embedded nature of property rights and rents was an insight that was lost in the Marginalist theory that followed and has only been revived in more recent NIE and heterodox views of rents. A later section in this chapter examines a theoretical construct – the ‘political settlement’ – to help describe these exchange relations. The political settlement expands the exchange relations as described by Marx by suggesting that sources of power within these relations could arise from sources other than purely economic ones.

### **4.2.3 The Marginalist Revolution:**

From the period 1870–1935, two trends are distinguishable – first, an increasing dissatisfaction with the economic perspective of classical economics and a greater use of microeconomic analysis in economic theory, and as an extension, the increasing use of marginal utility functions to explain income distribution. This trend in economic thought – labelled Neo-Classical Economics – applied the principles of marginal returns to explain the existence and level of rent, which was a natural extension of Ricardo’s work on differential rents. However, the extensions of general economic theory that followed the static marginalist perspective did not consider rent to be an analytically unique category or that natural resource scarcities needed separate treatment (Quadrio Curzio and Pellizzari 1999).

Jevons (1835–1882) established the first concise geometric exposition of rent theory. In **Figure 4.1**, if the x axis measures amount of labour and the Y axis the

marginal product of the labour, then the line APC is the marginal productivity of labour. If the wage rate is expressed in terms of product units as the line RPQ, then APR represents the amount that can be extracted from the labour as rent.



*Figure 4.1: Jevons' Geometric Representation of Rent*

Source: (Keiper et al. 1961: 80)

Menger and Clark debated the Ricardian proposition that land needed to be treated as an analytically separate factor of production. Their contention was with the Ricardian assumption that the value of rent arose from the powers of nature rather than as a return to factor of production like any other. Wicksteed formulated a more general theory of productivity, suggesting that under assumptions of perfect factor substitutability, perfect competition and homogenous production functions, all factor inputs (not just land) are subject to static scarcity and could be treated with the same analytical apparatus. In effect, the marginal productivity of each factor would determine the remuneration of that factor, and land rent was simply the remuneration to land based on its marginal productivity (Quadrio Curzio and Pellizzari 1999: 15). Therefore, as long as the assumption of constant returns prevails, the total



product could be expressed as the sum of the individual factors of production, each multiplied by its marginal product (Keiper et al. 1961). However these are very stringent assumptions. The particular nature of scarce and non-replicable natural goods do not satisfy these general conditions.

Marshall (Quadrio-Curzio 1999: 15) saw rent as simply one part of the producer surplus that need not be differentiated from profit. He espoused the view that rents could arise from factors other than land or natural resources, that showed differential qualities and scarcity in the short run even if not supply constrained in the long run. He used the analytical category of quasi-rents (as distinguished from true rents), that arise from temporary (or inter temporal) scarcities thus freeing rents from the limitation of being restricted to arising from land or natural resources. Marshall's concept of quasi-rents is interesting in the context of the telecom sector. If spectrum scarcity is determined by the current state of technology in the short term but contains the possibility of being expanded with technological advances in the longer term, these rents may be considered to be quasi-rents, arising from inter-temporal scarcities, rather than a natural, absolute scarcity.

Marshall also examined differential and scarcity rents. He identified two types of decreasing returns that could cause rents to arise – extensive (lack of land) and intensive (decreasing fertility). This therefore gives rise to two types of rents – extensive (where a higher quantity of land will be required to produce the same output on marginal land) and intensive ( where a higher quantity of labour and capital inputs will be required to produce the same output on marginal land). Thus Marshall (1997: Book 5, Chapter 9) famously pointed out that, in a sense, *all rents are scarcity rents and all rents are differential rents*. It may be more useful to examine the rents as arising from scarcity in some contexts and differential quality in others, but there is no fundamental difference between them.

This is an important extension to Ricardo's work. Ultimately rents arise from the creation of property rights. The rights are required to restrict access in the context of scarcity. Increasing demand may bring different quality grades of the asset into production, leading to differential rents in a marginal analysis. In this context the line between rents caused by scarcity and rents arising from differential quality is blurred. However Marshall's analysis does not make explicit the link between rents and property rights and in this it was inferior to the work by the classical economists.

By focusing on marginality in the Ricardian theory, this view of rents does not address the question of who the claimants to this rent are. Again, underlying this theory is an implicit assumption of ownership or property rights but this is not spelled out. Property rights are assumed to be exogenously given.

This neo-classical view of rents is the one most commonly applied to telecom sector rents in contemporary analyses. The Marginalist view explicitly recognizes the extension of the concept of rents to factors of production other than land. Spectrum rent is merely the marginal productivity of that particular band of spectrum. In fact, as it is not differentiated from other factors of production, it does not need separate classification as rent at all.

#### ***4.2.3.1 Market Failure and Property Rights in Neo-Classical Economics***

Quadrio-Curzio (ibid, 16-23) argues that extensions of general economic theory that followed the static marginalist perspective did not consider rent to be an analytically unique category or that natural resource scarcities needed separate

treatment. The constraint of static scarcity of resources was seen to be removed by the expansion of technological progress and therefore did not constrain the production equation. Joan Robinson (1933) summarized the neo-classical position on rents as “*a surplus earned by a particular factor of production over and above the minimum earnings necessary to induce it to do its work.*” (Robinson 1933: 102). Keiper et al. (ibid, 94) suggest that the rent for a factor of production in an industry is the surplus above transfer costs or returns that the factor would earn in another industry. In other words, a rent is an income in excess of what the asset would receive under free market conditions. Under the assumptions of perfect competition and a free market these rents are, by their very nature, inefficient since they move prices from the market determined optimum. This discussion often considered rents arising from monopoly to characterize rents as welfare-reducing. However, as Stiglitz states in his foreword to Polanyi’s book ‘*The Great Transformation*’ (2001), few economists today believe in the myth of a perfectly free and self-regulating market.

Market failures are universally recognized, arising because of externalities, public goods, common pool resources, asymmetric information and market power. In addition natural resources may be either exhaustible or renewable with very different implications for the solutions to their market failures. H. Hotelling’s (1931, c.f. (Quadrio Curzio and Pellizzari 1999: 16-17)) work concentrated on optimizing the exploitation of non-renewable resources. There was also work on the optimal rate of utilization of renewable resources based on their laws of growth and regeneration. Natural Resources may suffer from one or more of these market failures. Spectrum, for example, as a rival but non-excludable good, suffers from the problem of Common Pool type market failure, leading to the free access problem or the Tragedy of the Commons. It may also exhibit the failure of Market Power, having elements of a natural monopoly since the production of a telecom service is better provided by a restricted number of users.

The development of the market failure literature recognized that market failures often stemmed from ill-defined property rights. The solution to the failures lay in better defined property rights over the resource. NCE economists suggest that incentive-based policies could help overcome market failure, by creating rents to deter welfare-reducing behaviour or encourage welfare-enhancing behaviour. Therefore rents were recognized as welfare-enhancing where the underlying policy was aimed at correcting a particular market failure. Under this construct rent was defined as the excess value that an asset gets over its next best use (North 1981)<sup>24</sup>. Other studies that looked specifically at natural resource rents define rents as “supernormal profits”, the surplus over normal costs and profit (Collier and Hoeffler 2005) (Rothman 2000).

However, implicit in the Neo-Classical theory is a particular view of property rights that flows from the Marginalist tradition. While not explicitly stated, a necessary assumption within the NCE analysis is that property rights (i.e. rights that define the use of any asset) are complete. They are unambiguously defined and there is complete clarity and exclusivity regarding the claimants to the right. They are specified, negotiated and transferred within the market mechanism in a costless way (Roy 2013). In other words, there are no transaction costs in the specification of rights within the NCE framework. These conditions need to hold in order for the perfect market to function efficiently. Therefore, while NCE recognizes the importance of property rights, and the absence of properly defined rights as the source of market failure, it fails to explore why incomplete property right specification exists in the first place. Nor does it consider the costs of creation and maintenance of rights and the dynamic links between property right modification and rents.

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<sup>24</sup> Note that this was a definition suggested by North (1981), an Institutional, but it fits well with the Neo Classical assumptions on rent and is used frequently in studies that are from Neo Classical, Regulation theory and New Institutional schools of thought.

Also, while the rents themselves may be potentially welfare-enhancing under conditions of market failure, the very existence of the rents gave rise to rent-seeking behaviors. Rent seeking is the unproductive waste of resources used to capture or protect rents (Krueger 1974) (Bhagwati 1982). It was argued that the cost of rent-seeking could far exceed the allocative inefficiencies (in the case of welfare-reducing rents) of the rents themselves. The analysis of rent seeking introduces the discussion of the distribution of rents and rent capture but in a limited manner through two extensions of neo-classical theory – Public Choice Theory and Regulation Theory.

### Public Choice Theory

Public Choice Theory, an extension of NCE that explicitly attempted to introduce politics into economic analysis, recognizes the likelihood of market failures, for example, in public service sectors where natural monopolies tended to exist. Many other market conditions could also result in market failure, such as missing or incomplete markets. Here a benevolent and omniscient government (the contractual state) intervenes to distribute public goods so as to maximize social welfare. State-run water, electricity or telecommunication boards are common examples of such interventions. In other words, the state intervenes to create and manage the monopoly rents that are created through the natural monopolies or to address the free rider problems associated with private provision if the good has characteristics of a public good.

The effectiveness of such intervention is contingent on two factors – *state ability* (reflective of information asymmetries faced by the state) and *state capacity* (reflective of the state's capacity to rise above economic and political

interests), and is more likely to lead to government failure<sup>25</sup> (Saraswati 2007: 53). The further realization that, in many of these cases, the natural monopoly did not exist through the entire vertical production chain, combined with technological advances meant that there was, in many cases, at least the option of part-privatization<sup>26</sup>. States (or parastatal bodies) were still expected to regulate these sectors for reasons of both productive and distributive efficiencies. But any regulation or the rents that it created tended to be prone to capture by interest groups.

### Regulation Theory

Regulation theory also begins with the recognition that market failures can justify the creation of some rents. Beneficiaries of these rents are then likely to want to ensure that the market failure is maintained and the rents directed towards them in perpetuity. The easiest way to maintain these inefficient rents is by protecting them through regulation. Thus regulation is believed to be captured by interest groups in order to sustain the market failure that feeds them (See (McChesney 1997: 7-20) for a review).

A number of theories suggesting possible sources of regulatory capture have been forwarded. Stigler (1971) applied public choice theory to the regulation of firms to suggest that all regulation will be captured by industry for its benefit. This was broadened to include other interest groups such as banks, trade unions, etc. (Peltzman 1976) (Posner 1974) (Becker 1983). The rent-seeking theories were an extension of these models, arguing that regulation protects monopoly rents and therefore causes rent-seeking. Therefore the presence of rents not only reduced the allocative efficiency of the market, the regulation to

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<sup>25</sup> On the other hand, Toye (1993) argues that if markets are, in reality, as imperfect as governments, then there is no rational reason to suppose that the former will allocate resources more efficiently than the latter.

<sup>26</sup> The development of mobile technology in the telecom was an example of this perspective.

protect these rents encouraged further waste of economic resources through unproductive rent seeking (Krueger 1974, Bhagwati 1982).

Others such as De Soto(1989), Shleifer and Vishny (1994) and McChesney (1997) have argued that the state (not benevolent but itself captured by vested interests) is an active creator of inefficient regulation in order to create opportunities for rent extraction from the private sector (Srinivasan 1985)<sup>27</sup>. A third set of theories focus on the role of the regulator in actively or passively colluding with the state or interest groups to reduce social welfare. The Principal-Agent theory (Laffont and Tirole 1991, 1999) and the Life Cycle Theory (Martimort 1999) are examples.

These theories did attempt to include non-economic variables in economic analysis, using the “*economic approach*” (Fine (2006), paraphrasing Gary Becker) of methodological individualism to understand political factors. However, the analysis remained rooted in the paradigm of free market primacy, and politics was “*simply the pursuit of economic self-interest in an ‘as if’ marketplace for votes*” (ibid, 66). Power continued to be defined in purely economic terms and the market mechanism was seen as a sufficient lens through which its influence could be understood.

In sum, the perspective on rents and rent seeking in neo-classical analysis were expanded significantly from classical analyses but were also limited in some crucial ways. First, while the market failure literature recognized the potential welfare enhancing role of rents and their links to underlying property right

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<sup>27</sup> Often referred to as neo-classical political economy, this school portrays all state intervention as the deliberate action of rent-seeking coalitions of the government.

specification in more explicit ways, property right definition remained exogenous to the economic system and the process or costs of right creation and maintenance were not considered. Second, NCE analyses are rooted in the theoretical ideal of a perfect market. While market failures are recognized, they are treated as exceptions rather than the norm (Stiglitz 2007). If one was to consider market failures as pervasive, then the importance of rents as a way to address them becomes more salient. Third, the focus on rent-seeking obscured the potential welfare-enhancing role that rents could play. Rents arose from policy responses to market failures, where the market failure was a deviation of the market from its ideal state of a perfectly free market. Given that market failures by definition resulted in suboptimal resource allocation, the intervention that created the rents could potentially have improved resource allocation. However, specific failures of regulatory capture and rent-seeking resulted in poor outcomes and this is presented as a general case. Finally, in terms of the distribution of rents, the regulation theory school began to explore the underlying political factors that could shape regulation, but since regulation was not defined as central to the creation of rents, this could only lead to an analysis of possible configurations of interest groups seeking rent, rather than a holistic understanding of the process of rent creation and its effects on efficiency and distribution.

Fine (1982, 1996) suggests, in fact, that NCE lacks an adequate theoretical distinction between rents and profits. In a similar vein, Chang (1994) argues that the reason that rent seeking is seen as negative and profit-seeking as positive in NCE is the underlying assumption that profits will be productively deployed through the market whereas rents will not. Khan<sup>28</sup> (2000a) also questions the NCE view of rents as being limited. If rents are income flows created by any change in the underlying structures of rights of ownership, then the effectiveness of rents and the costs of rent seeking will need to be

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<sup>28</sup> Khan's view of rents will be considered in greater detail in the following sections as it forms the basis of the analytical framework of this paper.



considered within an understanding of the political structure driving the creation and management of rents.

#### **4.2.4 Developmental Statist Perspectives**

Theories of the Developmental State gained support in the 1960s as a counter to the hegemony of the orthodox neo classical view of market primacy. Stemming from a re-appraisal of the economic success of the East Asian Newly Industrialized Countries (EANICs), primarily South Korea, it placed a much greater emphasis on the role of the state in directing and facilitating growth. The state, rather than the market, was seen as the principal driver of the growth process in Developmental State theories. The EANIC States took an active interventionist role in addressing market failures in the areas of coordination and learning that constrained their growth process through the creation of targeted rent-creating policies. Chang (1995) (2002) suggests that the effective state played two key roles in the formulation of industrial policy – a more static role in reducing risk to new entrants by coordinating complementary investments and a more dynamic one in developing appropriate linkages and modifying policy over the business cycle.

These rent-creating policies were applied with stringent conditionalities of performance and the credible threat of withdrawal on non-performance. For example, specific heavy industry firms were allowed to benefit from monopoly rents to incentivize investment over a long time horizon. However, the maintenance of monopoly rent was conditional on achieving certain investment targets and was removed if these were not met. Wade (1990) has examples of where the state was able to withdraw a rent-creating policy when performance targets were not met. This meant that the rents were used to overcome specific market failures but were not allowed to become inefficient.

A vast body of empirical research (Amsden 1989, Chang 2005, Wade 1995, Evans, Rueschemeyer, and Skocpol 1985, Ranis 1989, Wade 1988, 1990) showed that contrary to earlier claims, the EANIC states were interventionist in the area of economic policy, created specific institutions that were crafted to fit specific institutional contexts and government capabilities and these context-specific interventions could be shown to be the key factor in their economic success.

State-created rents, according to this view, can be seen as the result of policy options that the state exercises in order to drive economic growth. Some rents were monopoly rents but there were many other types of rents that were created to aid the process of economic development. Some examples were rents that aided technological assimilation, or rents that provided compensation for higher levels of risk inherent in the development of a new industry. The distribution of these rents was decided by the policies that created them and were targeted towards specific business owners in specific industries in order to create incentives for behaviour and investments that were believed to be pro-growth. Effectively, the distribution of rents were a tool (and a source of power) in the hands of the state (the creator of the underlying policy) to influence the direction and pace of growth by mitigating growth-reducing market failures.

While the literature by and large does not explicitly consider the question of property rights, the creation of a state policy has the effect of creating or changing underlying property rights. So, to an extent, according to this perspective as in neo-classical economics, property rights remain implicit in the discussion<sup>29</sup>. However, unlike neo-classical economics, the specification of the right or policy is endogenous to the system. It arises from the developmental

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<sup>29</sup> Later work by Amsden (2010) looks more explicitly at property rights and explores how ruling elites may be able to manage unstable property right phases to actually drive growth. The work is similar to the developmental state perspective but addresses the institutional changes in terms of property right instability and state ability in terms of elite power. Its perspective on the process of property right creation and change is still limited in that it does not consider the costs of conflict.

state that consciously creates or changes the specification of rights or policies and targets their allocation in order to achieve developmental objectives.

The application of these policies by an interventionist state did not lead to growth in every context. Pakistan initiated industrial policies very similar to South Korea but did not achieve even a fraction of their success. Interventionist policies followed in South Asia descended into inefficient ring-fenced rents that once given could not be withdrawn and that were accompanied by significant rent-seeking that exacerbated their inefficiency (Khan 2000, b, 1998).

Therefore, what made a Developmental State? This brings us back to discussions of interest groups and power.

The key feature of a developmental state was considered to be its relative autonomy – understood as its ability to remain above interest groups that seek to undermine its agenda, often through rent seeking. Fine and Rustomjee (1996: 58) argue that in statist perspectives, *“(t)he autonomy of the state is taken as an analytical starting point in order to explain why some states can intervene more successfully than others”*. The objectives of the state were seen as economic growth (arising from objective self-interest on the part of rulers) – a very contractual view of the state, but its effectiveness was determined by the extent to which the state was able to rise above the predatory interests that attacked it from the outside. Success could then be ascribed to the states’ relative autonomy from economic and political interests – South Korea was a success because of greater state autonomy that meant it was better able to manage its interventions (Kohli 1994), while Pakistan was a less autonomous state unable to maintain efficient policy interventions or abandon inefficient interventions and their concomitant rents (Khan 2000).

The question of what made a state developmental was usually analyzed by an ex-post investigation of the characteristics of successful states and suggested the importance of historical factors that shaped the underlying socio-political network through which power was exercised by the state (see for example, Kohli (1994) for an analysis of the different colonial impacts of the Japanese in Korea and the British in India, and the difference this made to the independent states' relative autonomy, or Rodrik (1997) who explores the impact of greater formal education in South Korea and Taiwan in creating a stronger bureaucracy, and the more even income distribution resulting in fewer powerful groups).

Different descriptors of state autonomy have been forwarded to identify what makes one state developmental and not another. For example, Political Economy analysts Lloyd and Suzanne Rudolph (1987) classify India as a weak-strong state, displaying both autonomous power (through its centrist ideology and secular democracy consensus) and weakness (evidenced by its capture by fragmented but mobilized social forces). These types of descriptors attempted to broaden the concept of autonomy to incorporate underlying cultural, political or bureaucratic conditions that influence states decisions, embedding them within a societal framework – 'Embedded Autonomy'. However the perspective is one of the state managing change from above, and at its most effective, being distanced from the political realities below (Whitfield et al. 2015). This flaw restricts its applicability - the analysis was better at ex-post rationalizations of performance rather than providing ex-ante predictors of success.

The Developmental State approach has a broader conception of rents than that of NCE. First, the approach explored the use of policy and the rents they create as tools to drive growth rather than merely as a way to correct market failures and approximate a perfect free market. This meant that a wider variety of rents

could be seen as welfare-enhancing given specific contexts. The efficiency of the rent depended on the appropriateness of the underlying policy addressing growth. The approach also explores the specific conditions that make the rent efficient or otherwise, and in this, introduce an understanding of the underlying social, political, economic and cultural contexts that determine the efficacy of rents. Further, because rents were purposively directed to specific beneficiaries and could fall prey to predatory interests, there was an exploration of underlying power structures and their varied impacts on rent creation and distribution. The attempts to identify the characteristics of embedded autonomy provided many interesting strands of analysis that focused on understanding historical societal relations underpinning the creation and effective enforcement of policies or rights.

However, the perspective of a contractual state that is prone to capture, views the state as separate from the political settlement that it is shaped by. This makes it harder to see how a state could achieve the 'embedded autonomy' required to make it developmental. In reality, no state is able to achieve perfect autonomy and all states, to a greater or lesser degree, need to manage policy creation through a coalition of interest groups that have agency over it (Whitfield et al. 2015). If so, all processes of property right creation will entail contestation and conflict from the losers in the process and the costs of these needs to be considered for the effectiveness of policy.

#### **4.2.5 New Institutional Economics**

New Institutional analysis drew its theoretical inspiration from both Institutional Economics and Neo-Classical Economics. Institutional economists centred their theories on explaining divergent economic performances among countries, despite similarities in factor endowments, by looking at institutional

structures to determine the institutions and conditions that produced economically efficient outcomes.

North (1990) defines institutions as *'the humanly devised constraints that structure political, economic, and social interactions. They consist of both informal constraints—sanctions, taboos, customs, traditions, and codes of conduct, and formal rules—constitutions, laws, property rights'*. Institutions defined the rules of the game that structured the behaviour of organizations, the associations of players in the game. Institutions could arise through the market or outside of it. The set of institutions that merited the greatest attention in institutional economics were property rights.

Institutionalists argue that the process of running the economic system, of creating, changing or maintaining institutions such as property rights are not costless. This was its most significant departure from the theorizing of property rights in Neo Classical Economics. This cost of creating, changing, maintaining, transacting or interacting with institutions was referred to as a Transaction Cost (Allen 2000). Transaction costs as a category subsumed a variety of costs related to creating and enforcing institutional contracts – *"the costs of acquiring information, reaching agreements about how to organize collective activity, observing that these agreements are upheld, and subsequently enforcing these agreements"* (Khan 2009a: 35).

New Institutional economics (NIE), which gained prominence in the 1980s, acknowledged the pervasive existence of market failures and focused on *"strategic behavior by individuals and organized groups in the context of incomplete markets"* (Thorbecke 2007: 17). While NIE continued to be based on the underlying principles of NCE such as rational individual utility maximization, it represented a significant departure in the emphasis placed on

market imperfections. According to Fine (2006: 74), *“the puzzles are about how the market...works imperfectly, rather than how it diverges from perfection because of externally imposed constraints (especially through the state)”*.

Bates (1995), in his excellent critique of NIE, explains that the need for institutions arises from social dilemmas. Social dilemmas are caused when rational self-optimizing behaviors for individuals lead to a sub optimal social welfare outcome. Then, *“institutions provide the mechanisms whereby rational individuals can transcend social dilemmas.....Non-market institutions enable individuals to escape the tensions between individual and social rationality created by the perverse incentives that produce the failure of markets”* (Bates 1995: 29).

Property rights are institutions that arise in response to the presence of market imperfections in the shape of production externalities. Property rights can extend time horizons for the investor and enable contracting to take place by reducing the transaction costs of the contract. The emphasis on and modeling of transaction costs and the link between property rights and transaction costs were key contributions of NIE to the understanding of the functioning of institutions. In the NIE analysis, reducing the transaction costs that create a market failure would help overcome the failure and thereby improve efficiency. Transaction costs could be reduced by enhancing the degree of clarity in the definition of property rights, and by strengthening enforcement institutions responsible for enforcing the rule of law. Thus, property right clarity and enforceability are seen as key to driving down transaction costs.

NIE applied this institutional analysis to the NCEs conception of market failures. Arising from the view of market failures as a deviation from a theoretical optimum, NIE suggested market failures exist where property right

definitions for an asset are ill-defined or incomplete. Incomplete property rights make the cost of transacting with that asset too high. A more complete specification of the underlying property right would reduce transaction costs and remove the market imperfection. However, the specification of more complete property rights was not a costless process and involved transaction costs. Therefore one reason market failures persisted could be that the transaction costs involved in the changing and enforcing of property rights to mitigate the market imperfection were too high. From this perspective, a monopoly may exist because the particular specification of property rights that sustains the monopoly persists because the transaction costs of redefining property rights over the monopoly to allow competition are higher than the efficiency benefit that would be gained from the institutional intervention. Thus NIE is able to explain not only the source of the market failure, but also why those failures may persist.

Thorbecke (2007) suggests that appropriate institutions were seen not just as instruments to reduce transaction costs but as routes to reducing opportunistic behavior and corruption. The state is prey to interest groups and rent-seeking and this increases the role for regulation. *“The accumulation of distributional coalitions increases the complexity of regulation (and) the role of government”* (Olson 1982: 73). Institutions performed the role of regulation to ensure that incentives were not distorted in the absence of fully functioning markets. In other words, appropriately defined institutions would not only reduce rents but could also affect rent-seeking, an analysis that has some parallels to theoretical developments in the neo-classical stream. North (1981) also points to the possibility that property rights institutions may be created not just to reduce transaction costs but also for the personal political gain of the members of the state, a view that echoes Neo-classical Political Economy theorists like McChesney.



The puzzle was how ‘good’ property right institutions were developed and what the factors were, that led appropriate growth enhancing institutions to thrive in certain contexts (Rodrik 2008). While the classical economists and early institutional economists explored politics as a determining factor, most of modern NIE theory is more static in that it considers the institutional framework as separate from the political one.

One approach to the creation of the appropriate institutional framework is the ‘Good Governance’ agenda which was recommended by International Aid Organizations. The view here was that developing specific growth-enhancing institutions such as increased competition, democracy, accountability, transparency, rule of law, etc. that strengthened property rights was universally valuable and could be created through policy change. However, the failure of many attempts by Governments and Aid organizations to force fit a set of ‘one size fits all’ policies points to the fact that the perspective does not adequately recognize either the transaction costs involved or the political costs and conflict involved in a change of property rights.

Acemoglu, Johnson and Robinson provided a different explanation of property right development. Linking settler mortality data with institutional structures, they claimed that ‘good’ institutions and property right clarity was imported and established in countries that colonizers were keen to settle in, as compared to other countries where their ambitions were purely extractive (Acemoglu, Johnson, and Robinson 2001). The problem with this approach is that it reverses the direction of causality running between economic growth and property right clarity, asserting that the latter came first. It also does not explore the process of property right creation (no rights are created in a costless and conflict-free manner) and makes no mention of existing property right structures prior to the arrival of the colonizers, or the forced property right modifications that allowed colonizers to conquer and rule their colonies – extractive or otherwise.

In their subsequent book 'Why Nations Fail' (Acemoglu and Robinson 2012) they expand this hypothesis more generally to suggest that stable and inclusive economic institutions (such as property rights) are contingent on the existence of stable and inclusive political institutions to support them. While this does recognize a link between property right changes and political institutions, it does not go far enough in explaining what these links are and what they arise from.

North (1995) argues that while NIE drew from NCE the fundamental concepts of scarcity and competition, it extends the discussion by dropping a crucial implicit assumption of NCE – that of instrumental rationality, which assumes that the real world is identical to the decision makers perception of it, and that the decision maker has all the knowledge and computational power required to make decisions. In such a world, there is no information asymmetry, no costs to transactions, and no need for institutions. NIE's critical contribution was the understanding of the ubiquitous existence of transaction costs and therefore the need for institutional analysis. However, while property right definition is endogenous to the economic system in NIE, political factors are not, in any real sense (Bates 1995).

In reality, property right changes are heavily conflict ridden and highly contested processes since they change an individual's access to productive and valuable assets. The conflict inherent in the Capitalist Transition that Marx based his analysis on is a case in point. By ignoring the distributional implications of different institutions, NIE ignores the underlying political reality and the real impact this could have on the effectiveness of institutional performance. The objective was to identify blueprints for universally applicable institutional forms that will overcome key market failures as well as protect against the harmful side-effects of intervention. Yet, the actual processes through which institutions evolve are specific to the political conditions of

particular countries. Most of NIE is, in effect, a best practice analysis of policy, rather than a deeper understanding of underlying institutional processes. As a result, while it approaches a more complete view on the creation of rents, it fails to adequately represent the contestation over rent that drives institutional evolution and thereby economic growth.

The central critique of both the neo-classical and new institutional views of rent theory is that they do not consider adequately the context in which the underlying property rights are created or modified. Fine (1994) suggests that different rent theories were based on different and specific views of how landed property is organized. Viewing rent theory as abstracted from its view of landed property robs it of its analytical power. According to this critique, rent theory has languished as a result of this insufficient understanding of landed property that underpins the theory. For the expanded view of rents not necessarily arising from land, the same principle holds. Abstracted from the context that governs the creation of the property right, the analysis of rents loses explanatory power.

#### ***4.2.5.1 Limited Access Orders***

There is however a recent development in the NIE space that considers political and economic evolution using rents and property rights in a much more nuanced fashion. In their book *Violence and Social Orders* in 2009, North, Wallis and Weingast (henceforth NWW) presented a new theoretical construct to understand historical development of societies that combines an understanding of rents and property rights from NIE with other strands of work that have looked more explicitly at political factors in economic development such as Bates (2001) and Khan (2009a, 2010, 2012).

In *Prosperity and Violence*, Bates (2001) expressed the role of the state in the growth process as one that centralizes the capacity of violence and thereby reduces the risk of expropriation that deters investment with long time horizons. The problem with this perspective is that, like the Developmental State view, it promotes a Weberian (Weber 1948) view of a strong, autonomous state.

The NWW theory of Open and Limited Access Orders is a far more nuanced view of the state and the domestication of violence. The authors identify two predominant types of social orders or patterns of social organization based on different ways of dealing with violence. The Open Access Order (OAO) approximates to the modern Weberian state with impersonal affiliations to organizations, secure property rights, the predominance of formal organizations, etc. In contrast the Natural State, the Limited Access Order (LAO) is characterized by limited access to organizations based on personal affiliations, smaller numbers of organizations, hierarchy, insecure property rights, vulnerable economies and small centralized governments. However, unlike the modernist view, the authors do not characterize this as a necessary progression from LAO to OAO, nor a normative direction of growth.

The authors' characterization of the LAO, and its applicability to economic and political contexts such as India, is of most interest to us. The LAO reduces violence by forming a dominant coalition of interests. This coalition creates organizations that generate, protect and distribute property rights and rents that they benefit from. The dominant coalition acts as a group of shared interests, since the failure to protect the interests of any part of the coalition leads to a loss of rents for the whole. The double balance leads to stability in society. However no coalition is permanently stable and when destabilized through external shocks or unintended consequences, requires a renegotiation of the distribution of rents. This has some similarities to Khan's framework of

political settlements considered in the next section. However, Khans' analysis sees the coalition as a much more fluid and temporary agreement between various factions that do not necessarily include all the elite, and organizations in the LAO are more likely to compete than collude, in Khan's view (Roy 2013).

NWWs view of rents also differs from Khan's perspective. According to the former, rents exist in LAOs because of the limited entry to organizations but in OAOs rents are competed away. However, there is substantial evidence of rents and rent seeking in advanced capitalist economies, just in a more formalized manner. As Developmental State theories showed, the process of transition to capitalism requires the provision of rents for a variety of purposes – learning rents, Schumpeterian rents for innovation, rents to overcome coordination issues, etc. There are also significant redistributive rents – rents required as pay-offs to maintain political stability. These requirements exist in advanced economies as well, but the difference is that while in advanced economies (OAOs) these can largely be formalized, for reasons that will be explored in the next section, they remain informal in LAOs or developing economies.

#### ***4.2.5.2 Latin America and Reform Coalitions***

Some authors in New Political Economics have applied frameworks that start with an analysis of the underlying socio-economic structures. Schamis (1999), in his study of reform and the role of distributional politics in Latin America shows that all conceptions of power in terms of interest group coalitions only view this influence in a negative light.<sup>30</sup> There is no account of how distributional coalitions may actually work together with the government to support a reform agenda since it operates in the interests of the coalition to do

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<sup>30</sup> For example see (Acemoglu and Robinson 2000) for an account of how losers are likely to block reform and institution building.

so. He points out that most liberalization agendas, rather than being opposed by key interests, tend to be supported by proactive collective action by them since liberalization creates immense new opportunities for rents. His analysis “regards capacity and choice as rooted in power relations among socio-economic groups” (ibid :238). He points to the lack of recognition in conventional analyses of the fact that economic agents tend to be informed of the distributional implications of government policy and will therefore work to block or support it depending on the distribution and on their influence. This explanation of policy evolution shares some similarities with Khan’s work on political settlements, which we review next, but it is limited by the fact that it assumes that the asymmetries between interest groups can be explained largely by their differences in market power. This reduces all interest group coalitions to marketised distributional coalitions and does not consider groups whose source of power, and therefore preferred route of redistribution or compensation, lies outside the market.

Etchemendy (2001) applied Schamis’ theory to a study of reform coalitions in Argentina to understand the construction of processes of compensation by the state in order to continue to maintain coalitional support for the reform agenda. His study shows that the Argentinean state managed compensations to interest group coalitions in a horizontal manner across different sectors during reform. The process of coalition forming was one of political bargaining among the winners, rather than compensation to the losers. His analysis explains the differential level and speed of reform across different sub-sectors. It also brings out the complex bargaining processes involved in decision making and implementation that reflects underlying power balances. However it suffers from the same weaknesses as the previous study.

## **4.3 Khan's View of Rent Creation and Political Settlements**

The theoretical framework that I have chosen to apply in this thesis is one developed by Khan(1996, 1998, 2000b, c, 2008, 2009a, 2010, 2012, 2013). Khan's work uses a neo-classical definition of rents as "policy induced income flows" arising from the creation or modification of a property right. He incorporates the transaction cost analysis of NIE and the extended view of rents from the Developmental State literature. However he extends the analysis by exploring the costs and conflict involved in property right creation and the processes of elite bargaining that accompany it. He also embeds this analysis in a nuanced and historical materialist characterization of the underlying political, economic and social context that conditions the creation of organizations and the effectiveness of institutions that he calls a Political Settlement.

### **4.3.1 Property Rights, Transaction Costs, Transition Costs**

Khan begins by using concepts developed in Institutional Economics and shared with NIE. His analysis defines rents as incremental income flows associated with the creation or modification of specific property rights. As with the market failure literature, Khan agrees that market failures arise by definition from high transaction costs. However, unlike NIE economists, Khan's view is that the creation or realignment of property rights may reduce some transaction costs while simultaneously increasing others, and feasible improvements in the definition and enforcement of property rights are generally insufficient for ensuring growth and structural transformation in developing countries. The structures of property rights are constantly evolving and in addition, the structures that drive growth under one set of conditions will not be the same under a different set of conditions. Thus enhancing the

rights of some types of asset owners may have a far better impact on growth than strengthening the rights of others. What then becomes relevant for a state in terms of growth objectives is to minimize the transaction costs that have the maximum impact on growth, what Khan refers to as the “*growth-constraining transaction costs*” (Khan 2009a: 37).

But institutions such as property rights do not just define the rules of asset use and the costs of the contracting and enforcement. They also define the distribution of benefits arising from the specific definition of the right. In other words, property rights determine the distribution of rents where rents are defined as “*policy-induced income flows that would not exist in the absence of that policy*”(Khan 2008: 21). The point of a property right is that it benefits particular constituencies or groups and not others i.e., where there are winners, there are also losers. And where there are losers, there is also the possibility of contestation over these allocations. The creation or realignment of property rights is thus inherently conflict-ridden and driven by the rent-seeking activities of different groups of organized interests. Property right changes could have a huge impact on the wealth-generating ability or social status for generations to come, and with so much at stake, are often hotly contested. For analytical clarity, Khan defines these costs of conflict as “*transition costs*”, “*the costs of creating new rights or altering or destroying existing rights*” and distinguishes them from transaction costs that are the costs of operating with and enforcing existing rights (Khan 2009a: 53).

Transition costs can be the most significant costs of changing property right structures. These costs may be those of organizing negotiated transitions or, more importantly, the political contestation costs of overcoming the resistance of losers during processes of restructuring rights. The size and scale of these transition costs depend on the power and political relationships between actors both within the state and in society. Therefore, the actual evolution of property



rights is not always driven by growth considerations but rather by the calculations and organizational power of different organizations of rent seekers.

The outcome for growth therefore depends critically on the types of organizations that exist in a society and the distribution of organizational power across them. The configuration of organizational capabilities and powers can determine the path of institutional evolution and the particular types of rents that are created. These may not necessarily be growth-enhancing, and in many cases they are not. Sustaining or raising growth requires the reduction of growth-constraining transaction costs, but the maintenance of political stability might sustain inefficient institutions and high transaction costs. The state's responses can therefore be analyzed in terms of the 'management' of trade-offs between growth and political stability, twin pressures on institutional evolution at any point in time (Khan 2009a).

### **4.3.2 Political Settlements**

It is in the analysis of transition costs that Khan begins to disaggregate organizations within the state and in society into distinct constituent players with different political and organizational power, with shifting alignments and relationships with each other, and it is this organizational context which defines the growth–stability trade-offs facing particular paths of institutional evolution. The central organizing concept used here is the Political Settlement. Political settlements (PS) may be understood as the structure of power within which institutional decisions are made and political compromises between powerful groups shape institutional and policy choices. Khan (2010: 4) defines a political settlement more specifically as “*a combination of power and institutions that is mutually compatible and also sustainable in terms of economic and political viability*”.

The market is not viewed as a space consisting of atomized individual constituents, nor the state as the Weberian single actor. Instead, the rent-seeking activities that drive institutional change are typically driven by relatively small numbers of individuals or organizations with significant concentrations of economic and political power. A finite number of large business houses dominate particular sectors and their size and importance in the economy can give some of them asymmetrical access to and influence over the political and decision-making arms of the state machinery. Similarly, unlike the Weberian view of the state as a single unified entity with a common goal, this analysis recognizes that the state is comprised of a multitude of political and bureaucratic organizations. At the national and regional levels, political organizations compete for power to constitute the ruling coalition. In developing countries, these political organizations often use different types of patron–client networks to mobilize supporters and distribute rents to them. Unlike the LAO framework that suggests that there are fewer organizations in LAOs, Khan argues that, on the contrary, mature developing economies (mature LAOs) are characterized by a proliferation of informal organizations that use their power to compete for rents.

Power is defined in a specific way: the relevant concept of power here is Holding Power, defined as “*the capability of an individual or group to engage and survive in conflicts*” (Khan 2010: 6). An individual or group’s holding power is determined by his/their ability to impose costs on others in a conflict and his/their ability to absorb the costs imposed by others in a conflict. This in turn depends on the success of an organization in raising funds and mobilizing its supporters, both to contribute to the cause, and to absorb the cost of conflict when required. Khan suggests that the power of an organization could arise from economic power but this is not a necessary condition. Holding power could also come from political power, from access to formal authority (the

power of position), or from organizational strength (the power of numbers). The relevant factor is the ability to use this power to sustain conflict. Di John and Putzel (2009) emphasize that it is the bargaining outcomes between contending elites, rather than elite collusion that forms the basis of the political settlement.

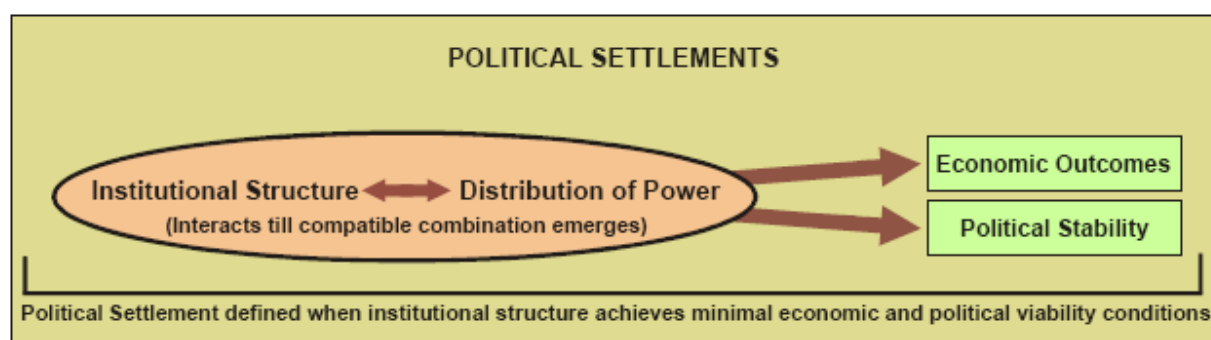
The political settlement, if relatively stable, will define the distribution of benefits for the dominant coalition. The stability of the settlement rests in its ability to distribute rents in line with the distribution of power within the settlement. The settlement will thus resist any distribution of benefits that is not in line with the current distribution of power and attempt to change it. This maintains the distribution of power, and stabilizes and strengthens the political settlement. However, the very distribution of these benefits can have the impact of changing the distribution of power in unforeseen ways. It is in this that the dynamic nature of the political settlements analysis lies. Even when stable, the political settlement is never static, as each distribution of benefits has to be negotiated. But the settlement is also prone to instability, caused by a change in the distribution of power of its members. Any instability of the political settlement gives rise to conflict and contestation over rent distributions until the settlement is renegotiated.

Conflicts or contestation over the evolution of property rights arise when particular groups feel that the distribution of rents that changes in property rights imply are not consistent with their expectations, given their assessment of their relative power, or when the distribution of power changes as a result of ongoing organizational activities, whereby groups perceive that they are stronger and demand changes in rights to reflect their power. Contestation and conflicts are likely to continue until the distribution of benefits or the distribution of power is realigned so that the two are roughly in balance again.

This characteristic, the attempt to align the distribution of rents with the prevailing balance of power or to change the balance of power to reflect the distribution of rents is a critical feature of the political settlement. At a macro-level the balance of power across organizations (in a society without escalating levels of violence) is therefore likely to be supported by the distribution of rents created by its institutions, and this describes the political settlement. The macro-level description of the political settlement then helps to assess the likelihood of institutional and policy evolution in particular directions as the distribution of organizational power determines the transition costs of institutional evolution in different ways. Political settlements defined in this way are not static but are continuously evolving, either gradually, or in some cases, discontinuously. Therefore, distributive arrangements based on institutions need to be flexible enough to allow for changes in order to maintain political stability.

Some commentators have argued that inclusionary political settlements have a greater degree of stability (North, Wallis, and Weingast 2009, Whaites 2008). Khan's analysis would lead us to the conclusion that wholly inclusionary political settlements are neither possible nor necessarily stable. The former suggest that there is a group of ruling elites that are relatively stable over the long run and ensuring a settlement that does not challenge any groups of these ruling elite should lead to less challenge and greater stability. However, if we apply Khan's perspective of a factional grouping that comes together for temporary gain then it is less easy to see a permanent and stable coalition of the ruling elite, and shifting boundaries between gainers and losers in the process are bound to lead to distributive conflicts. A high level of inclusion is unsustainable since resources are limited and the potential claimants are many – those with not just political clout but other sources of holding power. Under these circumstances the settlement is not likely to be inclusionary.

However, what leads to relative stability is either a small group with well-established sources of power that is not easily challenged (such as a stable and powerful government) or a greater balance of power among different claimant groups and a distribution of benefits that mirrors this balance of power. A stable political settlement and one that is evolving without an escalation of violence requires a minimum level of economic performance to sustain the rents that are politically necessary, and it also requires a maximum bound of political conflict to sustain economic performance (See **Figure 4.2**). This view of a political settlement is more fluid and is therefore better able to explain a change in policy and a consequent change in the distribution of benefits in one period by examining the effect of policy on the political settlement of the previous period.



*Figure 4.2: Political Settlements Impact Growth-Stability Trade-offs*

Source: Khan(2010: 21).

While the political settlement is a useful analytical tool it is an inexact one. The distribution of organizational power cannot be mapped in its entirety nor can all institutional and policy changes be explained by the relative power of organizations. Indeed, if that was the case there would never be conflicts in society because all institutional changes would be consistent with the distribution of power. Rather, the use of the political settlements framework is precisely to evaluate the growth–stability trade-offs associated with policies and

institutions that are introduced as a result of all sorts of contingent opportunities and factors. The argument here is that the macro-level distribution of organizational power will determine the sustainability of particular incremental institutional changes and can help to explain why apparently inefficient structures of rents can survive. I extend this argument to look at the structures of power at a less aggregated level of the sector in the following section. The analysis also suffers from the weakness of being easier to rationalize ex-post than to identify ex-ante. However the identification of the potential dynamics of a particular settlement allows policy formulation to better predict institutional effectiveness.

Political Settlements theory and similar characterisations of elite bargaining have been receiving increasing attention in academia and policy (Di John and Putzel 2009, Evans 2012, North, Wallis, and Weingast 2009, North 2012, Fritz and Rocha Menocal 2007, Gray and Whitfield 2014, Whitfield et al. 2015, Kelsall and Seiha 2014, Sen 2012). The applicability of the theory is predicated upon a detailed and nuanced understanding of the specific political settlement that impacts the institutional context under study. This understanding could operate at two levels of aggregation.

The first is a set of more general characteristics of developing country political settlements that effect their organizational composition and institutional context and that in turn condition the types of rents created and their distribution. Khan characterizes the political settlement in South Asia somewhat differently to the characterization of mature LAOs. The relevant characteristics that determine this difference are clientelism and informality. The next section will consider these in detail.

While Khan's work uses a political settlement defined at a national level, I argue here that a disaggregation to a sectoral level political settlement, and the understanding of how it relates to policy making in the sector, as well as how it interacts with the macro political settlement at the national level provides a better understanding of the effects on sectoral policy. This is laid out in the subsequent section.

### **4.3.3 India's Political Settlement – Clientelism and Informality**

The Political settlements in developing countries are different from those in advanced countries in some crucial ways. The differences can be explained by considering the type of patron–client network prevalent in society and the persistence of informality.

Khan (2010) identifies 4 types of patron–client relationships in his typology of settlements based on whether a) holding power is based primarily on formal institutions or not, and b) whether the formal institutions are growth enhancing or not (**Fig. 4.3**). A patron–client network describes a network involving a patron as an organizer organizing several clients who offer organizational support in exchange for benefits. The clients in turn can be patrons for lower-level clients. The structures of patron–client networks vary greatly across regions and over time and tend to be historically determined. The type that is most relevant to our discussion and that tends to characterize developing societies like India is the clientelist political settlement.

The central characteristic of a clientelist settlement is one where the distribution of holding power lies significantly outside the formal productive sectors of the economy (Khan 2010: 53). The exercise of power often takes

personal and informal forms but growth-enhancing formal institutions can often co-exist with these. However, the majority of the power does not come from formally institutionalized sources. In theory clientelist settlements could achieve a variety of economic outcomes depending on how well the alignment of the ruling coalition can benefit from policies that are growth-enhancing in the wider sense.

	Formal Institutions Potentially Support Growth	Formal Institutions are not growth-oriented or have collapsed
Holding power aligned with Formal Institutions	<p><b>'Capitalist' Political Settlement:</b> Formal productive rights dominate as associated incomes are the dominant source of holding power. Formal rights are well enforced, constraining the range of distributive conflicts.</p>	<p><b>Pre-Capitalist Political Settlements:</b> Variants of feudalism with formal land and military rights aligned with distributions of political-military power.</p>
Significant sources of Holding Power not aligned with Formal Institutions	<p><b>'Clientelist' Political Settlements:</b> Formal productive rights exist but are not well enforced. Powerful groups can influence economic outcomes irrespective of their formal rights. Ranges from developmental states to societies on the verge of crisis.</p>	<p><b>Political Settlements in Crisis:</b> Formal institutions have virtually collapsed and most informal 'economic' activity is supported by or based on the threat or exercise of violence.</p>

Figure 4.3: A Typology of Political Settlements

Source: (Khan 2010:49)

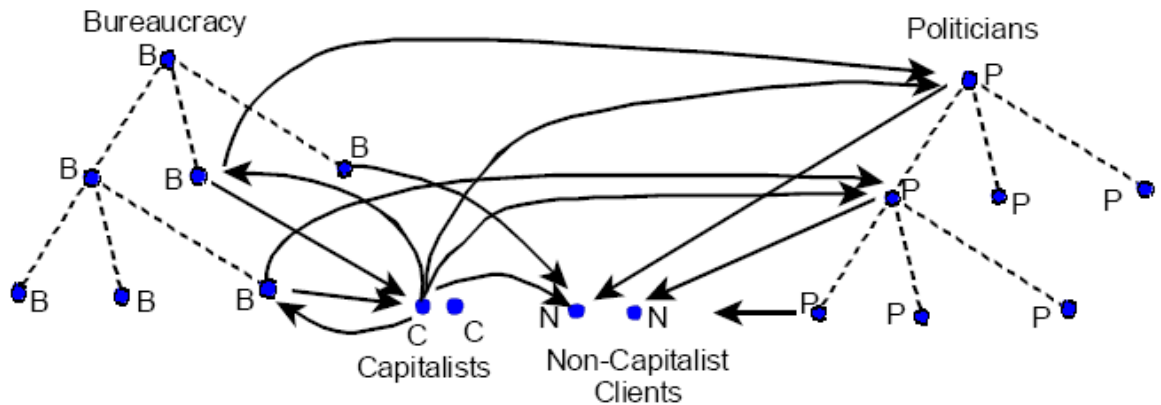
In clientelist political settlements the patron is typically a political entrepreneur and the clients tend to be faction members who constitute a faction within political parties and other organizations that may appear to be formally constituted, but which operate in significantly informal ways. The organization of the faction is based on the patron providing the clients with rents commensurate with their political or organizational support. The clients' membership of a faction is purely based on his/her expected returns rather than on any shared belief system or objective. This factional rather than class-based organization of politics makes political support more transient and more



vulnerable to changes in rent distribution strategies through patron–client networks (Khan 2007).

The patron relies on informal rent distribution as he or she typically lacks the resources for a broader and more formal distribution of benefits and even if she did not, would not be able to justify its distribution to broad electoral constituencies through formal budgetary and other institutions. Wade (1984: 12), in his analysis of state and bureaucracy in some south Indian states, indicated that the cost of achieving and maintaining political power was very high and resources often needed to be raised by the incumbent through different forms of corruption, rather than being granted by the party. The high cost of politics and the transient nature of factional politics combine to place a high degree of pressure on the ruling coalition to attempt to maintain political stability. Thus informal transfers of rents and rights are used to maintain the organization and this ensures significant informal rent creation in such a political settlement. However, the use of informal redistributions is not necessarily detrimental to growth as assumed by mainstream analysis. In this context, the informal redistributions may be necessary to maintain political stability given the characteristics of the political settlement. The resource redistribution may even result in accelerating the emergence of a class of nascent entrepreneurs with productive capabilities and these would drive the development of more formal institutions to protect their benefits over time.

**Figure 4.4** provides a visual depiction of resource flows at a very general level in the clientelist political settlement of the Indian type. Within India, there would be further significant regional variations in the types of organizations that dominate the ruling coalition and this too would have an effect on local institutional and policy evolution.



*Figure 4.4: A Representation of Resource flows in the Indian Clientelist PS.*

Source: Khan (2000:22)

Informality is thus a key feature of clientelist PS. While the LAO/OAO framework contends that a distinguishing feature between the two is the number of organizations present, Khan argues in contrast that LAOs often have a multitude of organizations, with a greater predominance of informal organizations. The source of this informality can be traced to the inability of the formal sector to generate sufficient rents. In advanced economies, the source of rent for redistribution can be raised by the ruling coalition through the formal economy. Tax revenues can provide the rents needed to ensure political stability and social redistributions. Khan contends that in developed countries with a large productive capitalist sector political and economic powers converge. The political settlement reflects the distribution of power based on formal capitalist institutions and the ruling coalition seeks to protect these institutions. In contrast, in developing countries the formal productive capitalist sector is too small and underdeveloped to dominate society and to provide the resources for adequate redistributions through formal budgetary processes to maintain political stability. In these cases, formal institutions alone

are not likely to be sufficient as these institutions mainly allocate rents to formal organizations that are by definition not the dominant ones in developing countries. As a result, it is not surprising that informal institutions and modifications of formal institutions that allocate rents to informal organizations play an important role in developing countries. This may explain why countries in the process of Capitalist Transformation are likely to demonstrate unstable property rights, and high levels of off-market transfers and corruption. And it may also explain why Good Governance policies designed to weed out corruption through greater transparency and rule-based formal institutions are likely to fail as they don't take into account the context within which informality thrives.

Khan suggests another reason for the predominance of informality in post-colonial developing states. He contends that colonial power structures created a class of intermediate interests whose support of the colonial state was maintained through the provision of rents from the state. This intermediate class continued to exert the same pressure over the newly formed independent state. The State was unable to afford such redistribution on a large scale and unable to justify limited redistribution to specific intermediate groups. As a result, much of this redistribution took place through informal means. Engerman and Sokoloff (2002) have argued that the political power of elites in post-colonial states stem from the unequal asset distributions of the colonial period. This view suggests that the source of power was economic. Khan's view suggests instead that the source of intermediate class power is organizational.

Kalecki (1972) is credited with the first analysis of intermediate classes and the role they play in the transition to capitalism<sup>31</sup>. A number of authors have since

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<sup>31</sup> Note that Kalecki saw the rise of the power of the intermediate classes as a transient phenomenon, losing its relevance with economic growth. However, Harriss-White (2003) persuasively argues that the evidence indicates that they are still a numerically powerful coalition in India, with the ability to impact economic policy to their own ends.

explored the importance of intermediate classes in development in the Indian subcontinent. Each has defined these in slightly different ways. Bardhan (1984) claims that a mix of inter-class alliances were created from coalitions Gandhi encouraged during the independence movement in India. He refers to a coalition of rich farmers, emerging industrialists and the intelligentsia or bureaucrats as the “*Dominant Proprietary Classes*”, who, he believes, have had the greatest negative impact on India’s growth<sup>32</sup>. Desai (1981: 390), for example, identifies the petty-bourgeois haute-proletarian classes (the “*petty proles....with little education and less property*”) as the strongest political force in India. Partha Chatterjee (1994) and Sudipta Kaviraj (1988) see the over-extended bureaucracy created by the ideology of state planning as the most powerful influence on policy.

The common thread to these differing descriptions is a class or group of people with power stemming, not from their economic power, but from their organizational capabilities. These organizational abilities in non-capitalist sectors are the source of their holding power. Harriss-White (2003: 71) quotes a Tamil saying:

‘What *Thangam* (gold/bribes) cannot do, *Sangam* (organization) can do’.

The source of holding power in clientelist PS is often organizational power, specifically that stemming from powerful informal organizations that are outside the formal capitalist sector. As a corollary the institutions and forms of redistribution in the PS are also informal in nature. Informal organizations are thus critical to understanding the operation of the political settlement and its impact on policy. This organizing framework of a Clientelist and informal

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<sup>32</sup> Bardhan did not explicitly define which groups made up the intermediate classes but referred instead to the dominant group who held significant property rights in land and industry and the government bureaucrats who could award these.

political settlement gives us a context within which to view the creation of property rights and the distribution of benefits that accrue in the formulation of policy within a sector.

Sen (2012) suggests that Khan's framework of political settlements is better at describing the political drivers of growth accelerations than the political drivers of growth maintenance. He believes that Khans framework is based on informal rather than formal organisations and more advanced growth transitions will move to less clientelist and more hybrid political settlements where formal institutions and organisations become more important. This thesis considers a sector in its growth acceleration phase where both formal and informal institutions have had an impact on the growth of the sector. As long as holding power reflects both the power that comes from informal as well as more formal sources, the PS analysis should be as useful in characterizing the growth maintenance phase of the sector.

#### **4.3.4 The Sectoral Political Settlement in Telecom**

The description of the relevant organizations in a political settlement will depend on the particular institutions or policies that are the focus of a particular analysis. The relative capabilities and powers of these organizations can then help us to understand the combinations of formal and informal institutions that generate rents in the system, and the likely directions in which they could evolve.

Khan's work refers to a single political settlement governing all policy at a national level. In his sectoral studies, he then looks at key sectoral influences and how they operate on the national political settlement. The political

settlements approach as elaborated in Khan's work, and used in other studies (Kelsall and Seiha 2014, Whitfield et al. 2015) describes the political settlement at the national level between ruling elites and powerful interests. These sectoral studies do explore the impact of a political settlement at a sectoral level but the organizations and agencies enumerated in their political settlement tend to be able to influence the national level settlement. Thus an agency is considered to be part of the settlement only when it is able to demonstrate sufficient power over the overall settlement at the national level. However, there may be other organizations or agencies in the political settlement that are not powerful enough to have an impact at the national level but do affect outcomes at a sectoral level through informal means.

This thesis uses the political settlement at a further level of disaggregation – a sectoral political settlement. The use of a sectoral political settlement allows us to explore the impact of agencies that do not have the power to influence a national level political settlement but nevertheless could have an impact on the outcomes at a sectoral level. The sectoral political settlement allows us to disaggregate the organisations and agencies within the national political settlement, and consider the ones that have a specific role with the sector. For example, the ruling coalition or the state could be further disaggregated into the Ministry of Telecommunications and the Department of Telecommunications (DoT) at a sectoral level as well as the Ruling party, the Opposition and Regional Political parties at a national level. This will allow us to not only look at the agencies that are relevant to the specific sector in question, but also help us understand the interactions between the different agencies within the ruling coalition.

The sectoral PS is distinct from but linked to the national PS. Agencies or organizations in the political settlement will attempt through contestation to grab a greater share of the rents, using their relative power in the PS. This is

likely to result in the rent distributions in the sector being aligned to the distributions of power in the sectoral political settlement. However, if there is a large enough rent capture by certain organizations in the sectoral PS, and a threat to the stability of the national PS, then the agencies with power at a national level could intervene to re-establish stability at the sectoral level. Additionally, exogenous changes that de-stabilize the national level PS may also affect the stability of the sectoral level PS.

The sectoral PS is particularly useful to explain policy shifts in the telecom sector as it reflects the fluidity and the mutability of the underlying relationships. The sectoral PS is better able to reflect smaller changes in the PS that would not be captured at a national level but could nevertheless influence outcomes in the sector. The next chapter will map out the particular agencies and organisations that make up the sectoral political settlement in the telecom sector with a view to studying policy changes from this perspective.

## **4.4 Summary**

We have discussed why policy-created rents are a significant part of the flow of funds in the Telecom Sector. **Chapter 3** has established that the rents in the Indian telecom sector are both large and heavily contested. This thesis contends that an analysis of the sector's policies from the perspective of the rents generated and their distributions will help explain policy choices in the sector better than current analyses of the sector that focus on Good Governance prescriptions.

To this end, this chapter explored the literature on rent theory to identify the analytical framework that would best apply to our current problem. Early

theoretical work on rents was focused on land rents and established the importance of resource scarcity as the underlying reason for the existence of rents and the fact that the differential quality of the resource gave rise to differential rents. While the early work hinted at the property rights that defined rent distributions, the conceptualization of property rights remained implicit in most of the analysis.

Marxist analysis brought in the importance of considering the context of power relations within which these property rights were defined and this strand of thought was further developed by Institutional economists. Advances in Neo-classical economics and NIE contributed the concept of market failures and established the existence of transaction costs that needed to be reduced in order to overcome particular market failures. This reintroduced property rights to the discussion on rents in a more explicit fashion, but the emphasis in most of the literature on the need for property right stability as a precursor to economic development misses the point.

NIE also broadened the scope of the discussion around how policy is made and what influences it, and there has been a greater focus on the role of elites in decision making although, in a majority of the studies, the impact of elite influence on policy is believed to be invariably negative. The neo liberal consensus on policy could be summed up by the “Good Governance” approach to policy, that emphasizes the need for base factors such as stable property rights and rule of law, and then increased transparency, independent regulation and a greater devolution of power to lower-level community-based formal organizations.

There are however, more recent efforts to understand the process of property right creation in greater detail by heterodox economists. These views suggest



that stable property rights are unlikely to exist during the process of development as the capitalist transition taking place is predicated on changing property right structures. However, all property right definition is bound to involve contestation since property right definitions create winners and losers.

Khan's framework of rents and political settlements provides the more detailed and nuanced way at looking at the process of property right creation and its consequent rent streams. Khan establishes that while property rights may be required in a sector and the rents they produce may help overcome specific market failures that hold back the development of the sector, the policies that define property rights also create transition costs, or costs of contestation of the property rights themselves. Which rights are defined and who they benefit is determined by the underlying substructure of power that Khan refers to as a political settlement. The rent flows from policy in turn can impact the political settlement over time, either strengthening it or changing it to better reflect the new distribution of benefit from policy.

The framework of rents within the context of a political settlement helps identify both the source of the significant rent flows in the telecom sector as well as explain the choice of policy that directs the distribution of these benefits within the political settlement that influences policy making in telecom. Khan's extended view of rents and rent seeking provides a basis for understanding the role that policy rents play in the development of the sector. However the rent flows cannot be explained adequately without the application of the analytical lens of the political settlement. The Political Settlement delineates the network of power relationships that determines the policy that drives the quantum and direction of the rent flows. The changes in the PS from these rent flows in one period help explain the policy choices of the subsequent period. The previous section argued that applying the analysis at a greater level of disaggregation – that of the Sectoral Political Settlement could enhance the detailed

understanding of the influences on policy at a sectoral level as well as the fluid reflection of policy outcomes on the sector.

The next chapter will apply this framework of rents within political settlements to the Indian telecom sector. The chapter will define the rent flows we shall consider in our analysis and define the parameters of the specific political settlement in the telecom sector. The chapter will also lay out the limitations of this framework and the likely biases in the data. It will sketch out the research methodology and sources of information before proceeding to the data analysis.

# *Chapter 5: Research Methodology*

## **5.1 Introduction**

This thesis began with the premise that current analyses of the telecom sector in India have been unable to satisfactorily explain the various policy changes driving the development of the sector as they are based on static definitions of efficiency and hence unable to map the dynamic implications of policy. As a result, explanations characterize the growth of the sector as taking place in spite of poor policy choices. Earlier chapters argued that specific features of the Indian telecom sector make it a rent-rich sector and one that is likely to see intense contests over rent due to its competitive structure and economics. These contests over rent often include the state, which views the sector as a key resource for rent extraction. After a review of rent theory and political settlement theory, **Chapter 4** suggested that analysing the development path of the sector from the perspective of rents and political settlements will more robustly explain the reasons behind particular policy choices and their consequent effects.

The next three chapters will apply this analysis of rents and political settlements to the telecom sector in India from the period 1995–2014. **Chapter 6** provides a revisionist reading of the policy history of the sector, examining the different phases in the sector's development from the perspective of rents created and distributed in each. **Chapter 7** examines the changes to the political settlement through each of the phases of development of the sector to explain policy choices and the impact of the outcome of the policy on the evolution of the political settlement. **Chapter 8** explores structural implications on the sector, which arises from the analysis using rents and political settlements. The analysis interrogates the source of spectrum scarcity in the

Indian context. It also uses the rents analysis to explain the source of market power of the largest telecom players and their consolidation of market share.

However before we apply the rent analysis to our question, this chapter seeks to clarify the methodology we will use in the subsequent chapters. The first section will explain the need to consider both rents and political settlements together for a robust analysis. It will also consider the strengths of the research method used. The following sections will deal with rents and political settlements in terms of conceptualization, data sources and data gaps. A robust political settlements analysis requires a richly detailed and granular understanding of the specific political settlement and the agencies within it. To this end, **Section 5.3** introduces the key agencies and organisations in the Sectoral Political Settlement for Indian Telecom. The ways in which these have interacted over the history of the sector's development forms the substance of the following chapters. Finally, this chapter will also lay out the limitations of this study in terms of its scope, its research methods and the applicability of its findings to other contexts.

## **5.2 Methodology:**

This thesis seeks to apply existing theory in rents and political settlements to the analysis of policy in the Indian telecom sector during the period 1995–2014.

Analysing policy in the telecom sector from the perspective of rents generated and distributed is justified given the magnitude and significance of policy-generated rents on the sector. Spectrum allocation policy creates significant rents for TSPs and the portion of rents extracted by the state form a substantial proportion of the costs facing service providers. It is therefore not surprising

that these rents are severely contested for and that these rent contests can influence the policy that allocates these rights.

The previous chapter has elaborated an analytical construct – the Political Settlement to decode these influences on policy making. The argument used is that underlying political settlements influence the creation of policy and the direction of rent streams as a result of the policy. The framework also posits that the consequence of rent distributions that do not complement the distribution of power in the political settlement is a change in either the distribution of rents or a change in the political settlement over time.

The academic literature on the subject has few examples of the rents perspective being applied to the analysis of the sector. Deepak Lal (2011) uses rents to explain that telecommunication in India has grown post-liberalization, despite the presence of significant “composite quasi rents”. He claims that these rents have not been detrimental to growth, since they do not affect productive efficiency but merely have a social opportunity cost. The analysis is limited by a static perspective of efficiency engendered by free competition and does not take the nuanced perspective on rents for development in the context of pervasive market failures.

Singh (2001) and Levy and Spiller (1996) have taken an NIE perspective and examined right creation in the sector. They have argued that property rights created in the sector need to be “impartial, inclusive, transparent and enforceable” (Singh 2001). However, this view of spectrum right creation does not really engage with the process by which the rights are created or the influences that are brought to bear upon the creation of rights. In other words, rights are seen as being created and enforced in a vacuum, rather than as part of a political settlement.

Desai (2006) undertakes a comprehensive history of the sector until 2006 which explores the myriad influences on policy. It is as close to an analysis of the underlying political settlement as the sector has had to date, but it does not incorporate the analysis of the actual rents that are being created and distributed. This makes it a fascinating read on the early history of the sector, but is subject to the criticism that it studies the policy without considering the considerable economic rent flows that have an impact on the formation of the policy itself.

Studies in other sectors have combined an analysis of rents and political settlements. Apart from Khan's work, Whitfield et al. (2015), Gray and Whitfield (2014), Kelsall and Seiha (2014) and Roy (2013) are examples of studies that have applied Khan's methodology of considering rents and political settlements in conjunction, to understand economic development or institutional performance. Kelsall and Seiha's (2014) study is particularly interesting as it considers the telecom sector (among other sectors) in its analysis of political settlements in Cambodia. The study is at an overall national level rather than a detailed sectoral study, The section on the telecom sector is interesting from a comparative perspective on policy and sector evolution, and shows that the issues facing the sector in Cambodia – excessive competition and low regulatory independence, have many similarities with the Indian sector.

The need to consider both rents and political settlements together forms the core of the research methodology in this thesis. Analysis of one without the other ignores the dialectic relationship between rents and political settlements where the rents flow from policy shaped by the political settlement and the political settlement in turn is shaped by rent flows to its members. Therefore an analysis that incorporates both rents and political settlements is more robust in

being able to explain both the causes and the outcomes of policy. This is especially important in the case of the telecom sector where rights limiting use of spectrum are essential for the effective operation of the sector. Here rents play a doubly important role.

### **5.2.1 Research method**

The research method used here is a rich case study method that allows us to collect in-depth and detailed information on the case. Yin (2003: 13) describes a case study as “*an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident*”. Odell (2001) outlines the strengths of a case study method over large n statistical methods in the study of International Political Economy. While the case study method could suffer from issues of generalizability, it also allows for a richer contextual study of processes and is a superior method for validating or extending theory. This thesis uses the case study method to critically apply a new frame of analysis to an existing problem. Yin (2003) refers to this as a Theory Evaluating Case and Odell calls it the Disciplined Interpretative Case Study, where the case applies “known theory to a new terrain” (Odell 2001: 163).

The limitations of this type of case study often revolve around generalizability and applicability in other situations. It may also suffer from bias in terms of selective choice of data that supports the hypothesis. Odell (ibid) suggests the rigorous use of supporting data and the interrogation of alternative hypotheses at each stage, especially in the use of counterfactual statements.

The method of data collection, involving triangulation of data sources and cross-checking of information from interviews, has been used to address the issue of selection bias. As for the generalizability of the findings, the thesis attempts to extrapolate some broader policy trends that could be applicable to other sectors in other contexts. This thesis uses one particular analytical perspective to characterize the evolution of the sector, in the belief that this perspective provides insights that are different to those already provided on the sector. It could also provide a way to consider policy evolution in other contexts.

### **5.2.2 Methods of Data Collection**

In order to obtain as much detail as possible, the study used a variety of data sources – secondary data analysis, secondary sources and interviews with key stakeholders in the sector from the private sector and the bureaucracy. The list of all interviewees is given in **Appendix 3**.

Quantitative data on the sector was accessed from the GSMA database for worldwide telecom data and from the DoT, TRAI, COAI and AUSPI websites for India specific data. While a significant amount of the recent data in the sector is available easily for these sites, some of the early data on the sector was harder to access. Private sector interviewees were generous with sector data that was not commercially sensitive. The COAI website was also a useful source of analytical reports on the sector. Financial data was collated from publicly available Company Annual Reports.

The history of the sector was gleaned from secondary sources, including journalistic sources, but the detail was collected through interviews with key



stakeholders in the sector. While reports from COAI and TRAI provided some details of the outcomes, the process of contestation was better elaborated by interviewees who had been part of the sector's early development. Since their view of events could have been biased by their role in them, the information was triangulated with information from the press as well as from other interviewees.

Spectrum prices and allotments are available from the TRAI and accessible on their website, albeit not in a consumer-friendly form. They were ratified with the data held by service providers who were willing to share the information.

One of the most challenging aspects of this study was the need for the technical understanding of the technology behind telecommunication required to make sense of the policy choices and implications. Interviews with service providers and with telecom consultants yielded detailed information on the technology behind the operation of the sector and the sources of constraint on its operation.

The information on rent-seeking and political influence on the sector was the hardest to obtain for obvious reasons. Some of it was accessed from secondary sources. India's long tradition of a free Press has meant that some information and much speculation is actually reported in the media and can be publicly accessed. Attempts were made to restrict journalistic sources to the better-established newspapers and media firms. Multiple journalistic sources were also accessed on the same event to ratify the information used. Other elements of the rent-seeking story came from interviews with stakeholders who asked to remain anonymous. Although many interviewees were quite forthcoming on information related to possible corruption, they were unwilling to be quoted directly. However, every attempt was made to triangulate information and data

from interviews with other interviewees, secondary data on performance indicators or with several different journalistic sources. I have indicated where the data or information is only alleged, not proven.

### **5.3 India's Political Settlement in Telecom**

As emphasized earlier, the more detailed and granular the understanding of the constituent elements of a political settlement, the better its ability to explain the influences on policy and outcomes. The PS analysis in the following chapters will refer to various organizations or individuals that appear to have influence over policy in the sector. This section seeks to introduce these various elements of the PS. To refer to these constituent elements of the PS I have adopted the term “agencies” used by Fine and Rustomjee (1996). Agencies could be formal organizations, informal organizations or even individuals. Fine uses the term “agency” in his Linkage-Agency approach so as not to privilege the institutional structure but its influence or agency on the process. This perspective and terminology has been applied to describe the ‘agencies’ in the political settlement. This differs slightly from the Institutionalist use of the term agency to denote state organisations.

The previous chapter argued that looking at a sector-specific PS in the telecom sector allows us to study influences at a sectoral level in greater detail and incorporate greater fluidity into the characterization of the political settlement and its influence on sector-specific policy. However agencies in the broader national political settlement do impact the sectoral political settlement in some periods, especially when the rent distributions in the sector are large enough threaten the stability of the wider political settlement. Below is an introduction to the key agencies in the Indian Telecom Political Settlement that will feature in the discussions of the following chapters. It identifies whether the

organisation or agency involved operates largely at a sectoral level or is also part of a wider national political settlement.

### **5.3.1 Political Agencies:**

India's crowded and chaotic political space is well recognized (Jayal and Mehta 2010, Hasan 2002, Kohli and Singh (eds.) 2012). The fact that multiparty coalitions have become the only viable ruling solutions since at least the 1990s, is indicative of the number and variety of competing pulls on the state in terms of managing its support base.

The two major national level political parties (the Indian National Congress, referred to hereafter as the Congress and the Bharatiya Janata Party (BJP)) which may claim to be organized along ideological lines have needed to align with a shifting and varied network of regional parties organized around caste or sub-caste, language, region or other smaller organizational factions. This has been temporarily at least reversed with the BJP victory of 2014, but for most of the period of this study, the government at the centre has been a loosely-knit factionally organized multiparty coalition, with allegiance to the coalition maintained by the disbursement of political rents and favours. The telecom sector is a prime example of this, with both the government at the centre and a regional party that demanded the post of the minister of telecom as payback for political support being important agencies in the PS.

The different agencies may not have aligned objectives when it comes to the telecom sector. We need to therefore examine the competing pulls on policy by the different organizations within the state apparatus. The following section disaggregates the state into different agencies, some of which are influential in

the sectoral political settlement, and others that operate at the level of the wider national settlement.

**a. Central Government:**

In 1995, the Congress Party led a majority government under the Prime Ministership of PV Narasimha Rao. However it lost support due to allegations of corruption in the 1996 general elections. The 1996 elections resulted in a hung parliament. After a 13-day government headed by BJP leader Atal Bihari Vajpayee had to resign since it was unable to garner support, a coalition of parties (including, among many others, the DMK, a regional political party from Tamil Nadu) headed by Janata Dal leader H. Deve Gowda and supported from the outside by the Congress gained power.

The threat of loss of Congress support led to a change in Prime Ministership to I.K.Gujral in 1997 (Hasan 2002). In November 1997, the Congress withdrew support from the coalition demanding the United Front drop the DMK from their coalition since the DMK was implicated in the assassination of Rajiv Gandhi (a Congress leader) in 1991. The assembly was dissolved and fresh national elections were called in 1998 (Sharada Prasad 1997). Again the results were inconclusive; leading to a BJP-led alliance of parties at the centre with Atal Bihari Vajpayee as Prime Minister but this National Democratic Alliance (NDA) government also fell in late 1998, when a regional party (AIADMK) withdrew its support for the centre.

Fresh elections were called in 1999. This time however, the BJP-led NDA was able to achieve a majority and form a government that lasted the full 5-year term. It was still a coalition and needed to ensure that its alliance members'

support was bought through clientelist payoffs. The BJP campaigned aggressively on its platform “India Shining” in 2004 but lost the general election (Hasan 2002).

The Congress came back to power with a coalition called the United Progressive Alliance (UPA –I) led by Prime Minister Manmohan Singh, a respected economist. Sonia Gandhi, Congress party President declined to lead the government although it was claimed that she remained the power behind the throne. While the UPA did not have a clear majority, it managed to complete its full 5-year term by securing support from several other parties at various times. In 2009, general elections were held again. The UPA alliance emerged victorious for a second full term. However UPA II also had to form outside alliances with regional parties who agreed to not give the NDA their support during the period of the assembly.

The UPA II alliance lasted its second complete term but by the end of its second term was mired in several corruption charges, one of which took place in the telecom sector – the infamous ‘2G Scam’, that will be covered in later chapters. The Prime Minister, Manmohan Singh, was seen as at best incompetent, and at worst complicit, in the corruption. The loss of faith in the government was reflected in the results of the 2014 election which gave the BJP an absolute majority, with Narendra Modi taking over as Prime Minister.

The ruling political party (the Congress, for most of this study) and the Opposition (the BJP, for most of this study) are both agencies in the National PS but have had an impact on the Sectoral PS during various phases. The need for the Congress-led UPA I and II governments to keep their coalition intact has led to agreements with regional parties that affect the sectoral political

settlement. The Opposition has also used events in the sectoral PS to exert pressure on the ruling party at the national level.

### **b. Regional Political Party – DMK**

The Dravida Munnetra Kazhagam (DMK) was a regional political party set up in Tamil Nadu in 1949, as a breakaway party of the Dravidar Kazhagam, a pre-independence party set up to fight for secession of the Madras Presidency from the Indian nation. The DMK first came to power in 1967 in Tamil Nadu, and since then has alternated with a splinter group AIADMK (headed by J Jayalalitha) for power in the state (Kohli and Singh (eds.) 2012).

The DMK was part of the Congress-led UPA I and UPA II alliances for power at the centre. During most of the period of the UPA government at the centre, the DMK won state assembly elections in Tamil Nadu and formed the state government. They were thus in a strong position to extract returns from the UPA for their support. In both governments, they demanded the post of the Telecommunications Minister go to a DMK appointee.

The Telecoms Minister during the UPA I period was Dayanidhi Maran. He was replaced by the DMK with A.Raja. The reasons behind the removal of Maran are discussed in Chapter 7. Raja's tenure from 2007 was made notorious by his involvement in the large scale corruption referred to as the '2G scam'. In the 2009 national elections, on the eve of formation of the UPA II government, the DMK threatened to withdraw from the alliance unless its demands on ministry posts were met, including the reappointment of Raja as Telecoms Minister (BBC 2009). The UPA II government acquiesced, and Raja was made telecom minister again. The press coverage of the 2G scam finally forced the UPA II

government to remove Raja from his post. The DMK also lost state assembly elections in 2009 on the back of this.

The power of the regional party came from its ability to impose costs upon the ruling coalition at the level of the national political settlement during this period. With the majority BJP government in power since 2015, the regional party has lost its relevance at the national level.

### **c. Ministry of Telecommunications**

This is the primary political agency that affects the Sectoral PS. Its links with the national PS relate to the power of the ruling coalition in the appointment of the Minister, and the power of the Regional Party over the ruling coalition to influence the appointment in order that they may benefit from informal rents.

While the ruling party (and the DMK from 2006–2009) have had power over the appointment of the minister of telecommunications, once the appointment has been made, the history of the sector has shown that the minister himself has been able to operate with a great degree of freedom. The history of the sector covered in Chapters 6 and 7 will show that several of the individual ministers were accused of corruption, and of having made policies to favour one or the other of the private sector players, presumably in return for some consideration. Indeed, through the period under study, the Telecom Ministry was coveted, probably for the very reason that significant rents could be extracted for personal or political gain.

The power of the Minister comes from the formal institutional power of his post, but also from his personal political allegiances and the strength of his contribution to the holding power of his political party. The power of the Minister appears to be checked by the executive only when the Minister's actions threaten to de-stabilize the national political settlement. The list of all telecom ministers from 1995–2014 is listed in **Appendix 4**.

#### **d. Ministry of Finance:**

While the Finance Ministry is not directly responsible for telecom and therefore does not operate at the sectoral PS level, it has played a pivotal role on decision-making in the sector during a few occasions in its history. Again, these relate to when the outcomes in the sector threaten to de-stabilize the national PS.

The Finance Ministry has been interested in the health of the telecom sector for two reasons. First, the firms in the sector have significant borrowing from the domestic financial sector. As was described in **Chapter 3**, the levels of debt in the sector are high and rising. A collapse of the telecom sector could have a knock-on effect on financial markets. Second, the sector is a significant contributor to central government funds. Policies that decide not just spectrum allocation but the prices of spectrum that the state can extract from the private sector have a considerable impact on the national government's fiscal position. The ministry of finance is therefore keenly involved in spectrum pricing during allocation. During recent spectrum auctions a high level Group of Ministers (GoM) including the Finance Minister has often been constituted to advise and oversee policy decisions regarding spectrum.



## 5.3.2 Bureaucratic agencies

### a. Department of Telecommunication (DoT)

As the original incumbent body in the telecom sector and the monopoly operator of the country's fixed line business prior to the advent of privatization in mobile telephony, the DoT remains a formidable source of power in the Sectoral PS.

It is a large and bureaucratic organisation with a rigid class hierarchy (Desai 2006). It is run by generalists from the Indian Administrative Service but is staffed by engineers who manage the telecommunications equipment. It is a large employer in the public sector. Desai (ibid) records more than 400,000 employees in 2004. It is also highly unionized. This numerical strength of unionized employees is its source of holding power and Telecom Ministers are careful to be seen as working in their interests.

As Chapter 6 will show, the DoT was resistant to change and suspicious of the growth of mobile telephony in its early years. It also had a high degree of power over the outcomes in mobile telephony, as it was the owner of existing fixed line infrastructure, the regulator, the policy-maker and the operator, all rolled into one. Its efforts to block mobile growth waned after it realized that it had more to gain from its growth in terms of shared revenues. Its power in the PS has also slowly eroded, as private sector firms have become market leaders. However, it still retains a crucial role that is the source of its power: it is responsible for the release of spectrum for the purposes of mobile telephony, its allocation and pricing.

### **b. Telecom Regulatory Authority of India (TRAI)**

Prior to the setting up of the TRAI as a separate regulatory body, the DoT was the regulator, the incumbent public sector operating firm in the sector and the political and policy-making body. In 1997, as a check on the power of the DoT, TRAI was set up but lacked any authority to overrule the decisions of the DoT. The near-collapse of the sector in 1999 engendered a rethink, and the role of the TRAI was strengthened in 1999 and again in 2000. Desai (2006) shows that the relationship between the DoT and TRAI was very confrontational in its early phase as it fought to gain more authority in the sector. However after its powers were strengthened and its board reconstituted to include more pro-incumbent members, the relationship between the two agencies has improved.

While the TRAI has more regulatory authority in the sector and has increasingly taken positions against the rulings of the DoT, it still remains subject to the Ministry of Telecommunications on many issues and is therefore mindful of the government's interests and, by extension, the interests of the public sector operational arm of the DoT – BSNL/MTNL. It thus is powerful, but only in the sectoral PS.

### **c. Telecom Dispute Settlement Appellate Tribunal (TDSAT)**

The TRAI was originally envisaged as the authority for dispute resolution within the sector. However, soon after its constitution in 1997, the orders of the TRAI were challenged by both private operators and the DoT, who took the cases to the Delhi High Court and the Supreme Court of India. The oft-changing policy stances of the DoT also created space for frequent disputes and the sector was very litigious in its early years.

In order to create a separate body to deal with dispute settlement between the various agencies and bypass the high courts, the TDSAT was set up in 1999 to adjudicate disputes and hear appeals against TRAI. Appeals from TDSAT hearings would go straight to the Supreme Court.

The relationship between TDSAT and TRAI is not a supportive one, with TDSAT often going against the rulings of TRAI. However, the Supreme Court has also often reversed TDSAT rulings thereby adding to the policy confusion and litigation prevalent in the sector (Desai 2006). The TDSAT operates at the level of the sectoral PS but its power in the PS is muted by the fact that the Supreme Court from the National PS can override its judgements.

### **5.3.3 Lobbying Agencies**

#### **a. Cellular Operators Association of India (COAI)**

Instituted in 1995 to represent the private cellular operators in their dealings with the policy maker, the regulator, and each other, the Cellular Operators Association of India was a very active lobbying body for the very early stages of development of the sector. It soon came to represent the GSM operators in the sector (those that were originally licensed to operate in mobile telephony) and some of its biggest battles were in questioning the validity of the CDMA operations that MTNL and Reliance commenced in 1997. In fact many of the early litigations in the sector were initiated by COAI against the DoT or TRAI.

In providing a unified voice for TSP demands however, the COAI has become an agency with significant power in the Sectoral Telecom PS. Since the inception of the sector, the DoT and TRAI have often held consultations with COAI, not only on TSP demands, but on a variety of policy issues and discussions related to efficient sectoral development. The COAI was an important part of the negotiations between the industry and the government in 1999 and was the prime mover on CDMA-related issues till 2003. The COAI is still an active lobbying body, reflecting current concerns of the TSPs to the government in the area of spectrum availability, for example.

#### **b. Association of Universal Service Providers in India (AUSPI)**

In response to representations by COAI to the government on the GSM operators' interests, the CDMA and fixed line operators formed a parallel agency that would represent their interests. The license has become technology neutral since Universal Licenses were issued in 2010 rendering different CDMA and GSM lobbies unnecessary. Of the two lobbies, COAI is definitely the more powerful and has been engaging with the sector longer.

### **5.3.4 Private Sector Agencies**

Business houses such as the Tata's and Birla's have existed prior to the creation of the independent state of India and their links to the political machinery have been documented since the independence struggle (Mitra 1998: 75). Others, such as the earlier unified Reliance group<sup>33</sup> grew with active support and concessions from Indira Gandhi's government as well as succeeding

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<sup>33</sup> The Reliance Group will be covered in this section as it remains among the most influential business houses in the country. Despite a split into 2 separate firms following a family feud, both firms are key agencies in the Telecom PS.

governments (Mitra 1998: 92-94). Business–government relationships have therefore continued to influence the formulation of policy. Their relative power is often, but not always, determined by their economic size. Historical relationships and specific patronage links may also be relevant in explaining their influence on policy.

Firms in the sector include large multiple interest business houses, firms that grew only with the Telecom sector, and International telecom players. While this isn't a comprehensive list of all players in the sector, the section below lists some key agencies in the sectoral PS.

#### **a. Bharti Airtel**

Airtel, the leading brand in the Indian telecom sector was promoted by an up-and-coming businessman from small-town India, Sunil Mittal. Bhandari(2012) tells a classic rags-to-riches tale of Mittal's rise. Sunil Mittal, who had been dealing with the import and domestic assembly of touch tone and EPABX phones in India saw the potential of the sector and bid for and won an important licence in the Delhi metro circle in 1995. Today the Bharti group is a conglomerate with a revenue of \$16.5 billion and interests in retail, insurance, digital TV and real estate, other than their core business – telecommunication. Mittal is reputed to have good and long-standing relationships with the DoT but his dealings are reputed to be above board. He is known to be relatively media-shy.

Airtel's source of power in the sectoral PS comes from its market dominance. The Bharti group, as one of the earliest entrants into telecom has also been one of the founding members of the COAI. Therefore from the very early stages of

sectoral evolution, Airtel has been a key agency in the sectoral PS. However, as its size has increased, it is beginning to have a greater influence on the national settlement. Industry analysts claim that Airtel's international partner, Singtel prefers not to involve the organisations in the National PS.

### **b. Vodafone**

Vodafone India was originally Hutchison Whampoa Group that started operations in India in 1994. Hutchison bought stakes in Usha Martin Telecom, Sterling Cellular, Max Telecom and Essar Teleholdings to become Hutchison Essar, a national player. Vodafone, a global telecom player bought a 67% stake in Hutchison Essar in 2007 for \$11 billion and launched the Vodafone brand in India. Vodafone PLC increased their stake in the Indian business to 74% in 2011 and 100% in 2013.

As a 100% subsidiary of a global telecom giant, Vodafone has the benefit of deep pockets. However as an international firm, it lacks the network of relationships in politics and bureaucracy that older Indian business houses have. Therefore while it has limited power in the sectoral PS, it has little voice at the national level. It has run afoul of the government over a disagreement about retrospective taxation in 2012 (Desai 2006, company website, market information). It is currently the second largest telecom player in India.

### **c. IDEA**

Idea Cellular was incorporated in 1995 as a joint venture between 2 large and well-respected Indian industrial houses with multiple interests – the Birla group and the Tata group, along with their foreign equity partner, Bell South

(later Cingular Wireless, the USA's second-largest telecom provider). Tata sold back its stake to the Birla group when it entered the CDMA market with its own subsidiary and Cingular sold its share back to the Birla group in 2006. In 2009, Axiata of Malaysia, a leading Telecom group in Asia with multiple regional brands bought a 20% stake in the company (Desai 2006, company website and market information).

It is currently the third largest player in the Indian wireless market in terms of revenue share and is seen as one of the most dynamic in the sector. The Aditya Birla Group are an Indian Fortune 500 conglomerate with a \$41 billion revenue and interests in textiles and yarn (their oldest business), retail clothing, and supermarkets, in addition to telecom.

#### **d. Reliance Infocom:**

The Reliance group of industries, one of India's largest conglomerates, was built from scratch by patriarch, Dhirubhai Ambani in 1966. From trading in spices and yarn in 1966, the conglomerate grew to establish itself as India's largest business house, with a combined family fortune of \$60 billion and interests in Oil and Natural Gas, Communication, Retail, Insurance, Banking, Telecommunication and many others. The group applied for licenses to the sector in its inception under the name of Reliance Infocomm, a group company.

In 2002, the patriarch and businessman extraordinaire who had set up and grown Reliance Industries, Dhirubhai Ambani, died without leaving a clear successor. Mukesh Ambani, the older son, took over the business as chairman, with the second son, Anil Ambani, acting as vice-chairman. In 2003, rumours of disagreements between the brothers begun to emerge and by November 2004, their disagreements became public. By December 2005 they agreed to split the

original business among the two brothers, with the older brother retaining the lion's share of their key businesses and the younger brother Anil getting some of the new businesses, including telecom.

The business was rebranded **Reliance Communication (RCom)**, part of the Anil Dhirubhai Ambani Group (ADAG). Chapters 6 and 7 will show that this firm had a significant impact at the sectoral level on the PS and many of the policy shifts in the sector can be attributed to RCom's attempts to establish a significant presence in the sector. However, unlike the larger Reliance Industries, run by older brother Mukesh, this firm has less power over the National Political Settlement.

Reliance Infocom has therefore moved from being a very influential firm in the sectoral and national political settlements prior to the split in 2005, to less influential in the national political settlement but very active in the sectoral political settlement after 2005.

#### **e. Reliance JIO**

The older brother's firm, Reliance Industries re-entered the telecom sector in 2010, with the purchase of 2300 MHz wireless access spectrum. Launched under a separate brand Reliance Jio, the firm intends to enter the mobile telephony sector with the launch of a 4G offering. In the following chapters, this firm will be referred to as Reliance Jio specifically to differentiate it from the other Reliance business. While, at the time of writing, the firm had not yet launched a product in the market, the sheer size of the firm and its reputed strength in the national political settlement make it a significant agency, one that operates at the sectoral level but has many links at the national level as well.



### **5.3.5 State Owned Telecom Service Provider:**

In 1986, prior to the advent of mobile telephony, the government chose to hive off part of the fixed line telephony business into a separate government-owned business (following Britain's model with BT). Two sections of the business were corporatized – Mahanagar Telephone Nigam Ltd (MTNL) which covered telephony in the urban centres of Mumbai and Delhi, and Videsh Sanchar Nigam Ltd. (VSNL) which was the international fixed-line calls business. The DoT's operational arm was also corporatized in 1999 and renamed Bharat Sanchar Nigam Ltd. (BSNL). Today MTNL operates a fixed and mobile telephony network in Mumbai and Delhi and BSNL operates a fixed and mobile telephony business in the rest of India.

While they are in theory corporatized in order to give them greater autonomy from the DoT, Desai (2006) argues that the DoT's hold on their operation continues and that the policy decisions of the DoT have often been designed to ensure that the interests of **MTNL/BSNL** are paramount. For the rest of this thesis, MTNL and BSNL will be considered as a single agency since their interests and fields of operation are complementary and non-competitive.

## **5.4 Limitations of the study**

While we have so far argued that our analytical framework of using the dialectic of rents and political settlements adds value to our understanding of policy choices in the telecom sector, the study has some key limitations that need to be recognized in order that its results may be used appropriately.

The first and most important limitation is that the study is neither an exhaustive enumeration of all rents in the telecom sector, nor is it able to map out completely, all the influences and agencies in the Telecom PS and understand in entirety their impact on all policy. The sector has seen the implementation of several policies in its 20-year history, many of which created rents. I have chosen here to focus on a specific set of spectrum allocation policies and their effects in terms of rents. There may be other economy-wide policies that also affect the sector. These are not considered in this thesis.

Similarly, describing the PS in its entirety, mapping and measuring all the sources of power in the PS and identifying all their impacts on policy is an extremely difficult, if not impossible, task and has not been attempted in this thesis. It is therefore important to guard against a tendency to retrofit all policy decisions to our description of the PS since this articulation of the PS itself may have gaps and therefore may not provide a complete explanation of policy choices. This thesis merely identifies some of the salient features of the Telecom PS that are discernible from a study of the sector and uses these to analyse the implementation of some spectrum allocation policies in the sector and the effect of their outcomes on the evolution of the sector. The aim is to provide a 'thicker' analysis of the factors underlying policy choice and their effects.

It could also be argued that the PS and its impact is most easily identifiable ex-post. It is certainly true that a history of the sector can be retold using political settlements much more easily than the future foretold with any certainty. The PS is more completely identifiable ex-post. This does not mean that it is impossible to use ex-ante however. An in-depth understanding of the sector, its historical choices and existing PS is essential to constructing possible future scenarios of policy effectiveness.

The analysis covered in Part II of this thesis does not restrict itself to an ex-post analysis of the evolution of the sector. The study, which can be argued to be valuable in that it provides a more complete explanation of event, also lets us draw out structural implications for the sector. The behaviour of agencies within the sector is shown to be shaped by these outcomes. This reiterates the belief that the effectiveness of policies is context specific and path dependent. Even with this in-depth contextual understanding, the PS approach is not meant as an exact predictive tool. It may not provide certain judgements but it can illustrate a set of probabilistic scenarios.

This conception of the PS is also not a closed system but an open system that is constantly evolving. Agencies that are external to the PS may become relevant due to entirely exogenous circumstances. The description of the PS will need to be modified to reflect these changes in order to remain useful. This underscores the fact that as analytical tools, rents and political settlements merely provide us with another way of examining economic development. They are only as useful as their ability to reflect the changing, multi-faceted and complex reality of dynamic growth.

More so in this sector than in others, the speed and impact of technological change could be profound. Technology is not only fast-changing; the speed of change is also accelerating in data- and information technology-based sectors such as Telecom. A change in technology such as the ability to use another bandwidth in spectrum could have a profound impact on the rents that can be generated from existing as well as new rights in the sector. The advantage of a dual approach that considers rents as well as political settlements is useful in that it captures changes in current and potential future rent flows.

The use of a sectoral political settlement was to allow for the analysis of factors such as technology, which make changes at the sectoral level but which may not be reflected in a significant change in terms of the National PS. While I have argued that this is a useful extension of the theorizing on political settlements in this case, understanding the links between the sectoral and national level settlements and its usefulness will benefit from application to other contexts. Keeping in mind the above limitations, the next chapter seeks to recast the developments of the telecom sector from 1995 to 2014 from the perspective of our analytical method.

## Part II

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# *Chapter 6: Rent Creation and Distribution in the sector 1995- 2014*

*“What is history, but a fable agreed upon?”*

*– Attributed to Napoleon Bonaparte*

## **6.1 Introduction:**

Part One of this thesis laid the foundations for considering the evolution of the Indian telecom sector from the perspective of rents and political settlements. We have argued that there is a gap in terms of current analyses of policy being able to explain the frequent shifts and the high levels of corruption that the sector has seen since the inception of mobile telephony in 1995. The characteristics of spectrum right creation in the sector make it a good candidate for an analysis from the perspective of policy created rents. However an analysis of the rents created in the sector is enhanced by placing it within the context of the political settlement that gives rise to the policy and affects the distribution of rents from it. We have also argued that rents in their turn affect the political settlement, especially at the sectoral level, either reinforcing it or modifying it to reflect significant changes in rent distributions.

The remainder of this thesis is devoted to applying this analytical framework to the Indian telecom sector. This chapter considers the rents that were created through policy during the various phases of the sectors development. The next chapter will consider the underlying political settlement that influenced the

distributions and the policy outcomes in each phase, which then shaped the political settlement in the subsequent phase. The separation of rent distributions and political settlements into two distinct chapters is an artificial one. As we have argued earlier, rents and political settlements need to be understood in conjunction with each other. For ease of analysis they have been looked at individually and sequentially in this analysis.

This chapter is divided into the phases of evolution that we have used earlier in this thesis. The phases mark significant changes in rent creation policy in the sector. They are therefore also marked by significant contestation over the rents created and their distribution. This analysis is not an exhaustive list of all policy in the sector. It merely focuses on the key policy shifts in terms of spectrum assignment and licensing that impact the creation of sector rents.

In each phase of the sectors evolution we will look at the changes in the policies that assigned rights over spectrum. These changes in rights also created changing rent streams. The rent that the policy created usually accrued to the producer of the service (the TSP) as the holder of the right. However, the state as the policy maker was able to extract a greater or lesser part of this rent for itself during the process of rent creation or spectrum right definition in the form of the price for spectrum and licenses, either administratively allocated or through auctions. It could also, through policy, ensure that some of the rent was dissipated to consumers by the producer, either by setting the price or the parameters of service. In a competitive market situation, the rents could also be competed away.

We can discern some patterns of rent distribution in the different phases of evolution of the sector. The sector has moved between high formal extractions of rents by the state, to phases where the rents remained largely in the hands of

producers. The analysis of each phase below attempts to identify, first, what rights were assigned and second, how the rents were distributed among producers, consumers and the state. A table in each section summarizes the spectrum rights created and characterizes the broader pattern of rent distributions from it.

While our focus is on the period between 1995 and 2014, this chapter begins by tracing the history of the telecom sector in India from just prior to the introduction of mobile telephony in 1995. The policy choices at different stages of the sectors development can only be understood in the context of the path dependent development of the sector. Tracing the factors that led to the establishment of mobile telephony establishes key policy choices that shaped the evolution of the sector and its underlying political settlement.

## **6.2 Prior to Mobile Telephony:**

This section begins with a characterization of fixed line infrastructure prior to the advent of mobiles in India. It explores the decision-making behind the advent of privatization with mobile telephony. The current policy view on the Telecom Sector is that privatization and the attendant increase in competition in the sector was the driver of sectoral development. It reduced cartelisation, lowered prices and inefficient rents and increased consumer value. Competitive markets are believed to have maximised allocative efficiency, productive efficiency and dynamic efficiency. However, earlier policy on telecommunications viewed it as an essential infrastructure sector, where social benefit would be maximised when it was run by the state or a quasi- state monopoly. In fact, prior to the advent of mobile telephony and ICT, most telecommunication firms the world over were state-run.



The generally accepted view is that the changes in technology (and the lowering of the costs of technology provision) have allowed the privatization of the sector. This has led to a huge increase in the universal availability of the service. The choice of strategy was also influenced by the prevailing global discourse that shaped the development doctrine of the period. India's historical political framework of democracy and global trends in policy discourse framed the space within which policy was considered, and limited the modes of operation for the agencies within it<sup>34</sup>. Understanding the context within which this change in policy took place is instructive in placing in context all further debates and characterizations of the sector. Indeed, the current policy discourse in the sector finds it hard to pull away from this neoliberal view that sector goals will be best achieved through increasing competition.

### **6.2.1 The Telecom Dark Ages**

Telecommunications were first introduced to India by the British in 1851 (Dash 2006: 11) and initially operated through private companies but consolidated under the Ministry of Communications in Independent India. At the time of Independence in 1947, when the new government of India took over the provision of telecom services, India's network had only 82,000 subscribers in 321 exchanges (Sethi 2006: 6). It remained either wholly government-owned or run through public sector companies till 1992. Telephone services were only wireline, and run by the Department of Telecommunications (DoT). In 1966, the number of registered DELs<sup>35</sup> in the entire country were only 623,000 with a waiting list of 734,000 (Dash 2006: 14-16). By 1982, the number of DELs had risen to 2.3 million, and by 1992 to 5.81 million (Desai 2006: 42) but still covered

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<sup>34</sup> Thorbecke (2007) demonstrates that the adoption of a development strategy at any time depends on the evolutionary state of current economic theory, the development objectives faced by the state and the underlying data systems and the methods of analysis.

<sup>35</sup> Direct Exchange Lines, equivalent to individual fixed line telephones.

only a very small proportion of the total population<sup>36</sup>. Until the 1980's, there was no indication that this was going to be turned on its head by a new technology.

By the 1980's, under the Prime Ministership of Mrs. Gandhi, telecom began to be seen as essential infrastructure. The Sarin Committee Report of 1981 recommended splitting of posts and telegraphs for greater focus on telecom (Mukherji 2004). In 1984, domestic private production of terminal equipment was first permitted in India. Under the Prime Ministership of Rajiv Gandhi (1984-1989), Telecom received even greater priority. It was listed as a major developmental priority in the 7th Five Year Plan (FYP) (1985-90). Outlay towards telecommunication investment in the 6<sup>th</sup> FYP jumped nearly 300% in the 7<sup>th</sup> FYP (Sridhar 2012: 22).

A separate Department of Telecommunication under the Ministry of Communication was set up in 1985. A technology mission was set up and led by Sam Pitroda, a telecommunications expert, to focus on driving development in the sector. Despite severe protests from the strong labour unions present in the state run telecom department, parts of the DoT were corporatized in 1986, with the setting up of MTNL (to cover telephony in Mumbai and Delhi) and VSNL. Mukherji claims that the Prime Minister's Office (PMO) wanted to bring in change to the state-run sector but it met with strong resistance from the ministry. For Mukherji the private wireless sector owes its launch in India to its support from the PMO (ibid). In 1989 a separate and powerful telecoms commission was set up but shut down within the year when VP Singh became PM, again because of ministry opposition. Chandrasekhar (following Singh) in 1990 set up the telecom restructuring committee, the Athreya Committee.

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<sup>36</sup> See **Appendix 5** for international tele-density comparisons in 1996.

This government focus was mirrored by an increasing consumer demand for better telecom services and more competitive pricing. There was also external pressure building on the reform of the telecom sector through liberalization and privatization from external sources through the WTO and GATT agreements. The combined effect of these pressures resulted in pushing India inexorably towards privatizing wireless markets despite significant resistance to change from within the DoT itself.

The following section explores this policy move towards privatization in greater detail, as it was the initial policy decision with the single greatest impact on the future shape of the sector.

### **6.2.2 The Decision to Privatize**

While current mainstream research in the area posits privatization and competitive markets as given best practice, this analysis takes a more historic approach to understanding the changes in policy in the sector. This section explores the economic logic behind the earlier policy and the reasons for the policy shift. These broader policy choices are still relevant in that they shape the current structure and economics of the sector.

The traditional view of telecommunications was one of an essential infrastructure, best provided by a state monopoly. It was an essential service, one that helped the connected individuals and helped business operate more efficiently. However, the costs of setting up the infrastructure were too high to be borne by a private investor. Traditional fixed line telephony required the laying of cables and wires to reach individual homes, a process that required the utilisation of public spaces and property, the service needed standardisation

in order to be universally accessible, and the cost of the last mile (i.e. the costs of connecting each individual telephone unit to the network) were high. In effect, it was the textbook definition of a sector needing public provision of the service.

Telecommunication as a public sector could be a source of revenue for the State (Mody, Bauer, and Straubhaar (eds.) (1995: xxi). Public ownership of telecom protected the newly developing nations from the pressures of international states and multi-national corporations. It was also prompted by national security concerns (Straubhaar 1995). Government ownership of telecom would also ensure universal access to telecom services. Given the essential nature of telecom infrastructure, private provision of the service ran the risk of only supplying those sectors and routes that were profitable. It might leave out large sections of the rural or the poor, where revenues did not justify their access to the service. Public provision was more likely to be able to invest in the infrastructure with the explicit aim of universal access (ibid). Most important from the perspective of this thesis, the size of these sectors and the significant levels of employment in the sector encouraged the use of the sectors' jobs as a way to distribute political patronage in many developing countries' newly formed states, post-independence (ibid: 7).

The Telecommunication Sector pamphlet of 1971 (WorldBank 1971), issued by the World Bank as a policy document for developing nations makes no reference to privatization at all. By 1987 however, a paper by Roth (1987) from the World Bank begins to suggest the possibility of private provision of public services in telecommunication, among other sectors. The suggestion at this stage is still tentative in regard to the suitability of private provision. Roth simply suggests that private provision may work as effectively in some developing country contexts. He suggests selective private partnerships such as subcontracting, franchising, but also privatizing specific areas – such as

equipment supply, private local services etc., rather than wholesale privatization. He also recognizes that privatization may encourage the formation of private monopolies (due to the sector's tendency to economies of scale) therefore will need some form of government regulation.

But the tide towards increasing privatization seems to have turned in the 1980's. Curiously, the timing coincides with a worldwide move towards liberalization and privatization, and the withdrawal of the active state in ideological terms and across sectors.

Roth (1987: 6) argues that three changes led to a change in the policy view on privatization in telecommunication. First, the change in technology had restructured the nature of costs in the telecom sector. Mobile telephony did away with the costs of the last mile – the cost of connecting each individual house to the network. Since it worked off spectrum, it did not need the laying of miles of cable. Some capital costs remained – in the setting up of tower infrastructure etc., but these were small in comparison to the capital intensity of fixed line services.

Second, the policy environment had changed. Ideologically, the USA and UK began converging on a strongly pro-market view. Liberal economics argued that the slow rate of growth of national telecom sectors and the rise of global trade and information flows pushed for liberalization of the sector. Market failure literature had given way to government failure literature. Public choice theory suggested that state capture by interest groups limited the state's ability to choose policy that would benefit the majority. Economic analysis had begun to focus on regulation as a means to manage market failure rather than active government intervention. This was reflected in policy advice and conditionalities imposed upon developing countries through the Washington

based organisations. Urey (1995) shows that the World Bank underwent a clear policy shift towards privatization in telecommunications in the early 90's, and that this policy shift represented an ideological shift, rather than the research-driven, 'non-ideological' one it was claimed to be. Roth, however, believed that there was sufficient evidence of the successes of privatizations and public private partnerships in mixed economies in the late 1980's. Infrastructure industries such as telecom that were earlier considered natural monopolies came to be viewed as "fit for competition tempered by regulation" (Desai 2006: 21)

Finally, Mody et al (1995: 11) point to the economic pressures faced by national telecom industries in the 80's. As the middle classes increased in number and the demand for residential lines increased, public telecom firms were unable to fund the investment required for expansion. These firms also struggled to fund investment in innovation or efficiency improvements, as their funding competed with wider government priorities. A government report estimated that the modernization of the telecom sector in India would require an outlay of Rs. 230 Billion, funds the government did not have (interview with Mr. Ramachandran). Less directly addressed in the literature were the pressures from global telecommunication firms keen to access potential new markets in the developing world. With rapidly evolving technology, the entry of the MNCs became the only way for a developing country to acquire it.

India too, underwent a significant shift in terms of telecom policies from 1984-1994, predating mobile telephony, and linked to wider changes in the policy attitude of the state towards services liberalization. McDowell (1997) provides a detailed analysis of the causes and stages of the policy change in India with regard to telecommunication. McDowell suggests that India's marginal role in the global political economy, its lobbying at international organisations such as the WTO against the prevailing liberal order, its model of post-independence

state-led growth all show India's 'counter-hegemonic challenge' (ibid: 60) to liberalization pre-1984. The key question then is why this position changed when it did.

McDowell challenges the three main neoliberal arguments for services liberalization – that the state was ineffective in driving economic growth, that the global economy had changed and needed liberalization, and that liberalization was required to ensure that there was a global convergence of communication technology. He emphasises, instead, the external factors that pressured the government to change its stance on services liberalization. He uses the GATT negotiations as an example to expose the changing interplay of hegemonic and counter-hegemonic forces that led to the change in policy.

Services liberalization was not on the GATT agenda in 1980. Services did not even come under the purview of GATT, which was set up to deal with trade related issues. It was first introduced by the US during negotiations in 1982 but the idea was initially met with resistance from the Indian negotiating team. India's initial research into services liberalization was highly qualified, if not negative. There was certainly international pressure backing the liberalization / privatization agenda. McDowell points out that not only was the Indian state under pressure to accept liberalization conditionalities after their fiscal crisis, but also the "counter-hegemony alliance" of the non-aligned states had slowly begun to unravel due to their increasing debt burdens (ibid: 74-91), removing concerted international opposition to the change in policy. As policy across different international organisations became more aligned, there was less and less support for any alternatives to a market-driven approach.

There was also pressure from within the country that began to build support for services liberalization. The growing importance of the service sector locally

(from 24% of National Domestic Product in 1952 to 39% of National Domestic Product in 1986 (ibid: 112) and the development of an organised voice representing Indian business began to push for dialogue in services liberalization. India's key interests in services liberalization was the loosening of controls on the international migration of labour, especially unskilled and semi-skilled labour. This was an interest that most large developing countries did have in common. In contrast, the US and Japan were interested in capital intensive and information based services liberalization and were not willing to negotiate on low skilled labour migration. After concerted US pressure, in 1987, services liberalization was put on the GATT agenda and many developing countries signed on to services liberalization, albeit at a gradual pace and with protection for domestic interests. The USA felt that this was weak deal for them and finally rejected it in 1995. While Indian negotiators touted this as a victory for India's sovereignty in the face of international pressure, the internal policy approach had also begun to shift towards services liberalization.

Mukherji (2004) disagrees with the above view. He claims that the opening up of the sector cannot be attributed merely to pressure from International Aid Organizations. The Athreya Committee report on the liberalization of the telecom sector was available by March of 1991, before the advent of the BOP crisis. The Athreya committee had recommended that 3 kinds of institutions were required – policy making, regulatory and field-oriented institutions. The report specifically talked about the sequencing of mobile telephony and also recommended the liberalizing of the equipment manufacturing space.

By the mid 1990's India was also particularly interested in the international mobility of domestic software programmers. Services liberalization became something the government was keen to promote and the introduction of privatization in what was seen as a small, scale luxury mobile telephony sector was a non-controversial backdoor entry point into a state run sector. Public



opinion in Indian press veered from being suspicious of the impact of liberalization to being convinced that it represented India's only hope for economic growth. This set the stage for the introduction of mobile telephony in India in the mid 1990's.

### **6.2.3 The Tipping Point**

In the final analysis, what tipped the hand of the government to finally tackle the privatization of telecom was the Balance of Payments (BoP) crisis that India suffered in 1990. It also had an impact on the route of privatization followed - the choice of license auctions to choose private partners. The IMF loans, provided to help tide over the BoP crisis, came with conditionalities that pushed for privatization and liberalization of a wide range of sectors, including Telecom. Further, the sale of spectrum to private entrants could serve as an important source of revenue for the state. These were also packaged as a way to cross-subsidize the rural penetration drives of the DoT.

In July 1992, the government of India first invited private participation in providing cellular mobile services. As discussed, privatization faced opposition – from the incumbent as well as from public opinion, which felt that exposure to external forces through liberalization undermined India's sovereignty. The introduction of private wireless had to be 'sold' to the nay-sayers. While wireline services remained the purview of the politically and organizationally strong incumbent, wireless services were considered a luxury good, non-competitive with the former and requiring high capital-intensity, hence the introduction of private participation and the conditions that made it necessary for them to have some foreign backing. Desai (2006) also points to the long waiting lists for telephones (1.7 million in 1990) as an argument used for private entry.

The following section traces the evolution of the sector through 6 phases that correspond to significant policy breaks in rent creation policies. The phases are: 1995-1999, 1999-2003, 2003-2007, 2007-2009, 2009-2012 and 2012-2014. The first phase from 1995 to 1999 was a rather shaky beginning, with poor growth and low revenues and a sector that seemed doomed to fail. The Noughties however, witnessed a turnaround and a strengthening of the sector in regulatory terms, in an attempt to encourage penetration and growth of revenues. 2003 to 2007 saw an increase in the competitive pressures on sector margins, and a driving of consumer value, as well as further regulation in terms of universalizing the wireless licenses. There was then a stated push by the DoT in driving consumer value through the dropping of costs per minute. This, combined with an attendant surge in penetration, firmly established the potential of the sector. 2008 witnessed a spectrum assignment process that was highly irregular, which drove a large number of new entrants to the sector but at an official loss to the government exchequer. Later characterized as the 2G scam, the exposure of the details of this scam from 2010 onwards has seen another change in the way the telecom sector is viewed. From 2010 onwards, both in the eyes of the government and in popular culture, there is no doubt that the telecom sector represents a huge growth opportunity. There is also a strong awareness that the sales of spectrum represent an unmatched opportunity for rent extraction by the state.

## 6.3 Phase 1: 1995-1999

Bids were invited from the private sector in 1992 (for metro licenses) and again in 1995 (for non-metro ‘circle<sup>37</sup>’ licenses). Licenses were finalised in 1994 and 1995 with a duopoly in each circle. Ten year licenses were issued along with 2 x 4.4 MHz (paired spectrum to accommodate uplink and downlink frequencies separately) of 900 MHz spectrum.

*Table 6.1: Spectrum Right Allocation 1995-1999*

License Round	License Type	Circles	Method of Allocation	Period of License	No. of Licenses	Amount of Spectrum	Winners
1994 – Phase I	Wireless (GSM mandated)	4 metros	Beauty Contest	10 Years	8 (2 per circle)	2X4.4 MHz of 900	Listed in <b>Appendix 6</b>
1995 – Phase II	Wireless (GSM mandated)	18 circles	Single Stage Auction	10 years	34 (max. 2 per circle)	2X4.4 MHz of 900	Listed in <b>Appendix 6</b>
1995	Fixed	6 Circles	Single Stage Auction	15 years	6	2.5MHz of 800 bundled with license	Reliance and Tata in 1 circle each. Listed in <b>Appendix 7</b>
1999	Wireless for BSNL/MTNL	All	Admin Allocation	20 years	1 in each circle as 3 <sup>rd</sup> operator	2X4.4MHz of 900	BSNL/MTNL

Key: High Formal Rent Extraction by the state, no rents left for producers or consumers

Lower Formal Rent Extraction by state, higher producer and consumer rents

Source: Data from TRAI, service provider information. Characterization of rents author’s own.

<sup>37</sup> India’s circle architecture was covered in **section 3.3.2 of Chapter 3**.

In January 1992, bidding process for licenses for the four metros followed a process that did not make any demands on the mobile service providers beyond the requisite funds and foreign collaborations to bring in expertise – this process was based on administrative allocation (‘ a beauty contest’ as it is known in the literature). In July 1992, two licensees for each metro were chosen who needed to exhibit business plans, foreign collaborators with experience, but most importantly, the maximum rental price for the license(Desai 2006: 76). It was August 1995 before the legal wrangling from the rejected bidders was settled in court and the first cellular operations were commenced. **Appendix 6** lists the winners of the metro licenses. Airtel won a license for Delhi and has since, through acquisitions, bought into Chennai and Calcutta. The other metro licenses show the presence of other key sector players – Aircel, Vodafone and Idea, either directly or through later acquisition.

The license cost for the metros was structured in the following manner: for each metro license, there was a fixed fee payable annually for the first three years of operation, after which the operators had to pay either the annual license fee or Rs.5000 per subscriber, whichever was higher. The fixed fee by metro is given in **Table 6.2**.

*(Note: All prices for spectrum in this chapter are given in Rupees Crores (Rs. Cr.). A crore is a uniquely Indian term denoting Rs.10, 000,000 (ten million rupees. It is the commonly used unit for currency in India, rather than millions. For most of the numbers, the value is also expressed as Rs. Million and US \$ converted at the prevailing exchange rate at the time. At the end of 2014 the currency exchange rates stood at about Rs.63 per US Dollar (exchange rates from <http://www.x-rates.com>)).*

*Table 6.2: 1995 Phase I Metro Licensing: Spectrum Prices (Rs.Cr.):*

	Delhi	Mumbai	Kolkata	Chennai
Year 1	2	3	1.5	1
Year 2	3	6	3	2
Year 3	8	12	6	4
Years 4-6	12	18	9	6
Ongoing	16	24	12	8
Price /MHz ongoing	16 Cr/4.4 = Rs. 36.3 Million/MHz	Rs. 54.5 Million/MHz	Rs. 27.3 Million/MHz	Rs. 18.2 Million/MHz
In US \$	\$800,000/MHz	\$1.2 Million/MHz	\$600,000/MHz	\$400,000/MHz

Source: Based on data from Desai (2006: 77).

In January 1995, bids were invited for wireless licences in 21 non-metro circles and also for wireline (or fixed line) licences in A (richer states) and B circles. At this stage, much clearer bidding requirements and guidelines were established. While the more stringent selection criteria should have eliminated all except the big business houses, the criteria were somewhat loosely applied and a number of smaller players got licenses too (Desai 2006: 77). The list of all wireless licenses awarded can be seen in **Appendix 6**.

The single stage bidding process raised around Rs. 20,000 crores (US\$ 4.5 Billion<sup>38</sup>) (Prasad and Sridhar 2014: 224-225), a ridiculously high figure for a nascent market in an undeveloped sector. Some of the bidders bid excessive and unrealistic amounts. In fact the number of licenses that could be won by a single party was retrospectively limited in order to bail out HFCL, who had indiscriminately bid on all circles and could not meet its obligations (ibid: 78).

<sup>38</sup> Exchange Rate in 1995 taken at 1\$ = Rs.45.

Six wireline licenses were also awarded (**Appendix 7**), raising Rs.27,000 Cr. (US\$ 6 Billion).

While the process raised substantial bids, it appears these bids had not taken into account the fact that the DoT had set high interconnect charges<sup>39</sup>. This led to the TSPs needing to price their calls at a very high rate. The combination of high license fees, high cost of calls and high cost of handsets depressed market demand and the wireless market had grown to a paltry 1.3 million subscribers by July 1999.

There were large-scale defaults in terms of license fee payments and firms in the sector were all close to bankruptcy. Prasad and Sridhar (2014: 226) estimated that the license fee payable till 31<sup>st</sup> July 1999 was as high as 20 times the annual revenue of all the mobile operators put together in 1999. Two studies were commissioned in 1998 on the health of the telecom sector, BICP (1998) and ICICI (1998). **Appendix 8** summarizes some of their key findings on the state of the sector. With large-scale defaults on license obligations, the sector was on the verge of collapse, with sector firms suing the DoT and vice versa. There was a demand from the firms in the sector for a regulatory agency that was independent from the DoT.

The outcome of the above turn of events on the sector was significant. An independent regulator, the Telecoms Regulatory Authority of India (TRAI) was set up in 1997. A revised National Telecoms Policy (NTP 1999) recognized wireless communication as an essential good. The DoT recognized the failure of upfront auctions and negotiated a move to a revenue sharing model for the firms in the sector, in return for their allowing increased competition. It was

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<sup>39</sup> Interconnect charges refer to the charges paid by the network that originates the call to the network where the call terminates. In the inception of the sector, since most lines are owned by the public sector incumbent, high interconnect tends to favour incumbents.

agreed that fixed and cellular operators would pay license fee dues up to 31<sup>st</sup> July 1999 as the entry fee into the new licensing regime, after which they moved to revenue sharing agreements with the government. All licenses were also extended to 20 years (starting 1994/95) from the original 10 year duration.

The entry fee paid by cellular operators was approximately 30% of their original license bid. 70% of the value of the excessive bids on the wireless licenses was written off. However, fixed line operators paid even less of their original fees and ended up with cheaper licenses as a result. For fixed line operators, due to the graded structure of their license fee agreements, the entry fee was only 5% of their original bid amounts (Bajpai and Hans 2005: 12).

The government incumbent was introduced as the 3<sup>rd</sup> player in each circle in 1999. BSNL (in the non-metro circles) and MTNL (in Delhi and Mumbai) were assigned 2 x 4.4 MHz of 900 spectrum free of cost (as government incumbents).

The conventional analysis of this phase of the sector's development typically describes a period of "bungled privatization", the power of the DoT and the need for better governance through an independent regulator. Desai (ibid: 29) for example suggests that "*the cupidity of the DoT led to the bankruptcy of the operators even before they had started*". Academic analyses of the period lay the blame for the collapse at the door of the DoT and its attempt to fix prices rather than allowing market forces to regulate price levels.

An examination of the distribution of rents in this period is, however, critical to understanding the underlying forces that culminated in this policy outcome. Wireless communication was still viewed very much as a "luxury" sector and this justified a policy framework where the rents accrued largely to the

government, in the form of license fees and levies. High interconnect costs ensured that any rent generated by the wireless operators was transferred to the DoT (as MTNL/BSNL were the dominant fixed line players and the nascent development of wireless meant most calls that originated on a wireless line terminated on a fixed line). This combination of policies meant that the economics of the wireless players had high fixed costs (rents captured by the government) and high variable costs (rents captured by DoT/MTNL/BSNL). This high extraction of rents by the state left little for the producers. Consumers did not benefit from this formal rent extraction by the state since costs per call were fixed at high levels. The state's high levels of rent extraction were threatening the viability of the sector.

While the political settlement underlying this distribution of rents will be detailed in the next chapter, suffice to say here that the large number of people employed by the DoT, and the characterization of this as a "luxury" good, worked to reinforce this distribution of rents. The near bankruptcy of the sector and the pressure this put on financial institutions (often owned by the government) who had lent them money was a critical driver in changes in policy direction to correct this distribution of rents. A revised National Telecom Policy (NTP 99) was the first move in this direction. NTP 1999 was in many ways an explicit recognition of the need to change this distribution of rents and set the stage for the next phase in the evolution of the sector. The granting of wireless licenses to MTNL/BSNL was the sop to DoT to enable the policy. It allowed the DoT to share in the potential of the sector.

On the basis of this analysis, it is not clear that the sector could have rectified its problems with an independent regulator alone as suggested by most analyses of the period. The rents that were being extracted by the state needed to be under threat for the state to be willing to rein in the oligopolistic interference of the DoT. Without the support of the state, a separate regulator



would neither have been set up nor would have had any power to curb the influence of the DoT. It needed the state to realise that its rent extractions were threatened to be willing to negotiate rent sharing with producers and consumers in order to grow the size of the pie. NTP 99 and the revenue sharing agreement with producers was in effect an agreement by the state to reduce their levels of rent extraction through license fees in exchange for an agreement by the existing producers to allow the state to lay claim on rents through spectrum right assignments as a participant in the sector. Thus while the state reduced its rent extraction and allowed producer rents to improve, it was simultaneously increasing its access to rents through rights to operate in the sector. **Table 6.1** characterises the phase as lower state extraction, but the state has agreed to lower its rents in anticipation of future rents as a producer in the sector, as well as a share of the revenue of private producers.

## 6.4 Phase 2: 1999-2003

As part of their bailout package, the TSPs in the wireless sector had agreed to give up the duopoly that they had been promised at the time of buying their original licenses. The state provider (BSNL/MTNL) had been introduced to the wireless sector in 1999. In 2001, the government wanted to introduce further competition in terms of a fourth licensee in each circle, a private sector player.

The allocation method was a three-stage bidding process with a sealed bid. Prasad and Sridhar contend that the auction procedure reduced the risk of overbidding and the results were evident in the more realistic spectrum prices. The price for pan-India license at this stage was Rs.1658 Cr. (Rs. 16.58 Billion or US\$ 368 Million) as against Rs.20,000 Cr. (US\$ 4.5 Billion) that the first auction had raised for 2 licences per circle. After the 1999 settlement the final price that the 1<sup>st</sup> and 2<sup>nd</sup> operators together had paid on a comparative all-India basis was Rs.7000 Cr. (US\$ 1.5 Billion).

*Table 6.3 Spectrum Right Allocation 1999-2003*

License Round	License Type	Circles	Method of Allocation	Period of License	No. of Licenses	Amount of Spectrum	Winners
June 2001	wireless	21 circles	Admin. Allocation	10 years	24 4 <sup>th</sup> operator.	2 x 4.4 MHz of 900/1800	Winners listed in <b>Appendix 9</b>
November 2003	Fixed and wireless	all	Change in License terms	20 years	-	-	UASL introduced

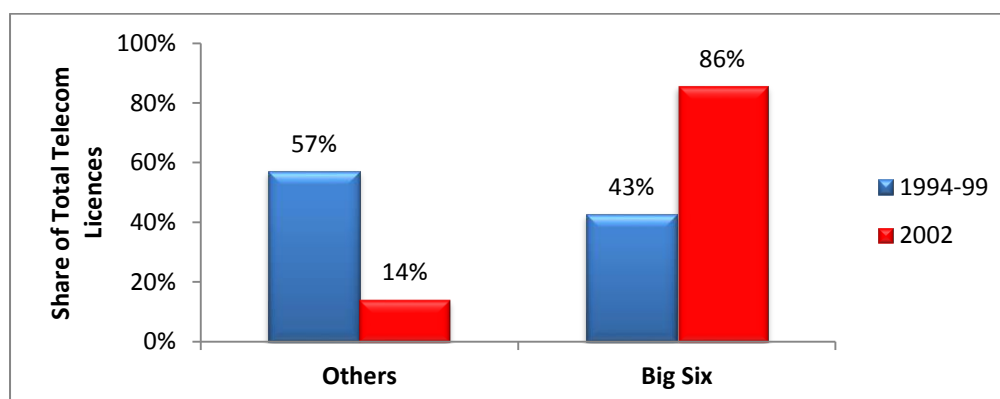
Key: Lower Formal Rent Extraction by state, higher producer and consumer rents

Source: Data from TRAI, service provider information. Characterization of rents author's own.

The spectrum allocated was largely 2 x 4.4 MHz of 1800 MHz spectrum since 900 MHz was not available in most circles. The 1800 MHz spectrum was less effective than the 900 MHz spectrum on voice calls since the latter had a greater range and required fewer towers<sup>40</sup>. The lower quality of the spectrum, the more realistic estimations of revenue, and the fact that the license fee had move to a revenue sharing method, all contributed to the lower cost of spectrum in this auction.

Airtel bought into 8 more circles. Reliance won the license for Kolkata, finally getting a metro presence with 900 MHz spectrum but it was unable to get 900 MHz spectrum elsewhere in the country (**Appendix 9**). By the end of 2001, Airtel was emerging as the clear leader in the market, with the largest presence – in all 4 metros and 13 other circles. By 2002, an increasing market concentration among the bigger players is also visible, with a largest 6 players accounting for 93% of the wireless licenses and 86% of all telecom licenses in the sector (**Figure 6.1**)

*Figure 6.1: Increasing Market Concentration 2002*



Note: Big Six: Bharti, Reliance, Tata, Vodafone/Essar, Aircel, And Idea.

Source: (Telegeography 2010), TRAI Data : March 2010.

<sup>40</sup> **Section 2.2.1** briefly explored the difference between 900 MHz and 1800 MHz frequencies. The lower the frequency the higher is the range of the signal, or the distance it can carry. The frequency differences will be explored in greater detail in **Chapter 8**.

In 2002, as the market began to grow, TSPs began to raise the question of further spectrum to meet growing demand. The DoT did not have free spectrum to assign but established a roadmap for how further spectrum would be assigned. They used the principle of *Subscriber Based Norms* (also referred to in some places as *Subscriber Based Criteria SBC*) where additional spectrum would be awarded on the basis of registered subscriber numbers. These norms promised the existing TSPs policy stability and continued access to spectrum. It was also an attempt by the state to set performance conditions on the TSPs' access to further rents.

The series of events that interrupted this consolidation and growth phase of the sector actually had their origin in the previous phase of evolution. In the late 1990's wireline (or fixed line) service providers had started to enter the wireless market in a roundabout way. The key fixed line players were the state owned MTNL/BSNL and large Indian business houses, Reliance and Tata. Reliance and Tata had not invested significantly in the wireless auctions. They won no metro licenses. Tata won a single non metro license and Reliance won licenses in six less important market circles. Instead, they had opted for wireline or fixed line licenses, and had won wireline licenses at a fraction of the cost of wireless licenses, but had not begun operations in the wireline market.

Wireline licenses were bundled with some spectrum that was originally meant to help reduce costs of operation in the fixed line space. With advances in technology they, along with the State-owned telecom company BSNL/MTNL began to use CDMA<sup>41</sup> technology, (initial wireless licenses were not technology specific), or more specifically known in this case as Wireless in Local Loop (WLL), to provide limited mobility wireless services within their circles. The

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<sup>41</sup> **Section 2.2.2** described the differences in the technology platforms of GSM and CDMA.

then COAI director general (Mr.TV.Ramachandran) claimed that limited mobility soon morphed into full mobility, allowing WLL (M) players to illegally offer mobile services without having bought a wireless license in the first place and therefore without the debt burden that wireless players then carried as a result of the 1995 auctions .

In 2001, the DoT overruled its own licensing policy yet again by allowing fixed line players to officially offer WLL services with full mobility. This circumventing of rules meant that these fixed line TSPs had entered the mobile telephony sector without the crippling license fees that hampered the rest of the players. In addition, incoming calls on WLL were free; giving WLL services a price advantage. The WLL operators were also able to use their long-distance call charges on fixed lines to cross-subsidize their mobile service. There is significant anecdotal evidence in the press that they benefited from informal support from the state and the regulator (Telegeography 2003).

Protests from the industry (primarily through the corporate lobbying body, Cellular Operators Association of India, COAI) led to several rounds of litigation and, finally, after a protracted three year battle, the DoT accepted TRAI's proposal to migrate all licenses including wireline licenses to a single unified license, referred to as the Universal Access Service License (UASL), that allowed both GSM and CDMA technologies to operate in the sector. The CDMA technology was to continue to operate on the 800 MHz band, and GSM operated on 900MHz and 1800MHz bands. Fixed operators had to pay the difference between the fixed and wireless license fees and Reliance was also charged a penal interest for its unauthorized provision of wireless service.

Further, apart from the one time entry fee of the UASL, all wireless operators had to pay a percentage of their revenue share (fixed at 10%, 8% or 6%

depending on the category of circle) as license fees and a separate percentage (fixed at 2%, 3% or 4% depending on circle category) as spectrum charges. The fixed line players were migrated to this license on paying an additional entry fee. The price differentials that WLL was able to benefit from were also changed with the regulation of interconnection charges and the implementation of a Calling Party Pays (CPP)<sup>42</sup> regime for both wireless and WLL players in 2003.

NTP 1999 saw a decisive shift in the direction of policy – the clear learning from the earlier phase was that the economics of the sector was not sustainable and there was an urgent need to redistribute the rent of the sector more in favour of the operators. This was successfully achieved and the outlook for producers improved significantly. Consolidation further reduced the fixed cost burden. Subscriber Based Criteria for the allocation of further spectrum reduced policy uncertainty with regard to spectrum assignment. Conventional analyses would view this as the success of an independent regulator. Such analyses would also view the CDMA/WLL move as a technological innovation that could add value to consumers (Sridhar 2006), and UASL as an attempt to create a technology-agnostic environment that allowed the best technology to triumph (interview with Mr. Arvind Kumar of TRAI).

An alternative view to this is that the increasing producer rents in the wireless business resulted in greater interest from the state owned players (BSNL/MTNL) and the large Indian business houses (Tata/Reliance) who both owned fixed line assets and had limited wireless presence. Reliance had managed to win a metro license in 2001 but it was with less valuable spectrum.

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<sup>42</sup> CPP is a system where the caller pays the cost of the call. It is the most common form in mobile markets today. The USA has RPP, where the receiver pays some of the costs of the call. RPP is theoretically better at ensuring allocative efficiency. The problem with the RPP system is that it does not allow mobile phone owners to have budgetary control over their bill and is believed to be detrimental to the growth of the sector. However, a CPP system allows the TSP to exercise market power in call termination charges and in the early stages of the sector, allowed TSPs the financial resources to fund customer acquisition.

The influence of the DoT and the big business houses on the ‘independent’ regulator is visible in the move to grant wireless licenses to MTNL/BSNL at no cost and to initially allow WLL at no incremental cost, but in fact significant cost advantages over GSM.

Viewing this evolution of policy from a rent perspective makes it clear that as NTP 1999 resulted in the increasing attractiveness of the wireless sector, the key driver to the evolution of this policy towards UASL was not the independent regulator or innovation in technology but the desire to allow DoT, and the private firms of Reliance and Tata to participate in these increased rents. At least in the early stage, in the way that its powers were defined and in its dependence on the DoT, TRAI was seen as a pawn in the hands of the DoT and unable to manage an independent agenda for the sector (Sen 1994, Dossani 2002).

Thus it was not the benefit of an independent regulator that resulted in this policy change but the challenge from those that had been left out of the existing rent distributions. This challenge was met with contestation by existing holders of the rights as they saw their rent being eroded through increased competition. The state finally settled the matter by allowing its own participation, as well as that of key industrialists in these ever more attractive rent opportunities.

The state’s formal rent extraction through the redesigned spectrum auction was reduced but the state had also opened two fronts in terms of its own participation in the sector – through GSM and CDMA. In addition the policy had bought entry for Reliance again on two fronts – GSM (although with poorer quality spectrum) and CDMA.

In that sense some producers benefited (**Table 6.3**) from the move to Universal Licensing, while others (the original GSM licensees) saw a reduction in their share of rents through increased competition. However, seeing that they were unlikely to be able to influence the state's position on this policy, they agreed to settle the dispute and accept the policy change. They had the benefit of better quality spectrum and the reassurance of guaranteed spectrum allotment if they grew.

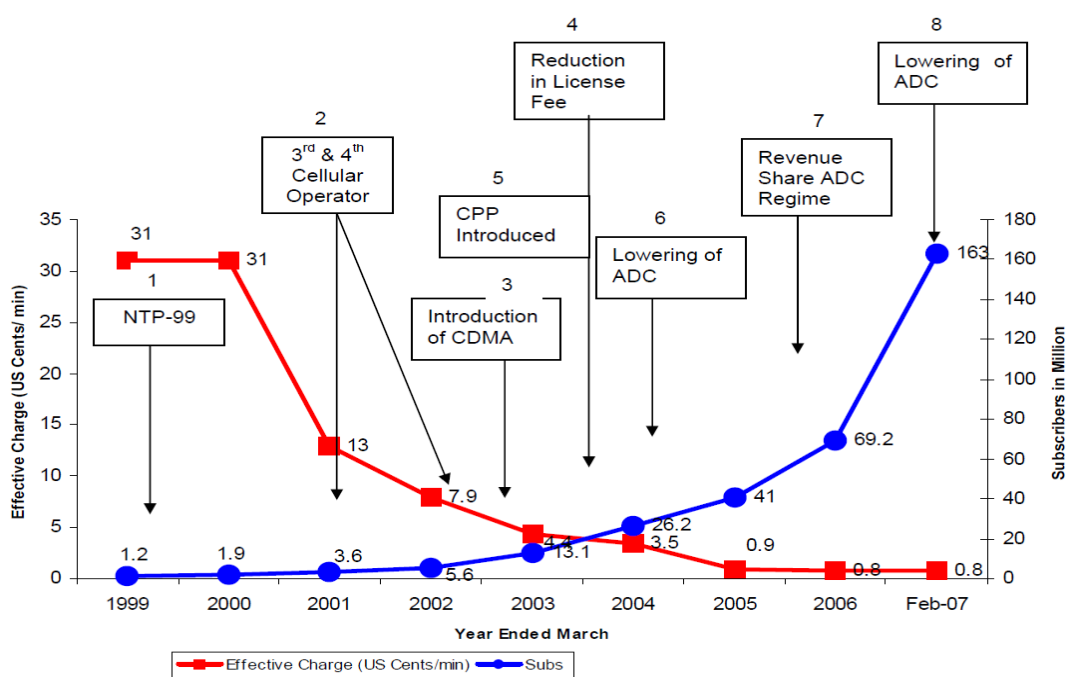


## 6.5 Phase 3: 2003-2007

Through what was clearly a litigious phase of development for the sector, the sector did manage to achieve a number of changes that benefited growth. First, several regulatory changes and the process of negotiations resulted in the strengthening of the powers of the TRAI. The strengthening of TRAI meant that, in theory, interest groups were less likely to be able to affect sector outcomes. Incremental policy changes had also, by 2003, adjusted tariffs and concessions in the field to create balanced tariff plans to ensure that both technologies operating in the sector faced similar costs. Importantly, it also led to the recognition of the need for a uniform licensing policy to cover both wireline and wireless players in the sector. The uniform policy, though a change from earlier licensing, resulted in greater spectrum right clarity and stability. And finally, the strong competition between WLL and wireless players had resulted in a dramatic dropping of price per minute resulting in an explosion of subscriber volumes (**Figure 6.2**). These changes led to a period of unprecedented growth and profitability for the sector.

Overall this phase was characterized by improved economics for producers, very strong consumer value and spectacular growth in the industry. By 2006, ROCE for industry leader Bharti Airtel had improved to 18%, from 0% in 2002 (calculated from Company published Annual Reports). The industry had grown to \$13B in revenue. Consumer prices had fallen to lower than Re.1 / minute (1/10<sup>th</sup> of global consumer prices). Explanations of this growth as usually put down to the competitive pressures on pricing and a stable regulatory regime.

Figure 6.2: Price per Minute vs. Subscriber Growth in Mobiles



Source: (COAI 2007b: 2)

However, this view does not take into account the fact that, in part, this increased consumer value (lower prices, better services) were driven by a forced dissipation of rents to the consumer by political pressure. In 2005, the post of telecom minister was given to a regional party (DMK in Tamil Nadu) nominee, Dayanidhi Maran. Maran, a party rising star, was technology savvy and was seen as progressive in his views for the sector. He challenged the sector players to drop call costs to Rs.1 per minute and saw substantial political mileage from this move.

The increased size of the sector and the rents it was generating also began to be noticed by the politicians. In spite of the independent regulator, liberalized and stable policy and the increased competitive pressure, rent seeking also increased, contrary to what neo-liberal theory would lead us to believe.

Six years after the fact, the Central Bureau of Investigation (CBI) in India has accused Mr. Maran, as Union Telecom Minister in 2006, of misusing his office to engineer the sale of telecom firm Airtel to Malaysia's Maxis Group. A criminal case that accuses Mr Maran of corruption and conspiracy alleges that in exchange, Maxis paid "illegal gratification" worth more than Rs. 700 crores (Rs. 7 Billion or us\$ 152 Million) to Marans family business interests. Maran was peremptorily sacked in 2007, and replaced by Andimuthu Raja, another DMK nominee who was seen as being very close to the power bases within the DMK party but not for reasons of political graft (Joshi 2010). The amounts allegedly paid by Maxis show the recognition that the size of rents had increased significantly and the contests for these rents showed higher levels of rent seeking.

The conventional view also ignores the fact that even as the profitability of players such as Airtel improved as they benefited from economies of scale, those with less of an incumbent advantage continued to remain sub-scale (e.g. Reliance ROCE in 2006 was only 3.8%) and did not yet have a national footprint. These players, especially Tata and Reliance, had managed to secure entry into the sector but were unable to compete with the incumbents. They were even keener for greater access to sector rents on the back of the improved economics of the industry.

Thus the rents analysis of this phase highlights the political mileage that redistributing rents towards consumers resulted in, the increasing attraction of this sector as a potential source of informal rents and the desires of the large businesses house to participate in what was now a thriving and vibrant sector. These trends are not visible from looking merely at the growth in sector volumes and profits. Thus, while the phase has traditionally been seen as one where the sector was growing due to the right institutional structures being in place and the right policies complementing these, a more nuanced rent analysis

shows that the increasing rents in the sector laid the foundation for greater rent seeking in the subsequent phase. The seeds of the 2G scam, in other words, lay in this growth phase of the sector's evolution.

## 6.6 Phase 4: 2007 – 2009

This phase saw the appointment of Andimuthu Raja as Telecom Minister in 2007. It signalled the start of a period of immense regulatory change and uncertainty, significant informal rent extraction, rent contests by firms and a dramatic change in the levels of competition in the industry. Subsequently characterised as the 2G scam, the allocation of a further round of 2G spectrum in 2008 completely changed the shape of the sector. However, the factors that led to this event had started to take form in 2007.

In 2007, Vodafone purchased Whampoa's 67% stake in Hutchinson Essar Telecom (HEL) for \$11.1 billion – valuing the entire entity at \$18.8 billion. HEL was a nationwide GSM operator and this valuation established, without doubt, in the eyes of several players (from politicians to large business houses), the rent and wealth creation opportunities in the wireless industry.

Yet again, the policy of spectrum assignment, and the policy view of competition structure in the sector, was changed in 2007. The TRAI brought out a set of recommendations in August 2007 (TRAI 2007) that went counter to their own recommendations of 2005 (TRAI 2005). In 2005, the report clearly stated that existing operators in India had less spectrum than their counterparts and that, as a scarce resource, all additional allocations of spectrum, even in the 3G band, should first be used to strengthen the efficiency of incumbent operators.

In 2007, the TRAI recommendations do a complete about-face. Claiming that the changing dynamics of the sector necessitate a re-evaluation, the report makes wide –ranging recommendations on competition and spectrum usage

and pricing. Professing a “light handed’ regulatory paradigm” (TRAI 2007: 11), it suggests that there should be no cap on the number of entrants to wireless. Further, that improved spectral efficiency among incumbent private players showed that they were not constrained by spectrum scarcity. It recommends that the existing subscriber based norms be re-calculated, but in the interim, that the levels be raised from current.

While the report also suggests that the pricing for spectrum at 2001 prices is unrealistic given market growth, it does recommend that spectrum in the 800, 900 and 1800 MHz bands should continue to be administratively allocated to ensure a level playing field because of legacy reasons, while all spectrum not in this range, such as the 3G spectrum, should be competitively allocated through an auction. Note that 3G spectrum, which was in 2005 seen as an additional support for the existing 2G service, is now being referred to as a separate service.

These recommendations first and foremost established a case for introducing new competition into an already crowded sector<sup>43</sup> on the basis that prior introductions of competition into the sector had driven significant growth. Second, it suggested that new allocations of spectrum in the 2G bands should not be auctioned (to maintain a “level playing field” with earlier spectrum in the band). And finally, it reduced the access that incumbents in the GSM sector had to further tranches of spectrum by raising the SBNs. The DoT, under Raja selectively used the recommendations of this report to justify his change in policy on the sector.

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<sup>43</sup> Crowded from the perspective that the number of players per circle was already 7-9, higher than in most other countries.

As part of the same ruling TRAI also recommended that a TSP could hold both a GSM and a CDMA license. Reliance applied for and was allocated 4.4 MHz of 1800 GSM spectrum nationwide (the license was only for 14 circles as R Com already operated GSM in the other circles) for a payment of Rs.1651 crores (Rs. 16.5 Billion, US\$ 413 Million at prevailing exchange rates) under this Dual Technology ruling. Of note is the fact that, while several other players (notably Tata) applied for the same license, the processing window was closed once the license was granted to Reliance and all other parties had to apply as part of the first come, first served 2008 allocation.

*Table 6.4 Spectrum Right Allocation: 2007-2009*

License Round	License Type	Circles	Method of Allocation	Period of License	No. of Licenses	Amount of Spectrum	Winners
2007	GSM	14	Administered	20 years	14	4.4 MHz	Reliance
January 2008	wireless	All/ some	Administered at 2001 prices	20 years	122 licenses	444 MHz of 800/1800	2G Scam. Winners in <b>Appendix 10</b> . All Licenses cancelled by 2012 Feb.

Key: Largely Informal Rent Extraction, producer rents for select few

Source: Data from TRAI, service provider information. Characterisation of rents author's own.

In January 2008, Raja suddenly announced a further auction of USLs (Universal Service Licenses i.e. those covering wireless and wireline services). However,

unlike earlier rounds of licensing, the price of these licenses for 4.4MHz of spectrum was administratively set at 2001 prices, Rs.1650 Crores (Rs.16.5 Billion), far lower than their current estimated market value. The market had grown significantly in the intervening years and the administratively set price of 2001 was around a tenth of the market value of the spectrum in 2008.

Further, instead of an open bid system, the licenses were awarded on a first come first served basis to players who did not need to prove credentials in the telecom space. This resulted in the awarding of new entrant licenses to players with no technological expertise<sup>44</sup> and insufficient funds for operation in the sector. After several applications had been received, an arbitrary cut-off date for applications was also announced, creating a furore in the industry and press. 122 licenses across the different circles had been awarded on this round, raising only Rs.12,386 Cr. (Rs. 123 Billion, US\$ 3.1 billion).

While the onward sale of the spectrum had been locked in for a period, new players were allowed to divest their business, bringing in foreign partners to fund their operation, resulting in windfall profits for the new entrants<sup>45</sup>.

Existing players, Reliance and Tata, also obtained nationwide GSM licenses at this time, again at a fraction of the cost paid by the earlier entrants.

The result of the 2008 auction was a greater crowding in of new entrants, some believe, unsustainably so (see **Appendix 11** for a review of market players in 2008). A shakeout resulted in some consolidation among firms in the market, but the average number of players per circle went up by almost 50% (**Appendix**

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<sup>44</sup> Winners of the new licenses seemed to be firms from the real estate or building sector, possibly Raja's old cronies from his previous post in the Environmental Clearances Ministry. The details of this will be discussed in Chapter 7.

<sup>45</sup> For example, Unitech divested 67% of their stock to Telenor from Norway for Rs.7000 Crores, making a profit of Rs. 5895 Crores on their license (more than 300% on their original investment) within a period of months.



12). In 2009, the news of the 2G scam broke in the press, leading to the resignation of the telecom minister Raja in 2010, and his investigation by the CBI on corruption charges.

This round of licensing in the sector seems to be a simple tale of the negative influence of interest groups (in this case, a politician) on the policy decisions for the sector. The minister was likely engaging in rent seeking in pricing spectrum rights at a fraction of what they were worth in the market. The influence of the minister on the process indicates that the regulator was not sufficiently independent. As much as overly high license fees in the first round of licensing crippled the sector, the exceedingly low fees in the later round resulted in the creation of opportunities for corruption, a loss of revenue for the state, and uneven playing fields for existing players. Increasing regulatory independence would prevent this type of political rent seeking from happening.

However regulatory independence seemed to have been achieved in the previous phase. If so why did it regress in this one? If the regulator, who was seemingly strengthened and insulated from political influence through institutional means, could be overruled by a minister, was it a problem of inappropriate institutional structures? An NIE approach would recommend reviewing institutional constraints on the operation of the regulator in order to further insulate it from interest group influence.

A rent based view would, however, clearly identify the underlying driver to this seemingly whimsical shift in policy. The increasing producer rents arising from the reforms of the earlier phase (culminating with visible events such as the Vodafone acquisition), led to politicians and business houses (Tata and Reliance) who had been left out of the “GSM gold rush” (as referred to by an interviewee in the private sector) driving a restructuring of the distribution of

rents. Their contest over these rents was engineered through a change in the policy of spectrum rights assignment in the sector.

Seen in this light, Mr. Raja's moves were about carving up the pie of rents differently – with more being extracted informally by politicians and their chosen corporate allies (such as Reliance and Tata, but also new entrants such as Unitech, who bought the license at a low cost and then brought in a foreign equity partner Telenor, to generate windfall gains). The 2G scam from this perspective was not an isolated incident of illegal rent seeking driven by one individual but a move by a powerful faction of interest groups that had been left out of the growing rent distributions in the sector.

As we have argued earlier as well, the assumption that greater isolation from the politics of patronage is possible and needs only a change in formal institutional structures such as a regulatory body is unlikely to be effective. This perspective ignores the underlying causes of informal rent seeking and does not acknowledge that the increasing rents were likely under any circumstances to lead to increasing contests for a share of them. Similarly, merely the removal of an official, who had clearly misused his power for personal gain (Mr. A. Raja), does not remove the likelihood of political patronage. This is not to say that large rent-seeking with a significant social cost did not take place, or that Mr. Raja was not to blame for his role in it. It just seeks to underline that the causal factors lie beyond individuals and their mal-intents.

## 6.7 Phase 5: 2009 to 2012

In 2010, while the 2008 licenses were still in operation, but in response to the bad press that the 2008 allocation was getting, the government decided to move to auctions as an assignment mechanism for 20 MHz of 2100 MHz (3G spectrum) and 40 MHz of 2300 MHz (wireless broadband) spectrum.

The 2G Scam and its aftermath in terms of the on-sell of the spectrum at higher prices had alerted the state and the general public that significant rents were now to be had in the allocation of spectrum and auctions would allow the state to extract this rent.

The government had set a reserve bid price of Rs. 35 billion, but the bidding among 9 operators for the 3 slots in 17 circles and the 4 slots in the remaining 5 circles for 3G spectrum was intense and far exceeded the reserve that had been set. The auction, which continued for 34 days, drove up bids for a pan-India license to Rs. 16,828 Crores (Rs. 168 billion, US\$ 3.6 Billion), ensuring total government revenue from the auction to nearly Rs. 70,000 Crores, (or Rs. 700 Billion, US\$ 15 Billion).

The BWA auction had only two lots of 20 MHz of BWA in each circle in addition to the state owned BSNL/MTNL who had already been allocated their spectrum. The BWA auction raised Rs.38,500 Crores (Rs. 385 Billion, US\$ 8.3 Billion), again far higher than estimates . Vodafone and Idea participated but withdrew from the bidding citing high prices. Airtel invested in BWA spectrum in 4 circles and Aircel in 8 but the only company that bid for and won a BWA licence in all 22 circles was Infotel, who was bought over and renamed Reliance Jio after the auction.

The auction was extremely successful in terms of revenue for the state - it had estimated a reserve price for a pan India block of 5 MHz of 2100 at Rs.3500 Cr. (US\$ 752 Million) and a reserve price for a 20MHz block of BWA spectrum to be Rs. 860 Cr. (US\$ 185 Million). Realized prices far exceeded the state's expectations, with 5MHz of 3G spectrum selling at Rs.16,750 Cr. (US\$ 3.6 Billion) and 20 MHz of BWA spectrum realising 12,848Cr.(US\$ 2.8 Billion).

Airtel, Reliance and Aircel won 3G spectrum in 13 circles each, and Vodafone and Idea won 9 circles each. BSNL/MTNL were assigned spectrum in all 22 circles for free. The BWA spectrum was won by Infotel (rebranded Reliance JIO<sup>46</sup>), Aircel, Airtel and others, and again, BSNL/MTNL were assigned spectrum free in all circles. Reliance JIO's entry was noteworthy. The firm is promoted by the elder Ambani brother of the duo who has made a play to enter the mobile telephony market through a launch of 4G technology on the 2300 MHz spectrum band. The list of license winners is provided in **Appendix 13**.

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<sup>46</sup> A brief note on Reliance Jio is given in Section 5.3.4 d. and e. of Chapter 5. To recap, Reliance Jio is the entry Reliance Industries owner, and elder brother Mukesh Ambani. He is reputed to have strong links with the government.

*Table 6.5 Spectrum Right Allocation 2009-2012*

License Round	License Type	Circles	Method of Allocation	Period of License	No. of Licenses	Amount of Spectrum	Winners
May 2010	wireless	All	Auction	20 years	3-4 licenses per service area	4 blocks of 5MHz each of 2100	3G spectrum. Winners in <b>Appendix 13</b>
May 2010	wireless	All	Auction	20 years	2 licenses per circle	2 blocks of 20MHz of 2300	Broadband Wireless Access (BWA) spectrum. Winners in <b>Appendix 13</b>

Key: Formal Rent Extraction, high rents for state and consumer, lower producer rents

Source: Data from TRAI, service provider information. Characterisation of rents author's own.

The 3G auction was hailed as a very efficient one. It was designed and conducted by objective third party agencies through a transparent online multistage bidding process. The comparison of the 2010 auction in terms of the process, and the revenue raised for the state, with those of the 2008 auction, was stark. The conventional view of this phase is that the return to an auction-based allocation of spectrum resulted in an efficient process with firms paying in line with their expectation of returns.

A rents view of this phase, however, highlights the more significant redistribution of rent away from producers with the higher auction price of spectrum. Return on Capital Employed (ROCE)<sup>47</sup> of key players declined substantially over this phase. Airtel ROCE moved from 30.4% in 2009 to 7.1% in

<sup>47</sup> Return on Capital Employed (ROCE) is calculated as  

$$\text{ROCE} = (\text{Net Profit} + \text{Net finance cost}) / \text{Average annual (Debt} + \text{Equity)}$$

2012; Idea ROCE moved from 11.6% in 2009 to 5.2% in 2012; RCom. ROCE moved from 11.9% in 2009 to 3.6% in 2012.

This squeeze on profits was in part caused by dropping prices - the over-supply, that was created through the introduction of multiple players in the earlier phase, put further downward pressure on pricing, as the new players looked to differentiate their services in a crowded market by dropping their prices (Do Co Mo being the standout example by launching a 1 paisa/ second offer - 50% lower than the prevailing Re.1/ minute) (source: interview with TSP employee). Merrill Lynch estimated that the effective price per minute was eroded by 20% between 2009 and 2010.

The incumbents, with stronger balance sheets, viewed the 3G auctions as an opportunity to move out of this commoditization and pressure on voice pricing. The mobile internet ecosystem looked promising on 3G. India was seen as a country where poor fixed line internet meant that it was likely to be a “mobile first” country for internet access. This combination of pressure on voice pricing and the opportunity 3G offered to differentiate led the incumbents to bid substantial amounts for the spectrum, and this resulted in substantial transfer of rent to the government. The impact this had on TSP balance sheets was significant, as it increased debt burdens of the TSPs and reduced profitability.

The analysis of rent distributions raises the question of whether the 3G auction was as efficient as it was made out to be. The excessive rent extraction by the state had left little leverage for the producers, and the hyper-competitive market eroded profitability. In a scenario where a number of new entrants were attempting to establish their service, this pressure was counter-productive. In addition the new entrants lacked expertise, and in some cases, requisite

funding, and were struggling to establish a viable business. The sector did not look attractive for the new entrants when even incumbent players struggled in terms of profitability.

At the end of this phase, the sector was severely under pressure as incumbents had too much debt on their books and new entrants found entry into an established and already crowded sector with high levels of policy uncertainty a challenge. The sector was going to need a readjustment. It came in the shape of a Supreme Court mandated policy change.

## 6.8 Phase 6: 2012 to 2014

Throughout the previous phase, there was a growing recognition that the allocation of 2008 had been highly irregular. Significant pressure had been brought to bear on the government to examine the process. In 2010, the Comptroller and Auditor General's office (CAG) released a report on the 2G allocation alleging misallocation with intent to defraud. The case was taken up by the Supreme Court and all the licenses issued in 2008 were cancelled in 2012. This resulted in most of the new entrants withdrawing from the market. The next chapter reviews the evolution of the political settlement that led to this landmark judgement. Here we examine the changes in spectrum rights brought about by the court-mandated policy change.

Based on the Supreme Court ruling, the spectrum from the cancelled licenses had to be put up for auction again. In November 2012, the 122 cancelled licenses of 2008 were put up for auction as blocks of 1.5 MHz of 1800 MHz spectrum each. Blocks of 800 MHz (CDMA) spectrum were also up for auction but found no takers. 102 blocks were sold, generating only Rs.9407 Cr. (US \$ 1.7 Billion at prevailing exchange rates) in total.

Only two of the new operators of 2008 whose licenses had been cancelled participated – Telenor and Videocon. Among incumbent groups, Idea, Vodafone and (very marginally) Airtel participated (**Appendix 14** has the list of winners). Telenor (Uninor) and Videocon paid on average, twice the price that the incumbents paid (Rs 104 crore per MHz of spectrum, as compared to incumbents, who have paid Rs 46.93 crore per MHz) on average (Pahwa 2012). Service providers claimed that the reserve prices that were set at Rs.14,000 Cr.(US \$ 2.5 Billion ) for 5 MHz of 1800 MHz spectrum and Rs.18,200 Cr. (US\$ 3.3 Billion)for 5MHz in the 800 MHz band, were too high.



*Table 6.6 Spectrum Right Allocation 2012-2014*

License Round	License Type	Circles	Method of Allocation	Period of License	No. of Licenses	Amount of Spectrum	Winners
November 2012	Wireless (re-auction of 122 cancelled licenses of 2G scam)	102 blocks across 22 circles	Auction	20 years		1800 and 800	800 unsold. 1800 at reserve price. Winners in <b>Appendix 14</b>
March 2013	Wireless	1800 in 4 circles, 900 in 3 circles and unsold 800.	Auction	20 years	1	1 block of 3.75MHz of 800 across 8 circles	No bidders at all for 1800/900 even with reduced reserve price. 1 winner of 800 - MTS ( <b>Appendix 15</b> )
August 2013	Fixed and wireless		Change in License terms			Spectrum and license unbundled	Unified License (UL) introduced
Feb 2014	Wireless (re-auction of expired licenses from 1994)	22 circles for 1800, 3 circles for 900	Auction	20 years	License unbundled	431.2 MHz of 1800 and 46 MHz of 900	353.2 MHz of 1800 and all of 900 were sold. Winners attached in <b>Appendix 16</b>

Key: Formal Rent Extraction, high rents for state and consumer, lower producer rents 

Source: Data from TRAI, service provider information. Characterisation of rents author's own.

The spectrum that found no takers in 2012 – 1800MHz blocks in 4 circles, 900 MHz in 3 circles and all the 800MHz that remained unsold in 2012 was re-auctioned in 2013 at reduced reserve prices. 1800 MHz spectrum was marked down by 30% at Rs.11,893 Cr. (US\$ 2 Billion at prevailing exchange rates) for 5MHz. 900 spectrum was set at twice the price of 1800 spectrum and 5MHz of 800 spectrum was set at Rs.9100 Cr. (US \$ 1.6 Billion). Even with these reduced reserve prices, the 2G spectrum found no takers at all in the market, and only one firm bought 800 MHz CDMA spectrum in eight circles (details in **Appendix 15**)

The failure of the 2012 and 2013 auctions is attributed to poor pricing and hence auction design. Most commentators, including the TSPs (interview with Ms Hans), claimed that the spectrum was overpriced.

However, as the previous section had pointed out, the 3G auctions had built up debt levels among all the established incumbent players. The cancellation of the licenses had affected all the new entrants to the sector in 2008, and the foreign firms who had bought equity in them, had barely established markets and were therefore not in a position to invest again. Since the foreign partners had paid a higher value for the spectrum than it had cost in the 2008 allocation, their losses on cancellation were high.

The combination of the pressure 3G auctions put on the balance sheet of the winners and the fact the spectrum that was auctioned in 2012/2013 could only be used for 2G and CDMA (based on the technology at that time) resulted in very weak demand for the 2012/2013 auctions. Despite the failure of this round of auctions, the 3G auctions brought in proceeds that were close to 10% of the fiscal deficit. The Government still believed therefore, in the potential of

spectrum auctions as a source of future revenue and as a route to managing the much monitored and reported fiscal deficit.

A significant policy change in 2012 was the delinking of spectrum from the license. This meant that spectrum which had been assigned to service providers from the inception of the sector till 2010 (what was referred to 'administrative' spectrum, as against anything bought from 2010 onwards which was auction-purchased spectrum) needed to be returned to the government at the end of the license period and repurchased in auction. From 2014 onwards a number of the early allotments of spectrum were going to come up for re-auction.

In February 2014, the first tranche of 20 year administrative spectrum expired and was re-auctioned. The government had mandated participation of those operators whose license was expiring and spectrum was up for auction if they wanted to continue operation in their areas. 431.20 MHz in 1800 MHz spectrum band was put up for auction across 22 circles at a reserve price of Rs. 882 Cr. /5 MHz (US\$ 142 Million). 353.20 MHz of this was sold at a final price of Rs. 11352 Cr. / 5MHz (US\$ 1.8 Billion). 46 MHz of 900 spectrum was auctioned for 3 metros – Delhi, Mumbai and Kolkata, and all of it was sold at a price of 7393 Cr./ 5MHz (US\$ 1.2 Billion), nearly twice its reserve price. The government raised Rs.61,162 Cr. (US\$ 9.5 Billion).

For the state, the 2014 auction marked a reoccurrence of the spectacular returns that had been promised by the 2010 auctions. The poor performance of the 2012/2013 auctions was thus overcome and it reinforced the view of the sector as one where significant rents had been created by spectrum rights and could then be extracted from the producers by the state.

The winners of the auction are listed in **Appendix 16**. Predictably, the incumbents Airtel, Vodafone, Idea and Aircel, whose licenses were on the block, were the biggest bidders. Uninor was a marginal player and Tata (TTSL) did not win any spectrum.

The interesting new entrant to the table was Reliance Jio, who won 79MHz worth of 1800 MHz spectrum across non metro circles. It was speculated that Mukesh Ambani who had last purchased 2700 MHz 4G spectrum but was yet to launch his service was interested in the 1800 MHz spectrum as a back up to his 4G launch (interview with Mr. Sheth).

While again newspaper reports claimed that the 2014 auction fared better because of more realistic pricing(Hindu 2014, Vikas 2014), this misses an important reason for the high prices achieved in 2014.

Prices in spectrum auctions that re-auction expired spectrum such as the 2014 auction and future auctions in the Indian market are significantly impacted by the fact that some of existing players will be aiming to repurchase the spectrum that their current business is based on(Prasad and Sridhar 2014: 275-280). To a TSP who needs to buy back his expired spectrum to sustain a current business, that spectrum is naturally more valuable than to another who is attempting to enter the sector. An incumbent would value the spectrum at its market value plus the current value of his business that the spectrum supports. For a new entrant, the spectrum only has its current market value. So in the current format of phased re-auctioning of expired spectrum, the incumbent's need to hold onto his spectrum allocation is likely to drive up spectrum prices. The regulatory head of Airtel estimates that this is the greatest influencer of realized spectrum price in the 2014 auction. According to him, this has the impact of over-estimating the market value of the spectrum significantly. He suggests

that the only way to combat this incumbent effect is either to have enough new spectrum available for new entrants in addition to the expired spectrum or to club expiry dates over a few years into one auction so that all incumbent players in the auction have some expiring spectrum to protect and are therefore not interested in over-inflating spectrum value. In the absence of this, the auction will structurally drive up prices higher than the market would be willing to pay without this need to protect incumbency.

A comparison of prices of the bands in recent auctions is given below.

*Table 6.7: Comparative Realised Prices of Spectrum Bands In Auction*

Circle Category	Price in Rs. Cr. Per MHz per Population					
	800 MHz	900 MHz	1800 MHz			2100 MHz
	in 2013	in 2014	in 2001	in 2012	in 2014	in 2010
Metro	118.5	262.02	23.38	56.63	123.46	257.98
A	20.48		5.99	23.66	22.73	33.7
B	7.14		2.85	14.28	12.84	15.55
C			0.37	4.43	5.97	5.41

Source: Adapted from Prasad and Sridhar (2014: 287)

Prices of 1800 MHz have been driven up significantly in the 2014 auction. The high prices of 2100 show the over bidding that took place on the 3G auction in 2010 and the low price of 800 MHz is related to its being locked into use with CDMA.

## 6.9 Spectrum Holdings at the end of 2014

The company wise spectrum holdings as of end 2014 are summarized in **Appendix 17**. 800 MHz spectrum has had few takers due to the lack of a cost effective device ecosystem around CDMA technologies (Prasad and Sridhar 2014). BSNL, Reliance and Tata still continue to hold around 10 MHz per circle between them but this spectrum can perhaps be better utilized if liberalized<sup>48</sup> and allowed to be traded. Advances in technology that make the spectrum band reusable and commercially viable on alternative technologies such as 4G could impact the value of this band of spectrum significantly.

The incumbents, (who either received 900 spectrum administratively in the initial years or took over companies that did), monopolize the market for the 900 MHz spectrum. BSNL/MTNL has the best allocation of 900 MHz spectrum. With at least 6.2 MHz across all circles, given their subscriber numbers, they are not the most efficient users of spectrum. Airtel, Vodafone and Idea have the best spread of this frequency pan India, while Aircel and Reliance have much patchier coverage at an all India level on 900 MHz.

Most current players in the market currently use 1800 MHz to supplement their 900 MHz holdings in order to get better pan Indian coverage. In spite of phases where the 1800 MHz band saw new entrants, they have mostly exited the sector by 2014. The only competitors with a presence in 1800 MHz but without a presence in the 900 MHz band are Tata, Uninor and Reliance Jio.

Across both GSM and CDMA technologies 800 MHz, 900MHz and 1800 MHz are the frequency bands that can be used to support 2G services that form the

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<sup>48</sup> Freed from the condition of its being used on CDMA

bulk of the voice traffic that is still the core business of firms in the sector in India. **Appendix 18** shows the amount of this 2G spectrum that each operator held at the end of 2014. This reinforces the strength of Airtel, Vodafone and Idea as the players with the greatest amount of 2G spectrum overall, as well as the greatest holdings of 900 MHz (barring MTNL/BSNL)

The 3G coverage on 2100MHz has mirrors this 2G coverage. In the 2300 MHz band that can today be potentially used to provide high speed mobile services using 4G technology, only BSNL and Reliance JIO have pan India coverage. Airtel and Aircel hold spectrum in some circles each.

The overall picture is one of increasing concentration and national presence with the top three private incumbents – Airtel, Vodafone and Idea. The state incumbent – BSNL/MTNL is in the strongest position in terms of use rights to spectrum in the sector. However, they have not been able to leverage this to a position of market leadership.

Aircel is the fourth strongest private player, but lacks a significant national presence. The patchy spectrum holdings of Tata, Reliance Telecom and Uninor make them unlikely to effectively challenge the dominance of the big three (Airtel, Vodafone and Idea).

The interesting new seat at the table is Reliance JIO, which although is new and yet to launch its service, seems to have made significant spectrum right gains in the sector by buying pan India spectrum in the 4G space and back up spectrum in 1800 MHz, even though its lack of early administrative spectrum is a disadvantage. Its position could be strengthened by a merger with Reliance

Communications, but although there is market speculation on the possibility, there have been no indications on such a move at the time of writing.

## **6.10 Summary:**

The above analysis allows us to move beyond superficial policy prescriptions of greater regulatory independence or more competition to explain the path dependent effectiveness of these institutional structures in driving sectoral efficiency. The evolution of the sector from a rents perspective allows us to explain the policy movements better in terms of what material changes in spectrum rights and rents were caused by these. It allows us to trace the impact of the policy change on the distribution of the rents in the sector and takes into account that spectrum right assignments have winners and losers, and that the allocations are likely to be contested by the losers. The distribution of the rents arising from spectrum sales is a deeply contested process. This means that the spectrum use right changes are never smooth and the frequent changes in policy direction and high levels of litigation the sector has seen are all the markers of this contestation.

The analysis also throws up some important structural implications for the sector's ongoing evolution. In spite of the phenomenal growth the sector has seen, it is not without its challenges. The scarcity of spectrum faced by the sector has gained salience as the critical factor facing the sector's development. The growth of the subscriber base and the increasing demand for spectrum hungry uses of data have led to severely congested networks, and the release and sale of new spectrum will be important in improving levels of service.



TSPs claim the sector is still unfairly stacked against them, with high spectrum costs, and high duties and levies. The high cost bases of the players has already driven local innovations on cost structures – regulation was broadened to allow spin-offs of passive infrastructure (through shared tower companies) and active base station infrastructure (to equipment manufacturers, to be leased by the service providers). However additional spectrum costs may force the smaller players out of the market, leaving only the players with the deepest pockets. The sector has already seen an increasing consolidation by the largest players in spite of several attempts to increase competition through policy.

For the State, on the other hand, the sector represents an unparalleled source of finances to fund budget deficits. Since 2010, the sector has assigned spectrum only through the auction process. This has also been mandated for all spectrum allocations from 2012 onwards by the Supreme Court ruling of 2012. With the entire lower cost administrative spectrum slated to come back to the auction table over the next few years, the price of spectrum, and the cost of debt for spectrum purchase by TSPs, is only going to increase. These structural implications for the sector's evolution will be traced in Chapter 8. First however, the following chapter seeks to deepen our understanding of the drivers behind the changes in policy.

While the analysis of rent flows from policy changes helps us trace the logic for the changes in the rights that underlie it, it doesn't adequately explain why particular changes happened when they did, and what drove this change over another. The changes are reflective of a change in the underlying power bases in the industry that influence the choice of policy and that can be understood by looking at the outcomes of this policy on the dynamics of the underlying political settlement in the sector. As we have argued earlier, the creation of rents in the sector is both influenced by, and in turn influences, the underlying political settlement. The next chapter explores the political settlement in each

of the above phases of the sector's evolution in order to trace its impact on policy creation and rent outcomes in the sector.

# *Chapter 7: The Impact of the Political Settlement on Policy Outcomes*

*“Of course it is,” said the Duchess, who seemed ready to agree to everything that Alice said; “there’s a large mustard-mine near here. And the moral of that is– The more there is of mine, the less there is of yours.”*

Lewis Carroll, *Alice in Wonderland*

## **7.1 Introduction**

Accounts of the development of telecom in India, as we have shown earlier, tend to view the sector’s development as handicapped by a lack of Good Governance. Failures were seen as arising from either bureaucratic incompetence or iniquitous political intervention. Greater liberalization, more regulatory independence and greater transparency were the policy prescriptions that arose from this view.

The previous chapters have established first of all that conventional analyses of the Indian telecom sector’s performance have been limited in their explanation of the sector’s growth trajectory, pointing at different times to either over-regulation or under-regulation as the principal causal factor of the sectors difficulties. On the flip side, all growth is attributed to either the sector’s

natural potential or to the beneficial effects of competition and independent regulation.

This is an incomplete view and does not adequately explain the underlying reasons for changes in policy or the impact that these policy changes have on outcomes in the sector. This thesis argues that we can better explain the patterns of growth and challenges in the sector if we view spectrum allocation and licensing as a process of creating rights and income streams arising from these rights.

Part of this process of rent creation is motivated by technical economic considerations and the bargaining of economic players but some rents are also created in response to political considerations and the political pressures directly and indirectly exercised even by economic players like telecommunication firms.

The chapters in Part I of this thesis laid out the background to the sector and the factors that make a rents-based analysis relevant to understanding policy in the sector in general and in India in particular. We also explored the theoretical perspectives on rents and political settlements to establish the analytical framework of this paper that uses both rents and political settlements to explain the evolution of policy.

To this end, the previous chapter applied the rents perspective to understanding the evolution of the sector. Based on significant shifts in rent creation policies, the sector's development was divided into 6 phases and the rent creation and distribution examined in each phase. It explored the rent management strategies in each phase that determined the distribution of the

rents and characterised the phases in terms of the level of rent extracted by the state, retained by producers or dissipated to consumers.

What this analysis has not done however was to explain the reason **why** particular organizations and agencies were able to influence or control the allocations of rents during particular periods or why these patterns changed over time. The analysis of rent creation and extractions showed that the state moved between period of low extraction and high extraction and between formal and informal methods of rent creation and allocation. As a corollary, rents left on the table for producers have also varied over the period.

The reason that the analytical lens of rents alone is incomplete is that it fails to identify the significant contests over rent creation that underlies the creation of policy. Since policies that create rights also determine the distribution of rents from it, these policies tend to be severely contested, especially when the rent streams are significant. Chapter 6 was able to identify some of the contests over the rents but could not explain why they took the shape as they did, and what the underlying causes for particular rent distribution changes were. It could not explain why particular stakeholder groups benefit more in some time periods than in others, or why this changes over time. The rents perspective does not explain why informal or illegal transfers dominate over some periods.

In order to effectively explain the shifting patterns of rent distribution, we need to explore the relative bargaining power of the different types of agencies and organizations involved in particular types of rent creation processes. The political settlement describes the relevant features of the distribution of organizational power and the changes in this distribution over time. It is an analytical tool that helps to identify and describe critical characteristics of the structure of politics and organizations in a country that are relevant for

understanding these rent-seeking process, and the ways in which rent-seeking can modify economic policies. Chapters 4 and 5 explained the analytical framework of political settlements in general, and the specific use of the sectoral political settlement in particular, and established its possible use in the analysis of the telecom sector.

This chapter seeks to apply this tool to our understanding of rent distributions and the outcomes of those distributions (what we will call ‘rent outcomes’) on the sector’s evolution. It aims to synthesize the information on the official recorded rent distributions in each episode of rent creation with an understanding of the underlying political settlement to better explain the patterns of distribution. This will also help to establish that the changes were not random, but were closely related to broader organizational structures in society and how these were changing over time. The policy outcomes show the inter-relationship between rents and political settlements as the rent distributions in one time period in their turn reinforce or modify the political settlement for a subsequent period.

## **7.2 Using Political Settlements**

The rents based analysis of the evolution of the sector indicated several changes and shifts in policy direction. It also stated that these changes in policy were driven by contests over rent distributions. However the changing patterns of rent distributions can merely hint at the underlying conflicts. Especially since some of these rent distributions may be informal / illegal and therefore will not feature in any of the official records of rent transfers. This section seeks to recast the recent history of the mobile telephony sector from a rents perspective through an analysis of the underlying political settlement at various points in the sector’s history.

Viewing the history from the perspective of rent flows embedded in an underlying political settlement allows us to not only better explain the reasons behind specific policies and their rent distributions, it also shows how the patterns of distribution then affect the stability of the current settlement and its likelihood of change. The analytical lens of the political settlement will help identify the reasons behind various policies and the resultant patterns of rent distributions. Since the outcomes of the distributions in one phase impact the political settlements in the next, it also helps explain the impact that the different rent distribution outcomes have had on the direction of development of the sector.

To briefly recap, political settlements are defined as “*a combination of power and institutions that is mutually compatible and also sustainable in terms of economic and political viability*” (Khan 2010: 4). A political settlement is therefore a relatively stable network of individuals, firms and institutions with holding power that impacts the interactions within the network. We will use the term ‘agencies’ (borrowed from Fine and Rustomjee (1996)) to refer to these firms or institutions that comprise the settlement. The source of their holding power could be institutionally defined or have a basis in economic, political or organizational strength. As the analysis below will show, at different time periods different agencies appear to have greater relative power in the sectoral political settlement. Any agency with sufficient holding power that is left out of rent distributions will attempt to modify or change policy, or disrupt the system until the change occurs in its favour. The rent distributions also feed back into the political settlement, as access to rents result in changes in productive and organizational structures, which in turn change the distribution of holding power over time. The relative stability of a particular settlement may hide the fault lines that give rise to instability. The policies then change to change rent distributions in line with a new settlement. The stability of a

particular settlement is determined by how well the distributions match the holding power in the underlying political settlement.

The aspects of a political settlement that are relevant for understanding policy-making and implementation in a sector are specific to the organizations relevant for that sector. In this sense we define political settlements at the sectoral level for understanding sector specific developments, though the relative power of organizations at the sectoral level has to be understood in the context of the political settlement at higher levels of aggregation. Linking the evolution of sectoral political settlements with changes in the national and state level political settlements is one of the contributions of this work.

The agencies that are relevant in the telecom political settlement (henceforth PS) operate in the policy-making, regulatory and service provider space. They have been described in Chapter 5 but a brief summary is provided here.

The state (encompassing the wider political apparatus, including the national leadership as well as regional political parties) provides the key policy making agencies. The state does not necessarily have a coherent set of interests. At times the Telecom Minister has been a representative of a regional party and has acted in the interests of that specific party rather than that of the ruling coalition at the centre. The DoT is considered separate to the state apparatus to denote both the bureaucratic arm of the state in policy making, as well as the specific interests of the DoT as a service provider in fixed line or wireless (i.e. BSNL/MTNL). The regulator, TRAI is also considered separately.

Individual private TSP firms are agencies that have sometimes worked specifically in their own interest but have often banded together to lobby



policy. The two major groupings within these are the GSM and CDMA players who have, for the most part, been on opposite sides of the fence on policy issues. The GSM players have lobbied through their association the Cellular Operators Association of India (COAI). The most influential of its members and the largest private firms in the service operator space are Bharti Airtel, Vodafone and Idea. The corresponding body for the CDMA players is the Association of Unified Service Providers of India (AUSPI). Its membership comprises Reliance and Tata Teleservices and more recently Sistema Shyam.

There has been little organised consumer lobbying in the industry until a consumer driven petition on net neutrality in early 2015 but that falls beyond the scope of this paper. For the period considered, consumers have not exercised agency through any significant organizations.

The rest of this chapter is divided into the same phases as have been used in the previous chapter: 1995 -1999, 1999-2003, 2003-2007, 2007-2009, 2009-2012, and 2012-2014. In each of these sections, we will describe the political settlement, look at what the key rent contests were, the differences between the stated objective of the rent and its likely underlying reasons, the beneficiaries of the rent in each case, and the outcomes of this distribution on the direction of development of the sector (both intended and unintended) and on the political settlement itself. A table in each section summarizes the key features of each time period.

## **7.3 Dynamics of the Political Settlement 1995-1999:**

### *Money for Nothing*

The dominant agency driving the creation of rents in the first stage from the inception of the sector to around 1999 was clearly the government – both at the level of the political decisions by the Centre and the activities of the state owned Department of Telecommunications.

Introducing wireless telephony through privatization was a politically bold step in a country that mistrusted the liberalization and privatization thrust of western financial institutions. The state clearly justified the move to private participation as limited to a small and premium sector of the market, which was unlikely to be relevant to the masses. Given the uncertainty of the potential and the fact that the cash-strapped state would be unable to support it, privatization was the only sensible solution. Certainly, in 1994, it was difficult for anyone to predict how ubiquitous mobile telephony would become in a couple of decades.

The decision to allow private investment in a new and not well-understood sector at this time would prove to be a critical one, though it was driven by a relatively weak constellation of forces that proved effective because of very specific contextual reasons. It was driven by the calculations of a cash-strapped government that was not fully able to evaluate the rent opportunities in the sector and a context of domestic political flux and a growing international climate in support of liberalizing investments.

Table 7.1: Dynamics of the PS 1995-1999

Policies driving rent creation and allocation	Policy Objective	Rent Distribution	Agencies that Define Critical Characteristics of the PS	Policy outcomes and economic effects given the PS	Consequences for the evolution of the PS
	Stated / Underlying	Formal/informal	Strong/weak		
1995 round of licensing	<p><b>Stated:</b></p> <p>Accelerate development of the sector in the face of uncertainty</p> <p><b>Underlying:</b></p> <p>Source of funds for the government.</p> <p>Allow development bypassing the incumbent</p>	<p><b>Formal:</b></p> <p>State – high (Cost of license)</p> <p>DoT – high (Tariffs and interconnect charges)</p> <p>TSPs – low (Low volumes, high taxes, high cost of license)</p> <p>Consumers – Low. High policy driven price per call</p> <p><b>Informal:</b></p> <p>Sukh Ram and HFCL</p>	<p><b>Dominant:</b> DoT, State</p> <p><b>Weak:</b></p> <p>TSPs , TRAI, consumers</p>	<p>Stunted penetration and growth of sector</p> <p>Operators on verge of bankruptcy</p> <p>TRAI set up</p>	<p><b>Growth-constraining outcomes affect evolution of the PS</b></p> <p>Operators band together with common agenda. Creation of COAI.</p> <p>State fears bailout of bankrupt firms. Power of DoT declines.</p> <p>Wireline players left out of potential growth</p>

Policies driving rent creation and allocation	Policy Objective	Rent Distribution	Agencies that Define Critical Characteristics of the PS	Policy outcomes and economic effects given the PS	Consequences for the evolution of the PS
	Stated / Underlying	Formal/informal	Strong/weak		
<p>NTP 99</p> <p>Revenue sharing model</p> <p>3<sup>rd</sup> operator license for DoT in 1999</p>	<p><b>Stated:</b></p> <p>Prevent collapse of sector</p> <p><b>Underlying:</b></p> <p>Avoid bailout of bankrupt firms.</p> <p>Allow DoT to enter wireless</p>	<p>State – low</p> <p>Notional write-offs of debt.</p> <p>Promise of future growth</p> <p>DoT – medium</p> <p>Entry into GSM</p> <p>TSPs (GSM) – medium</p> <p>Lowering of taxes, write-off of debt, revenue sharing</p>	<p><b>Dominant</b></p> <p>State Agencies, COAI emerge as the powerful players</p>	<p>DoT enters as third player</p>	<p>DoT's power challenged by COAI.</p> <p>TRAI strengthened.</p>

As discussed in the history of the sector, the period was characterised by the State's need for on-budget finances to cope with the BoP crisis engulfing the country. Thus, the creation of formal rents through the licensing mechanism in 1995 was driven by the Centre's need for fiscal resources. The increasing cost of the license was officially justified based on market potential but the message that the state was sending was certainly mixed. While, on the one hand, market potential estimates to investors were high, on the other, the telecom sector unions and internal stakeholders were being convinced that mobile telephony was only ever going to be a small, niche opportunity among a minuscule proportion of the population, and therefore could be privatised without threatening existing power structures. The DoT represented the largest state employer after the railways, with a very strong trade union. The state was managing a tricky balancing act that would allow the establishment of the sector through private means and raise formal rents that the state could use to manage the fiscal crisis. The policy at this stage does not seem to have made any allowances for building new productive capabilities in the sector through strategies that created 'learning rents' for private investors in mobile telephony, which might have helped the technological development of the sector in particular directions.

This was also a period of immense regulatory uncertainty in the sector. No independent regulator existed, and the DoT was keen to maintain the reins of power over the wireless and potentially the wireline sectors, to protect its own wireline market from cannibalisation. This it did by extracting any potential rents in the sector by setting high taxes and interconnect charges, the key beneficiary of which was the DoTs' wireline services. The DoT required the above to ensure that it maintained the market share of the public sector incumbent and to prove to the numerically strong DoT workers union that wireless services were destined to remain a small, luxury market in India. High taxes on private operators in the wireless market were also justified as required to subsidise the DoT's rural penetration and service obligations.

However, the blatant regulatory bias towards the wireline incumbent drove up the cost of mobile calls and dampened demand. An independent regulator (TRAI) was finally set up in 1997, but lacked any real power over decision-making in the sector. Policy making, regulation and dispute redressal all remained firmly in the hands of the DoT. Importantly, the DoT also had control over all the key elements of the cost facing private service providers – the cost of spectrum, the charges and duties on the sector and the cost of interconnect.

The key beneficiary of these on-budget rent strategies was the government exchequer. They allowed the State to raise formal funds to deal with the financial crisis and meet the demands of the IMF. However, for the sector, it meant rather stunted development with very inexperienced players. Wireless licences went to relatively small business houses – Bharti, Parasurampurias, BPL, HFCL etc.

Interestingly, none of the larger business houses bought into the potential of the wireless sector at this stage. There were no rents to the sector in the early stages, to compensate for the risks involved. It is possible that the more politically linked larger business houses (Tata, Reliance) foresaw the risks in the wireless sector and therefore registered a presence in the cheaper wireline sector through wireline licenses. A number of foreign participants (such as AT&T) had also bought licenses to operate in the wireline sector. The wireline sector was certainly less risky, with an established demand. However, the high cost structures, reflecting both high costs of last mile connections as well as interconnect charges with the DoT, and the constraints on pricing created through policy by the DoT, discouraged them from actually commencing operation in wireline. By 1996 a number of the international players had exited the wireline sector citing regulatory uncertainty. In contrast, smaller business

houses were prepared to take the risk on the wireless sector, especially if backed by a 'special relationship' within the telecom ministry (HFCL was known to have a special relationship with the telecom minister, Sukh Ram).

Apart from formal rents that accrued to the state and to the DoT, there is evidence of informal rents being pocketed by the minister for telecom, Sukh Ram. HFCL, a small local firm with little knowledge or expertise in telecom bid exorbitant amounts for licenses, possibly to block other entrants. They ended up winning 9 circles with a total bid amount of Rs.85,000 crores, an amount they had apparently not even worked out how they would honour (Pereira 1995). Sukh Ram, said to have close connections with the promoters of HFCL, came to their rescue, capping the maximum bids one could win at three, and even allowing HFCL to choose which bids they'd like to honour, rather than the three highest ones. In August 1996, the Central Bureau of Investigation in India (CBI) conducted a tax raid on Sukh Ram's houses and discovered over Rs.3.5 crores of cash, not to mention assets totally disproportionate to his earnings as a minister of state (Sharma and Rekhi 1996). It emerged in investigations that there was circumstantial evidence linking Sukh Ram to corruption with not only HFCL but a number of telecom equipment manufacturers (ibid). Newspaper articles also alleged that the bureaucrats of the DoT were often at odds with the minister in trying to prevent the corruption (Bhushan, Joshi, and Narayanan 1996, Sharma and Rekhi 1996). Sukh Ram resigned from the post of telecom minister and was asked to resign from the party<sup>49</sup>. Beni Prasad Verma took over as telecom minister from 1996-1998.

The informal rents created in the sector seem to have been captured by the minister. Given the press coverage of the minister's links and the subsequent

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<sup>49</sup> Sukh Ram was convicted in graft cases in 2002, 2009 and 2011, but each time he managed to have his sentence suspended or commuted on health grounds and remained out of prison. In 2012 the Delhi High Court upheld the lower court sentence of a 3 year prison term for Sukh Ram and he was finally sent to jail (PTI 2011a, 2012b, a).

scandal, it is likely that the Prime Minister's office was at least aware of the capture if not directly authorizing it. The formal rents in this period, meanwhile, were extracted largely by the state or the DoT, either through licence charges or via the DoT through tariffs and charges on the sector. Little was left for producers or consumers. The State seems to have seen the sector simply as a source of funds at this stage – a cash cow to be milked. However, it appears to have over-estimated how much rent was being produced or what it could sustainably extract. The rent extraction of the state was exacerbated by high call charges fixed by the DoT. Demand fell dramatically short of expectations, squeezing private operators' profits to such an extent that the sector was on the verge of bankruptcy by 1999. Private operators in the sector threatened that they would suspend operations and were defaulting heavily on the loans they had taken and on their license and tariff obligations to the State. License payments had been structured as a 3 year payback and then as a rate per subscriber (see **section 6.3**). License defaults reduced the formal rent payouts to the state. The collapse of the sector threatened the viability of the dominant players themselves.

This launch phase of mobile telephony was characterised by domestic and international industry watchers as almost irreparably flawed (a Bloomberg report refers to it as a “botched” attempt at telephone modernization (Bloomberg 1995, Muralidharan 1999, Thakurta 2003). However, to attribute many of these regulatory decisions to the incompetence of politicians or bureaucrats misses the story. An analysis of the PS and its effect on rent distribution give a more detailed and a more nuanced picture of the choice of policy and its implementation.

As the fiscal situation improved in the late 1990's, and the urgent need for large tranches of formal rents for the State had lessened somewhat, the state was faced with another problem. Desai (2006) shows that weak financial markets in



India drive most private sector players to raise debt through quasi-governmental financial services companies like IDBI (Industrial Development Bank of India). The finance ministry would thus have been concerned that the failure of the wireless sector could cause a collapse of government-owned banks and financial services. Pressure did seem to have come to bear on the DoT through the Finance Ministry, to drive more competitive and growth-conducive regulations, which lends credibility to this view (Muralidharan 1999).

Individual private sector players (both in wireless and wireline), no doubt, also used their influence on government. They may have exerted pressure on the DoT through the finance ministry, which had a vested interest in seeing the sector succeed. The sector also used lobbying bodies – the COAI and the AUSPI to try and lobby the government to adopt more growth-conducive policies, essentially by recognizing the minimum economic viability requirements of investors.

The political settlement in this phase thus describes a balance of power between the players that resulted in regulatory instability and unviable regulatory structures in the sector. The balance of power was tilted towards a few state agencies that were able to capture most of the rents but using strategies that prevented the viable development of the sector. The organizations cut out of the rent distribution, the GSM TSPs needed to band together and present an organised front through the COAI in order to have sufficient power to redistribute rents in their favour, through changing some of the unviable regulatory structures. This in turn implied that some of the specific organizational balances within the political settlement relevant for the sector needed to be changed.

The COAI began a period of litigation that aimed to attack the power of the bureaucrats, and therefore indirectly the power of the political organizations benefiting through their control over the state. The bureaucracy, under attack from the COAI, and being pushed by a slowly strengthening TRAI for more regulatory room and encouraged by the state to find a solution to the loss of rents finally had to give in to these pressures. Jagmohan, the Minister for Telecommunication from 1998-1999 had indicated that he was unwilling to renegotiate the contract with the TSPs. The then prime minister Atal Bihari Vajpayee, transferred the minister to another portfolio, took over the ministry himself for a period, and with his minister of state, Ram Vilas Paswan, personally oversaw the formulation of NTP 1999 to address the issues facing the industry (Muralidharan 1999).

The new National Telecom Policy announced in 1999 (NTP 1999) renegotiated the terms of the spectrum use right agreements between the state and the TSPs. The excessive rent extraction from the sector was replaced with a more inclusive system of rent distribution. First, the state agreed to forego all dues on license fees from 31<sup>st</sup> August 1999. Instead the state moved to a revenue sharing model with the sector. Second, the operators were allowed to enter into mutual agreements with each other to allow sharing of infrastructure within their service area, and on consultation with TRAI, in different service areas. The license period on cellular licenses was extended to 20 years from the original 10. In return for these concessions, the TSPs had to agree to remove the duopoly condition on their service areas that was part of their original license and allow a third player – the state owned but corporatized MTNL (in Mumbai and Delhi)/BSNL(in all other parts of the country) in all circles. BSNL/MTNL was given free spectrum and entry into the sector as a third player in each circle. This was an interesting about-face for a department that had claimed the lack of mass potential in the sector as a reason for privatization in the first place.

## 7.4 Dynamics of the PS 1999-2003: *Exploiting Loopholes*

A development in the sector during the previous period became the force that drove policy change yet again in the sector. It was the irregular entry of wireline agencies into the wireless space.

Big business houses in India, Reliance and Tata had likely misread the potential of wireless telephony in India, as had the DoT. Having allowed smaller business house to take wireless licences while they focussed on wireline licenses in 1995, the key private sector organizations in the wireline political settlement were now keen to rectify this problem and enter the wireless sector. However, they did not hold licenses for the sector and participation was limited to 2 private players + the DoT in each circle. They thus had to find another way to enter the sector. Clearly, the potential of the wireless sector was gaining recognition.

Wireline players – BSNL/MTNL, Reliance and Tata, among others had received 2.5 MHz of 800 MHz spectrum free along with their wireline licenses. This was meant to be used to provide last mile access where the laying of cable was difficult. According to a source in the TRAI, BSNL/MTNL first discovered the potential to use this spectrum using CDMA<sup>50</sup> technology to provide wireless access first within a circle and then using roaming features, provide some connectivity nationally. Reliance and Tata swiftly followed suit, but it is interesting that the innovation was led by the public sector which had begun to explore this technology before it was granted a GSM license in 1999. The private players soon established a wireless operation without actually holding a license in the wireless sector.

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<sup>50</sup> Refer to **section 2.2.2 of Chapter 2** for the difference between CDMA and GSM technologies.

Table 7.2: Dynamics of the PS 1999-2003

Policies driving rent creation and allocation	Policy Objective	Rent Distribution	Agencies that Define Critical Characteristics of the PS	Policy outcomes and economic effects given the PS	Consequences for the evolution of the PS
	Stated / Underlying	Formal/informal	Strong/weak		
Entry of Wireline players into CDMA  4 <sup>th</sup> operator license in 2001	<p><b>Stated:</b></p> <p>Increase penetration and profitability of sector</p> <p>Increase competition</p> <p>Increasing investment in infrastructure</p> <p><b>Underlying:</b></p> <p>State wants to formalise DoT's (and others) entry into CDMA</p> <p>Allow DoT to enter wireless</p>	<p><b>Formal</b></p> <p>DoT - high, entry into CDMA</p> <p>TSPs(CDMA) - high</p> <p>Entry into wireless without spectrum cost</p> <p>Consumers - no change</p> <p><b>Informal</b></p> <p>CDMA players?</p>	<p><b>Dominant:</b></p> <p>State, CDMA agencies strengthened through political links</p> <p>COAI strong representation of GSM lobby</p> <p>Weakening DoT</p>	<p>Growth of subscriber numbers</p> <p>TRAI strengthened</p> <p>TDSAT created</p>	<p><b>Growth-enhancing PS</b></p> <p>Strengthening of regulator vis a vis DoT</p> <p>Reliance and Tata (CDMA) enter as important players defining the PS relevant for the sector</p> <p>COAI becomes unified voice of GSM. Aggressively litigates against DoT.</p>

The CDMA operation had several advantages over the GSM operators. First, they had entered the sector, paying a lower license fee than wireless operators. They had received their spectrum therefore at much lower charges than that which had been paid for 900/1800 spectrum. Crucially, they also did not pay interconnect charges for their calls. This meant that they could afford to offer significantly lower consumer prices than the GSM operators. This helped drive CDMA growth in the sector and also exerted a downward pressure on GSM pricing through competitive pressure. However, the CDMA through Wireless in Local Loop (WLL) that was established during this period was limited by the fact that without a proper license, a full CDMA service could not be launched. The mobility worked effectively only within a circle. Any mobility outside the circle could only be provided by providing a new phone number to the customer<sup>51</sup>. Thus, it was cheap but not very consumer friendly.

A fourth operator was allowed in each circle with a new round of licensing in 2001. Even though Reliance had the opportunity to bid for GSM licenses at this stage it chose not to, instead buying non-metro fixed line licenses to complement their existing metro fixed line licenses. While all India GSM licenses cost Rs.1650 Cr. (Rs. 16.5 Billion), a pan-India fixed license cost Rs. 650 Cr. (Rs.6.5 Billion) and came bundled with 2 x 2.5 MHz of free 800 MHz spectrum. An industry watcher who was interviewed claimed that the industry was initially surprised that Reliance did not make a bid for the GSM spectrum. Perhaps at this stage they had decided that they were aiming to access the market through the much less expensive CDMA route and expected to get the regulatory clearances for the route in due course.

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<sup>51</sup> WLL was still clunky to use - when you moved from one SDCA (collection of BTS's) to another, your number changed and so while your incoming calls could be forwarded, your outgoing showed a new number every time you changed SDCA.

The political settlement within the mobile sector in the period is characterised by a flattening out of the relative powers of the organizations and agencies at play. NTP 99 allowed rent sharing with the GSM operators, allowing them to strengthen their position in the sector. The operators used the rent opportunity to develop their organizational links with politicians and bureaucrats, boosting their bargaining power in subsequent rounds. While these changes weakened the position of the state relative to the first phase of development, the changes in regulatory structures that followed allowed the state to drive the growth of the sector and share in its returns.

Importantly, it also allowed the DoT to develop and share the potential of the wireless sector. In turning a blind eye to CDMA advances into the wireless sector, the state not only protected its own CDMA offering and those of other private players, it also drove down prices and drove up volumes in the sector, ushering in the first strong period of growth in the sector. The changes brought about in the PS as a result of small initial changes proved to be growth inducing and resulted in consolidating these changes in the sectoral political settlement.

The picture of smooth growth on the surface however, hides the reality of a frantic churn in the details underneath. Through the COAI, private incumbents in the wireless sector strongly protested the CDMA route that allowed some fixed line players to enter the mobile market (Bajpai and Hans 2005). It heralded a period of frantic litigation in the courts with COAI leading the charge for GSM operators arguing against the DoT. The sheer volume of litigation encouraged the setting up in 2000 of TDSAT (Telecom Disputes Settlement and Appellate Tribunal); a separate tribunal tasked with adjudicating telecom disputes in the interests of consumers.

The view of the DoT was that the original license terms had stipulated that any technology may be used to provide wireless services. While the DoT was interested in ensuring the continuance of CDMA for its own purposes, NTP 99 had given it access to the GSM space and spectrum in the 900 band. The pressure to allow CDMA and give it access to full mobility is more likely to have come from the other operators – Reliance and Tata. It is rumoured that Tata merely followed Reliance’s lead on these matters, leaving the informal deal-making to Reliance. Telecom Ministers Ram Vilas Paswan (1999-2001) and Pramod Mahajan (2001-2003) were both accused in the press of having favoured Reliance Infocom (Jha 2010, IndianExpress 2005, Thakurta 2003).

While the litigation was taking place, Reliance began a concerted marketing drive to improve its market share and prove that the CDMA business was worth regularising. In early 2003 Reliance launched the Dhirubhai Ambani Pioneer offer<sup>52</sup>. It also innovated in terms of distribution and marketing reach, using the Amway tiered distribution channels for deeper reach. In July 2003, it launched its most effective consumer acquisition programme, slashing handset package prices from Rs.10,000 to Rs.501. It generated one million customers in 10 days!! COAI cried foul and GSM operators refused to provide interconnection between CDMA customers and their GSM network. In response minister Pramod Mahajan intervened and asked MTNL/BSNL not to provide interconnection to Airtel and Hutchinson Max (now Vodafone). More petitions were filed in court.

The process of extended litigation created two strong opposing organizational groups within the sectoral political settlement – the COAI (comprised of GSM players of whom Sunil Mittal’s Bharti Televentures was a market leader and an opinion leader), and the CDMA players (of whom, Reliance was the key power

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<sup>52</sup> DAPO - pay Rs.10000 upfront, get a handset free and get 40p/min calling and incoming free (vs Rs.2/min as the market price and paying for incoming

base). The additional effect that the litigation seems to have had is a gradual separation out of power and responsibilities between the bureaucrats of the DoT and those of TRAI and TDSAT. This stability of this emerging balance of power was, however, threatened by the capture of a greater proportion of rents by the CDMA players. This pushed the GSM players to resist the settlement. In order to find a way out of the litigation mess and to allow CDMA players a legitimate way to continue operation, the DoT finally proposed changing licensing terms again to the UASL (Universal Access Service License).

The policies that shaped this phase of the sector's development allowed for a period of growth in the sector, a flatter sharing of rents among the key agencies, organizations and consumers, and the emergence of a relatively stable sectoral PS with a greater balance of bargaining power across government agencies and service providing organizations. The state provider's access to the rents in the sector justified the DoT to support growth inducing policies like the reduction of pricing for wireless services and the reduction of interconnect charges. The DoT's source of rent in the sector would come from volume growth rather than rent extraction from a constant volume of business. However, even within this stable growth supporting political settlement, the fault lines for the breakdown of the settlement were already beginning to emerge.

The PS was under pressure since the formal distribution of rents did not match the distribution of organizational power within the sectoral PS (since the rents of the CDMA players had not yet been formalised. The organizations that had gained informal access to rents in the sector (the CDMA agencies) were being challenged by the organizations that had access to the formal rents the GSM agencies). On the other hand, the WLL play by CDMA agencies was not a scalable model. The CDMA players had gained only a partial access to rents without full mobility and they were keen to legalise their position and gain



better access to the rents in the sector. The regulatory structure needed to change to either remove the informal access to rents to CDMA organizations or to formalise their access to rents which would consolidate the emergent sectoral political settlement. As it happens, state agencies chose the latter option.

## 7.5 Dynamics of the PS 2003-2007: *Consolidating Gains*

Following increasing protests from the lobbying body of the wireless GSM operators, COAI, the Supreme Court finally ruled to merge licenses for the sector through the announcement of Universal Access Service Licensing (UASL) in 2003. This allowed both GSM and CDMA to operate full mobility services in the country.

The Prime Minister (Vajpayee) removed Pramod Mahajan and brought in Arun Shourie (who was Disinvestment Minister and had been involved in earlier tussles with Mahajan on the privatization of Videsh Sanchar Nigam Ltd (VSNL – the original public sector telecom firm prior to corporatization) as Telecom Minister to hammer out the agreement on UASL. It was speculated in the press that the speedy ruling on the UASL was designed to help legalise Reliance's forays into wireless using CDMA (Thakurta 2003). Interestingly, rather than criticising the move by Reliance, the minister of state for telecoms was most complimentary about the market expansion and the sheer innovation of the WLL format (Economist 2003).

Table 6.3: Dynamics of the PS 2003-2007

Policies driving rent creation and allocation	Policy Objective	Rent Distribution	Agencies that Define Critical Characteristics of the PS	Policy outcomes and economic effects given the PS	Consequences for the evolution of the PS
	Stated / Underlying	Formal/informal	Strong/weak		
<p>UASL</p> <p>Formalised Subscriber Based Norms (SBN)</p> <p>Calling Party Pays (CPP) regime</p> <p>Introduction of Access Deficit Charge</p> <p>Sale of Hutch to Vodafone</p>	<p><b>Stated:</b></p> <p>To regularize the licensing structure and rules for all players</p> <p><b>Underlying:</b></p> <p>To formalize the back-door entry of CDMA players into the wireless space and allow their full operation.</p>	<p><b>Formal:</b></p> <p>CDMA and GSM firms – High</p> <p>State agencies – lower rates of rents but benefiting from growth</p> <p>Consumers – High</p> <p><b>Informal</b></p> <p>CDMA players?</p> <p>Maran and Maxis Telecom</p>	<p><b>Dominant:</b></p> <p>CDMA firms</p> <p>GSM firms</p> <p>TRAI</p>	<p>Regularising of sector rules towards a level playing field</p> <p>Greater infrastructure development</p> <p>Licence fee and tariff reform</p> <p>Falling prices for consumers, increasing penetration and high sector profitability</p> <p>Consolidation of competition</p>	<p><b>Growth Enhancing PS</b></p> <p>consolidated</p> <p>Strengthening of GSM players’ markets shares and profitability strengthens their bargaining power</p> <p>CDMA players growth poor due to lack of device ecosystem internationally and poor management – weakens their bargaining power</p>

The UASL allowed CDMA operators to launch complete rather than partial mobility services. Reliance's "Monsoon Hungama" had begun a fierce price war in the marketplace among mobile service providers – both GSM and CDMA. Both GSM and CDMA subscriber bases grew, proving that the CDMA growth was market-expansive rather than competitive. As discussed in Section 6.5, producer profitability improved both from the growth in the market as well as from the introduction of producer friendly policies like CPP. Consumers also benefited from the competitive pressure on prices and the introduction of CPP. The competition also drove marketing innovations in the sector and the consumer had never before had the vast array of choices in terms of mobile tariff plans. In order to differentiate their service in the face of competition, and with the improved profitability, TSPs were driven to invest in infrastructure during the period, improving the quality of services for consumers.

Thus while CDMA players focussed on establishing a market, GSM players were forced to accept CDMA as a part of the competition and an important component of the sectoral political settlement and they stopped trying to regulate them out of the sector. Instead they focussed on protecting and growing their own markets. Despite competitive pressure, the market potential was large enough for all the players to co-exist. And the period saw a balance of forces that were all concentrating on driving sectoral expansion through price reductions and infrastructure improvements. One interviewee from the private sector referred to this phase as the "golden age" of telecom growth.

There were a few sops for GSM players too. As discussed in Chapter 6, India had a peculiar system of spectrum allocation. Unlike many other developed countries where TSPs were given up to 2 x 15 MHz of spectrum each, the initial allocations of spectrum were only 2 x 4.4 MHz of spectrum in India for GSM TSPs. The understanding was that more spectrum would be allocated as and when it became available based on need, that is, future allocations would be

linked to the number of subscribers on the books. Subscriber-based norms<sup>53</sup> had been formalised in 2002 and this provided incumbent private sector operators a way to access more spectrum based on their market share. The rationale for this unusual policy was that it allowed the state to release spectrum as and when it was vacated by the Defence Ministry and allocated according to need. This was justified as a more efficient use of scarce spectrum. The policy had the effect of strengthening the stronger players and helping further consolidate the market. Airtel benefited for example, by holding up to 2 x 6.4 MHz of spectrum in some markets.

The DoT still maintained a powerful position as an agency in the sectoral political settlement, as evidenced by their presence of the public sector in the wireless space and the introduction of the Access Deficit Charge in 2003. With the liberalization of the DoT's most profitable businesses, DLD/ILD, the department demanded that the cost and responsibility for driving rural penetration (which had remained solely a responsibility of the public sector incumbent) should be shared by private firms in the telecom space. As a result an Access Deficit Charge was levied on private firms in the sector theoretically to subsidize the rural penetration initiatives of the DoT. The decision was dogged by legal protests from the private sector and intervention by the newly strengthened regulator in favour of the DoT.

Reliance meanwhile had been going through a turbulent phase in its development. Section 5.3.4 in Chapter 5 described the origin of the Reliance group. The Reliance group was split into two following a disagreement between the two brothers that ran it. Prior to the split, Reliance Infocom, as the telecom subsidiary of India's largest business conglomerate and headed by Mukesh Ambani, known for his political connections, was a significant player in the wider national political settlement as well as the sectoral one. In the split, elder

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<sup>53</sup> See (Prasad and Sridhar 2009) for a description of SBN and changing norm levels

brother Mukesh Ambani retained many of the group's core industries. Telecom was retained by the younger brother, Anil Ambani, and was rebranded Reliance Communications (RCom). Anil Ambani's consolidated business, termed Anil Dhirubhai Ambani Group (ADAG) was significantly smaller than his brother's Reliance Industries.

RCom's growth was also hampered by issues relating to CDMA technology itself. CDMA was a proprietary technology with the license held by its originator Qualcomm. So handset manufacturers had to pay a license fee to Qualcomm on the CDMA handsets they manufactured. Further, the SIM was burnt into the handset<sup>54</sup>. In other words, handsets bought for one service could not be used on another. Also, in contrast to the closed licensed system of CDMA, GSM was an open standard that saw much greater innovation and product development. GSM could therefore begin to offer more services like SMS, MMS. All of this led to the global shift towards an inferior but more open technology (a bit like Windows vs. Apple). However, some markets like China, Brazil and the US continued to use CDMA.

Therefore, while Reliance now had access to full mobility via CDMA and had grown to nearly 15% revenue share of the total market by 2006, it was still keen to access the GSM market for which it needed to be allowed to hold a license for GSM technology and be awarded GSM spectrum. In February 2006, Reliance appealed to the ministry for a GSM license but the decision on allowing Dual Technology licenses had not been made at this stage (Mitra 2011). Reliance was thus still unable to access the more valuable section of mobile growth – GSM. Reliance's moves to withdraw from CDMA towards GSM however worried handset manufacturer Nokia, who started to pull their resources out of CDMA

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<sup>54</sup> This worked for their main market, USA where Verizon was a dominant market leader, but in India where the market lay in pre-paid cards and consumers switched based on price plans offered, this was a drawback.

handset manufacturing towards GSM handsets. Reliance's moves therefore pushed the already struggling CDMA market further downwards, only reinforcing its need to gain entry into GSM.

In 2006, Dayanidhi Maran was made Telecoms minister. Maran was a candidate of the regional political party DMK in Tamil Nadu. The DMK's support for the UPA coalition at the centre was crucial to the UPAs remaining in power. The awarding of the ministry of telecoms to a DMK candidate was in a sense, a pay-back for DMKs support. Maran, popularly described as a tech-savvy progressive, was generally popular with the GSM service providers.

During his tenure he drove the sector to reduce the price of calls down to one rupee per minute and was perceived by the business community as pro-growth and pro-business. However, in allegations that emerged only in 2011 (NDTV 2011) Maran was accused of using his influence to force C.Sivasankaran, the promoter of Aircel to sell his business to Maxis (a telecom player from Malaysia and Indonesia), promoted by Ananda Krishnan, a Malaysian businessman (Gopalan 2008). It was alleged that by the Central Bureau of Investigation (CBI) that in return, Ananda Krishnan made investments of nearly Rs. 800 Crores in Sun TV (ibid.) in Sun TV, a media channel that was owned by the Maran family and headed by younger brother Kalanidhi Maran that acted as the propaganda vehicle for the DMK (ibid).

Despite this, the PS remained a growth-conducive one for the most part. The growth in the sector benefited both GSM and CDMA agencies, and the DoT was also able to share in the growth. However, towards the end of this phase the growth of the market and the rent potential of the sector began to receive more attention. In the phenomenal growth of the sector lay the seeds of disruption of the PS once again.

The consolidation in market shares and the intense competitive pressure drove out some of the smaller players in the market. The explosive growth had also made India suddenly very interesting for foreign telecom giants. With the lifting of the cap on the percentage of FDI holding for firms in the sector to 74%, the sector became an attractive investment target.

In February 2007, Vodafone finalised the purchase of a 67% stake in Hutchinson Essar for \$11.1 billion in cash and absorb \$2 billion in debt onto their balance sheets. At 22 million subscribers, Hutchinson Essar was one of the larger players in the sector but the magnitude of the valuation rocked the sector and the financial markets in India (Knowledge@Wharton 2007). According to a source from the private sector, the sale made people “suddenly sit up and take notice” (Interview with Mr. Gandhi). While the sector was growing significantly, the fact that Vodafone was willing to place such a high valuation on buying a presence in the sector indicated its huge potential. It also indicated that significant rents were to be had in the sector and that the source of these rents lay in access to spectrum. This view was reinforced by the market response to Idea’s share listing. Idea, hoping to raise \$480 million, exceeded its expectations by raising \$27 billion, and was oversubscribed by 57 times (Knowledge@Wharton 2007).

It was obvious that the agencies that were benefiting from the increased rents of this phase were the GSM TSPs. CDMA for reasons of poor management in some firms and with a lack of an international device ecosystem had begun to get increasingly marginalised. Reliance was left out of these windfall gains that accrued to GSM players and was keen to gain access to more GSM spectrum. However there were also sections of the political apparatus that had noted the rent potential of the sector and were keen to participate in the rent capture.



Maran was replaced rather suddenly by A Raja, another DMK appointee, in May 2007. Maran appeared to have had a falling out with Karunanidhi, the patriarch at the head of the regional party, the DMK. It was suggested (interview with Mr. Hariharan, (TNN 2011)) that the argument flared over a survey published in the Sun TV group publication 'Dinakaran' regarding Karunanidhi's succession plans. The survey suggested that Karunanidhi's second son Stalin had more support than the eldest son Alagiri. It also suggested that Dayanidhi Maran was a popular minister. Alagiri's supporters torched Dinakaran offices and in return, Dayanidhi Maran demonstrated his displeasure to Karunanidhi. Karunanidhi was furious that the report was an attempt to fracture party unity and asked Maran to resign (PTI 2007) and sent A Raja, a young party faithful in his place (BusinessStandard 2007). Raja's audacious attempts to overturn the PS are the focus of the next section.

## **7.6 Dynamics of the PS 2007-2009: *Buying Political Support***

### **7.6.1 The Setting Up of the 2G Scam**

Raja's takeover in May 2007 as the Telecom Minister signalled a change in the focus of the telecom ministry. Raja claimed at the outset that he would continue the policies of his predecessors and that his focus would be rural telephony and foreign investment in the sector (TOI 2007). However, as soon as he took over the telecom ministry, Raja appears to have put in place a number of moves that would help him conduct the biggest swindle that India had so far seen. He needed to find ways to justify his manipulation of the rules. His first port of call was the regulator.

TRAI brought out a set of recommendations in August 2007 (TRAI 2007) that went counter to their own recommendations of 2005 (TRAI 2005). In 2005, their report clearly stated that existing operators in India had less spectrum than their counterparts in other countries and that as a scarce resource, all additional allocations of spectrum, even in the 3G band, should first be used to strengthen the efficiency of incumbent operators.

In 2007, the TRAI recommendations witness a complete about-face. Claiming that the changing dynamics of the sector necessitate a re-evaluation, the report makes wide-ranging recommendations on competition and spectrum usage and pricing. Professing a "light handed' regulatory paradigm" (TRAI 2007: 11), it suggests that there should be no cap on the number of entrants to wireless. Further, it argues that improved spectral efficiency among incumbent private players shows that they are not constrained by spectrum scarcity. It

recommends that the existing subscriber based norms be re-calculated, but that in the interim, the levels are raised from current levels.

While the report also suggests that the pricing for spectrum at 2001 prices is unrealistic given market growth, it does recommend that spectrum in the 800, 900 and 1800 bands should continue to be administratively allocated to ensure a level playing field because of legacy reasons, while all spectrum not in this range, such as the 3G spectrum, should be competitively allocated through an auction. Note that 3G spectrum that was in 2005 seen as an additional support for the existing 2G service is now being referred to as a separate service.

These recommendations first and foremost established a case for introducing new competition into an already crowded sector<sup>55</sup> on the basis that prior introductions of competition in the sector had driven significant growth. Second, it suggested that new allocations of spectrum in the 2G bands should not be auctioned (to maintain a “level playing field” with earlier spectrum in the band). And finally it reduced the access that incumbents in the GSM sector had to further tranches of spectrum by raising the SBNs. Raja’s ministry selectively used the recommendations of this report to justify a particular course of action.

Just four months after Raja took over the Telecom portfolio, he announced a fresh round of licensing. On September 24, 2007, the DoT issued a press release announcing that applications for new licenses in 2G would be accepted till October 1<sup>st</sup> 2007. A flood of 575 applications were received by the DoT in a matter of days.

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<sup>55</sup> Crowded from the perspective that the number of players per circle was already 7-9, higher than in most other countries.

Table 7.4 Dynamics of the PS 2007-2009

Policies driving rent creation and allocation	Policy Objective	Rent Distribution	Agencies that Define Critical Characteristics of the PS	Policy outcomes and economic effects given the PS	Consequences for the evolution of the PS
<p>2008 licensing (2G scam)</p>	<p><b>Stated:</b></p> <p>To increase competition in the sector</p> <p><b>Underlying:</b></p> <p>Creating source of off budget funds for political parties.</p> <p>To allow Reliance entry into the GSM sector</p> <p>To facilitate rent capture by firms outside the sector that had links with the Minister.</p>	<p><b>Formal:</b></p> <p>State – low (Low price of licenses)</p> <p>Existing TSPs – Low (Due to increased competition.)</p> <p>New Entrants – high (Low price of license. High market value at divestment)</p> <p>Consumers – Unclear</p> <p><b>Informal</b></p> <p>Growing rents captured by Minister, Reliance, cronies of ruling political organizations, regional political party.</p>	<p><b>Dominant:</b></p> <p>Growing bargaining power of Reliance Infocom</p> <p>Entry of Regional Political party as a major player in sectoral political settlement</p> <p><b>Weak:</b></p> <p>Central government</p> <p>Existing TSPs (other than Reliance)</p> <p>TRAI</p>	<p>Entry of new players</p> <p>Worries of spectrum scarcity</p> <p>Squeeze on sector profitability</p> <p>Innovation in infrastructure sharing</p>	<p>Emergence of Reliance as a Pan-Indian player in GSM market</p> <p>Rapidly changing configuration of sector and uncertainty about direction of evolution of sectoral political settlement</p>

On the 19<sup>th</sup> of October, the DoT issued another press release with important implications for the sector (a copy of the press release is attached in **Appendix 19**: the highlights added are not in the original and have been added by the author). The release announced that, based on TRAI recommendations, there would be no cap on the number of licensees in any service area. It also announced that in keeping with the principle of dual technology licenses and to improve efficiency, any CDMA subscriber that wanted to apply for a GSM license could do so by paying Rs. 1651 Crores (the value of an all India license in 2001) and that they would be allotted spectrum in the appropriate band as and when available. The reverse was also applicable for GSM licensees wanting to enter CDMA. Not surprisingly, there were no takers for the latter but Reliance had finally got its desired entry into GSM and at prices that were risibly low given the growth of the sector in the intervening 7 years.

Reliance apparently offered to pay the Rs.1651 crores on the same day as the announcement (Mitra 2011). Given the sum of money involved, it would not be unfair to say that Reliance was aware in advance of the terms of the announcement. Tata applied for its GSM license on the 22<sup>nd</sup> of October, and HFCL Infotel and Shyam Telelink (now MTS) applied even earlier. Reliance and Tata now had approval for licenses for the GSM sector and needed the spectrum allocation that was promised to take place at the same time as new licenses were issued in the sector (ibid).

Raja had set in place the steps he needed to offer the spectrum at low prices to 'desired' new entrants to the sector such as Reliance and Tata. However, he now needed a way to restrict the number of licenses and cherry-pick the ones he wanted to honour. The low price of the spectrum had led to a flood of takers. In order to do select a desired list, the member Technology, Telecom Commission, K Sridhara, wrote to the Law Ministry on October 26th 2007 seeking approval to retrospectively advance the cut-off date to September 25<sup>th</sup>

instead of October 1<sup>st</sup> as had been announced. The Law Ministry recommended that an empowered group of ministers look into the matter but Raja went ahead with his proposal anyway, claiming he was applying the first come first served principle and thereby reduced the number of approved applications to 122 (ibid).

It was clear by now to sections of the central government that the licensing process was irregular. Neither Raja nor any other member of the state could have been unaware of the low valuation of the spectrum taking place by using 2001 prices. Even apart from the rapid market growth of the intervening years<sup>56</sup>, the Vodafone purchase of Hutch had made the potential of the sector amply clear.

The Finance member of the Telecom Commission Manju Madhavan (with a reputation as an upright civil servant) sent a note to the ministry pointing out the abnormally low price of spectrum. The telecom Secretary, DS Mathur, supported her view. Raja apparently criticised them sharply for it and by the end of 2007 Madhavan applied for voluntary retirement and Mathur retired. Subramaniam Swamy (Swamy 2011), has since published communication between the Prime Minister Manmohan Singh and Raja and between the Finance Minister P Chidambaram and Raja (accessed using the Right to Information Act) that took place in this period, where the PM questioned Raja on issues of spectrum pricing and the allocation method. Raja however held fast to his claim that he was merely following precedent by using an earlier discovered price and allotment based on a first come first served policy. Siddharth Behura (who had been Secretary, Ministry of Environment during Raja's tenure) was moved as Secretary Telecoms in January 2008. Raja had thus removed dissenting members of the DoT and had put his people into their

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<sup>56</sup> Bhandari (2012), p. 19 points out that in 2001, the market size was 4 million subscribers. In 2008, that had gone up to 249 Million.

place to ensure he had the support he needed to carry out his plans (Mitra 2011). The stage was set for a massive politically driven rent allocation scam.

### **7.6.2 The Process of Allocation of Spectrum**

On January 7<sup>th</sup> 2008, the DoT confirmed that all those who had submitted licenses up to September 25<sup>th</sup> would be eligible for spectrum but the order of allocation of spectrum would be on a first come first served basis, not in the order of submission of applications (as had been indicated earlier) but in the order that the supporting documentation and the license draft (for Rs.1651 Crores) were submitted in person at the DoT office, Sanchar Bhawan in Delhi and receive a signed letter of intent from the authorities (Mitra 2011, Bhandari 2012). The amount of spectrum available for allocation was insufficient to cover all the license applications. This was a thinly veiled attempt to ensure that the DoT could control who got the spectrum allocations on this round.

On January 10<sup>th</sup>, at 1:47pm, the DoT first issued a press release confirming the cut-off date of September 25<sup>th</sup>. It followed this with another press statement at 2:45pm (Mitra 2011, Bhandari 2012) stating that all applicants needed to report to the Committee Room at Sanchar Bhawan with completed paperwork and bank drafts worth Rs.1651 Crores by 3:30pm on the same day! That gave applicants 45 minutes to prepare all the relevant paperwork, issue bank drafts and travel through central Delhi's well known traffic chaos in 45 minutes.

According to a deposition by SE Rizvi, a DoT Undersecretary in later investigations, the staff at DoT was told on the morning of the 10<sup>th</sup> at 10:30 am that they should set up counters for the collection of applications between 3:30

and 5:30 pm that same day. However the announcement went out four hours later.

The descriptions of the ensuing chaos at Sanchar Bhawan that afternoon from eye-witness accounts are so fantastic as to seem nearly improbable<sup>57</sup>. An internal source who wishes anonymity provided details of the circus on the day. Apparently instructions came from the minister to set up four counters for the simultaneous acceptance of applications. The applicants had to file their applications at the counters on the second floor and then go down two floors to submit the draft and complete the process. There were employees of the DoT who were blocking certain players and allowing others through at the entrance hall to the counters first. Mitra (2011) suggests that one person fell down and got a bloodied lip and another had to be escorted from the premises for unruly behaviour. The source claims that as people rushed to file their papers and then down the stairs to submit the draft, one company actually had someone on the ground floor positioned near a window so that he could catch the papers being tossed out of a second floor window and steal a march on the rest. However, he claimed, one firm was so much in the pockets of the minister that it actually went straight to the telecom secretary's office and handed in the draft, thereby sidestepping the process entirely. Each processed application had the time that it was handed in recorded on it and apparently there were a matter of seconds separating the applicants.

At 5:30 the counters were closed and when the dust settled, it appeared that the following firms had benefited from new licenses:

1. **Unitech Wireless** – a firm from the real estate sector with no telecom experience (22 licenses).

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<sup>57</sup> For a detailed review of the process, see Bhandari (2012: 9-17).



2. **Swan Telecom**, an unknown entity, promoted by Shahid Balwa of DB Realty and no known connections to telecom (although connections were to emerge later during investigations) (13 licenses).
3. **MTS**, originally Shyam Telelinks that operated in only one circle. In September 2007 (prior to the allocation of licenses), the Russian firm Sistema bought a 10% stake in the business for \$11.4 Million, with indications that they were keen to increase their stake in the business. Since then it was rebranded as **Sistema Shyam** and later as MTS (21 licenses).
4. **Videocon** - or Datacom, a firm promoted by Mahendra Nahata of HFCL. Nahata sold his 36% equity to the Dhoot Brothers of the Videocon group in early 2010 (21 licenses).
5. **Loop Mobile** – believed to have been a front for the Essar group to apply for licenses they would not be eligible for otherwise (21 licences).
6. **Reliance Infocom** – whose attempt to gain access to GSM rents was detailed earlier and who clearly had prior knowledge of all the announcements of the Minister.
7. **Tata Teleservices** – who seem to have benefited again from their association with Reliance. Tata teleservices won 3 licenses.
8. **Stel** – Owned by Sivasankaran, who had been forced to sell his firm to Maxis. Stel won 6 licenses.
9. **Aircel** - the firm that Maran supposedly helped transfer the ownership to Ananda Krishnan of Maxis, who then repaid his favours by taking a stake in Sun TV.

The evidence of limited prior experience in the sector of most of the winners and their hidden links with the political process that were gradually revealed

shows that the list of winners was hand-picked by Raja and his associates within the DoT.

### **7.6.3 The Aftermath of the Allocations**

Almost immediately after the 2008 round of telecom licensing, questions were raised about the auction process and the identity of the beneficiaries. On 14<sup>th</sup> January 2008, just four days after the auction had taken place, Sunil Jain, a columnist at Business Standard, wrote that the beneficiaries of the auction were all cronies of minister Raja and that they had got licenses at “bargain basement prices” (Jain 2008). He further predicted that the licensees would not have the funds required to operate in the telecom sector and would most likely resell the licenses. The DoT had also received protests from the service operators themselves about the arbitrary and changing auction procedure - Kumar Mangalam Birla, the Chairman of the Aditya Birla Group that owns Idea, registered his protest the very next day. It was also very obvious within the industry and to industry observers that the spectrum had been wildly under-priced – at levels it had been sold at nearly a decade before, in the sector’s infancy.

Initial allegations of wrong-doing in the press seem to have died down quite quickly after the auction. Soon after the completion of the 2G auction, the DoT initiated the discussion on the upcoming 3G auction. Raja claimed that 3G spectrum would be auctioned at higher prices. Many of the press articles that followed were focused on speculations about the upcoming 3G auction, first promised by the ministry in 2009, and ultimately conducted only in 2010. Attention on the 2G auction in the press and among the public waned. A telecom analyst interviewed also suggested that the reason Vodafone and Bharti, as incumbents, did not fight more vociferously against the pricing set by

the 2G auction was that they benefited if the price was applied to the excess spectrum that they were supposed to be charged for.

In October 2008, Unitech Wireless sold a 67.25% stake in its company to Telenor of Norway for Rs.6120 Cr. (Rs.61.2 Billion, \$1.2 Billion). This would value the company at \$2 Billion without a single customer on their books. In other words, the valuation was based entirely on the perceived value of their spectrum. In December 2008, Swan Telecom divested a 45% share of its company to Etisalat of the UAE for Rs.3217 Cr. (Rs 32.17 Billion, \$670 Million). Again, this would give the company a total valuation of \$2 Billion. Towards the end of 2008, Tata divested a 26% stake in Tata Televentures to NTT DoCoMo, giving it an enterprise value of \$8 Billion (note that Tata had both customers and infrastructure on their books already). In January 2009, Stel sold a share of its firm to Bahrain's Betelco. In June 2008, RCom was also in talks with South Africa's MTN to divest their CDMA business but the talks fell through. Rumour has it that the brother Mukesh Ambani, who had the right of first refusal in case of a sale as per their original agreement when the Reliance business was split between the brothers, caused the negotiations to fail (interview with private TSP employee, (BusinessToday 2008, Badkar 2011)).

The obvious financial gain made by licensees selling out to foreign telecom players seemed to reignite comment among industry watchers against the 2G licensing<sup>58</sup>. In November 2008, Subramanian Swamy, member of an opposition party (Janata Party) wrote to the prime minister seeking sanction to prosecute Raja for corruption. By mid-2009 the CVC (Central Vigilance Commission) had received complaints from other public interest litigators regarding illegalities in the spectrum sale to Swan Telecom and Loop Telecom. The CVC initiated a CBI (Central Bureau of Investigations) probe in the Telecom Sector. The CBI,

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<sup>58</sup> See for example several op-ed pieces by Sunil Jain in Business Standard from March – September 2008.

however, appeared to be dragging its feet on the investigation until pulled up by the Supreme Court in November 2010 (Bhandari 2012: 12). In October 2009 the CBI lodged an FIR against unknown persons in the DoT under the Prevention of Corruption Act. In 2009, the Comptroller and Auditor General of India, Vinod Rai and his team began to prepare an audit report of the entire licensing process.

Meanwhile in 2009, the government at the centre was up for re-election. The UPA II coalition that was put together to achieve a majority in parliament was again dependent on regional allies. The DMK was again able to pick its ministries. What is most surprising, however, is that despite common knowledge of the allegations of wrong-doing and Raja's brazen flouting of norms and rules within the sector<sup>59</sup>, these facts did not stand in the way of Raja's reappointment as the telecom minister with the new UPA II government after the 2009 elections.

While the details of the corruption took a while to emerge, it was obvious that irregularities had taken place and that it was likely that Raja, and possibly, by extension, the coffers of the DMK party and other parties linked to it had benefitted. The creation of these informal rents for a regional party came at a significant loss to the exchequer in terms of formal rents that could have been extracted through the auction process. However, the coalition national government at the centre appeared to be resigned to these losses, a sign perhaps of their dependency on the regional political party for political support in order to remain in power or of the possibility that the dominant Congress Party had also received a share of the spoils. Commentators in the press openly referred to the political need for support from the DMK for the UPAAII government that forced Raja's reappointment despite allegations of misconduct

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<sup>59</sup> In fact Raja campaigned in the 2009 elections on the claim that he had dropped call rates.

(Jain 2009, BusinessStandard 2009). Raja seemed to have emerged unscathed and ready to tackle his next term as Telecoms Minister.

#### **7.6.4 The Force of Public Knowledge**

Three concurrent events brought the focus of the public back on the scam. The first was the 3G auction conducted by the Raja ministry in 2010. The details of the auction and its impact on the sector will be dealt with in the next section, but here it is sufficient to note that the 3G spectrum auctioned in June 2010 by the same Minister, Raja, was an exemplar in market auctions to raise revenues. The market price of 3G spectrum settled at Rs. 3365 crores per MHz<sup>60</sup> (\$730 Million) as compared to a price of Rs. 375 Crores per MHz<sup>61</sup> (\$93 Million) that was realized during the 2G auction in 2008. The prices realised for spectrum during the 3G auction exceeded all expectations. Ironically, what the phenomenal success of the 3G auction did was to focus media and public attention on a comparison with the now very obviously under-priced auction of 2008.

Now details began to emerge in the press that the Central Bureau of Investigation (CBI) was already in the process of investigating several telecom ministry officials involved in the 2G auction as well as some of the private companies (ET 2010d). The picture that emerged was one of a deliberate attempt to subvert the law in order to benefit a few, possibly in exchange for pay-offs of some sort – what the Indian media began to refer to as the “2G scam”.

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<sup>60</sup> i.e. Rs.16,828 Crore for a pan-India 3G license divided by 5MHz.

<sup>61</sup> Rs. 1650 Crores for a pan-India license divided by 4.4MHz

Opposition parties began calling for Raja's resignation from the Telecom Ministry. By the 10<sup>th</sup> of May 2010, under increasing pressure from the media and opposition parties, the DoT sent a letter to the PM defending Raja's actions during the 2008 licensing round, against allegations that he had both given away mobile licenses at throwaway prices and that he had been influenced in this process by lobbyists (Philip 2010). TRAI also began to face heat from incumbent groups, especially Bharti and Vodafone on their recommendations on the use of existing 2G spectrum by incumbents. By the end of May the CAG had been drawn into the investigation of the 2G scam case and a Public Accounts Committee was being considered to probe the issue further. However, in spite of repeated opposition calls for action against Raja, the Prime Minister, Dr. Singh, reiterated that he believed that the rules had been followed and that he would wait for the results of the investigation.

The second event was the public exposure of the 'Radia Tapes' that laid bare the wheeling and dealing that were involved in Raja's re-appointment as the Telecom Minister in UPA II. While the details of the 2G Scam had begun to emerge in the print media, a parallel story had broken in online journals. On 17<sup>th</sup> November 2010<sup>62</sup> Outlook and Open Online web versions of reputed Indian media leaked copies and transcripts of taped phone conversations<sup>63</sup> between a corporate lobbyist called Niira Radia with several prominent business people, politicians and media people. Supposedly, Niira Radia's phones had been tapped by the Income Tax Department for a period of six months in 2009 to collect evidence on tax evasion. They had then been submitted to the Supreme Court in November 2010 in relation to a tax evasion case, but the leaked transcripts provided an interesting sub-text to several big business-politics deals, including the 2G scam.

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<sup>62</sup> According to Bhandari (2012), the taped conversations between Radia and Raja had been leaked to the media as early as May 2010. The journals claimed that it wasn't released immediately as they were attempting to verify the story.

<sup>63</sup> For a complete listing of all the taped conversations available publicly, go to <http://www.outlookindia.com/article.aspx?268214> and <http://www.outlookindia.com/article.aspx?268618>

The transcripts show Radia in several conversations with political leaders and with prominent media persons who claimed access to the key decision makers within the UPA II government at the Centre, attempting to negotiate the reappointment of Raja as the telecom minister after the 2009 elections. Radia's contacts within the DMK appear to have been Raja and Kanimozhi, daughter of DMK party leader Karunanidhi, who is also alleged to have had a personal relationship with Raja. Radia was also the official corporate lobbyist for the Tata group. It is obvious from the recordings that Ratan Tata, who was said to have misunderstandings with the previous telecom minister, Dayanidhi Maran, (who was also one of the contenders for the post of telecom minister in UPAIL), was keen to promote the reappointment of Raja over Maran through the work of his lobbyist, Radia (Bhandari 2012: 56). Radia also seems to suggest that the CEO of Bharti, Sunil Mittal was lobbying to get Dayanidhi Maran back.

The Radia tapes caused a wave of public opinion against the perceived nexus between large corporates, politicians, lobbyists and journalists. The lobbying itself was not illegal but the picture it painted of the country being run by and in the interests of a few powerful people was one the public didn't take too kindly to. The tapes thus served to further intensify the pressure on the UPA government to fully probe the 2G scam.

However, the most important impetus to the recognition of the scam and to its consequences was the publication of the report by the CAG on the spectrum allocation of 2008. The CAG submitted a draft report to the Supreme Court in October 2010. Even before the final details were published, excerpts had been leaked to the press that threatened to implicate several businessmen and senior politicians. The CAG Report (CAG 2010) was made public on 10<sup>th</sup> November 2010.

It suggested that the loss of revenue from the actions resulted in a revenue loss to the exchequer to the tune of Rs. 1.76 Lakh Crores or Rs. 1760 Billion (approximately US\$ 39 Billion<sup>64</sup>), 10 times the value raised in the Jan 2008 auctions of Rs. 16.58 Billion (\$368 Million<sup>65</sup>) (ibid). The estimated revenue loss was based on the difference between the market value of the spectrum and its sale at 2001 prices, which was computed to be Rs. 1400 Billion (\$31 Billion) and the revenue loss arising from the allocation of spectrum beyond their contractual limit to 9 players, which accounted for the remaining loss of Rs. 367 Billion (\$8Billion). The loss value was computed based on the prices for spectrum realised in the 2010 3G auction.

Apart from the eye-wateringly large loss figure, the report also made a number of important accusations. The report was scathing about the Minister and the DoT not following due process in the allocation of licenses and in not accepting any of the recommendations of the Prime Minister, the Finance Ministry, the Telecom Commission or the Law Ministry. It laid the blame for the manipulation of due process squarely at the door of the Telecoms Minister. It cited the arbitrary change of date and the manipulation of the first come first served policy as indications of “deliberate and unhealthy haste” in favouring certain applicants. It claimed that critical information was leaked to certain applicants based on the fact that they had demand drafts for the exact amount prepared prior to the date of the announcement. 13 out of the 16 companies had drafts dated prior to the notification dates. It also claimed that 85 out of the 122 licenses issued went to firms that were not eligible for the licences in terms of other qualifications.

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<sup>64</sup> Worked out at exchange rate taken to be \$1 = Rs.45.

<sup>65</sup> Worked out at exchange rate taken to be \$1 = Rs.45



Nine of the 16 firms had not been properly registered according to DoT guidelines for the allocation. 6 of those belonged to the Unitech Group. The other firms were Allianz Infratel that was bought by Etisalat, and Shipping Stop Dot Com that changed its name to Loop Mobile. Thirteen companies did not have the requisite amount of paid up capital on their books as per DoT guidelines on the date of registration. These included firms that were part of Unitech, Loop, Videocon and SwanTelecom.

The report also made further allegations against two firms. The first was Swan Telecom. It showed that at the time of applying for a license, Reliance held a 10.71% stake in Swan Telecom. No firm that was already incumbent in the sector was allowed to have more than a 10% stake in any other firm in the sector as per DoT guidelines. Instead of disqualifying Swan Telecom, it was given a chance to rectify its shareholding discrepancy by December 2007, and Swan Telecom claimed that Reliance had divested its entire stake in the company. However, the firm's promoters were senior members of Reliance's management team and had listed their Reliance email addresses as contacts. The CAG report states clearly that Swan Telecom appeared to be a front company for Reliance. The report also showed that Swan telecom had unfairly benefited in terms of licenses in two circles by excluding Idea and Spice Telecom on spurious grounds, allowing Swan to move up in the priority queue for spectrum.

The report also indicated that undue benefit was shown to Reliance on other grounds. The Dual Licensing system was rushed through without following due process or getting any approvals from other ministries. The 'in principle' acceptance of Reliance's license, along with those of two other firms (HFCL and Shyam Telelinks) was granted even before the press release confirming the policy. As discussed earlier, Reliance was ready with its payment draft on the very same day. Based on this 'in principle' approval, Reliance alone was

allocated start up spectrum in 14 circles ahead of all other applicants and ahead of the new licensees.

The report thus exposes evidence of an alliance between the telecom minister Raja and the Reliance ADAG group, who wanted to extend their footprint in the wireless space to a pan-India one. Reliance received a hastily agreed license and spectrum allocation prior to the allocation to new players. However, in order to subvert monopoly restrictions on further holdings of spectrum they also applied through a shell company – Swan Telecom. To ensure that shareholding requirements were met, Swan telecom took on DB Realty as partners, who did not invest significantly in the company but provided a conduit to funnel payoffs back to the minister. In sum, the CAG Report made it clear that Raja was to blame and that he had unduly favoured Reliance. While the report did not explicitly state it, it is easily surmised from the above that Raja benefited from a significant consideration in return for all the favours he bestowed on his contacts in the real estate sector and Reliance.

The report caused a furore in Parliament as opposition parties threatened a boycott, demanding Raja's resignation. While Raja, with the backing of the DMK, bravely continued to claim his innocence in the face of mounting evidence, by the end of the week, public outrage forced a reluctant central government to act and to demand Raja's resignation. On 14<sup>th</sup> November 2010, Raja was finally dropped from the central cabinet. The DMK, which had at first threatened to withdraw support to the UPA II government at the Centre if they dismissed Raja, were also forced to give Raja up given the mounting weight of evidence against him. On the 2<sup>nd</sup> of February 2011, Raja, former telecom secretary Siddharth Behura and Raja's ex-private secretary at the telecom ministry, RK Chandolia were charged with manipulation in the awarding of radio frequency, forgery and misusing official positions and were jailed awaiting

trial (TOI 2011). Raja remained under arrest in Tihar Jail until the 15<sup>th</sup> of May 2012, when he was released on bail.

### **7.6.5 Following the Money Trail**

The CBI charge sheets, finally filed in April 2011, implicated a number of operators. Swan Telecom was charged with withholding information on its shareholding patterns, indicating a link with Reliance Telecom. The promoter of Swan Telecom, Shahid Usman Balwa, was arrested for financial irregularities. The CBI also alleged a money trail leading from DB Realty who had purchased Swan Telecom to Kalaingar TV, with links to the DMK.

It has emerged that Balwa- owned Cineyug Films had given an unsecured loan of Rs. 206 crores to Kalaingar TV in 2009, a television channel in which Dayalu Ammal, Karunanidhi's second wife and Kanimozhi, his daughter, owned an 80% stake. Following the CBI investigation, Kanimozhi was also charged in this case and jailed awaiting trial. Vinod Goenka of Swan Telecom, Sharad Kumar of Kalaingar TV, Karim Morani of Cineyug Films, Asif Balwa and Rajiv Agarwal of Kusegaon Realty have also been named as co-accused (TOI 2011). In addition the CBI also charged and took into custody Sanjay Chandra of Unitech, and three executives from the Reliance Anil Dhirubhai Ambani Group (ADAG). The charge against Unitech (owned at the time by the DLF realty group, since bought over by Norwegian telecom group Telenor and renamed Uninor) relates to their having misrepresented their paid up capital figures at the time of submitting their application (Bhandari 2012: 161, Hindu 2013).

The CBI investigations also highlighted the irregularities in the auction process discussed earlier. The announcement that licenses were to be awarded to 15

eligible license applicants was made suddenly, without prior notification. The applicants managed, almost miraculously, to be present at the appointed time with the appropriate fees in spite of the short notice. The applications were considered in the order that they met the letter of intent, rather than the order of receipt of original application. There appeared to have been a manipulation of who was allowed to submit their acceptances of the letters of intent, and therefore the priority in which they would be awarded spectrum. And finally, there was the issue of the price of the spectrum itself. All of these suggest that the DoT officials were attempting to privilege some applicants over others in an unfair manner.

The second area of investigation was the ownership structure of Swan Telecom. In order to prevent monopolies in the sector, the license agreement barred an operator from holding more than 10% equity in another operator in the same circle. Reliance Telecom, who was already present in the circles that Swan Telecom was applying in, held a 10.7% share in Swan Telecom, through 9.8% ownership of ordinary shares and another 0.9 % in preference shares. The remaining shares were held by Tiger Traders. However, the bulk of the net worth (more than Rs.1000 Cr. of the total Rs.1101 Cr.) was contributed by Reliance Telecom, with Tiger Traders only contributing Rs.98 Cr. Further Tiger Traders itself appeared to be a shell company, set up by Gautam Doshi (a President at Reliance ADAG), and two other Reliance ADAG associates, Surendra Pipara and Hari Nair<sup>66</sup> (Bhandari 2012). In October 2007 DB Infrastructure was also brought into the shareholding of Swan Telecom, with 5 million shares, making Reliance Telecom a minor shareholder. It is however unclear what equity they brought into the company. There is evidence that the Finance wing of the DoT raised questions on the noncompliance of the Swan application on the equity clause, but that the concerns were over-ridden by the minister(Bhandari 2012). This establishes an alleged attempt by Reliance

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<sup>66</sup> Bhandari (2012), p. 165-178 shows that Tiger Traders was one of a triangular set of firms, each of which was created from the share-holding of the other two.

Telecom to subvert monopoly regulations and buy a greater stake in the sector with the collusion of the Minister.

This allegation of bypassing monopoly rules was also investigated in the case of Loop Telecom. The Ruias, promoters of the Essar group of companies are believed to have held a 10% stake in Loop telecom (majority stake owners are the Khaitan Group: the Ruias are also related to the Khaitans) while already holding a 33% stake in Vodafone Essar at the time (Philip and Singh 2013).

The CBI also presented evidence of a trail of money that linked DB Realty, key shareholders in Swan Telecom, and Kalaighar TV which had clear links to Raja and the DMK (PTI 2011b). In December 2008, Swan Telecom had sold 47% of its equity to Etisalat for Rs. 3200 Cr. (Rs. 32 Billion). It also received Rs. 320 Cr. (Rs. 3.2 Billion) from a company called Genex Exim Ventures, which had just been incorporated. From December 2008 to August 2009, Dynamix Realty and two other DB group companies transferred Rs. 209 Cr. (Rs. 20.9 Billion) to Kusegaon Fruits and Vegetables Pvt Limited as an unsecured loan. Kusegaon then invested in Cineyug Pvt Limited to the tune of Rs. 200 Crores, (Rs. 20 Billion) who then loaned Rs. 200 Cr. (Rs. 20 Billion) to Kalaighar TV. Kusegaon listed as its director Asif Balwa, who was a brother of Shahid Balwa, the man behind DB Realty. Kalaighar TV was the TV channel set up by the DMK as a competitor to Sun TV, the cable TV channel run by the Maran Brothers. The CBI further alleged that when they contacted Raja for questioning on this matter on the 24<sup>th</sup> of December 2010, it initiated a reverse transfer of the same amount, Rs. 200 Cr. (Rs. 20 Billion), back to DB Realty through Cineyug and Kusegaon as a cover up (Bhandari 2012 : 179-184).

Investigations also focused on GenexExim Ventures, a company created (with paid up capital of just Rs. 100,000) just before the Etisalat sale that bought

shares in Swan Telecom, and further sold these shares to Etisalat Mauritius for Rs. 320 Cr. (Rs. 3.2 Billion), exactly the amount it had paid for its shares earlier. Genex is believed to be a front company for ETA Star, a large Dubai based conglomerate with many business interests in Tamil Nadu and whose directors are believed to be close to the DMK (Chaudhury 2010, NDTV 2010). There was speculation in the sector that Swan Telecom was a front company for Reliance that would also allow Raja himself to hold a stake in it (interviews with private sector competitors and telecom analysts).

Datacom Solutions, which sold its entire stake to Videocon Telecommunications is alleged to have an equity stake by a director of Reliance Industries Limited (from the Mukesh Ambani led arm of Reliance Industries) (Bamzai 2011).

In return, Raja, Behura and Chandolia have also challenged the courts to probe the role of the Tata group in the scam. They claim that the Tatas, through their corporate lobbyist, Radia had agreed a deal that would bundle Kalaignar TV as a part of the bouquet of channels offered by TataSky, a national cable operator and part of the Tata group of companies. Radia was also a lobbyist for Mukesh Ambani in other sectors. Transcripts of her recordings show her wanting to bring the Tatas, Mukesh Ambani and Sunil Mittal of Bharti group together to coordinate a united strategy against the Anil Ambani Group.

#### **7.6.6 The Outcome:**

Around four years after the event, on the 12 of February 2012, the Supreme Court ruled on the 2G case. In a bold move, it cancelled all 122 2G licences that had been issued in 2008. The entire spectrum that had been issued had to be

vacated within 4 months and returned to the government to be re-auctioned. It also fined Swan Telecom and Unitech an amount of Rs.5 Crores each and Loop Telecom Pvt Ltd, S-Tel, Allianz Infratech and Sistema Shyam Tele Services Ltd Rs. 50 lakhs each.

The cases against Raja, Behura, Chandolia and Kanimozhi are ongoing at the time of writing. However, after a maximum of 15 months in prison, all the accused have been released on bail pending the verdict. In fact while he still awaits the verdict of the trial court, Raja was fielded by the DMK as a candidate during the national assembly elections in 2014. He was defeated in the election by the opposition (ADADMK) party's candidate, but it appears that his political life is far from over (Hebbar 2014).

### **7.6.7 The Forces at Play in the Political Settlement:**

The roots of the policies and rent-seeking conflicts in this phase of the sector's growth derived from three facts. The first was the dawning recognition of the sector's potential and the value of spectrum that the Vodafone and Idea valuations drew attention to.

The second was a factor related to the political milieu. The government at the centre was Congress led but having failed to achieve a majority, the Congress had to cobble together a group of coalition parties who had no ideological links to them. In order to keep the support of myriad interest groups, the ruling Congress (UPA I) government bought their support by promising them "lucrative" ministry posts in return. The posts with a greater potential to award contracts represented greater opportunities for graft and were much sought after. When a member of the DMK was first placed as the Telecoms Minister,

there must have been an implicit understanding between the Congress and the DMK that a certain portion of the rent generated by the sector would be extracted by the DMK. There may also have been a rent-sharing agreement between individuals in the DMK and the Congress Party that led the UPA coalition. Although this allegation was regularly made by the opposition, it is difficult to verify such a claim, though it must be regarded as a plausible allegation. This is a pattern that is consistent with the clientelist political settlement that characterises India at the most aggregated level, as discussed in an earlier chapter. Emboldened by this fact and the UPA's dependence on DMK's support for their majority, Raja engineered an audacious scheme to capture state rents.

The third key factor was that Reliance had been increasingly marginalised in the political settlement describing the drivers of sectoral rent seeking in spite of their entry into the sector in 2001. It was obvious to Reliance that access to the lion's share of sector rents would go to GSM agencies. Reliance needed a way to not only enter the GSM sector but gain a sufficient share of spectrum to make rapid market share gains in order to truly access the rents to be made. Some of the important organizational changes that characterized changes in the sectoral political settlement were driven by Reliance organizing new forces and alliances that reflected its bargaining power outside the sector, at the national level, to change the distribution of organizational forces that affected decision-making within the sector. This is an example of how political settlements at different levels of aggregation can interact.

While allowing Reliance to enter the sector by subverting the rules, Raja was also happy to extend the same courtesy to others in the sector that were willing to accede to his terms – Loop, Videocon etc. This created a coalition of interests supporting the changes and made it more likely that the changes would be sustainable. As we have seen, the uproar that resulted, driven by opposition



parties at the national level, shows that this expectation was not fully met. Once again, configurations of power at the national level affected the attempts to restructure the sectoral political settlement. Raja's strategy also helped turn a tidy profit for a set of firms in the real estate sector (Unitech, DB Realty) who had suddenly expressed an interest in the telecom sector. It is worth reiterating here that Raja's previous association with them was as Minister for Environment where he had to provide clearances for construction projects. These businesses now wanted to invest in the sector even though they had no knowledge of or interest in continuing in the telecom sector. Their interest was clearly in capturing some of the spectrum rents. While they were prevented from selling the licenses, they quickly sold equity in their companies to a number of international players seeking entry into a lucrative market. Raja thus created rents for a number of his old friends, and it may be safely surmised that some of that money made its way back to him, his party and beyond through kick-backs.

The entire set of policies leading up to the 2008 allocation was a way for Reliance to manage its entry into the GSM sector and for Raja to maximise rent capture both for personal gain as well as the benefit of his regional party and possibly the coalition. The DMK's willingness to stand by Raja in the face of mounting evidence and to field him again as a party candidate in 2014 despite all that had gone before is a sign that Raja's actions had the blessings of his party President, Karunanidhi, and that a significant portion of the rents captured made their way back to party coffers through some route.

It is also obvious that several sections of the Central Government were aware of what was taking place. The interventions by the Law Ministry, the Finance Ministry and the Prime Minister show that the wider state apparatus was aware that the rules were being circumvented for political gain. The questions by the Prime Minister and the Finance Minister can be seen in this light as suggestions

to possibly curb the amount of graft or give it a more acceptable face. The insolence with which Raja ignored these interventions shows his perception of the strength of his organization in the political settlement at the national level. And his assessment was fair. There was no attempt by the centre to stop the process or undo it after the fact. Despite allegations of wrongdoing, the centre neither admitted to it nor instituted disciplinary action. The Radia tapes indicate that there may have been some reluctance on the part of the UPA II government to offer the post back to Raja but faced with pressure from the DMK they did so again. In fact they continued to support Raja and deny wrongdoing until it became politically untenable for the government at the centre to do so and the loss of DMK support became the least of their worries. This change came about not because the DMK became weaker, but because the opposition managed to mobilize sufficient forces against the coalition government at the centre using the scam as one of its key rallying cries. At some point, the configuration of the national political settlement began to change, with the UPA facing significant challenges to its authority as large scale mobilizations against it emerged on the streets and in the media. It was only at this point that the costs of abandoning Raja became lower for the central government than the costs of continuing to cover up for his activities. However, even before this, the use that the opposition was making of the scam, and the perception that the regional party had extracted far too much rent for itself meant that the central government had to ensure that the 3G auction had much greater oversight from the finance ministry and Raja was not allowed to take over the process like he had done on the 2G allocation.

The 2008 allocation of spectrum by Raja had the unintended consequence of bringing about a sudden influx of competition into the sector. The incumbents were now faced with potential competition from a group of new international telecom firms – Telenor of Norway, Etisalat of Dubai and Sistema of Russia. While the incumbents had an advantage in having a share of existing market that new entrants would have to work to build inroads into, the key concern for

incumbent organizations at this stage was the sheer number of players and the lack of a clear roadmap for spectrum allocation in the future. Prior to 2008, clear subscriber based norms existed that allocated additional spectrum on the basis of subscriber numbers. These had now been revised and a committee instituted for revising them so that the levels at which further spectrum could be issued was higher. The number of licenses that had been issued meant that there was already a backlog in terms of spectrum to be allocated.

It was the sheer scale and audacity of the rent capture that was Raja's downfall. If the level of rent extraction had been more moderate or if he hadn't flouted so many rules in the most cavalier manner, it is quite likely that he may have got away with it. The government at the Centre was obviously unwilling to rock the boat, and supported Raja's political party as long as it could. But Raja's open flouting of procedure and precedent, the all-important bases of government policy, left him vulnerable to investigation by the CAG.

The Comptroller and Auditor General (CAG) also became an important player in the sectoral political settlement during this period. The office of the CAG, meant to independently audit government processes had been known to challenge the government only rarely in the past. Under Vinod Rai's tenure this changed and the 2G report was the first big report filed by his team. The forthright accusations made against senior politicians and big business certainly caught the attention of the media and general public and forced the government into action.

The report did face some criticism from some economists on the grounds that the presumptive valuation of the loss to the exchequer was too high. The CAG applied 4 different methodologies to calculate the loss to the exchequer.

The first was based on the excess price over the license value that STel offered to pay in an application for a license in 2007, addressed to the Prime Minister. On this basis, the allocation could have realised Rs.65,909 crore as against Rs.12,386 crore collected by the DoT, with a potential loss of Rs.53,523 Cr. (Rs. 535 Billion).

The second was the use of 3G spectrum price realised in the 2010 auction, based on the assumption that given technological advances, the 2G spectrum was as efficient at 3G spectrum. This assumption leads to the notional loss of Rs.1,39,652 Cr. (Rs. 1396 Billion).

The third and fourth methods of valuation used the prices realised on equity sale of firms Swan and Uninor to foreign investors. On this basis, the allocation could have raised between Rs.58,000 and Rs.68,000 crores (Rs. 580-680 Billion), with a notional loss of between rs.46,000 and rs.56,000 crores (Rs. 460-560 Billion). It can be seen that three methods cluster loss values of around Rs.50,000 Cr. (Rs. 500 Billion). The 3G method of valuation estimates the loss to the exchequer to be nearly three times that, at Rs.1396 Billion. This last value was the one chosen to be highlighted and became the number quoted in the press. The CAG defended allegations of sensationalism with the retort that they only presented a presumptive or potential loss figure.

There is no doubt that the high figures did get more press attention. It is also undeniable that, even at the lower figure, it still represents rent capture at an enormous scale. Vinod Rai became an overnight celebrity and continued to strengthen his image as an upright crusader against corruption in India with similar work on other sectors. To date, unlike many other anti-corruption

crusaders in India, he has shown no interest in leveraging his image into a career in politics (Denyer 2012).

Some commentators have suggested that the public reaction to the CAG report on the sector was part of a broader wave of public revulsion to high profile corruption at least within the educated middle class in India since 2010. The anti-corruption movement of Anna Hazare and the renewed public interest in political accountability that resulted in, among, other things, the trouncing of the Congress government in the 2015 elections, are all part of this wave (Malik and Jenkins 2013). The report of the 2G scam was certainly the first of many other exposes that revealed the scale and consequences of the politics of patronage which was becoming increasingly predatory – Coalgate, the Commonwealth Games, to name a few. Roy (2013) argued that there was a significant shift from old-fashioned patronage to predatory corruption by coalitions of business and politics during this period. The 2G scam appears to follow the same pattern.

The public reaction to these scams has for the moment resulted in some unexpected results. There are suggestions that government employees now so fear being charged for corruption that the result is policy paralysis (Denyer 2012, Malik and Jenkins 2013). While that may be an overstatement, the scam has impacted both on how the telecom sector (both government agencies and businesses) are viewed by the consumer and how government policy makers view the sector. Specifically, it appears that the 2G scam did result in the hardening of the government stance towards spectrum allotment in future phases, if only because the political costs of appearing to condone crude attempts at rent capture are now clear.

## 7.7 Dynamics of the PS: 2009-2012: *Laying Down the Law*

The 3G auctions held in May 2010, under Raja's second round of leadership of the DoT, were in stark contrast to the 2G licensing process of 2008. By now, although the details of the 2G scam had not been uncovered in the Press and while the general public had no inkling of the scale of rent capture, the Central Government was aware that rents had been captured but had been diverted too exclusively to the regional party and to the minister himself. In order to ensure that this did not take place a second time, the process was overseen by the Finance Ministry and the Telecom Commission.

The auction was designed by DotEcon, a UK based consultancy in line with a brief from the DoT. It was also overseen by independent audit firms. The DoT brief had laid out the following objectives:

- the auction should feature an open stage where bidders can obtain information about the demand for the licences offered;
- the risk of lots going unsold should be minimised;
- bidders should not be given opportunities to submit bids they did not intend to honour, and potentially raise prices to discourage entry;
- the government should raise a fair price even in the absence of competition in the auction or in the event that valuations from bidders were highly asymmetric, which in turn implied that a strict second-price rule might not be a good tool for capturing the value of licences as revenue;
- entry by regional operators should be possible and encouraged; and

•as far as possible, aggregation risks for operators seeking a national footprint should be mitigated (i.e. the risk of winning licences in some, but not all key regions).

(Source:(Dot.econ 2010))

The resulting design of the auction was an ascending clock e-auction with modifications, where bids were placed online by pre-registered bidders in a secure manner. The bids were presented in an ascending manner by the auctioneer, and bidders had to either accept or decline, ensuring cartelization or collusion could not take place and allowing the greatest possible value of spectrum to be determined by market bidding. The auction was deemed a resounding success as all the available spectrum was sold and the levels of rent extracted were twice those that had been expected by the State (ET 2010a).

The prices achieved for 3G spectrum need to be understood in terms of the competitive context at the time. The 2G auction had taken place and the market saw the introduction of a number of new entrants with FDI backing. Incumbent firms faced the prospect of market share wars with foreign players whose pockets were possibly deeper than their own. All these players were keen to establish a foothold in the Indian market and any gain in market share that they achieved was likely to come disproportionately from the largest firms. In addition the earlier roadmap of spectrum allocation based on subscriber norms had been scrapped and any future availability of spectrum would be contested for by a greater number of firms. Sunil Jain of Business Standard suggested that the high prices were caused by an artificial spectrum scarcity created by Raja when he doled out too many licenses in 2008. Incumbents therefore had to engage in a fierce bidding war to retain their advantage. It was hoped that 3G, with faster speeds, would help unlock the nascent data market and access the higher value customers with greater Average Revenues per User (ARPU).

Table 7.5: Dynamics of the PS 2009-2012

Policies driving rent creation and allocation	Policy Objective	Rent Distribution	Agencies that Define Critical Characteristics of the PS	Policy outcomes and economic effects given the PS	Consequences for the evolution of the PS
	Stated / Underlying	Formal/informal	Strong/weak		
3G (2100 MHz) and BWA (2300 MHz) auction	<p><b>Stated:</b> To drive growth and extract formal rents for the state</p> <p><b>Underlying:</b> To shift from informal to formal rent extraction</p>	<p><b>Formal:</b></p> <p>State: High</p> <p>TSPs: Low</p> <p>Consumers: Low</p>	<p><b>Dominant:</b></p> <p>State, CAG, Public</p> <p><b>Weak :</b> All TSPs</p>	<p>High competition and uncertainty of spectrum.</p> <p>High debt levels</p> <p>Reduced investment in infrastructure</p>	<p>Growth-retarding phase</p> <p>Changes in sectoral political settlement retard sectoral growth as a result of the maximization of formal rent extraction</p> <p>Entry of global telcos.</p> <p>Entry of Reliance Jio</p>



The operator-wise results of the spectrum allocations were discussed in Chapter 6. The auction was dominated by the top three market players. Reliance Infocom also won 13 circles. None of the new entrants won any further licenses in this round (Maistre 2010). Bharti Airtel had the biggest spectrum bill at Rs. 12,300 Cr. (Rs. 123 Billion). Airtel, Reliance and Vodafone also won the key metro licenses (ibid).

State owned operators BSNL and MTNL had already been allocated 3G spectrum in all circles in 2009. However they were now charged the equivalent of winning bids in each circle, reflecting an explicit recognition by the government of the value of spectrum as a resource and as a source of generating state revenues.

The winners of 3G spectrum exhibited 2 divergent bidding strategies. Birla-owned Idea cellular and Aircel focused on the smaller and cheaper non-metro circles and therefore achieved more efficient gains, while Vodafone, Reliance and Airtel, in an attempt to maintain presence in key metros, ended up paying significantly higher for potential rupee revenue for their spectrum (ET 2010c, Gupta 2010). The incumbents had the advantage of several years of accumulated profits and stronger balance sheets as a result of higher rent retention in the preceding years based on their rights over 900 MHz spectrum (this will be discussed in greater detail in the next chapter, Chapter 8). Reliance however, needed to overextend itself in order to participate in the bidding war. All the TSPs who participated ended up with high levels of debt but the incumbent firms – Bharti and Vodafone were probably best placed to manage the debt on their balance sheets.

Two days after the conclusion of the 3G auction, spectrum in the 2300MHz range was also auctioned. This was meant as spectrum for Broadband Wireless

Access (BWA) but all spectrum bought at an auction (i.e. Spectrum from the 2010 auction onwards) was declared to be liberalised. In other words, the spectrum could be used with any technology on mobile wireless communication.

The BWA auction saw the entry of a significant player into the sectoral political settlement. Infotel, who won licenses in all the circles for the 2300 BWA spectrum, were in talks with Reliance Industries during the bidding process and were bought over by them immediately after the auction and renamed Reliance Jio (Tripathy and Narayanan 2010). Reliance Industries was the other arm of the original Reliance business that had stayed with the elder brother Mukesh Ambani, now the richest businessman in India. The non-compete agreement with his brother that prevented him from entering telecom had been scrapped only weeks previously (Hibberd 2010).

The entry of Mukesh Ambani's Reliance Jio marks an important change in the sectoral political settlement as it could potentially enable Mukesh Ambani's very significant bargaining power in other sectors to be leveraged in bargaining within the telecom sector. Although at this stage Reliance Jio did not have a mobile telephony business and had no spectrum in any other bandwidths, his purchase of the countrywide BWA spectrum was speculated to be a play buy into 2300 MHz in anticipation of the planned new developments in technology (TDD-LTE or 4G) that were expected to be able to work on this spectrum band in the future (ibid).

Telecom analysts and industry experts suggested the 3G and BWA bidding process and consequent huge pay-outs for the firms involved would be margin-diluting in the short term (ET 2010b). Graham Friend, managing director of Coleago Consulting, said of the 3G auctions "*The resulting US\$ / MHz / Pop (the*

*standard benchmark) for Mumbai, for example, makes the prices paid in the UK and German 3G auctions look relatively good value. If the prices were adjusted for the relative differences in GDP per capita the Indian prices would be off the scale.”* However he also believed that the 3G spectrum would help relieve congestion in 2G networks and start to earn a return quicker in India’s low cost markets (Middleton 2010). Meanwhile service providers claimed that the firms were under severe financial pressures as they were saddled with high debt levels (from spectrum auction costs) and revenue projections based in higher ARPUs were not being achieved. Cash-strapped TSPs began to cut back on investment in infrastructure.

As discussed in a previous section of this chapter the collapse of this phase of the political settlement had already been put into motion after the 2G allotment in 2008, but the values raised in the 3G/BWA auction raised the pressure on the government to put in motion the actions that would change the sectoral distribution of organizational power, the sectoral political settlement, once again.

The political settlement in this period had two defining characteristics. The first was the high levels of competition and the attendant insecurity for spectrum investors that the 2G licensing had caused. This had a huge and apparently paradoxical impact on the behaviour of the TSPs in the 3G auction, as it led to high levels of rent extraction by the state and high levels of debt for the TSPs. The consumers did not see any particular benefit during this phase as rents were simply being redistributed from service providers to the state through formal rent extraction processes. If anything, the TSPs had to cut back on infrastructure provision to manage their increased debt.

The second defining characteristic was the awareness and acknowledgement by the state and the general public that spectrum was a valuable natural resource. Spectrum came to be seen as not just a resource for the telecom sector but as a way for the state to formally raise funds to manage the fiscal deficit. The Supreme Court judgement of February 2012 that cancelled all 122 of the licenses issued in 2008 changed the first of these characteristics, that of competition. However, the investigation into the scam intensified the second characteristic. State agencies and the political leadership responded to the check on informal rent extraction that actually left some rents with the service providers by moving to transparent formal auction-based rent extraction that paradoxically left much lower levels of rents for TSPs. As far as can be judged from the media, the general public supported the change as the perception was that formal rent extraction by the state that fed into the country's budget was a good thing since it was a sign that informal rent extraction that lined the pockets of a few was not taking place. All further spectrum that has been assigned in the sector till the date of writing has been through a formal auction process that aimed at maximising state revenue.

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## 7.8 Dynamics of the PS: 2012-2014: *Akshayapatra Phase*

*Akshaya patra meaning inexhaustible vessel, is an object from Hindu mythology. It was a wonderful vessel given to Yudhishtira by the Lord Surya, which held a never-failing supply of food to the Pandavas every day.*

Source: <http://www.babylon.com/definition/Akshayapatra/English>

The cancellation of the 2G licences by the Supreme Court had important implications for the investment dynamics in the sector. The license cancellation and the fines imposed by the court on the new entrants made them hesitant to continue in the sector. It was followed by a period of uncertainty as many of the new entrants challenged the court rulings and threatened to sue the central government in return (Aulakh 2012). Etisalat exited the sector in 2012 soon after the cancellation of the licenses. Uninor and Sistema announced plans to continue in India. The Supreme Court had decreed that the cancelled licenses be re-auctioned within 4 months of cancellation. The spectrum from the cancelled licenses was put up for auction in November 2012.

The formal auction process of 2G in 2012 mirrored the 3G auction of 2010. However, as discussed in the last chapter, the high reserve prices combined with the debt laden balance sheets of the operators led to a dampened response to the spectrum. Only Uninor and Videocon, of the new operators in 2008 participated in the auction. Of the incumbents, Vodafone and Idea were the key participants. Airtel participated very marginally possibly because they had over-extended themselves in the 3G auction. The auction was not the resounding success that the state had hoped for and a large part of the 2G 1800 spectrum that was up for auction remained unsold.

*Table 7.7: Dynamics of the PS: 2012-2014*

Policies driving rent creation and allocation	Policy Objective	Rent Distribution	Agencies that Define Critical Characteristics of the PS	Policy outcomes and economic effects given the PS	Consequences for the evolution of the PS
	Stated / Underlying	Formal/informal	Strong/weak		
2012 cancellation of 122 2g licenses  2012 auction (cancelled licenses)  2013 auction  2014 auction	<p><b>Stated:</b> to drive sectoral growth</p> <p><b>Underlying :</b> to maximise rent extraction by the state</p>	<p><b>Formal:</b></p> <p>State: high to moderate</p> <p>TSPs: moderate</p> <p>Consumers: Low to moderate</p>	<p><b>Dominant:</b></p> <p>State, TRAI</p> <p>Big 3 GSM operators</p>	<p>Consolidation and strengthening of key players</p> <p>Spectrum shortages caused by policy</p>	<p>Growth-conducive PS</p> <p>A more conducive context for growth</p> <p>Exit of many new entrants increases bargaining power of those who remain</p> <p>Consolidation of big 3.</p> <p>Reliance Jio strengthens its position for an entry into the sector</p>

The auction of 2012 had the effect of eliminating the threat of further competition in the sector. The only new entrants that remained – Uninor and Videocon had not managed to buy heavily of spectrum given reserve prices and remained marginal players. Vodafone invested heavily during this auction, increasing the debt on its balance sheets too.

The spectrum that remained unsold was put up for auction again in early 2013 at reduced reserve prices. As discussed in the previous chapter the 2013 auction was also a failure as debt-laden companies also had an eye to the next year where some of their original licenses would expire and come up for re-auction. The only spectrum that was sold was CDMA spectrum purchased by Shyam Sistema (rebranded MTS). Industry observers have suggested that MTS' purchase of 800 MHz spectrum may be a long term strategic play since 800 MHz spectrum can be re-farmed to be used for 4G.

Reliance Infocom did not win any bids in the auction of 2012. It did not participate in the 2013 auction either. The company was struggling under debt burdens and it was rumoured in the marketplace that it was exploring selling part of its stake in 2013 (Interview with Telecom Sector Analyst). While it did own significant amounts of spectrum in 800, 900, 1800 and 2100 MHz bands, Reliance had been struggling to maintain its market share but it fell from 11.5% revenue share of the market to 7.8% by 2013. It had ceased to be a significant threat to the incumbent players in its current state.

Thus by the end of 2013, the market had consolidated significantly around the key incumbent players of the GSM market – Airtel, Vodafone and Idea. While they had also accrued debt in the years between 2010 and 2013, their balance sheets were in a better position to take on these debt burdens. Their market dominance was consolidated by the end of 2013.

This period also saw the strengthening of the regulator. The Supreme Court judgement of 2012 had made clear that the DoT had erred in not accepting TRAI recommendations or doing so only partially. It reiterated the need for the DoT to operate in consultation with TRAI (BBC 2012).

The failed auctions of 2012 and 2013 forced the state to temper its expectations of rent extraction. The restraint exercised by state agencies in rent extraction as a result of these experiences amounted to a more balanced distribution of forces within the sectoral political settlement between state agencies, the regulator and the TSPs, and this began to encourage a market-driven phase of growth in the sector.

The auction of 2014 was a critical one for some of the incumbents who had licenses expiring (first issued in 1995) that needed renewal. While Airtel, Vodafone and Idea held on to their 900 spectrum, a new entrant in the bids for 1800 spectrum was Reliance Jio. Jio won 1800 spectrum in 14 circles across the country. With advances in technology, 1800 MHz 2G spectrum could now be re-farmed for 4G. Reliance Jio's purchase of 1800 spectrum was meant to bolster its 4G capability. Reliance Jio's proposed launch in the 4G space now posed a credible competitive threat to incumbent players. Thus while the 2014 auction served to further concentrate the market in the hands of the top three players – Airtel, Vodafone and Idea, the counterpoint of a Reliance Jio threat of entry, with its political connections and spending power signals a more competitive distribution of power within the emerging sectoral settlement. It is also likely to be the source of change in the sectoral political settlement in the future.



## 7.9 Conclusions

Our analysis of policy formulation and implementation in the context of changes in the sectoral and national political settlement shows how the growth process has been driven by the interplay between ‘politically-driven’ rent creation and capture strategies and ‘economic’ calculations of investors and the state. State agencies, regulators, political organizations and private sector organizations have each participated in both types of calculations. The rapid growth and expansion of the sector has been impressive, but was by no means inevitable. There were several moments of vulnerability where the rent definition and allocation game came close to bankrupting important players and destabilizing the national political settlement. The responses and counter-responses of important organizations changed the sectoral political settlement repeatedly, with consequences for economic activity in the sector. Sometimes the changing parallelogram of forces resulted in new spurts of investments, sometimes it led to the stifling of investment. This analysis of phases of rent creation and allocation in the telecom sector in the context of underlying political settlements at the sectoral and national levels serves to explain why the policies that created the rents arose in the form they did and why the rents were distributed among the different organizations and agencies in the way that they were in each phase. More interestingly, it also allows us to identify how new mobilizations and entry in response to earlier moves and economic results led to continuous changes in the sectoral political settlement and sometimes fed back into changes in the national political settlement.

An important characteristic of the rent-creation strategies in the sector is that the central state was rarely if ever sufficiently coordinated across agencies and capable of enforcing rent allocations on all the players in a way that could enable it to lead an ‘industrial policy’ game. There were no deliberate attempts at using rents to generate learning and capability development by local firms.

However, rent capture strategies of local firms did allow some of the big domestic players to acquire significant capabilities and the resources to make the very large investments in infrastructure that are required in the sector. But these were fortuitous outcomes rather than deliberate ones. Once the initial tussle over rents had created some significant players, the sectoral political settlement that best supported growth was one that was characterized by a more even distribution of power across the major TSPs and government agencies. This was necessary to prevent both attempts at monopolistic rent extraction by private sector players or predatory extraction by state agencies. Any phase where a particular government agency or political organization was so strong as to dominate the distribution of power in the sectoral political settlement resulted in adverse outcomes for the sector in the longer term, even though these episodes did allow some private firms to engage in 'primitive accumulation' that allowed some of them to emerge as important productive players later. In the early phase from the inception of the sector till 1999 the DoT was the dominant power within the sectoral PS and was able to capture a greater share of the rent, but its strategies actually left sufficient rents on the table for emerging private players and indirectly helped the emergence of the sector. Similarly, in 2008, Raja was able to control policy making to divert a significant chunk of the sectoral rents towards his political organization and himself. But this process too resulted in significant rent capture by private sector organizations close to the politicians. Whether this would have resulted in the emergence of new productive activities by the organizations that had captured rents will never be known as the Supreme Court intervened to reverse this rent capture. However, the predatory nature of most of the business-government relationships that had developed by the late 1990s makes it unlikely that these rents would have supported new productive capability development.

The sectoral political settlement has not been stable over the time period we have studied. This is because a political settlement is stable when the rent

distributions as a result of policy are in line with the distribution of power across organizations and agencies that constitute that political settlement. The case study of the sector shows that the set of organizations that are relevant are not fixed, particularly since organizations that are powerful in the broader national political settlement may not yet have participated in the sector. However, the profitability of a sector can attract new players who are powerful in the broader context, and this can repeatedly reconstruct and reconfigure the sectoral political settlement. A good example was Reliance's repeated attempts to enter the sector to share in its rents. While this organization is one of the most powerful at the national level as one of India's biggest business houses with longstanding links with the political and bureaucratic apparatus of the country, they had been cut out of rents in the telecom sector. They had made a mistake in not pushing for success on their original bids for a GSM license in the sector. Their attempt to enter the sector through other means in 2003, again in 2007/08, and finally in 2010/2013 with 4G required the mobilization of political and bureaucratic forces in their favour, and resulted in periodically upsetting the sectoral political settlement.

Finally one of the key characteristics of the sector that is highlighted by the PS analysis above is the important role of informal rent extraction mechanisms at critical phases in the history of the sector. Much of the development in the sector was driven by the intended and unintended consequences of informal rent extraction strategies and mechanisms. In very general terms, this is symptomatic of economic policies in countries with a clientelist PS, where the political establishment is unable to meet the rent demands of its clients purely through formal means. The high rent generation potential of the telecom sector made it particularly prone to informal rent extraction and informal rent-seeking by the TSPs. The informal links between businesses and politicians had important consequences for policy formulation that favoured particular business. In 1995, Telecom Minister Sukh Ram favoured HFCL, Paswan was rumoured to have favoured the Ambanis and from 2006-2009, ministers

Dayanidhi Maran and Raja extracted rents to support the regional party and for personal gain with the help of businesses that were not directly connected with the telecom sector. Organizations and agencies within the sector were always aware of these rent extraction strategies and the success or otherwise of particular strategies depended on the relative power of different organizations and agencies within the sectoral political settlement. This predominantly informal rent definition and extraction strategy went unacknowledged and tacitly accepted until 2010 when Raja's massive rent extraction resulted in a backlash that changed the rules of the game. The scale of the graft got public attention and was successfully mobilized by the opposition to threaten the ruling coalition at the national level to an extent that a significant shift from informality to formality took place in rent extraction strategies in the sector. According to the expectations of standard institutional economics and good governance advocates, the shift to greater formality should always be better as it is a more transparent process with greater accountability and the rents extracted have to be used in accountable ways. However, the reality is more anomalous in countries where significant catching up remains to be done, capabilities need to be developed, new organizations have to be set up and massive infrastructure spending has to be financed. In these contexts, a partial move to greater formalization of the rent definition and allocation process in one sector can also have unpredictable effects that need to be assessed in the context of the pushes and pulls on policy-making within a national political settlement that is still largely clientelist. We see this in the period after 2010, when rent definition and extraction has been mostly through formal means of auctions and a transparent regulatory structure. However, the outcome has been a high level of rent extraction, which has made the emergence of new national players more difficult and is likely to have squeezed investments and capability developments in the sector. Transparency has made it politically difficult to leave rents for private sector players and the state has continued to drive up spectrum pricing through policy driven scarcity and clever auction design. The high extraction of rents through auctions means that firms have reduced their infrastructure spending to manage their debt levels. In the longer

run, this could well be detrimental to the development of the sector and the creation of social value in a developing country context where significant market failures exist that constrain capability development and infrastructure investment. The extent to which this will be a problem will depend on how the sectoral political settlement evolves in the sector, and whether credible strategies of capability development can be designed in a transparent and enforceable manner.

# *Chapter 8: Structural Outcomes and Impact*

*“My dear, here we must run as fast as we can, just to stay in place. And if you wish to go anywhere you must run twice as fast as that.”*

Lewis Carroll, *Alice in Wonderland*

## **8.1 Introduction:**

The application of the perspectives of rents and political settlements to the analysis of policy changes in the mobile telephony sector since its inception have helped explain the policy shifts as being shaped by the contests over use right allocation in spectrum and the resulting rent distributions that flow from the policy. The analysis has shown that the agencies in the political settlement have contested the formation of rent creation policies in the sector in order to appropriate a larger share of the rent for themselves. The state too has, through the different phases of development of the sector, moved from high levels of rent extraction that left little rent for producers, to lower levels of rent extraction, allowing rents to be shared more by the producers, to high levels of rent extraction again in the later phases of the sectors development.

Meanwhile, the analysis also shows that despite several policies that formally aimed to increase competition in the sector, the sector has progressed towards greater consolidation. These structural outcomes are created by the history of policy in the sector and the evolution of its political settlement.

The patterns of rent distributions and the imperatives underlying them have these shaped structural outcomes in the sector. These outcomes in turn characterize the interaction of the various agencies of the political settlement

with the formulation and implementation of policy. This chapter will explore two structural outcomes in particular that characterize the interactions of the state and of the producers respectively with policy in the sector. The first is the growing rent extraction by the state through policy-created scarcity, and the second is the advantage that initial firms in the sector had in terms of access to Ricardian rents that allowed them to consolidate their position in the market.

The previous two chapters have shown that the state has increasingly viewed spectrum assignment as a means to raise significant funds for its budget deficits. It has therefore espoused spectrum auctions as a way to maximize the rent extraction. The value the spectrum achieves in auction is believed to be what the spectrum user who most values it is willing to pay based on a rational calculation of his/her market return from the spectrum right. Earlier chapters have also established that the Indian telecom sector is spectrum starved, with lower average spectrum holdings per operator than any other country. As rent theory has argued, spectrum's value arises from scarcity. We have argued earlier that there are physical components to this scarcity. However, creating spectrum scarcity through policy and thereby driving up price of spectrum in auctions could be very useful for a government seeking to maximize auction revenues. This chapter interrogates the nature of spectrum scarcity in India to explain the implications of these on the outcomes of state-run auctions.

The second structural outcome that this chapter will focus on is the tendency for market shares to be consolidated amongst players in the sector. Again an earlier chapter suggested that telecom sectors, given the nature of the network and the economics of the sector, tend to be oligopolistic. This is a tendency we see in the Indian sector as well, where despite several policies that increased competition in the sector at various points, the sector has consolidated around three service provider firms. However our analysis of rents in the sector allows us to advance a view of what drove these particular firms to market leadership.

This section examines the Ricardian differential rents that exist between holders of different frequencies of spectrum and the reason this allowed these incumbent top three firms to see off competition and maintain and grow their share of the market.

Both of the above structural outcomes – growing rent extraction by the state and the gains from initial allocations for incumbent TSPs, have influenced the creation of and the impact of policy on the sector and will continue to have an effect on sector outcomes. However, both are vulnerable to change with changing technology. The chapter will explore what impact technology change has on these structural outcomes.

It is also obvious from the revisionist reading of the sector, that most of the consumer benefit in the sector has come from competitive pressures driving down prices. Attempts to manage rent dissipation to consumers through policy have been few and far between. Except in the first stage of the sector's evolution, where the DoT set consumer prices at a very high level there has been little direct interference in price setting through policy. Other rent management mechanisms to ensure that consumers benefit from the rent creation by setting performance conditions on producers have been instituted but not strongly enforced. In the interests of completeness this chapter will explore the few instances of rent dissipation to consumers and interrogate why these have not been more important in the sector's evolution.

The rest of the chapter is structured as follows. The next section explores the structural outcome of the evolution of policy on the state through an examination of spectrum scarcity. The following section establishes the structural outcome of policy on the top three TSPs in the sector that has aided their consolidation. Finally, we will also consider the lack of impact that



consumer needs have had on policy and the implications of this from a political settlements perspective.

## **8.2 Spectrum Scarcity and the State**

I have argued earlier that the scarcity of the key natural resource in the sector, airwaves or spectrum, necessitates the creation of use rights in the sector to govern their use. If the underlying resource in the sector, spectrum, were freely and infinitely available, rights limiting and specifying use would not be necessary. However, the scarcity of natural resources prevents even the theoretical possibility of a zero-rent market. Scarcity of spectrum is driven both by the physical nature of spectrum and definition of rights over spectrum that allowed the establishment of the telecom service, as the latter would be inefficient and of poor quality in the absence of these exclusionary rights. Before we explore the underlying sources of scarcity in spectrum, the next section reiterates why exclusive rights are needed in the sector.

### **8.2.1 Why do we need Exclusive Use Rights in Spectrum?**

To understand the need for exclusive use rights over spectrum we need to identify what kind of economic good spectrum is. Prasad and Sridhar (2014: 52-70) have looked at spectrum along the axes of excludability and rivalrousness. A good is said to be excludable if it is possible to easily and at reasonable cost exclude others from the use of the good. A good is said to be rivalrous if the use of the good by one individual precludes the use of the good by another. Non-excludable goods suffer from the tragedy of the commons while non-rivalrous goods suffer from the difficulty of determining how to charge non-rivalrous users for the good.

Radio frequencies are in theory non excludable (unless specified by law). However multiple TSPs transmitting on the same frequency would cause

significant interference, reducing the efficiency of the good. In theory, coordination between TSPs could reduce the interference and could allow the good to be used efficiently without exclusive rights being defined on it. However, this coordination would be expensive and difficult, and would increase in complexity with every additional TSP. Thus, in order to overcome the tragedy of the commons that takes the shape of interference in spectrum, and to avoid the high transaction costs of coordination that non-excluded use would entail, use rights are defined to limited numbers of TSPs over spectrum. The creation of use rights in effect allows spectrum to become an excludable good. This does not remove the problem of interference, but reduces it to levels that can be managed by technology.

Use rights in spectrum could be assigned through auctions. The auction assigns exclusive rights of use over a particular band of spectrum with a certain frequency. That right allows the winner of the right to exclusively transmit and receive signals within the allotted frequency band. However radio signals suffer from interference – the signal from one transmitter to a receiver will be sensed by other receivers within a boundary that is defined by the strength of the transmitted signal and its frequency. For the most part, technology has developed devices that allow the relevant signal to be read and the interference to be ignored.

Spectrum is a partially rivalrous good. The use of a particular frequency does not preclude its use by another user, within limits. The good is also non-depletable and therefore it is non-rivalrous over time. In other words, frequency used by one user can be reused by another once the first use is completed. However, if too many users use the good at the same time it will lead to congestion. Spectrum assignments to specific users overcome the problem of congestion by internalizing it to the owner of the right. The owner

of the right is then responsible for overcoming congestion within his defined band of spectrum.

Spectrum rights make the spectrum an excludable good given its partially rivalrous nature. These rights allow the good to be used more efficiently and enhance net social benefit. The rights thus created give rise to rent streams. In other words, rents are inevitable in the sector if efficiency is to be achieved and the potential problem of a tragedy of the commons is to be avoided.

Mobile communication is also a network good with a need for international cross-border harmonization in order to maximize the benefit of the network. Use rights in the sector therefore not only protect the scarce resource from the tragedy of the commons but allow the sector to maximize social benefit by extending the reach of the network through a harmonization of frequencies across countries.

### **8.2.2 The Scarcity of Spectrum**

Classical economists discussing rents were preoccupied with identifying the source of rents. Differences in characteristics chosen were reflective of the different underlying assumptions on what causes rents to arise in the first place. However they shared a common agreement that the value of a rent is rooted in scarcity of the factor, land in the classical case, spectrum in ours. In contrast, in the Marxist perspective scarcity was rooted in the very definition of property rights. For Ricardo, since rent arose from the natural properties of the land, the scarcity of land ultimately caused rents. The scarcity of the factor is created by a limited availability of the resource and the demand for the output

of the resource. From this perspective, it is physical scarcity of spectrum that affects the rents that it can command.

Since Ricardian rents in the sector are predicated on the scarcity of spectrum, this section discusses the nature of this scarcity and identifies the factors that define this scarcity, as these have an impact upon both the quantum of rent that the sector commands and how it is managed. Scarcity can be caused by the physical properties of spectrum (as in land), but temporal scarcities can also be created by technology constraints and by national or international policy governing spectrum use (OFCOM 2010) p.10-13.

As discussed in an earlier chapter, mobile telephony tends to be harmonized across the globe and works in specific spectrum bands. These have been determined by two factors:-

One, the physical attributes of the spectrum band that determine efficiency of propagation of the signal and its reach and

Two, the availability of the same frequency bands worldwide for mobile communication so that mobile communications can take place across national borders.

Mobile phone handsets and the signalling equipment in towers have been built to read these specific frequencies and avoid interference from other devices that may be signalling on other frequencies. In other words, the physical properties of the spectrum limit the efficient use of spectrum for telecommunication, but the device ecosystem<sup>67</sup> that builds around these physical limitations also reinforces them.

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<sup>67</sup> The device ecosystem is the term used to denote the collection of handsets, technology and the signaling equipment required to make the communication possible.

However, this harmonization of frequencies and device ecosystems is essential to build value in the sector. As such, the prescribed bands of telecom spectrum today are limited. What this section aims to do is to establish where exactly the limitations in terms of mobile frequency lie and whether the quantum of the resource places a genuine constraint on the operation of the sector either presently or in the foreseeable future. It will also identify whether the binding constraint on the sector is absolute scarcity based on physical limitations given current or foreseeable technologies or a form of inter-temporal scarcity driven by current limitations of the sector, but where plausible solutions to the constraint are foreseeable, even if not available currently.

There are three possible physical sources of scarcity constraint within the sector. The first lies in the existence of free and available spectrum bands themselves. These are determined by the current use of the spectrum, international harmonization and the availability of cost-effective device ecosystems. Within each of these spectrum bands, the number of independent operator rights that can be supported is determined by the state of technology and the size of contiguous spectrum blocks needed by the technology. This is a physical bound on the number of players that a sector can support. It is distinct from the economic bound on the number of players the sector can support in order that each TSP makes enough rents to invest in the physical infrastructure that the sector needs. And finally, the number of calls or data requests that can be supported concomitantly by this contiguous band of spectrum held by each service provider is also determined by the state of the available technology and is measured by the spectral efficiency of the band of spectrum.

In addition to the above physical factors that limit the availability of spectrum, a significant non-physical determinant of spectrum availability is the spectrum use policy of the state that determines allocation of bands and spectrum distribution rules. It also impacts the price that the spectrum commands.

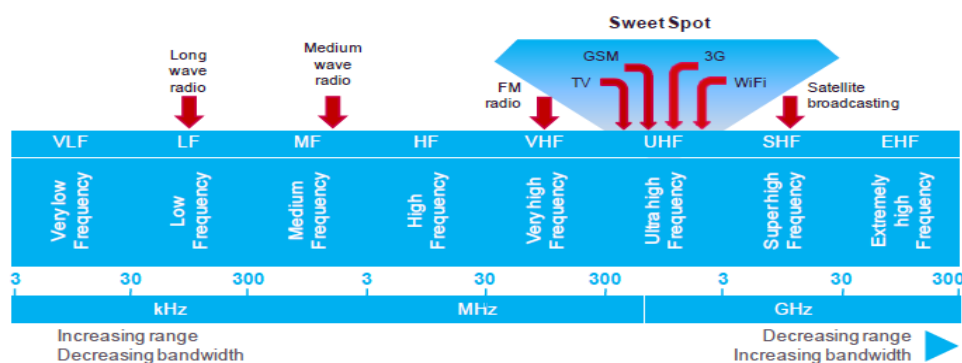
The number of service providers may also be limited by policy in order to protect the economic viability of players – the economic bounds on the number of players referred to above. From this perspective policy may be about ensuring viability of the individual players and the sector as a whole.

Each of these is considered below in order to identify which of them places a binding constraint and therefore impacts scarcity of spectrum in the operation of the sector today.

### **8.2.3 Physical Scarcity of Spectrum**

The physical nature of spectrum is such the frequency of wave propagation is inversely proportional to the wavelength. Wavelength is directly proportional to range and inversely proportional to bandwidth. This means that the higher the frequency, the greater the bandwidth (or the amount of data that can be carried) but the lower the range (or the distance that a signal can travel). The requirements of mobile telephony are best met by a range of frequencies between 700 and 3000MHz. This Spectrum Sweet Spot is depicted in **Figure 8.1** below. Since voice calls are low in terms of data intensity, there is no appreciable difference in the bandwidth for voice calls within this range. However, there is a significant difference in the range and the strength of the signal. At the lower ends of this 700-3000 MHz spectrum, signals carry through walls whereas at higher ends of this spectrum, the service requires a greater density of towers in a given area and signals carry less well through walls, causing a problem in built up areas.

Figure 8.1: The Spectrum Sweet Spot



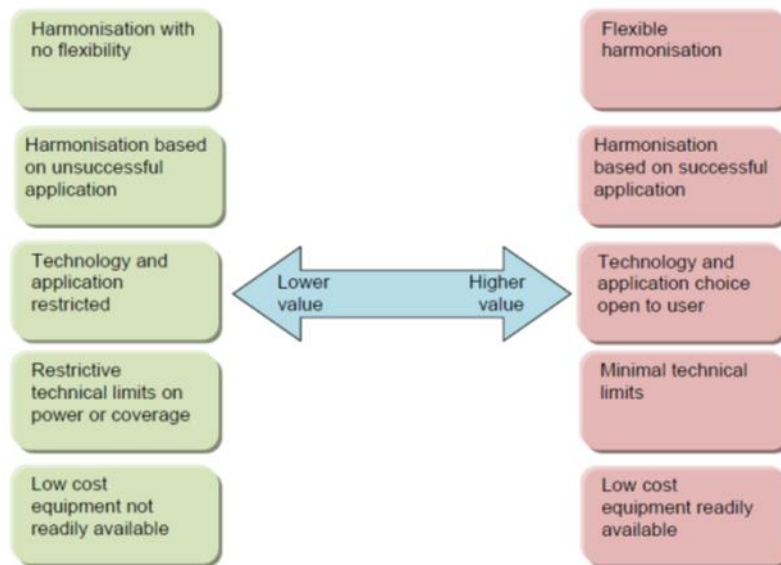
Source: SRSP: The revised Framework for Spectrum Pricing, Ofcom , 2010. (OFCOM 2010) Available at [http://stakeholders.ofcom.org.uk/binaries/consultations/srsp/summary/srsp\\_condoc.pdf](http://stakeholders.ofcom.org.uk/binaries/consultations/srsp/summary/srsp_condoc.pdf), p. 12

However, while the entire band of 700-3000MHz can theoretically be used for mobile telephony, in practice, the bands of spectrum that are usable are restricted. First, even within this optimal band for mobile use, several competing demands for spectrum exist. Television broadcasting worldwide tends to use frequency within the same band. India has also ring-fenced some of the spectrum within this band for use in military communication.

Second, the usable bands are restricted by demands of international harmonization and the availability of low cost device ecosystems. Handsets need to be programmed to operate within specific frequency bands. International harmonization of these bands allows for the development of efficient low-cost handsets. An efficient system is one that is both harmonized internationally and has low cost and multiple device choices for consumers. This is pictorially depicted in Fig 8.2. A result of this constraint is the poor development of CDMA as a worldwide technology due to the lack of a cost effective open device ecosystem.



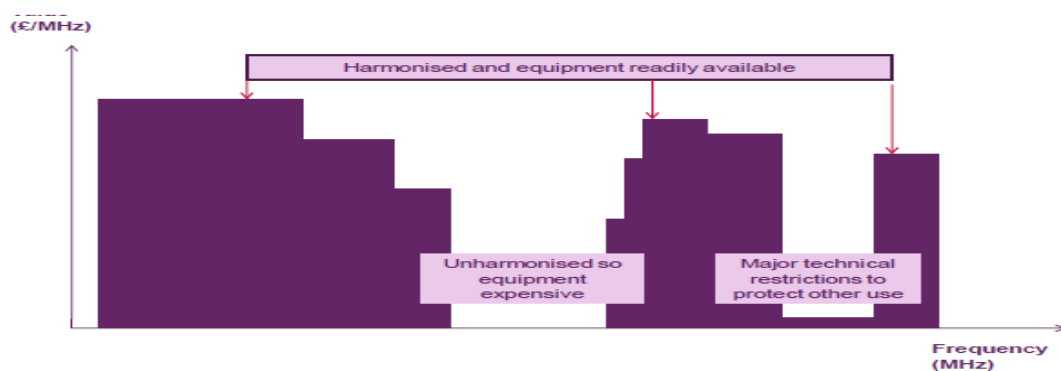
Figure 8.2: Non Physical Factors Affecting the Value of Spectrum



Source: SRSP: The revised Framework for Spectrum Pricing, (OFCOM 2010) p.13. Available at [http://stakeholders.ofcom.org.uk/binaries/consultations/srsp/summary/srsp\\_condoc.pdf](http://stakeholders.ofcom.org.uk/binaries/consultations/srsp/summary/srsp_condoc.pdf).

Therefore the frequency value relationship in spectrum is not a smooth one. There are many discontinuities in the way spectrum can be used. Fig. 8.3 represents the above with illustrative spectrum values.

Figure 8.3: Discontinuities in Spectrum Usage



Source: SRSP: The revised Framework for Spectrum Pricing, (OFCOM 2010) Available at [http://stakeholders.ofcom.org.uk/binaries/consultations/srsp/summary/srsp\\_condoc.pdf](http://stakeholders.ofcom.org.uk/binaries/consultations/srsp/summary/srsp_condoc.pdf), p. 14

Not only is the overall amount of spectrum available limited in quantity, the number of service providers that can operate within this amount of spectrum is also limited by physical properties of the spectrum itself and the way it is required by the technology.

First, in order to operate each service provider needs a contiguous band of a certain minimum amount of spectrum that is determined by the generation of technology in use<sup>68</sup> (i.e. 2G vs 3G vs 4G). Each of these has a prescribed minimum of contiguous spectrum that is required to run an efficient service. The level is defined by the way the technology uses the spectrum to carry signals. Some of the technologies (Frequency Duplexing rather than Time Duplexing) also require that the spectrum assigned is paired. In other words, it requires the provision of a corresponding paired band of equivalent spectrum assigned at a separated distance on the frequency map in order to provide uplink and downlink<sup>69</sup> services to and from the handset.

Separate frequency bands required for each service provider because of how each handset talks to the mobile network in the process of a call. First each operator sets their local towers to read and transmit in that frequency. Individual handsets that contain the sim card of that operator then allow the handset to be discovered by the operators nearest mobile tower and ignored by the towers of competitive operators. It is then the operator's responsibility to assign appropriate spectrum when the handset makes a call and also hand over the handset to the next tower in case it moves out of range. This is what we described earlier as internalizing the problems of congestion. The need for contiguity in the bands is driven by the demands of the technology, and the size of the contiguous band required varies by technology.

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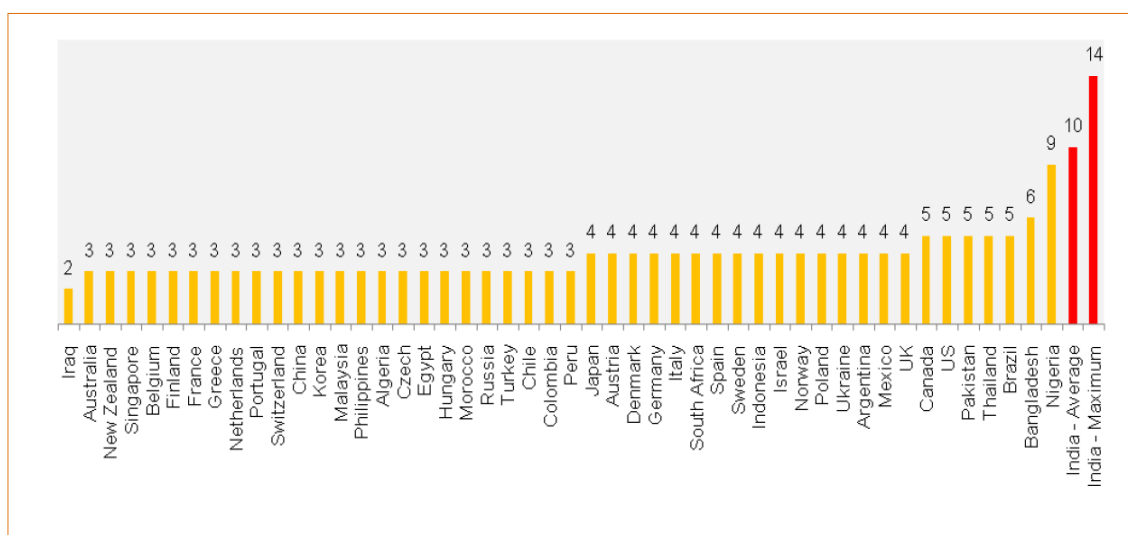
<sup>68</sup> See Chapter 2, section 2.2.2 for a quick description of the differences in operation of 2G vs 3G vs 4G technology.

<sup>69</sup> Uplink and Down link refer to the direction of linkage between the handset and the tower.

Given these minimum lot sizes and a restriction on the total amount of spectrum available, it follows that the number of players that can be licensed in any circle is limited. The number of individual licenses that can be assigned within a band is also limited by guard bands. Individual spectrum bands need to be separated by guard bands in order that signals do not intercept, i.e. to reduce interference. Guard bands exacerbate the problems of fragmentation of spectrum and reduce the number of players the spectrum can support.

**Appendix 17** shows the number of players by circle in India and the amount of spectrum they have been assigned. At the end of 2014, nine TSPs operate in the voice segment in India. This is an unusually large number of operators when compared to other countries (see **Figure 8.4**). A larger number of operators implies that there is less spectrum holding per head and that could affect the quality of service that they can provide.

*Figure 8.4: Comparison of Number of TSPs in India vs selected other countries (March 2011)*



Source: (PWC 2011), p.26.

Given the high and growing demand for telecom services and the explosion of mobile data usage, the International Telecommunications Union (ITU) has assigned harmonized international spectrum bands based on demand estimates in 2005. A repeat estimation in 2011 further revised demand estimates upwards. The ITU is therefore expected to identify further bands over time (TRAI 2014a) p.32.

#### **8.2.4 National Spectrum Allocation:**

The current frequency allocation bands and their national application are given in the National Frequency Allocation Plan 2011<sup>70</sup> (DoT 2011) (Table 8.1).

**Appendix 17** gives the spectrum holdings by TSP in each circle.

It can be seen that on average 8.8 - 10 MHz of 800 MHz spectrum has been given per TSP in the CDMA space. The maximum amount assigned in any circle is 12.5 MHz in Delhi.

On average, about 20MHz of 900 MHz spectrum has been assigned in each circle. The TN and Chennai circle has the maximum amount of 900 MHz spectrum assigned, since this was originally 2 circles, the metro Chennai and the category A state – Tamil Nadu, which then was combined into a single circle in 2005. Delhi and Mumbai, the biggest metro circles have 22.2 MHz of 900 spectrum allotted. The allotment of 900 MHz spectrum in each circle is

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<sup>70</sup> NFAP 2011 available at <http://www.coai.com/Uploads/MediaTypes/Documents/National-Frequency-Allocation-Plan-NFAP-2011.pdf>

very even across circles, with the smallest circle being allotted 18 MHz. Given the state of technology and the market, this band is currently the most valued band in the sector but only 2x22.5 MHz of it has been allotted.

The amount of 1800 MHz spectrum allotted by circle is both the largest quantum as well as the most varied by size. 56 MHz of 1800 MHz spectrum has been allotted in Mumbai circle as against only 20 MHz in Jammu and Kashmir Circle. The variation in the amounts of 1800 MHz spectrum allotted points to the fact that TSPs have used the 1800 MHz spectrum to cover gaps in the coverage of their 900 MHz spectrum. The amount of 900 MHz spectrum in the Indian market is limited to what was first assigned in 1995. Since then only 1800 MHz spectrum (in the 2G technology space) has been available. So in the largest circles, in addition to about 20MHz of 900 MHz spectrum, about 50 MHz of 1800 MHz spectrum is currently being deployed to service demand.

A further 20 or 25 MHz of 2100 (3G) spectrum per circle over 4 or 5 TSPs and 60 MHz of 2300 (BWA) spectrum over 3 TSPs per circle have also been assigned so far. In the 2100 (3G) band only 20 out of a possible 60MHz has been assigned to telecom, whereas in most countries the entire 60MHz has been allocated to TSPs (TRAI 2014a: 37).

*Table 8.1: Indian spectrum bands available for Mobile Communication*

Harmonized Frequency Range (MHz)	Frequency Bands (MHz) (uplink/downlink – for paired spectrum)	Amount of spectrum	Assigned to Mobile Telephony	Assigned to Others/ Not Assigned
400	450-470	2X7 MHz		2X7 MHz to other users.
700	698-806	2X45 MHz		2X15 assigned to Ministry of Defence (MoD) Remaining not assigned.
800	824-844 /869-889	2X20 MHz	Between 2X5 and 2X15 to CDMA TSPs	Remaining not assigned
900	890-915 / 935-960	2X25 MHz	Maximum 2X22.5	2X1.6 Railways 4.8 MHz to MoD
1800	1710-1785 / 1805-1880	2X75 MHz	High variation 2X20 MHz to 2X55 MHz	2X20 MHz to MoD
1800	1785-1805 and 1880-1900	20+20		MoD
1900	1900-1910 /1980-1990	2X10		2X2.5 for MoD Remaining not allotted
2100	1920-1980 /2110-2170	2X60 MHz	Up to 2X25 for 3G	Up to 2X40 for MoD
2100	2010-2025	15 MHz		All allotted to other users e.g. Railways
2300	2300-2400	100 MHz	40MHz	20 MHz for MoD, 20 MHz as inter-operator guard bands, 20MHz not assigned
2600	2500-2690	190 MHz	40 MHz assigned to BSNL/MTNL only	150 MHz assigned to Department of Space (DoS)
3300	3300-3400	100 MHz	100MHz assigned to internet service.	
3400	3400-3600	200 MHz		Currently assigned to DoS but can be assigned to mobile.

Source: (DoT 2011), (TRAI 2014a) and service provider information.

Thus, while there are still spectrum bands that are commercially viable and internationally harmonized and available, more than half of this spectrum currently lies with other (non-telephony) users (see summary in **table 8.2** and **fig. 8.5**).

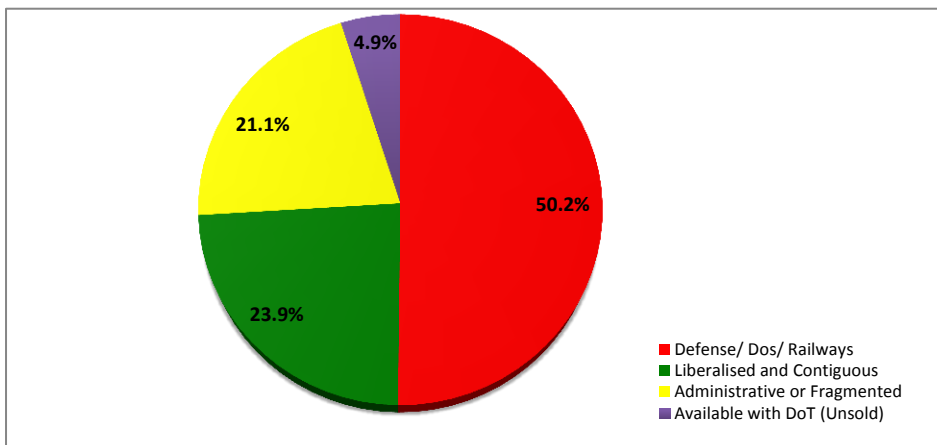
*Table 8.2: Commercially Viable Spectrum not Available Today*

<b>Band</b>	<b>Total Amount of Spectrum per circle</b>	<b>Amount of spectrum per circle assigned to other users</b>	<b>Usage / Earmarked (in respect of spectrum not available for TSPs)</b>
800MHz	2 x 20 MHz	-	Defence / Railways
900MHz	2 x 25 MHz	2 x 1.2MHz – 2x4.8MHz	Defence / Railways
1800MHz	2 x 75 MHz	2 x 20MHz	Defence
2100MHz	2 x 60 MHz	2 x 35MHz	Defence
2300MHz	60 MHz	20MHz	Defence
2600MHz	2 x 75 MHz	2 x 75MHz	Dept. of Space (DoS)
<b>Total</b>	<b>2 x 285 MHz</b>	<b>2 x 143MHz</b>	<b>Defence / DoS</b>

Source: TRAI data

In addition to the problem of non-contiguous spectrum (due to blocks being used by other users), spectrum assignments in India face an additional hurdle that prevents efficiency. This is a legacy issue that arises from the history of the sector's development. Prior to 2010 all spectrum was administratively assigned (rather than through a multi stage auction). This administrative spectrum was non-liberalized, i.e. the spectrum specified what technology it could be used with. With advances in technology spectrum in some bands can be reused on higher generations of technology, what is known in the sector as spectrum re-farming. Non-liberalised spectrum cannot be re-farmed according to current policy rules. Re-farming may also require different blocks of contiguous spectrum than are available currently.

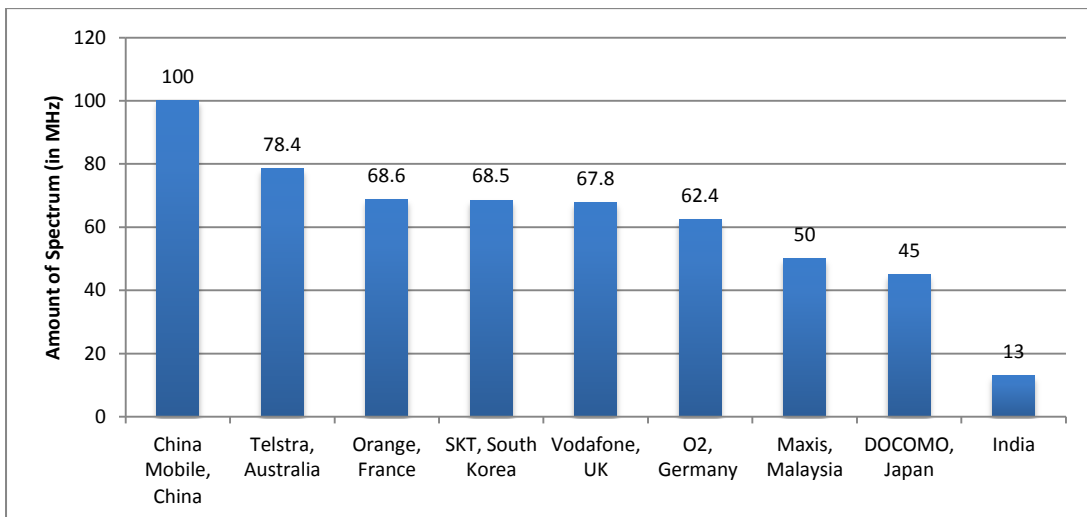
*Fig 8.5: Current Spectrum Assignments in India*



Source: Estimates from Airtel

**Appendix 18** lists the total 2G spectrum assigned to each TSP by circle. The number of TSPs licensed in each circle ranges from 7-9. An average spectrum holding per operator by circle can be computed to range between 2 x 7 MHz to 2 x 11 MHz. When compared to 2G spectrum assignments in other countries this is abysmally low (**Figure 8.6**).

*Figure 8.6: Comparison of Spectrum Holdings of International Telecom firms Vs. Indian Average*



Source: Estimates from Airtel



Given the limited spectrum assigned per operator and the number of licensed operators in the India market, TSPs in India tend to operate at a much higher efficiency than their worldwide counterparts. A report to the GSMA by Lewin et al of Plum Consulting in 2008 on the spectral efficiency of the Indian telecom sector suggests that India is operating at the spectral efficiency frontier already. India has more players per circle than the average (**figure 8.4**) and less spectrum per circle than the average (**figure 8.6**). Therefore TSPs in India are at a much higher spectral efficiency than average. Comparing spectral efficiency of busy hour traffic in Mumbai and Delhi with that of Singapore, Hong Kong and London, they suggest that India's index of spectral efficiency is 7 times that of the comparison countries. This efficiency is achieved both by a greater density of towers and by the application of advanced technologies to maximize capacity. The report calculates that there are unlikely to be further efficiency gains under current technologies (Lewin 2008: 9-12).

In summary, India's map of assigned spectrum indicates a higher than average number of licensees and a lower average holding of spectrum per licensee. The dearth of spectrum has pushed TSPs to operate at much higher spectral efficiencies in India.

However, with growing demand for spectrum hungry services such as mobile broadband, the scarcity in spectrum will lead to deterioration in the quality of service provided. Unlike many developed countries, India lacks an extensive network of fixed line cables. It is therefore more dependent than these countries for both voice and data services through the mobile network. The demand for mobile spectrum is therefore likely to increase faster in India than in a market like the U.K. with a developed fixed line network that carries a lot

of the data traffic. There does seem to be an urgent need for greater spectrum in the sector.

The internationally harmonized bands that support the development of cost effective device ecosystems have been identified and are being expanded. However the national frequency allocation plan indicates that a large proportion of the spectrum allocated to telecom has either not been assigned yet to TSPs or is currently assigned to other users. The critical constraint is therefore not just an absolute physical limitation, but also in the legacy issues that limit the physical availability of spectrum. The latter could be overcome by the State but requires the policy will to bring more bands of spectrum to the auction table.

### **8.2.5 Restrictions created by Policy**

The section above establishes that the way that the physical factors of the spectrum interact with economic efficiency requirements could cause the scarcity of spectrum that determines its value. However in India, as **tables 8.1** and **8.2** have established, not even all the spectrum within a band that is internationally harmonized and assigned to mobile telephony is made available to the sector. A large part of the spectrum within the bands is either allocated and being used by other users or is yet to be vacated by them for mobile telephony.

The spectrum held by alternative users such as the Ministry of Defence (MoD) is partly in use for defence communication, but possibly in only specific parts of the country that are sensitive from a security perspective such as Kashmir and the North East, rather than over the entire country. Currently, this use is tied to

the specific frequency bands since it uses dated equipment built for those frequencies. However, according to the head of the COAI, Mr. Matthews, this equipment gets phased out over time and replaced and can be easily replaced with equipment built for other frequencies. The problem, he contends, is that the Defence sector, which pays nothing for this very valuable spectrum, is not incentivized in any way to vacate the spectrum. If they were either charged a notional market value for the spectrum or allowed to recoup some of the value of the spectrum they release, they may be motivated to clear the spectrum for other uses. As it is, they view their spectrum holding as a bargaining chip to secure benefits for the MoD and are not keen to release it.

Even within the spectrum that has been released and assigned to TSPs, there are inefficiencies that exacerbate scarcity. A classic example is the spectrum efficiency of the state incumbent MTNL/BSNL. For a 6% revenue share of the market (refer **Figure 3.10** in **Chapter 3**), the public sector incumbents are sitting on 17.78 % of the total spectrum assigned in the 800 MHz, 900 MHz and 1800 MHz 2G bands, the highest of any TSP. This compared to the rate of utilization of other players in the sector shows a far lower efficiency for the state incumbent. Again, the public sector incumbents (BSNL/MTNL) have never paid for any spectrum that has been assigned to them so far. They are nevertheless allotted sizable blocks of spectrum at every auction and subsidies in operation. As employees of a government firm, MTNL and BSNL employees are a powerful and unionized interest group – laying off employees is an expensive and sensitive business for the government. Nor are BSNL/MTNL allowed to commercially trade their spectrum as spectrum trading is restricted in India, as explained below.

In fact many industry observers, including the TRAI (Interview with Mr.Arvind Kumar, TRAI), believe that the lack of a clear and effective spectrum trading policy or mergers and acquisitions (M&A) policy for the sector are amongst the

biggest hurdles facing spectrum availability today. As established, the sector has substantially more players than comparable markets and significantly less spectrum allotted. Even if India was able to support a few more players than the average because of the size of the market (Mr. Arvind Kumar, TRAI), that still implies that some of the existing players will probably be driven to exit over time, so the market can consolidate around the more efficient players, releasing inefficient and fragmented spectrum for consolidation as well. However this is prevented by the lack of an M&A policy that proscribes spectrum trading today.

The M&A policy in the sector is hampered by legacy issues. All spectrum assigned before 2010 is considered to have been assigned at administratively determined rates rather than by the market through a multistage auction<sup>71</sup>. This is referred to in the sector as ‘administrative’ spectrum. Administrative spectrum was contractually linked to 20 year licenses and the last of these licenses expires in 2024. After 2012 spectrum assignments were de-linked from license allocations and the method of assignment was through the auction mechanism. Spectrum has become significantly more expensive in this method.

TRAI recommends that non administrative spectrum can be traded. However a majority of the spectrum held by firms today in the 2G space is administered spectrum. Firms that today want to exit the sector need to hand their administrative spectrum allocation back to the state. The state may resell the spectrum to the purchaser of the firm but the purchaser would need to pay the market determined price of the spectrum to the state for the remainder of its license period in addition to whatever purchase price is agreed between the buyer and the seller. There is little incentive for inefficient firms to exit the

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<sup>71</sup> This is not strictly true since the 1995 allocation of spectrum was through auction-based market pricing. However bid amounts were significantly reduced through the agreement on revenue sharing in NTP 1999, so these could be considered to be administratively determined too. Allocations from 2001 to 2010 were based on an administratively determined price of Rs. 1650 Crores for a pan India licensee.

market since they will reap no benefit from their rights over their most valuable asset – the spectrum. Instead, they will have to sell a firm with possibly high debt levels and a not very profitable consumer base, while their most valuable asset has been stripped out. It is no wonder then, that firms like RTL and Uninor have not exited the sector despite several years of poor financial performance.

While it appears that there are obvious policy solutions to the above problems of alternative users or inefficient users of spectrum, the policy responses are slow in coming. This raises the question of what slows their implementation, and why there is a lack of political will to make them happen.

The answer to this may lie in the significant contribution of the proceeds from spectrum auctions for filling holes in the fiscal deficit in the last few years. As the analysis of rent distributions in the sector covered in chapter 6 argued, since the 2010 auctions, it has become abundantly clear to the government and to the public that the auction of spectrum rights could raise substantial funds for the exchequer. Auctions from 2010 to 2014 have raised in excess of US\$ 26 Billion for the state. They are the most lucrative source of funds for the central government in recent years. Government policy thus seems to be in no hurry to aid the release of greater amounts of spectrum for the sector, instead creating an artificial scarcity that keeps the prices of spectrum high.

The political settlement analysis in the last chapter also argued that the state appears unable to manage more nuanced regulation that might allow the state to ensure that rents are returned by producers as long as the producers deliver on operational conditions that would drive sector efficiency. The volatile sectoral PS is liable to disruption by new entry and the organisational activities of political, bureaucratic and private sector organizations attracted to the sector

by the potential rents. Therefore the state may deem it a more efficient solution to maximise its rent extraction rather than leave rents that are liable to capture or mismanagement and wastage. In practice, this outcome can also be induced by the actions of powerful organisations at the national level who are threatened by rent capture of a very high magnitude by rival organisations operating in the telecom sector. These organisations are likely to support rent extraction by the state rather than allow incumbents in the sector to capture very significant rents that can threaten to disrupt the national level political settlement.

As long as formal rent extraction by the state through auctions is supported by powerful organisations at the national level, the state has every incentive to create artificial scarcities in spectrum. A source from Airtel suggests that policy led scarcities are the binding constraint on the sector's growth today, rather than the scarcities caused by the physical constraints of spectrum.

Ramachandran (2015) points out to the short-termism inherent in this act. He claims that the government would benefit more in the long run by keeping spectrum prices lower and driving growth in the sector. Feedback from both service providers directly and from their representative, the COAI, indicates that the TSPs see the high price of spectrum and the high levels of debt on firm balance sheets as a most significant constraining factor to their continued growth and their ability to invest in infrastructure for the sector.

In spite of complaints about the impact of rising prices of spectrum on their balance sheets, at the last round of auctions in 2014, operators still appeared to be willing to pay increasingly high values for the spectrum right. In other words, while service providers claim that the rent extraction from auctions is too high, they are willing to pay substantial amounts to maintain their exclusive use rights and their access to rents available in the sector. We argued in the earlier section that the auction of 2014 may have inflated auction prices since

incumbents whose administered spectrum was on the auction block needed to bid aggressively to maintain the rights to support their existing businesses.

### **8.2.6: The Impact of Technology:**

The imperatives that govern the state have resulted in structural outcomes in the sector from 2010 onwards that have resulted in the creation of policy-driven spectrum scarcity. This is reflected in the method of spectrum assignment, the amount of spectrum auctioned and the policies that create or modify rights in the sector. However, this outcome that defines the behaviour of the state can change with changes in technology. This section explains the impacts that changes in technology could have on the tendency of the state to create artificial policy-driven spectrum scarcity and maximise revenues through spectrum auctions.

Technology that drives efficiency in the sector could dramatically impact the amount of spectrum available and the ability of the state to maintain scarcity. Technology developments allow TSPs to use all their spectra in different bands to complement each other – a feature known as carrier aggregation. Carrier aggregation could increase spectral efficiency by as much as 20%, releasing the pressure on scarce and patchy spectrum coverage. The development of digital systems to replace analogue systems on television and radio has resulted in the freeing of spectrum bands within the feasible range for mobile telephony. Referred to as the '*digital dividend*', this has allowed spectrum in the 700 MHz range to be re-farmed in many markets. India is yet to release this frequency band. Developments in 4G have allowed spectrum in the 850MHz (currently underutilized by a marginal CDMA service) and 1800 MHz ranges to also be re-farmed for 4G. This will make these ranges not only enjoy greater demand but also become more efficient.

Technology also increases flexibility of operation in the sector. Traditionally phones contained a single chipset that was set to operate within a single frequency band. Today, manufacturers like Qualcomm are designing chip sets that can read 5 different bands of spectrum. This allows scalability on device ecosystems that will drive down the price of handsets and give greater flexibility from the constraints of international harmonisation. This in turn opens opportunities for more frequency bands to be considered.

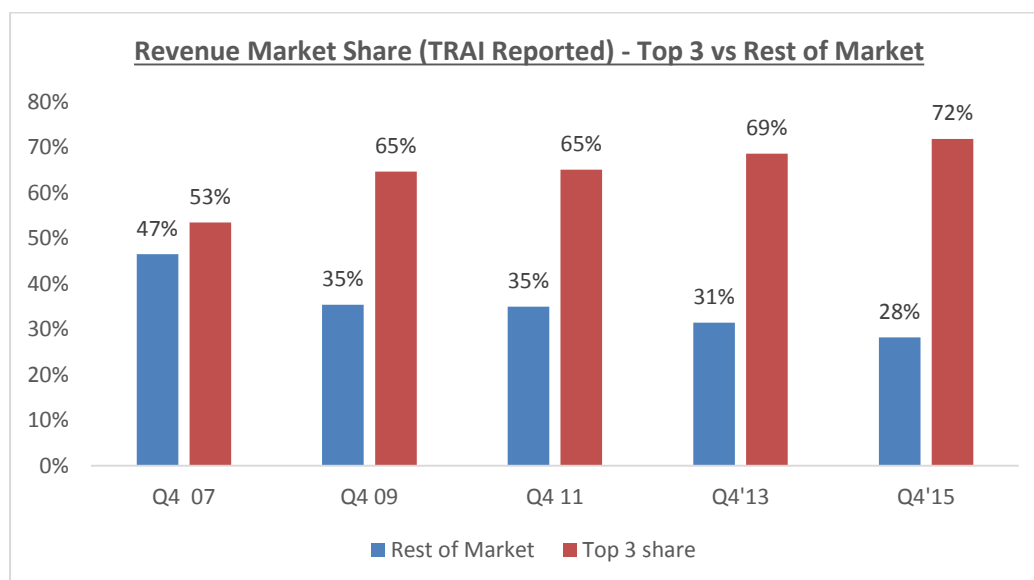
Finally, technology could also radically impact spectrum right structures in the sector by reducing the costs of coordination. To recall an earlier section, the individual rights in spectrum exist since the costs of coordination for open access spectrum are too high. However, Prasad and Sridhar (2014) have described changes in technology being developed today that lower the costs of coordination among multiple players significantly allowing the creation of a 'spectrum commons'. Prasad and Sridhar (ibid) differentiate between an open access system and a Spectrum Commons system, where the latter has a limited number of licensed operators much like the current system, but the spectrum is held in common to allow the most efficient use of all of the available resource. Mr. Gopalan of Airtel believes that this technology is 10 years away from its commercial application but Prasad and Sridhar argue that India would do well to plan for its possibility in terms of transitioning its legacy systems of spectrum licensing. Spectrum Commons, if and when introduced, would radically change the system of individual spectrum rights and rent creation and extraction that the sector had been predicated upon.



## 8.3 The Incumbent Advantage Explained

The second structural outcome of the evolution of rents in the sector that we observed was the tendency towards consolidation in the sector. Despite attempts to increase competition in the sector by licensing new spectrum right owners and differences in rent distributions among the different producers during the different phases of the sectors evolution, the sector has become increasingly concentrated, with the top three TSPs in the sector accounting for 72% in value terms (**Figure 8.7**). They also hold 45% of the resources in 2G spectrum (**Figure 8.8**). We have chosen to look at the 2G spectrum since 2G accounted for over 80% of TSP revenues in 2014.

*Figure 8.7: Growing Concentration in the Indian Market*

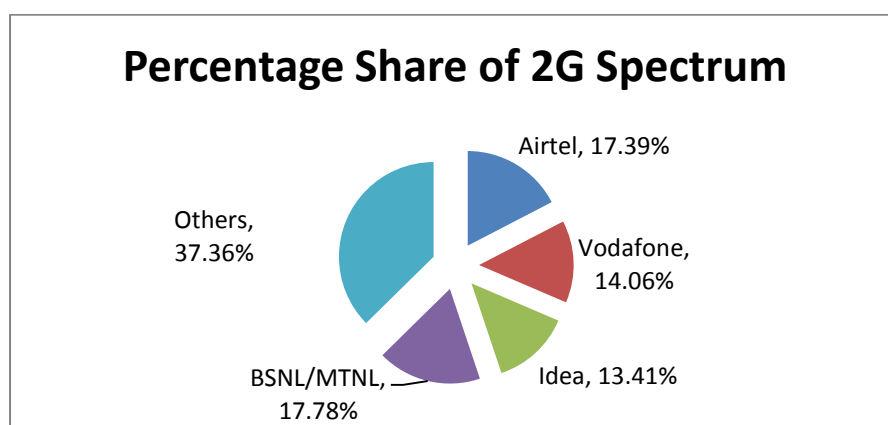


Source: Data from TRAI quarterly reports.

The worldwide tendency to consolidation in the sector is explained by the economies of scale inherent in infrastructure investments and the network effects of telecommunication. Telecom requires a high up-front investment in

fixed infrastructure that benefits from economies of scale. Therefore larger service providers are able to be more competitive in terms of prices, more profitable, more able to take on debt, better able to make the large upfront investments required in infrastructure and better adapted to weather the longer time periods for payback.

*Figure 8.8: 2G Spectrum ownership of the Big 3.*



Source: TRAI data from March 2014.

These were the same reasons that drove the fixed line service to be originally provided by a single monopoly player in the public sector. Mobile technology reduced the scale of the fixed cost investment somewhat and opened up the possibility of privatization but fixed costs (including the cost of spectrum) still comprise the largest proportion of costs facing the mobile telephony sector and therefore significant economies of scale still exist. The higher the consumer base, the greater the spread of fixed costs, the better is the margin and the ability of the firm to invest in infrastructure to provide a better network. The quality of the network is a tangible experience and operates at the level of the local market. Consumer buy-in in the sector is often at a local level driven by recommendation (interview with Mr. Gopalan, Airtel) and the greater the local consumer base for a brand the more likely that it will be the brand recommended. This virtuous cycle drives the agglomeration of a mobile brand.

Network effects also drive agglomeration in the sector. In closed networks, the larger the network, the greater is the consumer benefit of belonging to it. Since interconnection between networks is mandated, the telecom network is an open one, i.e. a person on one network can easily connect to consumers on any other network and in that sense, the size of the network one belongs to is irrelevant. However the cost of connecting to a person on another network maybe higher than the connection cost on the same network. Regulation on interconnect costs can and does narrow the gap between this cost differential, and over time regulation in India has reduced this cost differential considerably.

The combined effects of network and economies of scale have driven consolidation of the top few players in India despite the higher levels of competition and fragmentation in India compared to other markets worldwide. The dissipation of rents through competition has paradoxically accelerated this process. Mobile telephony markets worldwide tend to have 3-4 profitable players. Fewer players would reduce the costs of coordination but would suffer the negatives of a lack of competition on pricing and innovation. More players would increase the costs of coordination between players and reduce the scale benefits that each player enjoys. In spite of India's unusually high number of 8-9 service providers per circle, the scale and network effects are visible in the consolidation and share gain of the three largest networks – Airtel, Vodafone and Idea.

While these factors explain the consolidation of the top 3, it does not explain why these particular firms were able to establish themselves against the rest of the sector. I argue here that the consolidation of these particular TSPs can be

explained by looking at the sources of their rents in the early years of the sector's evolution.

Spectrum in the 900 MHz band that was allocated in first round of spectrum right creation in 1995 was physically superior (given prevalent technology) to the 1800 MHz spectrum that was distributed in the later allocation rounds in a predominantly voice-driven 2G market. The only group of producers who have remained relatively well-off through all the phases of development of the sector and who have managed to continuously consolidate their position in the sector are those that either were beneficiaries of this first round of spectrum allocation of the 900 MHz spectrum or, soon after, took over or merged with firms that were beneficiaries<sup>72</sup>. Their ownership of the 900 MHz spectrum and the terms under which they acquired these gave them a Ricardian rent advantage over the firms that entered later and were assigned 1800 MHz spectrum. It is this rent advantage that has allowed these firms to establish their market dominance and drive consolidation despite several subsequent spectrum right changes. To establish this hypothesis, the next section examines the basis for this Ricardian rent advantage and the effect it had on the TSPs' profitability.

While the rent advantage going to recipients of 900 MHz spectrum helped shape the structural outcomes in the market, these advantages are being eroded by changing technology. The subsequent section will examine the impact that technology changes have on this structural advantage that the top 3 players have been able to build.

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<sup>72</sup> The ruling that firms needed to pay market value to the state for administrative spectrum trading or sale was only relevant after market valuation of spectrum was established in the 2010 auction.

### **8.3.1 Differential Rents 900 MHz vs. 1800 MHz**

Ricardian rent refers to the differential income that arises when different qualities of an input (land in the case of Ricardo's analysis) are brought into play as a result of high levels of demand. For Ricardo, rent arises from returns to the indestructible and original properties of land that is of superior quality to land at the margin of cultivation. Due to the physical properties of spectrum and its suitability for the transmission of wireless signals, different frequencies of spectrum also have varying efficiency when it comes to their use for mobile telephony. Therefore higher 'quality' spectrum would afford a Ricardian rent over lower 'quality' spectrum, where the quality of the spectrum is determined by the spectral efficiency of the particular spectrum band and the costs of operating a network on it.

Unlike land, the quality difference in these bands is non-contiguous because of the nature of international harmonization and handset development but differential quality and differential pricing of these bands are discernible by considering the costs and efficiency of use of each of these bands. This section argues that the differential qualities of the 900 MHz vs. 1800MHz bands gave rise to a differential rent, and access to this differential rent can explain the persistence of the original incumbent firms despite changes in rent distributions over the period of development of the sector.

For ease of analysis, this calculation is restricted to the spectrum in the 900 MHz and 1800 MHz bands for 2G GSM coverage. We analyse the data for voice calls alone (not data) to reflect the majority of usage over the period of study. While this is not the total of all rents made from spectrum during this period

by the 3 largest players, it is argued here that this differential rent was the critical determinant to market consolidation.

The 1800 MHz spectrum differs from the 900 MHz band in terms of its physical properties. The physical properties of airwaves are such that as frequency increases, the bandwidth (or the amount of data that the frequency can carry) increases but the range (or the distance that the waves carry) decreases. At very low frequencies, the bandwidth is low but the range is high and this relationship is reversed at higher frequencies. Thus 1800 MHz spectrum has a higher bandwidth than 900 MHz but a lower range. The difference in bandwidth between 900MHz and 1800MHz has a lower impact on voice calls (since voice calls do not demand the bandwidth that data does) and is less material to the quality difference between the two spectrum bands. However the difference in range has a significant impact on the quality differential since 900 MHz band spectrum has a range of 18 sq. metres against an average range of 8 sq. m for the 1800 MHz spectrum (range estimates from interview with Mr. Sheth, Airtel). In other words, a network using the 1800 MHz band of spectrum needs twice as many towers to cover the same area as one using 900 MHz spectrum.

A rough costing of running a network on 900 MHz vs. 1800 MHz spectrum has been created in **Appendix 20** (adapted from Tirumalai and Shah (2012: 17), Figure 22). It shows that the network operating costs on an 1800 MHz network double because of the number of towers that are needed for the same coverage (>2x number of towers needed for 900 MHz spectrum). The total annual operating costs of the 1800 MHz business including amortization of spectrum costs remains at twice that of the 900 MHz network, despite the higher cost of 900 MHz spectrum. However at the cost per voice call level the difference disappears since the higher number of towers can support a higher number of calls. This would be true however only when the network is capacity

constrained within a limited area. In other words, the difference would disappear in the crowded inner city spaces within the metros but in other parts of the network, the network is not pushed to capacity on voice calls alone. Here the cost per voice call metric is less relevant than the metric on total operating costs. Note that this analysis is not based on actual call volumes but on the carrying capacity of the line. The actual call volumes and revenue are also biased towards the 900 MHz spectrum as detailed below.

The existence of 900 MHz spectrum also gives a clearly perceptible quality advantage in the network over 1800 MHz spectrum. The higher range of the signal results in a stronger signal and lower problems with connectivity. Increasing the number of towers for a network is difficult not just from a cost perspective, but also because getting permissions from local authorities for tower sites is a complicated bureaucratic process. Where the number of towers is less than optimal, customers are able to clearly perceive a difference in the network quality of a 900 MHz network over an 1800 MHz network. This is reflected in the fact that in almost all the circles, the TSP with the 900 MHz spectrum is the market leader (**Appendix 21**).

The market share and revenue calculations made the following simplifying assumptions: 1. All revenue figures were Gross Revenue taken from TRAI Full Year 2014/15 Q1 Quarterly Report.

2. Spectrum holdings of all TSPs were based on pre Feb 2014 auctions
3. An operator was classified as a 900 MHz operator if it held  $\geq 4.4$  MHz of 900 in the circle, even if it also held 1800 MHz as a capacity layer above that. 80 - 85% of the spectrum holding of these players is in the 900 MHz range.
4. Revenue/MHz for 900 operators was calculated based on their total spectrum holdings in 2G i.e. 900 MHz + 1800 MHz.

5. MTNL/BSNL revenue and spectrum holdings were removed from the calculations since they received their significant spectrum tranches free and do not utilize them as effectively and so would skew the results.

**Table 8.3** summarizes the findings on the market share and revenue comparisons between 900 MHz and 1800 MHz spectrum. The detailed tables are given in **Appendix 21**.

*Table 8.3: Revenue and Share Comparisons for 900 MHz operators vs. 1800 MHz operators*

Circle Category	Metros	A Circles	B Circles	C Circles	All India
900 Operators Revenue Share	57%	68%	66%	61%	65%
900 Operators Revenue Share excl MTNL/BSNL	54%	63%	59%	54%	59%
900 Operators Share of 900 + 1800 Spectrum excl MTNL/BSNL	34%	38%	32%	33%	34%
% 900 Operators spectrum that is 1800	16%	19%	17%	15%	17%
900 Operators excl MTNL rev/quarter/mhz	74	105	70	33	71
1800 Operators excl MTNL rev/quarter/mhz	46	45	25	18	31
900 Rev/Mhz:1800 Rev/Mhz Ratio	161%	231%	278%	186%	231%

Source: Data from TRAI. Calculations authors own.

The analysis shows that across all categories of markets, the operators that have 900 MHz spectrum hold the position of market leadership, with market shares of around 60%. For this analysis we have considered a TSP as a 900 operator, if it holds 80% or more of its spectrum in the 900 MHz band in the circle, even if it has some 1800 MHz in addition, and as an 1800 operator otherwise.

The revenue per MHz that the operators with 900MHz spectrum are able to achieve is also more than twice that of the revenue per MHz received by 1800 operators. This difference in efficiency of revenue generation of the 900 MHz is



the least in Metro markets, which is in line with our expectations from earlier discussions of the reduced advantage of 900 MHz over 1800 MHz in densely populated areas.

**Table 8.4** looks at these results only for the metros. These results are more diluted in the metros as in the more dense areas the advantage of 900 MHz band over 1800 MHz is overshadowed by the increased voice capacity of the 1800 MHz network, and the advantage in the carrying distance of the 900 MHz signal is less perceptible in the densely populated areas. However, the 900 MHz operators still show a clear revenue advantage over the 1800 MHz operators in the market.

*Table 8.4: 900 vs. 1800 Revenue Shares - Metros*

Circles	Revenue/Qtr./MHz		<u>Price paid as multiple of quarters revenue</u>	
	900 Operators	1800 Operators	900 Operators	1800 Operators
Delhi	108	69	6.9	5.3
Mumbai	69	58	8.2	4.7
Kolkata	38	17	5.1	4.3

Source: Authors own

The calculations show the share and revenue advantages of the 900 MHz spectrum. Another way to evaluate whether there is a differential rent is to compare recent valuations of the two bands of spectrum. Price discovery through an auction is considered the most reliable estimate of true market value of the spectrum. Since there is no recent auction involving 900 MHz and 1800 MHz spectrum across circles in India, this analysis will restrict itself to pricing for the two bands in the 3 metro cities of Delhi, Mumbai and Calcutta,

where the 2014 auction established recent market determined prices for 900 MHz and 1800 MHz.

**Table 8.5** gives the prices of each of the spectrum bands for the metros<sup>73</sup>. Prices for the 900 and 1800 bands of spectrum are derived from the prices paid during the re-auction of expired metro licenses in February 2014. The prices for the 2100 and 2300 bands of spectrum are based on the auctions in April/May 2010. These have been used as the most recent and therefore the best approximation of current market value of these bands.

It can be seen from **Table 8.5** that in all the metros 1800 MHz spectrum is less than half the price of 900 MHz spectrum. In fact the 900 MHz spectrum band seems the most valuable across markets. There is also a difference in value across metros, with Delhi being the most expensive and Kolkata the least across spectrum bands, reflective of the size of market and earnings potential differences between metros. However our specific interest lies in the price of 1800 MHz vs 900 MHz in individual circles, which is less than 50% of the latter's price. This is indicative of a difference in the rent that the 900 MHz generates in comparison to the 1800.

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<sup>73</sup> Note that Chennai has now been incorporated into the TN circle and is not licensed separately. The 3 metros considered therefore re Delhi, Mumbai and Kolkata.

*Table 8.5 Price Per Mhz for spectrum in the metros<sup>74</sup>*

<b>Rs Cr. Per MHz</b>	<b>900</b>	<b>1800</b>	<b>2100</b>	<b>2300</b>
Delhi	741	364	663	224
Mumbai	563.1	272	649	229
Cal	194.6	73	109	52

**Indexed to 900 Mhz pricing in the city**

<b>Per Mhz Index</b>	<b>900</b>	<b>1800</b>	<b>2100</b>	<b>2300</b>
Delhi	100%	49%	90%	30%
Mumbai	100%	48%	115%	41%
Cal	100%	38%	56%	27%

**Indexed to 900 Mhz pricing in Delhi**

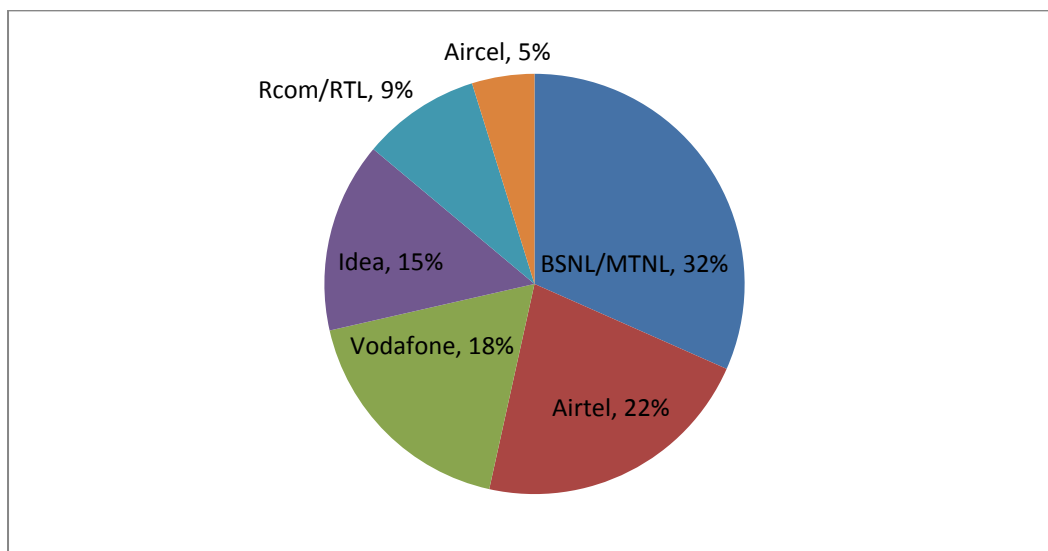
<b>Per Mhz Index</b>	<b>900</b>	<b>1800</b>	<b>2100</b>	<b>2300</b>
Delhi	100%	49%	90%	30%
Mumbai	76%	37%	88%	31%
Cal	26%	10%	15%	7%

Thus the 900 MHz spectrum seems to be twice as valuable in terms of market price and more than twice as efficient at generating revenue per megahertz. The costs of running a 900 MHz network on 2G were also seen to be significantly lower because of the lower need for tower infrastructure.

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<sup>74</sup> 900 and 1800 MHz prices based on Feb 2014 auction  
 2100 and 2300 MHz prices based on April/May 2010 Auctions  
 2300 MHz calculated based on 10 MHz as 20MHz unpaired sold as TDD

*Figure 8.9: Percentage Holding of 900 MHz Spectrum by Operator (2014)*



Source: Operator data.

The majority of this 900 MHz spectrum is held by the top 3 operators – Airtel, Vodafone and Idea (**Figure 8.9**). The public sector firm (BSNL/MTNL) has the largest share of the spectrum but as was argued earlier, does not use it efficiently so has been removed from the analysis of differential rent creation so as not to bias the results. Airtel, Vodafone and Idea hold 55% of the spectrum. The only other private telecom service providers with any 900 MHz spectrum are Reliance and Aircel but their holdings are small.

This entire 900 MHz spectrum had been assigned at the point of inception of the sector in 1995. Although the amounts bid on the initial auction were high, the subsequent change in pricing brought in by revenue sharing in NTP 1999 meant that TSPs only paid around 30% of the original bid value for the spectrum. At the time of writing, most of this spectrum was administratively allocated spectrum and had not been purchased at an auction at market determined rates (except the metro spectrum we considered earlier). Thus the

top three players, who had either won this spectrum with licenses in 1995 or had subsequently, acquired it when they bought over companies that had, are the only firms with significant, all-India holdings of 900 MHz spectrum that afforded them a rent over the lower quality 1800 MHz spectrum that was assigned after 1995. The pricing and assignment mechanism was such that a large part of this rent was not extracted by the state at spectrum sale but remained with the producers. The advantage that this gave the top 3 firms is briefly considered in the next section.

While our analysis has focussed only on the GSM bands for comparability, the rent advantage of 900 MHz spectrum over 850 MHz spectrum used on CDMA was also high but arose from the lack of market development on CDMA, predicated on the poor development of the device ecosystem for CDMA devices.

### **8.3.2 Translating the Rent into Economic Advantage:**

The above analysis showed that the revenue generated by 900 MHz was twice that of 1800 MHz. The costs of operating the 900 MHz network were also significantly lower since the number of towers needed to cover the same area is lower for a 900 MHz network. These advantages resulted in significant rents for the holders of the use rights on 900 MHz spectrum as evidenced from the fact that they were willing to pay twice the price of 1800 MHz spectrum for 900 MHz spectrum in the market. However, each of these top 3 firms actually received their 900 MHz spectrum through administrative allocation and did not pay market price for it. In other words, the rents that the better quality spectrum afforded were not extracted by the state but left in the hands of the top three firms. Especially in the early years of development of the sector, this gave these firms a significant advantage over competitors.

The top 3 firms are the only market players other than the public sector incumbent to own substantial tranches of 900 MHz across a number of circles. Between them, the three hold the top two share positions in almost all markets. The other private sector holders of 900 MHz spectrum have very small amounts of it and do not have a national coverage with 900 MHz spectrum. Thus while their 900 MHz advantage may have given them market leadership in one market (e.g. Aircel in Tamil Nadu), they are unable to leverage this benefit at a pan-India level. The public sector incumbent, despite holding the largest spectrum allocations across all frequency bands in all circles (and not having paid for them) has been unable to translate this significant rent potential into market leadership. They are inefficient users of their spectrum and are a smaller market player across all circles.

The rent advantage that the 900 MHz spectrum gave was crucial in the sectors development before 2010. It allowed the top three players to achieve higher margins, invest in infrastructure, aggressively compete on price and grow the market as we have discussed when we reviewed the evolution of the sector. It has also allowed the top three players to have relatively stronger debt-equity ratios and the ability to withstand debt that has been critical to survival in this sector. **Table 3.3, Figures 3.20, 3.21 in Chapter 3** demonstrated the profitability of the sector. The comparative profitability figures are unavailable for Vodafone since it only presents consolidated accounts for its worldwide business in its annual reports. However ROCE levels of 5-10% for Airtel and Idea in 2014 and debt equity ratios of 1.2 are probably similar to levels in Vodafone. While Return on Capital Employed (ROCE) levels have come down since 2012, the levels in the mid 2000's were at a healthy 30-35% for the top three players and EBITDA margins were also in excess of 30%. This meant that the top three players were uniquely placed to invest in further spectrum and to build strong networks through improved infrastructure.

This explains in part why the continuous attempts by Reliance to break into the lucrative GSM market that we detailed in the Political Settlements analysis in the previous chapter failed to achieve the desired outcome. The huge rent advantage afforded by the early administrative allocation of 900 MHz spectrum was hard to overcome in the later stages of the sectors evolution despite later spectrum right allocations in Reliance's favour.

The rent advantage that the process of spectrum allocation allowed the producers to retain would be eroded when the licenses expire and the administratively allocated spectrum comes up for re-auction. The administrative spectrum will all be re-auctioned over the years 2014-2024. The first few years will see much of the 900 MHz spectrum go back to the auction block. Since this will be at market determined prices, much of the rent advantage of the 900 MHz spectrum will be extracted by the state with differential pricing if the auctions have the same characteristics as they do currently. The Ricardian rent advantage that the incumbents had is therefore likely to be reduced over the coming years. However the market dominance in terms of revenue share, subscriber base, brand dominance and infrastructure that the incumbents have managed to build up since the sector's inception will be much harder to challenge.

### **8.3.3 Impact of Technological Change on the Incumbent Advantage**

The incumbents have built up a considerable advantage in terms of market dominance, once that is not going to be easy to challenge at this stage, despite the likely extraction of the rent differential in the future by the state. However, this differential in Ricardian rent that the 900 MHz spectrum affords today is

itself under threat from changes in technology that change the efficiency advantage of 900 MHz spectrum over other ranges.

First, the market itself is evolving towards greater data use on mobile technology. Data today accounts for nearly 20% of the revenue share of the top 3 firms and is its fastest growing segment. As discussed earlier, the lack of fixed line infrastructure in India points to rapid growth of mobile data usage in the coming years. The range and signal quality advantages of 900 MHz vs. 1800 MHz become less relevant for data and the 1800 MHz's additional carrying capacity becomes more relevant. This squeezes the rent advantage of 900 MHz from both directions.

More importantly, technology has made 4G technology usable on other parts of the spectrum range. 4G technology can be deployed on 1800 MHz spectrum and 850MHz spectrum in addition to the 2300 MHz spectrum that has been sold for 4G in the Indian market during the 2010 auction. This suddenly makes the 1800 MHz spectrum much more attractive. Firms with significant 1800 MHz spectrum now have a market advantage in already owning spectrum that can be re-farmed on 4G technologies. 900 MHz can be re-farmed on 3G technology but cannot be deployed on 4G at this stage. 850 MHz CDMA spectrum can also be re-farmed on 4G. This spectrum that has remained under-utilized on a slowly declining CMDA business could suddenly become very important in determining spectrum rents.

These technological developments affect all the top 3 dominant players since the current strength of their spectrum portfolio lies in the spectrum that drives the 2G voice market but the growth areas of the market play to the weaknesses in their portfolio. In contrast the TSP who is likely to benefit most in terms of current spectrum portfolio holdings is Reliance Infocom, which holds spectrum



in the 850 MHz CDMA as well as the 1800 MHz GSM ranges. Reliance Infocom, run by the younger Ambani brother Anil Ambani, has therefore a perfectly complementary spectrum portfolio to Reliance Jio, run by the older Ambani brother, Mukesh Ambani. While their feud from 2006 was well documented as fierce, peace has been made between the warring brothers in the last couple of years. There is no talk of a merger between the two firms at the time of writing this thesis, but one cannot but speculate on its possibility since a combined Reliance's spectrum portfolio would put it a very strong position to challenge the incumbents' market dominance with the development of 4G.

## 8.4 Rents Dissipated to Consumers

We have so far looked at spectrum right assignments in the sector that have created rents for the producers in the sector. In theory, the allocation of rents to service providers can have dynamic efficiency advantages for consumers if it results in investments and extensions of service provision in areas that would otherwise not have happened. However, some benefits can be more immediate, and can take the form of rent dissipation, by which we refer to the price setting by the regulator that results in some of the notional rents that could have been captured by the producers or the state being 'dissipated' to consumers. In fact, we find that this has rarely taken place as evidenced by our discussion of the evolution of the sector. The reason for this absence of rent dissipation to consumers is largely the lack of effectively consumer lobbying organisations in the India telecom sector. Consumer interests therefore do not feature as an organisational player in the sectoral political settlement.

Through the TRAI Act (established in 1997 and amended in 2000), the regulator is authorized to ensure that some of the rents potentially created by policy are passed on to consumers. Theoretically, the means of passing benefits on to consumers include regulations on pricing, mandating services to regions or consumer groups that would not otherwise be profitable or mandating parameters on the quality of service provided. While the TRAI has been somewhat active on the latter, it has no authority on price setting and therefore the only interventions on price in the sector have come from politicians who have used price movements in the sector for political mileage and therefore indirectly constrained price setting. The following sections look briefly at India's history of consumer rent dissipation before examining what could change this scenario.

### **8.4.1 Price Setting**

While consumer prices have seen a steep fall over the last two decades of mobile telephony in India, this has been driven more by the competitive dynamics of the sector rather than the activity of consumer organizations contesting a share of the rents generated in the sector. When significant rent dissipation to consumers has happened, this has typically been driven by politicians seeking to generate mileage by emerging as consumer champions or TRAI's intervention in response to a rising tide of complaints generated by individual consumers.

While the TRAI is authorized to provide pricing guidelines, it practices “forbearance” (TRAI 2012a) when it comes to mandating exact prices, which it allows private TSPs to set as long as they fall within some overall guidelines and are not anti-competitive. TRAI mandates price caps on some services such as roaming charges. In other areas, it allows the TSPs to set prices but maintains a downward pressure on pricing through moral pressure on the TSPs and the threat of evaluation of pricing that seems anti-competitive. They also enact regulatory policies to drive costs of TSPs downwards, allowing competition to push pricing downwards.

Political intervention in pricing has been driven by politicians seeking political mileage from the act. They have typically used MTNL/BSNL as the “battering ram” for the implementation of the pricing change they propose in the knowledge that the competitive market will force the private sector to follow suit. However, as these organizations (MTNL/BSNL) have weakened in the market, their ability to play this role has been compromised.

Perhaps the most successful political intervention that enabled dissipation of rent to consumers was Dayanidhi Maran's announcement, with much fanfare, of the One India Plan in 2006 (PTI 2006). Under this plan, from March 1, 2006, MTNL and BSNL would charge a maximum of Re. 1 per minute for a call to any place in India – prior to this announcement the average cost was Rs. 1.20 within a circle and Rs. 2.40 across circles. While MTNL/BSNL put up a brave face at the announcement, commentators at the time estimated that this move would lead to a Rs 4,000 -7000 cr. cut in their profitability (Purkayastha 2006). In part this was because to enable the One India plan interconnection rates (a significant source of revenue for the dominant fixed line players) were reduced by TRAI. This move by a significant market player at the time was a trigger to other competitors to drive down pricing and certainly played a role in rents being dissipated to the consumer. However, as the financial and market strength of BSNL/MTNL has weakened the ability of the politicians to use them as a way to drive dissipation of rents to the consumer has been compromised. For instance, on June 15th, 2015 the Telecom Minister announced that BSNL would make national roaming free but no significant national player followed.

#### **8.4.2 Service Parameters:**

TRAI, as part of its mandate has authority on tariffs, Quality of Service (call centre service and complaints as well as network parameters such as call drop rates), consumer protection and interconnection. In theory this mandate allows the state (through its regulatory arm, TRAI) to set conditions on performance of the private firms in the sector. Ideally the rents that the firms in the sector can access should be predicated on meeting these service provision conditions. If the rents were correctly calibrated, firms that invested in meeting the service conditions should still get some incremental rents to create the right incentives. This requires both a calibration of the rents with the conditions the

state wants to achieve as well as adequate monitoring and enforcement capacities on the part of the state. It would also require a distribution of power that would enable TRAI to enforce conditions, backed perhaps by strong consumer organizations. These background conditions were entirely missing.

The most significant interventions by TRAI were more in the nature of ad hoc responses to consumer complaints. One example was the regulation on dual consent for Value Added Services (VAS) provided by TSPs in 2012/13. TSPs provide several VAS service such as caller tunes, astrology/cricket/Bollywood updates etc. Each of these services typically comes at a low unit cost. By 2012/13, TRAI received a growing number of complaints suggesting that TSPs were deducting payments (from the prepaid balance) for services customers did not subscribe to and hence the TRAI mandated a dual consent process (i.e. the customer had to confirm twice that they had opted for the service before the TSP could charge for it). This resulted in 2-3% loss of revenue to the industry (analyst estimates suggest VAS revenue dropped by 30-50% after this change and VAS accounted for 5-7% of industry revenue in 2012).

Other than this, TRAI has focused largely on annual audits of Quality of Service (QoS) and Billing and Metering. QoS regulation was introduced in 2000 and subsequently revised in 2005 and 2009<sup>75</sup>. The parameters are monitored through a three-pronged approach. The first is a Quarterly Performance Report, self-reported by service providers and published quarterly by TRAI. Network quality and customer satisfaction are also assessed independently by third party agencies quarterly and half-yearly respectively, and the results are published in newspapers and publicly available. TRAI also obtains Point of Interconnection (POI) congestion reports on monthly basis from the service providers.

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<sup>75</sup> The parameters that are mandated are listed in **Appendix 22**.

By and large, the impact of these audits have been limited and restricted to press releases highlighting gaps. Interviews with TSP senior executives confirm that the extent to which this has resulted in significant benefits to customers has been marginal. There have also been sporadic regulatory interventions on tariff structures (e.g. Special Tariff Voucher guidelines in 2012) but these have been focused on marginal alterations in communication and disclosure to customers rather than an activist intervention to drive rent dissipation.

### **8.4.3 Implications for the State's Ability to Manage the Growth Process**

The theoretical framework of rents used in our analysis views the rents generated in the sector as potentially beneficial for sectoral development as long as they can be linked to overcoming specific market failures and contingent on performance. The sector's high upfront investment costs, the regulatory uncertainty and the high risks of technological change have been challenges for the development of the sector at various phases in its evolution. This is evidenced by the rising levels of debt in the sector and knock-on effects of reduction in infrastructure investment. The Digital Divide between urban and rural India remains in spite of advances in mobile telephony. Rents that the sector generates could thus be used to target the market failures that constrain the extension of service provision to new areas and consumer groups.

However, our discussion of the evolution of the sector driven by the powerful organizations that constitute the sectoral political settlement show that the state is unable to effectively manage and enforce any conditions on TSP performance. QoS conditions are not rigorously enforced and the regulator lacks the power to impose penalties on non-performance. Even the non-performance by the public sector provider is condoned in spite of the hugely

inefficient use of the biggest portfolio of spectrum in a spectrum-starved sector. As we discussed in the theoretical analysis of the political settlement, the factional nature of the national and the sectoral political settlements makes the state unable to act authoritatively to manage rent conditions. Neither is the state able to prevent informal rent capture by the agencies in the PS.

Under the circumstances, the state has come to extract all the available rent through formal means. Since it cannot identify and enforce the finer conditions that it would need to manage in a more nuanced regulatory structure that would allow the rents to be used to drive sectoral growth and consumer value, it has come to resort to a blunt instrument instead – maximising the formal extraction of sector rents through auctions. This is a sub-optimal solution as the effective management of the rents would give the sector the ability to overcome key market failures. However, the forces of the political settlement have rendered this option implausible and have driven the choice of formal rent extraction as a second-best strategy that claims to optimise efficiency.

#### **8.4.4 Can Consumer Impact on the Political Settlement Change?**

Social Media provides a platform for the mobilisation of dispersed consumer groups. A very recent example of this was the popular mobilisation of consumers protesting purported violations of net neutrality by telecom service providers in India. The mobilisation was effected entirely through social media and garnered 100,000 consumer signatures supporting the campaign. The campaign gained public exposure on mass media and forced the DoT to institute a committee to study the problem. While the phenomenon is still numerically small and urban-centric, it shows the possible future direction of technologically driven mobilisations.

## 8.5 Conclusions:

The impact of the rent distributions driven by the sectoral political settlement has resulted in specific structural imperatives on the actions of the state and the big private sector firms that drive outcomes in the sector. We examined two key structural imperatives in this chapter.

The first relates to the tendency by the state to drive artificial spectrum scarcity through policy in order to meet its financial objectives. This has an impact on future spectrum right allocations in the sector and private operators may need to re-examine their economic strategies as the spectrum auctions will put further pressure on their balance sheets through an increasing debt burden.

The second is the persistence of the market dominance of the 3 biggest private sector operators in the sector, which we argued arose from the Ricardian differential rents they were able to access because of their early administratively-allocated spectrum rights in 900 MHz spectrum. This might well explain the inability of Reliance to achieve market significance despite several subsequent spectrum right allocations that it benefited from. While that rent advantage might be eroded, it is arguable that the advantage in terms of market share and infrastructure that the top 3 firms now have in the market will be hard to challenge.

Finally, we also explored the lack of an effective consumer voice in the sectoral political settlement. As a result of this absence, the dissipation of rents in terms of immediate benefits to consumers in the sector has been sporadic and driven by occasional political interventions by populist politicians. I have argued that



in the absence of credible mechanisms to manage rents with appropriate conditions that can drive consumer value, the state has been pressured to revert to methods of formal rent extraction as the more efficient but sub-optimal solution.

However, this analysis has to be conditioned with the recognition that this is a sector with very fast-changing technologies. Technological changes that are already on the horizon of possibility could radically alter some critical technological characteristics of the sector defining rents and thereby affect outcomes significantly. Changes to both the pricing of spectrum and its allocation mechanisms or to the strengths of different firms' spectrum portfolios will also reflect in a dynamically altered sectoral political settlement, as will the introduction of effective consumer voice through social media.

These possible changes reiterate the need to view the sectoral PS as fluid and dynamic. Any future analysis of the sector's evolution will need to consider the effect of these technological changes on the sectoral PS and the impact of the changed sectoral PS on policy direction in the sector.

## *Chapter 9: Conclusions*

*“When we asked Pooh what the opposite of an Introduction was, he said “The what of a what?” which didn't help us as much as we had hoped, but luckily Owl kept his head and told us that the Opposite of an Introduction, my dear Pooh, was a Contradiction; and, as he is very good at long words, I am sure that that's what it is.”*

A.A. Milne, *The House at Pooh Corner*.

The growth of mobile telephony in India, in the two decades from its inception in 1995, is nothing short of remarkable. It has grown from a service that connected one in every 3400 Indians to one that today can boast of nearly 100% penetration. In a country the size of India, and with its socio-economic demographic, this is indicative of the value consumers perceive in the service and its importance in their day-to-day lives.

The progress of the sector has been tremendous but tumultuous. The rapid growth has taken place in a context of significant policy and regulatory instability, and has been accompanied by high levels of corruption. The conventional explanations of this contradiction lie in failures of ‘Good Governance’, blaming bureaucratic incompetence, or more often, bureaucratic ineffectiveness to discipline political duplicity. Solutions to these have been sought in greater regulatory credibility and independence on the one hand and greater deregulation of spectrum rights in the sector on the other.

I have argued in this thesis that viewing licensing as the assignment of spectrum rights in the sector and therefore the policy –created income flows from those rights as rents allows us a more nuanced understanding of the motivations behind the creation of policy and the effectiveness of its outcomes. It can also explain why rent seeking of different forms is widespread in the sector, and why in the developing country context of India, it is not surprising that some of this rent seeking takes the form of corruption. The important question for policy is therefore not how to ensure the absence of rents but to recognize the inherent presence of rents in the sector, the possibility that some rent allocations and conditions can drive potentially progressive and value-enhancing outcomes, so that regulation and rent-management can be explicitly designed to increase the probability of these positive outcomes.

The telecom sector is particularly amenable to an analysis from the perspective of rents and rent seeking since access to the critical resource in the sector, spectrum, needs the creation of exclusive rights in order to be efficiently used. The prevailing view on the best method to assign these rights is through an auction that assigns the rights to those who value it the most and auctions are also believed to allow the true value of the right to be discovered through the market. This method of assignment also allows the state to extract through the price of the spectrum rights a significant share of the rents that the right has the potential to generate.

India's experience with auctions has been mixed. The first auction led to a significant over-pricing of spectrum as it did not take into account the regulatory failures induced by the public sector incumbent whose monopoly rents were being threatened. Once the state had found a way to take a share of the significant rents in the new sector, it then used administrative allocation to allocate rents and used a combination of formal and informal mechanisms to extract a share of these rents. This left a greater share of the rents in the hands

of the producers and drove spurts of rapid growth and investment, but also resulted in significant episodes of unproductive rent capture by the private sector and by political organisations and individuals. Since 2010, the state switched to an increasingly formal auction process that extracted much of the rents from service providers. This reduced informal rent extraction and corruption, but threatened the viability of the productive firms and had negative impacts on infrastructure investment and the emergence of new firms and capabilities.

The potential of the Indian telecom market in terms of size and revenue makes spectrum rights in the sector very valuable. Due to particular structural features of the Indian telecom sector and due to policies that have at various points in the sector's evolution driven competition, the telecom market in India has become hyper-competitive and fragmented, with a greater number of service providers than in most other markets worldwide, but the lion's share of the market has consolidated in the hands of the top three players. The sector also operates at very high spectral efficiency as it has lower assignments of spectrum per operator than many other comparable markets across the world. The scarcity of spectrum is a result of legacy issues in the availability of free spectrum ranges as well as policy-driven regulation of spectrum availability. This combination of high levels of competition and low spectrum availability means that spectrum rights carry significant rents, and the allocation of these rights are therefore fraught with contestations over policies. This explains the high levels of rent seeking and corruption that have marked many phases of the sector's evolution: the rights create significant rents and the rents are subject to contestation over their distribution.

Thus the analysis of rent flows in the sector needs to be augmented with an exploration of the contests over the rent, the forces that influence these contests and their outcomes in order to robustly explore and explain the links

between rent seeking and policy. This thesis has used the analytical tool of Political Settlements to describe the relative power and interests of the set of organisations that seek to influence the distribution of rents in the sector. The sectoral political settlement during the period studied was volatile, reflecting the significant rents in the sector and the continuous entry of new organizations in the rent contests. The identity of these entrants and their relative power could in turn be better understood by looking at their origins in the broader society, and here higher level political settlements at the national or state level are important for understanding the relative power and capabilities not only of existing players in the sectoral political settlement, but also of the new entrants. Thus, changes in the sectoral political settlement were driven in part by changes in technology that changed the relative power of existing players, but also in part by the dynamics of new entry and contestations over rents by new firms and organizations who were powerful at the state or national level political settlements but had been left out of the rent distributions in the sector.

This analysis developed the concept of a sectoral political settlement that operates at the sector-specific level but is affected by higher level political settlements when the sectoral rents become high enough for organizations that are powerful at the national or state levels to begin to contest the sectoral political settlement. The value of mapping a sector-level political settlement is that it allows us to distinguish the sector specific power dynamics that drive policy at the sectoral level, but which clearly operates within the context of a national political settlement based on wider power structures that are normally not relevant for explaining or understanding sectoral dynamics. These interdependencies also explain why the political settlement at different levels can be fluid and dynamic as different parts of a political and economic system are always interacting. An application of this approach to other contexts may help to develop a better understanding of the interactions between national and sectoral political settlements.

Applying this dual analytical lens of rents and political settlements could thus help to explain both the influences at the sector level that shape policy, and how the rent outcomes of these policies can in turn shape the evolution of the sector by consolidating or disrupting the sectoral political settlement. The application of this framework has allowed the development of a revisionist reading of the evolution of the sector through six phases defined by significant shifts in the policies driving rent creation in the sector:

**1995-1999:** Policy on rent creation was driven by a relatively powerful DoT, which dominated the sectoral political settlement at the time. Private sector organizations were weak, and the DoT determined the number of new entrants and spectrum pricing. The excessive rent extraction by the state, and the private sector's inexperience with the sector and its potential, as well the regulatory challenges it faced, led to the near collapse of the sector. The collapse threatened rent distributions to the state agencies, which were therefore forced to renegotiate the policies of rent distribution in order to enable sectoral development. However, spectrum rights issued at this stage gave the private sector incumbents a Ricardian rent advantage over all future entrants to the sector for several years.

**1999-2003:** The growing potential for rents in the sector attracted private sector organisations that were powerful at the national level, but had been left out of the rent distributions in the sector. These organisations used a variety of methods to begin accessing the rents and influenced the state to formalise their access to the rents through policy revisions.

**2003-2007:** The sector went through a phase of relative stability in the sectoral political settlement that was conducive to growth. The power of the public sector incumbent waned and that of the private sector grew. The state, which shared in the growth of the rents going to the private sector, was content to leave rents on the table for the service providers as it drove investment and growth in the sector. However, the growing sector came to represent growing potential for rent generation, and the consolidation of the private sector incumbents based on their access to Ricardian rents made challenging their market dominance through formal regulatory routes more difficult.

**2007-2009:** The evolution of the sectoral political settlement led to the hatching of an audacious attempt at rent capture by private sector firms who had become significantly more powerful in the sectoral political settlement. By developing coalitions with political organizations that were hungry for rents required for distribution to their political clients, and using new private firms as fronts that could develop informal and potentially corrupt links with these politicians and political organizations, a coalition of powerful interests drove a bid for rent capture on an unprecedented scale.

**2009-2012:** The scale of the rent capture at the sectoral level threatened to destabilize the political settlement at the national level. Left unchallenged, the rent flows generated at the sectoral level would very likely have altered the balance of forces at the national level. In the event, powerful organizations at the national level intervened to reverse the spectrum rights allocations at issue. The sector was thrown into a state of uncertainty and flux until the sectoral political settlement re-stabilized with the exit of several of the new entrants. The older private sector incumbent firms from the earliest phase of the sectors development were able to weather the storm due to the advantage that the 20 years of exclusive access to Ricardian rents that their initial allocations

provided them. But several new players suffered significant losses and the front organizations were wiped out.

**2012-2014:** The regulatory and enforcement capacity of the state had by now been shown to be inadequate for allocating rights in such a way that rents could be left for service providers with effective conditions for investments and capacity building. Occasionally, rents for private service providers achieved very productive outcomes through serendipitous combinations of conditions, but rents for service providers were just as often wasted or informally extracted by political organizations. The state was unable to formally or informally impose deliberate value-enhancing conditions on private rent recipients. Its earlier strategies of leaving rents for private service providers was therefore coming under strong public pressure and scrutiny, even though in various phases and for accidental reasons these rents had driven much of the growth and investment in the sector. The pressure from powerful organizations at the national level who were threatened by the informal rent capture at the sectoral level now drove formal rent extraction by the state through spectrum auctions. At the same time, the pressure on margins and the emergence of spectrum-hungry data transmission technologies have led to increasing spectrum scarcity in the sector. This fitted in with the state's interests of maintaining an artificial scarcity of spectrum in order to maximise rent extraction. As a result, auctions resulted in increasing indebtedness of firms in the sector, and only the ones that had bolstered their balance sheets with the Ricardian rents from the early days of the sector were able to deal with these pressures in a viable manner. The result was a growing consolidation of the sector in the hands of three dominant private sector players.

The sector is today poised at an interesting point in its evolution. The structural imperatives that drive the actions of the state, the service providers and the consumers are all susceptible to changes driven by technologies that are either



imminent possibilities or already commercially available. These changes could destabilize the current political settlement or even require a radical redefinition of the structure of the sector.

A long period of Ricardian rents captured by Airtel, Vodafone and Idea based on their access to 900Mhz spectrum, gave these firms a powerful incumbent advantage as they were able to build up their balance sheets. Their early capture of this part of the spectrum was important because technologically, this spectrum was ideal for an industry where most of the revenue came from voice calls (rather than data) and from an increase in category penetration. As discussed earlier the 900Mhz spectrum was the most appropriate for indoor coverage and in rural areas. The sector in India today has grown to over \$25B and industry revenue growth has slowed from the heady days of 30-50% per annum to a steady 10-12%. The metro and category A circles account for more than 50% of this revenue and these markets are largely urban. As internet adoption (largely on the mobile) grows, these markets will become even more significant since mobile internet adoption will happen in these markets first. As a result, the structural advantage in the sector will increasingly be driven by access to spectrum that enables a better mobile internet experience. It is in this context that technology is beginning to erode the incumbent advantage.

4G or LTE (Long Term Evolution) is currently the most efficient way of delivering mobile internet. Across the globe, the largest deployments of 4G LTE have happened on 1800 MHz (Europe and China), 800 MHz (Korea), 700 MHz (US) or 2300 MHz (China). This has meant that the device ecosystem has evolved to support these spectrum bands. 800 MHz in India has largely been used for CDMA and 1800 MHz has so far been a “disadvantaged” part of the spectrum portfolio. The 900 MHz LTE ecosystem is very nascent, and as a result, very few devices support it. Hence, the valuable spectrum rights (and hence the contestation of rents) will move increasingly towards the hitherto

disadvantaged spectrum bands – CDMA 800 MHz, 1800 MHz and 2300 MHz. 700 MHz (released by the ‘Digital Dividend’ of moving from analogue to digital TV) is expected to be auctioned in India in 2016 and will bring in an entirely new band of spectrum to the auction table. The incumbent advantage driven by superior voice spectrum (900 MHz) will therefore erode with time.

The evolution of technology in the context of rapid growth of the mobile internet will also have an impact on the government’s ability to keep spectrum prices high, through limiting supply. It is estimated that close to 50% of the growth in smartphone sales from 2013-2018 will come from India and China. It is also forecasted that India will overtake the US and become the 2<sup>nd</sup> largest market for smartphones sales by 2016 (eMarketer.com). The impact this shift has had on the direction of technological research and innovation in the sector is significant.

Earlier, R&D in the sector was driven by the needs of developed markets that were not spectrum constrained (by population densities and legacy issues) like the developing markets. Research was focussed on maximising speed rather than optimising bandwidths. Further, the smaller subscriber numbers meant that cost effective device ecosystems could only develop around one or two spectrum bandwidths. However, future market growth and significant volumes will come from spectrum hungry nations, who also have legacy issues constraining their choice of bandwidths. This has shifted to the focus of R&D in the sector to address these issues of constrained spectrum availability, and widen the band of spectrum for which cost effective device ecosystems can be developed.

This has already resulted in device and chipset manufacturers investing in innovation that is focussed on spectrum bands available in India and China and

in optimising their devices to deal with spectrum scarce environments. Increasingly, the device ecosystem is being driven by spectrum available in India (and China), rather than in the US and Europe. Device and chipset manufacturers are, for example, beginning to build LTE devices that operate on 700 MHz, as this spectrum band will have abundant supply in India after the 2016 auction. Developments such as new generations of Qualcomm Snapdragon chipsets now support 4-5 bands of spectrum (vs. 2-3, historically) and this means handsets are increasingly able to support multiple bands and allow spectrum to be used more efficiently.

R&D in the sector is also focussed on being able to use fragmented spectrum more effectively. Technologies are evolving that allow TSPs to provide LTE with as little as 1.5-3.5 MHz of spectrum against the current requirement of 5 MHz of contiguous spectrum. In addition, more futuristic technologies such as “White Space” (technology that makes use of the gaps and guard bands between spectrum bands) are being developed by large players such as Microsoft. Spectrum commons based innovation (based on technologies that reduce the coordination costs between players and allowing multiple players to use the same bands) is also being funded to address the growing demand-supply gap in spectrum starved countries such as India. As more of this innovation is commercialised, spectrum constraints will become less significant.

In addition to the technology innovation, the dominant political settlement is also beginning to focus on driving greater digital adoption – Digital India is one of the Modi government’s headline initiatives. As all of this innovation gathers pace and the government’s need to demonstrate progress on “democratisation of the internet” increases, the current bias of revenue extraction through limiting supply will become less sustainable and effective.

Perhaps the significant accelerator to the process of declining incumbent advantage, and the declining extraction bias as a result of the growth of the internet, is the re-entry of Reliance Industries (RIL) and Mukesh Ambani into telecommunications. Reliance Jio (a unit of RIL) has laid out an ambitious plan to build a 100% LTE based network across all of India and invested \$14B in spectrum and infrastructure over the last 5 years. The fact that Jio is yet to launch is proof of the strength of the current incumbent advantage, but once launched, it could pose a significant threat to the dominance of the top 3 players.

RIL is, moreover, a significant force in the current national political settlement and is beginning to have a significant effect on the sectoral settlement. This is visible in the evolution of policy in the sector. Many industry observers believe that the 2014 reduction in inter-connect charges was influenced by Jio as it reduced the incumbent advantage. With the \$14B investment, Jio has also created a step change in available capacity in the industry – the 2015 MVNO announcement by TRAI was a substantial change in direction on policy and will assist Jio in utilising this capacity (MVNO are Mobile Virtual Network Operators – players who do not invest in the network themselves but pay a variable cost to existing players, who have excess capacity). A week before the submission of this thesis, the new Spectrum Trading guidelines were approved by the Cabinet. These guidelines allow a TSP to sell part or all of its spectrum in a circle to another TSP, provided this spectrum has been purchased at an auction or the seller pays the government the market value pro-rated for the remaining term of the spectrum. These could be seen as policy moves that particularly benefit Reliance Jio in enabling its access of the complementary spectrum portfolio held by Reliance Infocom.

Historically the consolidation of firms in the sector has been limited by two factors – the fact that the seller in any such consolidation is likely to have significant debt on their balance sheets, well in excess of the value of their

spectrum, and the fact that the M & A guidelines required that any administrative spectrum sold on had to be liberalised by paying the market determined price to the government pro-rated for the remaining term of the spectrum. In ensuring that the spectrum still has to be liberalised, the Trading guidelines ensure that the government still extracts revenue and is not seen as biased. However, in allowing some or all of the spectrum in a circle to be sold the guidelines allow Jio to overcome the last element of its structural disadvantage – access to low frequency spectrum to support voice on its service. Research analysts speculate that, given these changes, R Com is likely to liberalise its CDMA spectrum and then trade this with Jio so that the latter can use this for providing voice services. The Ambani brothers, who appear to have reconciled differences since 2010 will now have a way to cross-utilize the complementary bands of spectrum held across the two firms. This will make Reliance Jio a significant organizational player in the sectoral political settlement, enabling it to deploy its significant power at the national level.

What is clear is that the technological evolution supporting moves towards greater internet consumption and LTE will have a significant impact on the structure of the industry over the next 5-10 years. The analytical framework of rents and political settlements will remain significant in providing a framework for analysing the possible ways in which new structures of spectrum rights will influence the creation and allocation of rents. We can already see that there will be a greater bias towards spectrum that supports data revenue. We can also predict that organizations and influences that are powerful at the level of the national political settlement (like RIL, or the Modi government's support for Digital India) will have an impact in changing the sectoral political settlement over time and driving rent policy in ways that are advantageous to them.

The last twenty years of the evolution of this industry in India provides very useful policy learnings through the lens of rents and political settlements.

Firstly, the sector has had an independent regulator (TRAI) for fifteen of these twenty years. The policy recommendation that most analysts of the sector focus on has been the importance of an independent regulator. The political settlements analysis shows why there has been rampant rent capture throughout much of this period, and in particular during 2007-09 when the sectoral political settlement was out of alignment with the national political settlement. While independent regulation may be desirable, an understanding of the underlying political settlement shows that it is unlikely to occur simply by changing formal institutional structures. Regulation did become more effective after this period, but only because the national power structure was inimical to policy that left rents in the hands of incumbents in the sector. The latter were not powerful enough at the national level when the contestation shifted to that level. The more profound point is that this was a particular type of regulation, one that extracted rents to the state through formal auctions and enforced rules consistent with this rent structure. A regulatory regime that could deploy rents within the sector for a public purpose did *not* emerge.

Secondly, and related to the previous point, the ability of the state to manage nuanced policies and regulations that allows it to allocate rents purposively and to enforce performance conditions on the sector to drive growth appears to be low. Under such conditions, a powerful coalition of forces at that national level has enforced the maximization of rent extraction and the enforcement of market-supporting regulation. However, this has had a negative impact on the sector's ability to invest, especially in the context of significant technological change, and has instead opened up the possibility of the emergence of a tiny number of players with significant holding power at the sectoral level. An interesting and potentially worrying possibility over the next period is the alignment of holding power at the national and sectoral level supporting the dominance of a very small number of private sector players. If technological changes reduce the value of the spectrum, the state will in any case not have the economic ability to extract significant rents through auctions and

regulators may well lack the power at the national political settlement to effectively regulate prices and conditions in a sector dominated by players who are powerful at the national level. This is an extreme scenario, but some directions of technological and political evolution may lead in that direction. If so, the political settlement analysis can forewarn other constituencies of the importance of organizing consumer and political coalitions to check such possibilities.

The traditional, simplistic view of resource allocation tends to view auctions as the guarantor of efficient resource allocation. This is based on a simplistic underlying model of a market that ignores the possibility that dynamic efficiency may require a state to have the ability to leave rents for private players and manage the conditions of rent allocation through an effective regulation of conditions attached to these rents. Auctions as a tool for efficient resource allocation assume that full rent extraction by the state is necessary and sufficient for static and dynamic efficiency. When auctions have been used in India, in line with a belief that they are the most efficient way to allocate resources, TSP viability and consequently the quality of service and infrastructure expansion has actually suffered. The most stable, high growth and high investment phases have been when the key private organizations and state agencies relevant at the levels of the sectoral and national political settlements have had access to rents in the sector, and the characteristics of the political settlements created opportunities and compulsions for investments and expansion. If the state is serious about its Digital India initiative, it may need to review its spectrum assignment policies to ensure that rents can be effectively used to drive growth in the sector under evolving technological conditions.

Finally, if there is one thing that this thesis establishes, it is that this is a sector that is transforming with great rapidity. Changes are driven by technology and

these changes are reflected in shifting power alignments within the sector. While this thesis has characterized the growth of the sector in the last twenty years using a specific analytical lens, the value of the use rights, the rent distributions and the underlying political settlements are all likely to change radically over time. The usefulness of the analytical framework is that it provides a robust way to continue to analyse these changing trends and to provide a framework for policy discussions that can incorporate the technological, economic and political aspects of policy feasibility. This is a more complete and robust way to explain policy evolution in dynamic contexts.



## Appendix 1: List of TSPs and Area of Operation

Number of service providers (GSM and CDMA) operating as on 30<sup>th</sup> Sept 2014

<b>Sl.No.</b>	<b>Service Provider</b>	<b>Area of Operation</b>
1	Bharti	All India
2	Aircel Group	All India
3	Reliance Communications Ltd	All India (except Assam & NE)
4	Reliance Telecom Ltd	Kolkata, MP, WB, HP, Bihar, Orissa, Assam & NE
5	Vodafone	All India
6	Tata Teleservices	All India except Assam, NE & J&K
7	IDEA/Spice	All India
8	Sistema Shyam Telelink	Delhi, Kolkata, Gujarat, Karnataka, Tamil Nadu (incl. Chennai), Kerala, UP(W), Rajasthan & W.B.
9	BSNL	All India (except Delhi & Mumbai)
10	MTNL	Delhi & Mumbai
11	Loop Telecom Pvt Ltd	Mumbai
12	Quadrant	Punjab
13	Telewings Communications Services Pvt. Ltd.^	MH, Gujarat, AP, UP(W), UP(E), Bihar
14	Videocon Telecommunications Ltd	Gujarat, Haryana, UP(W)*, UP(E)*, MP, Bihar*

\* M/s Videocon has no subscriber in UP(W), UP(E) and Bihar service areas as on 30.06.2014.

^ Telewings Communications was previously known as Unitech Group.

Source: TRAI (2014b) Quarterly Report July-Sept 2014.

## Appendix 2: Cost Break ups of TSPs

(All costs expressed as a percentage of Gross Revenue)			
	Airtel	Idea	Vodafone
Gross revenue (Rs. Million)		265189	356101
%	100	100	100
Revenue Splits			
Voice	77	83	77
Outgoing	61		
Incoming	16		
Data	16	10	9
Value Added Services (VAS)	7	7	14
Cost Breakdown			
Total Operating expenses	62	69	
Network expense and outsourcing cost	26	25	
License fee and WPC charges	12	11	
Roaming and Access charges i.e. interconnect	11	16	
Sales and Distribution	4	7	
Advertising and business promotion	1	2	
Other overheads	8	7	
EBITDA Margin	38	31	30
Depreciation and Amortization	14	17	
EBIT Margin	24	14	
Interest	4	3	
PBT	20	11	
Tax	4	4	
PAT	16	7	
CAPEX (%of gross revenue)	15	17	13
SPECTRUM LICENSE PURCHASE (Rs. Million)		104,242	

Source: Company Annual Reports 2013-14. Note Vodafone does not report India results separately.

### Appendix 3: List of Interviewees

Organisation	Contact Person	Designation	Topics Covered
Mercer Oliver Wyman, New York	Mr. Laurent Bensousson	Managing Partner, Telecoms	Telecom Industry structure worldwide, Profitability in telecoms, Spectrum valuation and auctions.
Analysis Mason, Singapore	Mr. Amrish Kacker	Head, Operator Strategy Consulting, Asia-Pacific	Network technology, spectrum scarcity, industry structure, future directions
	Mr. VS Hariharan	Private Equity Investor	Political Settlement in Indian telecom, financial performance of Indian telecom
Airtel, India	Mr. Karthik Sheth	Senior Manager (Data and Devices)	Network technology, spectrum scarcity
Assocham	Mr. TV Ramachandran	Ex-Regulatory Director, Vodafone India, Ex-Director General COAI	History of Indian Telecom Sector, Regulatory and policy features, political settlements in Indian Telecom
TRAI	Mr. Arvind Kumar	Advisor (Network, Spectrum and Licensing)	History of Indian Telecom Sector, Regulatory issues, spectrum scarcity, telecom industry structure, growth challenges for the sector
Vodafone India	Ms. Anjali Hans	VP, Policy and Regulation	Regulatory history of Indian telecom, political settlement features.
COAI	Mr. Rajan Matthews	Director General	Industry structure, challenges facing TSPs, spectrum auctions and policy, growth challenges for the sector
Airtel, India	Mr. Ravi Gandhi	Chief Regulatory Officer (Policy)	History of the sector, network economics and pricing, regulatory and policy issues in spectrum, auctions, spectrum scarcity, political settlement features
Airtel India	Mr. Srinivasan Gopalan	Director (Marketing)	Network Technology, Regulatory Policy, Spectrum scarcity, industry structure and competition

Diamond Cluster Consulting	Mr. Vinod Nair	Partner	Telecom structure dynamics, regulatory history, political settlement features
Edelweiss Equity Analysis	Mr. Peeyoosh Chaddha	Equity Analyst	TSP Performance, financial data, prospects for growth
McKinsey and Co.	Mr. Pradeep Parameshwaran	Partner	Industry analysis, Challenges facing TSPs

## Appendix 4: List of Telecom Ministers 1990-2014

Sno.	Telecom Minister	From	To	Years	Ruling Party	Prime Minister	From	To	Years
63	Kapil Sibal	15-Nov-10	26-May-14	3.5 yrs	CONGRESS	Manmohan Singh ( Re-elected: 22 May 2009)	22-May-04	26-May-14	10.0 years
62	Manmohan Singh	15-Nov-10	15-Nov-10	1 day					
61	<b>A. Raja</b>	16-May-07	14-Nov-10	3.5 Yrs					
60	<b>Dayanidhi Maran</b>	23-May-04	15-May-07	3.0 yrs					
59	Arun Shourie	29-Jan-03	22-May-04	1.4 yrs	BJP	Atal Behari Vajpayee ( Re- elected: 13 Oct 1999)	19-Mar-98	22-May-04	6.2 years
58	<b>Pramod Mahajan</b>	2-Sep-01	28-Jan-03	1.40 yrs					
57	<b>Ram Bilas Paswan</b>	13-Oct-99	1-Nov-01	1.0 yr					
56	Atal Behari Vajpayee	8-Jun-99	13-Oct-99	4 mths					
55	Jagmohan	6-Dec-98	8-Jun-99	6 mths					
54	Atal Behari Vajpayee	11-Oct-98	6-Dec-98	2 mths					
53	Ms. Sushma Swaraj	20-Apr-98	11-Oct-98	6 mths					
52	Atal Behari Vajpayee	19-Apr-98	20-Apr-98	1 day					
51	Buta Singh	21-Mar-98	19-Apr-98	1 mth					
50	Atal Behari Vajpayee	19-Mar-98	21-Mar-98	2 days					
	<b><u>Independent charge to Ministers of State</u></b>								
49 B	<b>Beni Prasad Verma</b>	10-Jul-96	19-Mar-98	1.9 yrs	Janata Dal	I.K. Gujral	21-Apr-97	19-Mar-98	1 yr
49 A	Beni Prasad Verma	1-Jun-96	10-Jul-96	1.1 mth	Janata Dal (S)	H.D. Deve Gowda	1-Jun-96	21-Apr-97	1 yr
48	Atal Behari Vajpayee	16-May-96	1-Jun-96		BJP	Atal Behari Vajpayee	16-May-96	1-Jun-96	16 days
47	<b>Sukh Ram</b>	17-Jan-93	16-May-96	3.5 yrs	CONGRESS	P.V. Narasimha Rao	21-Jun-91	16-May-96	5 years
46	Rajesh Pilot	21-Jun-91	17-Jan-93	1.5 yrs					
45	Dr. Sanjay Singh	22-Nov-90	21-Jun-91	7 mths	Janata Dal	Chandra Shekhar	10/Nov/90	21-Jun-91	7 mths
44	Chandra Shekhar	10-Nov-90	22-Nov-90	12 days					

Note:

1. This only lists the telecom ministers between 1990 and 2014.
2. All Telecom Ministers important for this thesis have been marked using a bold typeface.

Source: data from <http://www.dot.gov.in/about-us/former-ministers> , Department of Telecommunications. Table authors own.

## Appendix 5: International Tele-density Comparisons in 1996

Country	Per Capita GDP Year 1995 US\$	Teledensity Year 1996
India	365	1.54
Indonesia	1038	2.13
Philippines	1098	2.49
Brazil	4591	9.57
Chile	4714	15.59
Malaysia	4339	18.32
Spain	14260	39.25
Australia	19210	51.88
UK	18975	52.76
Germany	29489	53.84
France	26496	56.36
USA	27569	63.99

Source: Dash 2006, p.20,

Citing: TRAI, Consultation Paper No.99/1

## Appendix 6: Winners of Duopoly Licenses in 1995

Service Area	Operator 1	Operator 2
Mumbai	BPL Telecom ( <i>Now Loop Mobile</i> )	Maxtouch ( <i>Now Vodafone</i> )
Delhi	Bharti Cellular ( <i>Now Bharti Airtel</i> )	Sterling ( <i>Now Vodafone</i> )
Calcutta	Usha Martin ( <i>Now Vodafone</i> )	Modi Telstra ( <i>Now Bharti Airtel</i> )
Chennai	SkyCell ( <i>Now Bharti Airtel</i> )	RPG Cellular ( <i>Now Aircel</i> )
AP	J.T. Mobile ( <i>Now Airtel</i> )	TATA cellular ( <i>Now IDEA</i> )
Gujarat	Birla AT&T ( <i>Now IDEA</i> )	Fascel ( <i>Now Vodafone</i> )
Karnataka	Modicom ( <i>Now Spice Comm.</i> )	J.T. Mobile ( <i>Now Airtel</i> )
Maharashtra	Birla AT&T ( <i>Now IDEA</i> )	BPL Cellular ( <i>Now Vodafone</i> )
Tamil Nadu	BPL Cellular ( <i>Now Vodafone</i> )	Srinivas Cellcom ( <i>Now Aircel</i> )
Haryana	Aircel Digilink ( <i>Now Vodafone</i> )	Escotel ( <i>Now IDEA</i> )
Kerala	BPL Cellular ( <i>Now Vodafone</i> )	Escotel ( <i>Now IDEA</i> )
M.P.	RPG Cellcom ( <i>Now IDEA</i> )	Reliance Telecom
Punjab	Modicom ( <i>Now Spice Comm.</i> )	JT Mobile ( <i>Now Airtel</i> )
Rajasthan	Aircel Digilink ( <i>Now Vodafone</i> )	Hexacom ( <i>Now Airtel</i> )
UP(E)	Koshika Telecom ( <i>later cancelled</i> )	Aircel Digilink ( <i>Now Vodafone</i> )
UP(W)	Escotel ( <i>Now IDEA</i> )	Koshika Telecom
W.B.	Reliance Telecom	-
Assam	Reliance Telecom	-
Bihar	Koshika Telecom ( <i>later cancelled</i> )	Reliance Telecom
H.P.	Bharti Telenet ( <i>Now Airtel</i> )	Reliance Telecom
Orissa	Koshika Telecom ( <i>later cancelled</i> )	Reliance Telecom
North East	Hexacom ( <i>Now Airtel</i> )	Reliance Telecom

Source: Service Provider information

### Appendix 7: Summary of Licenses issued until 1999

Company	Wireless				Wireline		Total
	Metro	A	B	C	A	B	
Reliance			2	5	1		8
Rai	1		2	2			5
Sterling	1	1	3				5
BPL	1	2	1				5
Bharti	1			1		1	3
Escorts				3			3
Modi	1	1	1				3
Parasurampur ias		2	1				3
RPG	1		1		1		3
Shyam			1	1		1	3
Birla		2					2
Tata		1			1		2
Essar						1	1
Hutchison	1						1
Maloo-Nahata		1					1
Ispat					1		1
Thapar	1						1
<b>TOTAL</b>	<b>8</b>	<b>10</b>	<b>15</b>	<b>9</b>	<b>4</b>	<b>3</b>	<b>49</b>

Source: Desai (2006: 80)



## Appendix 8: The Health of the Indian Telecom Sector in 1998

### BICP Study 1998

#### Telecom Economics in the Metros

Firm	Network	Operating Costs	Depreciation	Interest	Loss
Hutch Mumbai	19%	47%	14%	20%	32%
BPL Mumbai	16%	46%	10%	27%	19%
RPG Chennai	9%	40%	26%	26%	56%
Skycell Chennai	13%	34%	27%	27%	60%

Of the 13 operating firms in the telecom space studied, 4 had negative IRRs and 4 had IRRs of less than 10%.

### ICICI Study (1998)

1. Of the 22 operators studied, only one (Bharti Telecom) made a profit in 1997-98.
2. 17% of cellular subscribers made no calls at all and 37% of subscribers had a monthly bill of less than Rs. 500.
3. License Structure: Rs.5000/line/year was charged as minimum license fee from Year 4 of operation but the maximum that could be charged by the firm to the consumers as license fees was Rs. 1870/year. In other words, 60% of license costs for firms had to be made from call charges.

By 1997, 6 cellular operators were in default of their license service obligations. By 1998, 8 cellular operators were in default.

**Source:** Desai (2006) p.80-84.

### Appendix 9: Winner of the Single License per Circle in 2001

S No.	Circle Name	Price of spectrum in 2001 (for 20 years) ( In Crores)	Operator
1	Delhi	170.7	Birla AT & T (now Idea)
2	Kolkata	78.01	Reliance
3	A.P.	103.01	Hutchison (now Vodafone)
4	H.P	1.1	ESCOTEL (now Idea)
5	NE	2	
6	Punjab	151.75	ESCOTEL (now Idea)
7	Karnataka	206.83	Hutchison (now Vodafone)
8	Rajasthan	32.25	ESCOTEL (now Idea)
9	Gujarat	109.01	Bharti Airtel
10	Haryana	21.46	Bharti Airtel
11	Kerala	40.54	Bharti Airtel
12	MP	17.45	Bharti Airtel
13	Maharashtra	189	Bharti Airtel
14	Mumbai	203.66	Bharti Airtel
15	TN in CHN	233	Bharti Airtel/Hutchison
16	UP(W)	30.55	Bharti Airtel
17	Assam	5	
18	Bihar	10	
19	J & K	2	
20	Orissa	5	
21	UP (East)	45.25	ESCOTEL (now Idea)
22	WB	1	
	Total	1,658.57	

## Appendix 10: Winners of Licenses in 2008

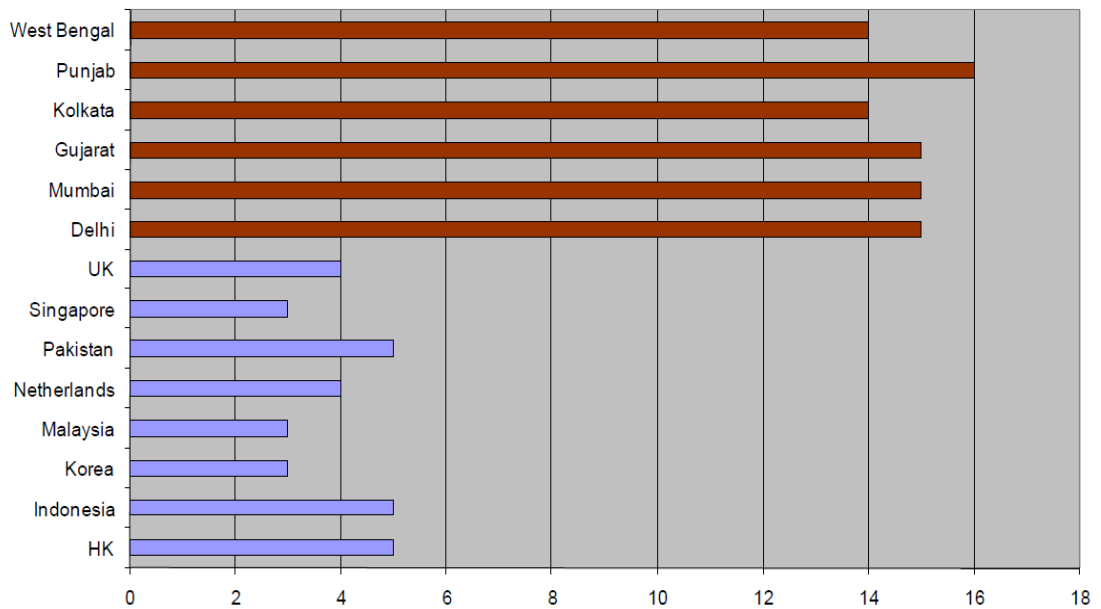
Company	Telecom regions	# of licenses	Remarks
Adonis Projects	Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh (East)	6	<p>Adonis Projects, Nahan Properties, Aska Projects, Volga Properties, Azare Properties &amp; Hudson Properties were acquired by Unitech.</p> <p>Since Unitech Infrastructure and Unitech Builders &amp; Estates were subsidiaries of Unitech Group, in 2008 Unitech had 22 2G licenses. Later that year, Telenor bought a majority share in the telecom company from the Unitech Group.</p>
Nahan Properties	Assam, Bihar, North East, Orissa, Uttar Pradesh (east), West Bengal	6	
Aska Projects	Andhra Pradesh, Kerala, Karnataka	3	
Volga Properties	Gujarat, Madhya Pradesh, Maharashtra	3	
Azure Properties	Kolkata	1	
Hudson Properties	Delhi	1	
Unitech Builders & Estates	Tamil Nadu (including Chennai)	1	
Unitech Infrastructures	Mumbai	1	
<a href="#">Loop Telecom</a>	Bihar, Gujarat, Himachal Pradesh, Kerala, Kolkata, Punjab, Rajasthan, Uttar Pradesh, West Bengal, Andhra Pradesh, Delhi, Haryana, Karnataka, Maharashtra, Odisha(Orissa), Tamil Nadu (including Chennai), Assam, Jammu & Kashmir, Madhya Pradesh	21	

Datacom Solutions	Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Kolkata, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu (including Chennai), Uttar Pradesh, West Bengal, Delhi, Mumbai	21	Operates as <a href="#">Videocon Telecom</a>
Shyam Telelink	Madhya Pradesh, Kerala, Kolkata, Punjab, Uttar Pradesh, West Bengal, Andhra Pradesh, Delhi, Haryana, Karnataka, Maharashtra, Odisha, Tamil Nadu (including Chennai), Assam, Jammu & Kashmir, North East	17	Shyam Telelink & Shyani Telelink have a combined 21 licenses. In late 2008 Russia-based <a href="#">Sistema</a> bought a majority share in the company, which now operates as <a href="#">MTS India</a> .
Shyani Telelink	Mumbai, Bihar, Gujarat, Himachal Pradesh	4	
Swan Telecom	Andhra Pradesh, Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Punjab, Rajasthan, Tamil Nadu (including Chennai), Uttar Pradesh, Delhi, Mumbai	13	In 2008, Swan merged with Allianz Infratech; late in the year Abu Dhabi's Etisalat bought about 45 percent of the company, renaming it Etisalat DB Telecom.
Allianz Infratech	Bihar, Madhya Pradesh	2	
<a href="#">Idea Cellular</a>	Assam, Punjab, Karnataka, Jammu and Kashmir, North East, Kolkata, West Bengal, Odisha(Orissa), Tamil Nadu (including Chennai)	9	Since <a href="#">Idea Cellular</a> bought <a href="#">Spice Communications</a> in 2008 for ₹27 billion (US\$410 million), of the 122 spectrum licenses sold in 2008 Idea owned 13
<a href="#">Spice Communications</a>	Delhi, Andhra Pradesh, Haryana, Maharashtra	4	

<a href="#">S Tel</a>	Assam, Jammu and Kashmir, Odisha(Orissa), North East, Bihar, Himachal Pradesh	6	In January 2009, <a href="#">Bahrain Telecommunications</a> agreed to buy 49 percent of S Tel for \$225 million. <a href="#">C Sivasankaran</a> owns the remaining . In May 2009, <a href="#">Sahara Group</a> bought an 11.7-percent share in S Tel
<a href="#">Tata Teleservices</a>	Jammu and Kashmir, Assam, North East	3	In late 2008 Tata sold a 26-percent share to the <a href="#">NTT DoCoMo</a> for about ₹130.7 billion (US\$2.0 billion), or an <a href="#">enterprise value</a> of ₹502.69 billion (US\$7.6 billion).

**Source:** Built from various news reports from the period and verified with telecom sector consultants and service providers. The TRAI and DoT websites do not provide the list of awarded licenses in 2008 as they have subsequently been cancelled.

## Appendix 11: Over-Crowded Market in 2008



Horizontal Axis: Number of Licensed Operators in the market

Note: Includes operators for whom spectrum was assigned or promised but had not begun operation.

Operators with cdma and gsm are counted as two operators.

Source: (Lewin 2008) p.7, built from data from COAI and media reports. Available from GSMA website.

## Appendix 12: Increasing Competition 2010

Service Providers	Licenses Held	Licenses Held
	Q4 2005	Q1 2010
BSNL/MTNL	23	23
Bharti	23	23
Reliance	23	23
Tata Teleservices	20	23
Hutch/ Vodafone		
Essar	13	23
Aircel	9	18
Idea	8	23
BPL / Loop	4	1
<u>Spice</u>	2	
HFCL	1	1
<u>Shyam</u>	1	11
<u>Escorts</u>	3	
<u>Unitech</u>	0	8
<u>S Tel</u>	0	3
<u>Videocon</u>	0	2
<u>Etisalat</u>	0	9
<b>Total</b>	130	191

Note: **Players in Red**: sold stake to Idea **Players in Blue**: new entrants to the market

	No. of Players	No. of Players
<b>All India</b>	<b>3</b>	<b>6</b>
15-20 circles	1	1
10-15 circles	1	1
5-10 circles	2	2
< 5 circles	5	4
Number of players	12	14
<b>Circles/ player</b>	<b>10.8</b>	<b>13.6</b>
<b>Players/circle</b>	<b>5.7</b>	<b>8.3</b>

Source: (Telegeography 2010), TRAI data

## Appendix 13: License Winners in 2010

### Circle wise and operator wise spectrum allocation in April/May 2010 3G/BWA Auction

3G Spectrum Allocation									
Service Areas	Amount Paid in ` Crs.	Airtel	Vodafone	Reliance	Idea	Tata	Aircel	Stel	BSNL/ MTNL
Delhi	3,316.93	3G	3G	3G					3G
Mumbai	3,247.07	3G	3G	3G					3G
Maharashtra	1,257.82		3G		3G	3G			3G
Gujarat	1,076.06		3G		3G	3G			3G
Andhra Pradesh	1,373.14	3G			3G		3G		3G
Karnataka	1,579.91	3G				3G	3G		3G
Tamil Nadu	1,464.94	3G	3G				3G		3G
Kolkata	544.26		3G	3G			3G		3G
Kerala	312.48				3G	3G	3G		3G
Punjab	322.01			3G	3G	3G	3G		3G
Haryana	222.58		3G		3G	3G			3G
UP (E)	364.57		3G		3G		3G		3G
UP (W)	514.04	3G			3G	3G			3G
Rajasthan	321.03	3G		3G		3G			3G
Madhya Pradesh	258.36			3G	3G	3G			3G
West Bengal	123.63	3G	3G	3G			3G		3G
Himachal Pradesh	37.23	3G		3G	3G			3G	3G
Bihar	203.46	3G		3G			3G	3G	3G
Orissa	96.98			3G			3G	3G	3G
Assam	41.48	3G		3G			3G		3G
North East	42.3	3G		3G			3G		3G
Jammu & Kashmir	30.3	3G		3G	3G		3G		3G
3G Spectrum allocation in circles		13	9	13	11	9	13	3	22
Total Amount in ` Crs.	16,750.58	12,295.46	11,617.86	8,585.04	5,768.59	5,864.29	6,499.46	337.67	16,750.58
Total Amount in ` Crs.		67,718.95							



BWA Spectrum Allocation									
Service Areas	Amount Paid in ` Crs.	Airtel	Infotel	Qualcomm	Tikona	Augere	Aircel	BSNL/ MTNL	No. of Operators
Delhi	2,241.02		BWA	BWA				BWA	3
Mumbai	2,292.95		BWA	BWA				BWA	3
Maharashtra	915.64	BWA	BWA					BWA	3
Gujarat	613.85		BWA		BWA			BWA	3
Andhra Pradesh	1,059.12		BWA				BWA	BWA	3
Karnataka	1,543.25	BWA	BWA					BWA	3
Tamil Nadu	2,069.45		BWA				BWA	BWA	3
Kolkata	523.20	BWA	BWA					BWA	3
Kerala	258.67		BWA	BWA				BWA	3
Punjab	332.27	BWA	BWA					BWA	3
Haryana	119.90		BWA	BWA				BWA	3
UP (E)	142.50		BWA		BWA			BWA	3
UP (W)	183.87		BWA		BWA			BWA	3
Rajasthan	97.32		BWA		BWA			BWA	3
Madhya Pradesh	124.66		BWA			BWA		BWA	3
West Bengal	70.97		BWA				BWA	BWA	3
Himachal Pradesh	20.66		BWA		BWA			BWA	3
Bihar	99.28		BWA				BWA	BWA	3
Orissa	63.63		BWA				BWA	BWA	3
Assam	33.02		BWA				BWA	BWA	3
North East	21.27		BWA				BWA	BWA	3
Jammu & Kashmir	21.27		BWA				BWA	BWA	3
<b>BWA Spectrum allocation in circles</b>		<b>4</b>	<b>22</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>8</b>	<b>22</b>	
<b>Total Amount in ` Crs.</b>	<b>12,847.77</b>	<b>3,314.36</b>	<b>12,847.77</b>	<b>4,912.54</b>	<b>1,058.20</b>	<b>124.66</b>	<b>3,438.01</b>	<b>12,847.77</b>	

Total Amount in ` Crs. 38,543.31

**Note: Infotel, who won BWA spectrum in all circles, has been rebranded Reliance JIO**

Source: DoT website, verified with Service provider information

### Appendix 14: License winners in 2012

Circle wise and operator wise spectrum allocation in Nov 2012 Auction (1800 MHz)

Service Area	Provisional Winning Price per block (in Rs. Cr.)	Airtel	Idea	Telenor	Vodafone	Videocon
Andhra Pradesh	286.91	-	-	4	-	-
Assam	8.67	1	4	-	2	-
Bihar	46.43	-	1	4	2	4
Delhi	0	-	-	-	-	-
Gujarat	224.84	-	-	4	-	4
Haryana	46.52	-	-	-	2	4
Himachal Pradesh	7.78	-	-	-	1	-
Jammu & Kashmir	6.33	-	4	-	2	-
Karnataka	0	-	-	-	-	-
Kerala	65.3	-	-	-	1	-
Kolkata	113.72	-	4	-	-	-
Madhya Pradesh	53.99	-	-	-	2	4
Maharashtra	262.81	-	-	4	1	-
Mumbai	0	-	-	-	-	-
North East	8.84	-	4	-	2	-
Orissa	20.27	-	4	-	2	-
Punjab	67.28	-	-	-	1	-
Rajasthan	0	-	-	-	-	-
Tamil Nadu	306.09	-	4	-	-	-
Uttar Pradesh (East)	76.17	-	-	4	1	4
Uttar Pradesh (West)	107.41	-	-	4	2	4
West Bengal	25.84	-	5	-	2	-
<b>Total Payout (in Rs. Cr.)</b>		<b>8.67</b>	<b>2,031</b>	<b>4,018</b>	<b>1,128</b>	<b>2,221</b>

Source: Service provider information.

## Appendix 15: License Allocation in 2013

Circle wise and operator wise spectrum allocation in March 2013 Auction (800 MHz)

Service Area	Provisional Winning Price per block	MTS
Delhi	450.49	3.75
Gujarat	146.15	3.75
Karnataka	214.58	3.75
Kerala	42.45	3.75
Kolkata	73.92	3.75
Tamil Nadu	198.96	3.75
Uttar Pradesh (West)	69.82	3.75
West Bengal	16.79	3.75
<b>Total Payout</b>	<b>3639.48</b>	

Source: (Prasad and Sridhar 2014: 268-269)

## Appendix 16: Spectrum Allocation 2014

Circle wise and operator wise spectrum allocation in Feb 2014 Auction (900/1800 MHz)

Circles	Winning Price	Spectrum Sold (MHz)							
	Rs. Cr./MHz	Airtel	Vodafone	Reliance JIO	Idea	Aircel	Uninor	RCOM	Total
<b>900 MHz</b>									
Del	741	6	5	-	5	-	-	-	16
Mum	563.1	5	11	-	-	-	-	-	16
Kolkata	194.6	7	7	-	-	-	-	-	14
<b>1800 MHz</b>									
Del	364	7	8	5.4	0.6	-	-	-	21
Mum	272	6	8.2	6.6	2	-	-	0.6	23.4
Kolkata	73	5	8	5	-	-	-	-	18
KK	155	8.8	5	5	5	-	-	-	23.8
TN+CHN	208	5	-	6.2	-	-	-	-	11.2
AP	163	8.8	0.6	5.8	6	-	1.4	-	22.6
PB	54	8.2	0.6	-	8	-	-	-	16.8
Gujarat	237.8	-	4.4	6	1.6	-	-	-	12
Maharashtra	290.4	-	-	5	9	-	-	-	14
RAJ	26	8.2	0.8	-	-	1.6	-	-	10.6
OR	16	5	-	5	-	-	-	-	10
NE	7	7	-	6.4	5	1.8	-	-	20.2
AS	36.1	-	-	5.4	-	-	6	-	11.4
Ker	52	5	7	5	10	-	-	-	27
WB	24.6	4.4	-	5.6	-	1.2	-	-	11.2
HP	6	10.2	-	-	-	-	-	-	10.2
MP	50.4	5.8	-	6.4	7	-	-	-	19.2
HAR	27	-	2.4	-	6	-	-	-	8.4
BH	43.1	-	-	-	-	-	2.2	-	2.2
UPE	64	-	4	-	-	1.8	1.8	-	7.6
UPW	95	-	-	-	-	-	2	-	2
JK	6.1	2.6	-	-	-	1.8	-	-	4.4
<b>TOTAL</b>		<b>115</b>	<b>72</b>	<b>78.8</b>	<b>65.2</b>	<b>8.2</b>	<b>13.4</b>	<b>0.6</b>	<b>353.2</b>

Source: Service Provider Information

## Appendix 17: Summary Spectrum Holdings by Operator

Summary Spectrum Holdings by Circle and Operator (As of 31st Dec 2014)												
S No	Circle	800	800	800	800	900	900	900	900	900	900	900
		BSNL/MTNL	Rcom/RTL	Tata	TOTAL	BSNL/MTNL	Airtel	Vodafone	Idea	Rcom/RTL	Aircel	TOTAL
1	A.P.	3.8	5.0	2.5	11.3	6.2	7.8	0.0	6.2	0.0	0.0	20.2
2	Assam*	2.5	2.5	0.0	5.0	6.2	1.8	0.0	0.0	6.2	4.4	18.6
3	Bihar	2.5	5.0	2.5	10.0	6.2	6.2	0.0	0.0	6.2	0.0	18.6
4	Delhi	3.8	5.0	3.8	12.5	6.2	6.0	5.0	5.0	0.0	0.0	22.2
5	Gujarat	2.5	3.8	2.5	8.8	6.2	0.0	7.8	6.2	0.0	0.0	20.2
6	HP	2.5	2.5	2.5	7.5	6.2	6.2	0.0	0.0	6.2	0.0	18.6
7	Haryana	2.5	3.8	2.5	8.8	6.2	0.0	6.2	6.2	0.0	0.0	18.6
8	J & K	2.5	2.5	0.0	5.0	8.0	6.2	0.0	0.0	0.0	4.4	18.6
9	Karnataka	2.5	5.0	2.5	10.0	6.2	7.8	0.0	6.2	0.0	0.0	20.2
10	Kerala	3.8	5.0	2.5	11.3	6.2	0.0	6.2	6.2	0.0	0.0	18.6
11	Kolkata	2.5	5.0	2.5	10.0	6.2	7.0	7.0	0.0	0.0	0.0	20.2
12	Maharashtra	2.5	5.0	2.5	10.0	6.2	0.0	6.2	7.8	0.0	0.0	20.2
13	MP	2.5	5.0	2.5	10.0	6.2	0.0	0.0	6.2	6.2	0.0	18.6
14	Mumbai	2.5	5.0	3.8	11.3	6.2	5.0	11.0	0.0	0.0	0.0	22.2
15	NE	2.5	2.5	0.0	5.0	6.2	4.4	0.0	0.0	4.4	4.4	19.4
16	Orissa	2.5	3.8	2.5	8.8	6.2	6.2	0.0	0.0	6.2	0.0	18.6
17	Punjab	2.5	3.8	2.5	8.8	6.2	7.8	0.0	7.8	0.0	0.0	21.8
18	Rajasthan	2.5	3.8	2.5	8.8	6.2	6.2	6.2	0.0	0.0	0.0	18.6
19	TN in CHN	2.5	5.0	2.5	10.0	6.2	6.2	6.2	0.0	0.0	7.8	26.4
20	UP (East)	2.5	5.0	2.5	10.0	6.2	6.2	6.2	0.0	0.0	0.0	18.6
21	UP(W)	2.5	5.0	2.5	10.0	6.2	0.0	6.2	6.2	0.0	0.0	18.6
22	WB	2.5	3.8	2.5	8.8	6.2	4.4	4.4	0.0	4.4	0.0	19.4
	<b>Grand Total</b>	<b>58.8</b>	<b>92.5</b>	<b>50.0</b>	<b>201.3</b>	<b>138.2</b>	<b>95.4</b>	<b>78.6</b>	<b>64.0</b>	<b>39.8</b>	<b>21.0</b>	<b>437.0</b>

S No	Circle	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	TOTAL	2G Spectrum
		BSNL/MTNL	Airtel	Vodafone	Idea	Rcom/RTL	Aircel	Tata	Uninor	Reliance Jio	TOTAL		
1	A.P.	3.8	11.0	6.8	7.8	4.4	4.4	4.4	6.4	5.8	54.8	86.3	
2	Assam*	3.8	5.7	6.9	5.0	0.0	1.8	0.0	6.0	5.4	34.6	58.2	
3	Bihar	3.8	3.0	6.9	5.7	1.8	4.4	4.4	7.2	0.0	37.2	65.8	
4	Delhi	6.2	7.0	8.0	8.6	4.4	4.4	0.0	0.0	5.4	44.0	78.7	
5	Gujarat	1.2	6.2	6.4	1.6	4.4	4.4	4.4	5.0	6.0	39.6	68.6	
6	HP	3.8	10.2	5.7	4.4	0.0	4.4	4.4	0.0	0.0	32.9	59.0	
7	Haryana	3.8	6.2	4.9	6.0	4.4	4.4	4.4	0.0	0.0	34.1	61.5	
8	J & K	0.0	2.6	6.9	5.0	4.4	1.8	0.0	0.0	0.0	20.7	44.3	
9	Karnataka	3.8	11.0	13.0	5.0	4.4	4.4	4.4	0.0	5.0	51.0	81.2	
10	Kerala	3.8	11.2	8.3	11.8	4.4	4.4	4.4	0.0	5.0	53.3	83.1	
11	Kolkata	3.8	5.0	8.0	5.0	6.2	4.4	4.4	0.0	5.0	41.8	72.0	
12	Maharashtra	3.8	8.2	1.3	11.0	4.4	4.4	4.4	5.0	5.0	47.5	77.7	
13	MP	3.8	12.0	6.9	8.8	0.0	4.4	4.4	0.0	6.4	46.7	75.3	
14	Mumbai	6.2	15.2	8.2	6.4	5.0	4.4	4.4	0.0	6.6	56.4	89.9	
15	NE	3.8	8.8	6.9	10.0	1.8	1.8	0.0	0.0	6.4	39.5	63.9	
16	Orissa	3.8	6.8	6.9	5.0	0.0	4.4	4.4	0.0	5.0	36.3	63.7	
17	Punjab	0.0	8.2	8.1	8.0	4.4	4.4	4.4	0.0	0.0	37.5	68.0	
18	Rajasthan	1.8	10.2	0.8	6.2	4.4	6.0	4.4	0.0	0.0	33.8	61.2	
19	TN in CHN	3.8	8.0	1.0	5.0	4.4	2.0	4.4	0.0	6.2	34.8	71.2	
20	UP (East)	3.8	1.0	7.3	6.2	4.4	6.2	4.4	6.8	0.0	40.1	68.7	
21	UP(W)	3.8	6.2	2.5	1.8	4.4	4.4	4.4	7.0	0.0	34.5	63.1	
22	WB	1.8	6.2	4.3	6.3	1.8	5.6	4.4	0.0	5.6	36.0	64.1	
	<b>Grand Total</b>	<b>74.2</b>	<b>169.9</b>	<b>135.8</b>	<b>140.5</b>	<b>73.8</b>	<b>91.2</b>	<b>79.2</b>	<b>43.4</b>	<b>78.8</b>	<b>886.7</b>	<b>1525.0</b>	

		2100	2100	2100	2100	2100	2100	2100	2100	2100		
S No	Circle	BSNL/MTNL	Airtel	Vodafone	Idea	Rcom/RTL	Aircel	Tata	STEL	TOTAL		
1	A.P.	5	5		5		5			20		
2	Assam*	5	5			5	5			20		
3	Bihar	5	5			5	5		5	25		
4	Delhi	5	5	5		5				20		
5	Gujarat	5	0	5	5			5		20		
6	HP	5	5		5	5			5	25		
7	Haryana	5	0	5	5			5		20		
8	J & K	5	5		5	5	5			25		
9	Karnataka	5	5				5	5		20		
10	Kerala	5	0		5		5	5		20		
11	Kolkata	5	0	5		5	5			20		
12	Maharashtra	5	0	5	5			5		20		
13	MP	5	0		5	5		5		20		
14	Mumbai	5	5	5	0	5			0	20		
15	NE	5	5			5	5			20		
16	Orissa	5	0			5	5		5	20		
17	Punjab	5	0		5	5	5	5		25		
18	Rajasthan	5	5			5		5		20		
19	TN in CHN	5	5	5	0	0	5	0	0	20		
20	UP (East)	5	0	5	5		5			20		
21	UP(W)	5	5		5			5		20		
22	WB	5	5	5		5	5			25		
	<b>Grand Total</b>	<b>110</b>	<b>65</b>	<b>45</b>	<b>55</b>	<b>65</b>	<b>65</b>	<b>45</b>	<b>15</b>	<b>465</b>		

		2300	2300	2300	2300	2300	2300	2300				
S No	Circle	BSNL/MTNL	Airtel	Reliance Jio	Aircel	Tikona	Augere	TOTAL				
1	A.P.	20		20	20			60				
2	Assam*	20		20	20			60				
3	Bihar	20		20	20			60				
4	Delhi	20	20	20				60				
5	Gujarat	20		20		20		60				
6	HP	20		20		20		60				
7	Haryana	20	20	20				60				
8	J & K	20		20	20			60				
9	Karnataka	20	20	20				60				
10	Kerala	20	20	20				60				
11	Kolkata	20	20	20				60				
12	Maharashtra	20	20	20				60				
13	MP	20		20			20	60				
14	Mumbai	20	20	20				60				
15	NE	20		20	20			60				
16	Orissa	20		20	20			60				
17	Punjab	20	20	20				60				
18	Rajasthan	20		20		20		60				
19	TN in CHN	20		20	20			60				
20	UP (East)	20		20		20		60				
21	UP(W)	20		20		20		60				
22	WB	20		20	20			60				
	<b>Grand Total</b>	<b>440</b>	<b>160</b>	<b>440</b>	<b>160</b>	<b>100</b>	<b>20</b>	<b>1320</b>				

Note:

All figs in MHz

BWA allocations of Qualcomm in Delhi, Mumbai, Haryana and Kerala have been shown under Airtel. Some BWA Spectrum held by BSNL/MTNL was assigned earlier and not obtained through auction. The validity of the BWA spectrum is 20 years.

Source: TRAI, DoT data.

## Appendix 18: Total 2G Spectrum holding by operator

### 800/900/1800 MHz 2G Spectrum Held by TSP by Circle

2G Spectrum Holdings Of Each Service Provider by Circle (Mar 2014)															
S No	Circle	Airtel	Aircel	Vodafone	Rcom	RTL	Idea	BSNL	Tata	Uninor	MTNL	Reliance JIO	TOTAL	No. of TSPs	AVG
1	A.P.	18.80	4.40	6.80	9.40	-	14.00	13.75	6.90	6.40	-	5.80	86.25	9	9.58
2	Assam*	7.45	6.20	6.90	-	8.70	5.00	12.50	-	6.00	-	5.40	58.15	8	7.27
3	Bihar	9.20	4.40	6.90	5.00	8.00	5.65	12.50	6.90	7.20	-	-	65.75	9	7.31
4	Delhi	13.00	4.40	13.00	9.40	-	13.60	-	3.75	-	16.15	5.40	78.70	8	9.84
5	Gujarat	6.20	4.40	14.20	8.15	-	7.80	9.90	6.90	5.00	-	6.00	68.55	9	7.62
6	H.P	16.40	4.40	5.65	2.50	6.20	4.40	12.50	6.90	-	-	-	58.95	8	7.37
7	Haryana	6.20	4.40	11.10	8.15	-	12.20	12.50	6.90	-	-	-	61.45	7	8.78
8	J & K	8.80	6.20	6.90	6.90	-	5.00	10.50	-	-	-	-	44.30	6	7.38
9	Karnataka	18.80	4.40	13.00	9.40	-	11.20	12.50	6.90	-	-	5.00	81.20	8	10.15
10	Kerala	11.20	4.40	14.45	9.40	-	18.00	13.75	6.90	-	-	5.00	83.10	8	10.39
11	Kolkata	12.00	4.40	15.00	5.00	6.20	5.00	12.50	6.90	-	-	5.00	72.00	9	8.00
12	Maharashtra	8.20	4.40	7.45	9.40	-	18.80	12.50	6.90	5.00	-	5.00	77.65	9	8.63
13	MP	12.00	4.40	6.90	5.00	6.20	15.00	12.50	6.90	-	-	6.40	75.30	9	8.37
14	Mumbai	20.20	4.40	19.20	10.00	-	6.40	-	8.15	-	14.90	6.60	89.85	8	11.23
15	NE	13.20	6.20	6.90	-	8.70	10.00	12.50	-	-	-	6.40	63.90	7	9.13
16	Orissa	13.00	4.40	6.90	3.75	6.20	5.00	12.50	6.90	-	-	5.00	63.65	9	7.07
17	Punjab	16.00	4.40	8.05	8.15	-	15.80	8.70	6.90	-	-	-	68.00	7	9.71
18	Rajasthan	16.40	6.00	7.00	8.15	-	6.20	10.50	6.90	-	-	-	61.15	7	8.74
19	TN in CHN	14.20	9.80	7.20	9.40	-	5.00	12.50	6.90	-	-	6.20	71.20	8	8.90
20	UP (East)	7.20	6.20	13.45	9.40	-	6.20	12.50	6.90	6.80	-	-	68.65	8	8.58
21	UP(W)	6.20	4.40	8.70	9.40	-	8.00	12.50	6.90	7.00	-	-	63.10	8	7.89
22	WB	10.60	5.60	8.70	3.75	6.20	6.25	10.50	6.90	-	-	5.60	64.10	9	7.12
	<b>Grand Total</b>	<b>265.25</b>	<b>112.20</b>	<b>214.35</b>	<b>149.70</b>	<b>56.40</b>	<b>204.50</b>	<b>240.10</b>	<b>129.20</b>	<b>43.40</b>	<b>31.05</b>	<b>78.80</b>			

Note: All figs in MHz. Spectrum holding will be 2X above figs to account for uplink/downlink in paired spectrum.

Source: TRAI data

## Appendix 19: DoT Press Release of 19/10/2007

Department of Telecommunications

### PRESS RELEASE

“Given the central aim of NTP 99 to ensure rapid expansion of tele-density” and the objective “to transform in a time bound manner, the telecommunications sector to a **greater competitive environment** in both urban and rural areas providing equal opportunities and level playing field for all players”, the recommendations of TRAI that there should be **no cap on the number of access provider in any service area** has been considered by the Government and has been accepted.

The Unified (Telecom) Access Services (UAS) licenses are technology neutral and the licensees are required to provide access services and meet the stipulated roll-out obligations using wireline and / or wireless technologies by utilizing network equipment that meets the prescribed standards. The allocation of radio-spectrum and grant of Wireless License shall be subject to availability. In case UAS Licensee is not allocated spectrum due to non-availability, the Licensee shall endeavor to roll out services using wireline technologies. It has also been decided that the roll out for wireless services shall be reckoned from the date of spectrum allocation. This will also apply to those licensees who are awaiting initial spectrum allotment.

TRAI had recommended to enhance the subscriber link criterion for allocation of frequency spectrum to UAS/CMTS licensees and to set up a committee to study further allocation of spectrum. Government has accepted the TRAI's recommendation of **enhanced subscriber linked criterion for frequency allocation** and has set up a committee in Telecom Engineering Centre (TEC) to further study and give a report to the Government.

In order to further enhance the penetration of access services for rapid expansion of teledensity, it has also been decided that **the existing private UAS Licensees may be permitted to expand their existing networks by using alternate wireless technology** i.e. the present UAS Licensee who is using GSM technology for wireless access may be permitted to use CDMA technology and vice-versa. The spectrum for the alternate technology, CDMA or GSM (as the case may be) shall be allocated in the applicable frequency band subject to availability after payment of prescribed fee. Allocation of spectrum for the alternate technology may be done to private UAS Licensees on payment of prescribed fee, which will be **an amount equal to the amount prescribed as entry fee for getting a new UAS licence in the same service area**. The existing UAS Licensees, who have already applied for allocation of spectrum for the alternate technology shall also be considered for allocation of spectrum in alternate technology from the date of payment of prescribed fee. BSNL and MTNL being incumbent operators shall be permitted usage of alternative technology and allocated spectrum for the alternate technology without paying the prescribed fee. For the purpose of



payment of licence fee and spectrum charges, the stream wise revenue of different technologies shall be considered.

At the time of further allotment of spectrum in any technology, allotment will be subject to the condition that in case the eligibility of the licensee for allocated spectrum in other technology falls below the criterion set for spectrum allotment in the specified technology for the last consecutive six months then corresponding chunk of spectrum in that technology will be surrendered by the licensee before any further allotment of spectrum is considered.

The Access Services providers shall endeavor to use more efficient methods and optimum technologies for spectrum utilization. In order to encourage Licensees to use all available methods for efficient spectrum utilization, the "Spectrum Enhancement Charge", in addition to annual spectrum charges based on revenue share, may be levied at the time of additional spectrum allotment to licensees beyond 10MHz for GSM and 5MHz for CDMA. For each additional 1 MHz or part thereof "Spectrum Enhancement Charge" @ Rs 16 Crore, 8 Crore, 3 Crore for Metro/ Category 'A', Category 'B', Category 'C' service areas respectively may be charged.

SACFA clearance should be given in a stipulated time frame of 60 days unless there are circumstances to the contrary. For the Substantial equity holding in the UAS/CMTS Licensee Company, there is no change in the existing criterion.

For failure to meet roll out obligation within prescribed time schedule, the existing stipulation of termination of license under Clause 35.2 of UAS Licence Agreement shall continue. In addition, Performance Bank Guarantee (PBG) may also be forfeited and the service provider may be asked to resubmit PBG of the same amount. No additional spectrum may be allocated to licensees without fulfilling the roll out obligations. In case of spectrum auction, a Licensee, who has not met roll-out obligation against an existing licence, should not be eligible to participate in any spectrum auction till the roll out obligation is met. Any proposal for permission for merger shall not be entertained till the roll out obligation is met; however, request for permission for acquisition may be entertained. Roll out for each licensed service area is to be dealt separately. In case of violation of roll out conditions, government may consider termination of license in certain cases.

Self certification scheme for completion of roll-out obligation is already in place and shall continue. The authorized testing party of the Licensor shall issue the required test certificate of compliance within 120 days from the date of submission of self certificate which is correct and complete in all respect.

Merger & Acquisition guidelines will be issued separately.

## Appendix 20: Comparative Costings for 900 vs. 1800 MHz on 2G

	2G @ 900MHz	2G @ 1,800MHz
Spectrum allocation (MHz) [A]	5	5
Intersite distance (m)	4,508	2,962
Coverage area (sq km) [B]	18	8
2G: No. of channels of 200kHz [C = Ax1000 / 200]	25	25
Bandwidth requirement for voice call	7 calls supported per channel of 200kHz	7 calls supported per channel
No. of simultaneous calls supported per site [D]	175	175
Cost of 3-sector site (Rs)	660000	660000
Life of equipment (years)	15	15
Annual depreciation (Rs)	44,000	44,000
Network opex per site (Rs/month)	45,000	45,000
Network opex per site (Rs/year)	540,000	540,000
Total annual operating cost per site (incl. depreciation)(Rs.) E	584,000	584,000
Total inhabited land area in India (sq km)	2,159,870	2,159,870
70% of area (sq km) [F]	1,511,909	1,511,909
No. sites required to cover 70% inhabited area [G = F / B]	85,904	198,935
Voice capacity of network (mn simultaneous calls) [H = G X D]	15	35
Total annual operating cost for network to cover 70% area (Rs)	50,168	116,178
Spectrum cost per MHz (for 20 yrs) (Rs mn) [EGoM / 2010]	60000	30000
Amortisation cost for allocated spectrum over 20 yrs (Rs mn)	15000	7500
Total annual operating costs including spectrum amortisation	65168	123678
Vs 2G @ 900MHz	100%	190%
Total operating cost per unit voice capacity (Rs) [L = K / H]	4,335	3,553
vs 2G @ 900MHz	100%	82%

Source: Adapted from (Tirumalai and Shah 2012), sourced from telecom analyst.

## Appendix 21: Market shares of 900 MHz TSPs vs 1800 MHz TSPs

Circle Category	A	C	C	M	A	B	C
	AP	Assam	Bihar	Delhi	Gujarat	Haryana	Himachal
Circle total revenue	3328	777	2383	3440	2533	964	326
900 Operators Revenue (Rs cr)	2275	327	1359	2278	1617	619	224
900 Operators Revenue Excl MTNL/BSNL	2085	268	1283	2151	1518	543	185
1800 Operators Revenue	1052	449	1023	1163	916	345	103
900 Operators 900 + 1800 Spectrum	28	22	27	32	23	25	22
MTNL/BSNL 900 Spectrum	6	6	6	6	6	6	6
MTNL/BSNL 1800 Spectrum	4	4	4	6	1	4	4
900 Operators 900+1800 Spectrum excl MTNL	18	12	17	20	16	15	12
900 Operators 1800 spectrum (excl MTNL)	4	2	5	4	2	3	
1800 Operators 900 + 1800 Spectrum (excl MTNL)	24	19	31	17	29	24	19
1800 Operators 900 Spectrum Holding (excl MTNL)		2					
<b>Key Metrics</b>							
900 Operators Revenue Share	68%	42%	57%	66%	64%	64%	69%
900 Operators Revenue Share excl MTNL/BSNL	63%	35%	54%	63%	60%	56%	57%
900 Operators Share of 900 + 1800 Spectrum excl MTNL/BSNL	34%	30%	29%	41%	30%	30%	30%
% 900 Operators spectrum that is 1800	18%	13%	22%	17%	11%	14%	#VALUE!
900 Operators excl MTNL rev/quarter/mhz	116	22	75	108	95	36	15
1800 Operators excl MTNL rev/quarter/mhz	43	23	33	69	31	14	5
		irtel effect					
900:1800 Rev/Mhz Ratio	269%	93%	229%	155%	305%	258%	275%
Circle Category	C	A	B	M	B	A	M
	J & K	Karnataka	Kerela	Kolkata	MP	Maharashtra	Mumbai
Circle total revenue	493	3202	1869	1103	2197	3681	2730
900 Operators Revenue (Rs cr)	391	1973	1415	673	1221	2288	1186
900 Operators Revenue Excl MTNL/BSNL	338	1792	1156	644	1110	2112	1119
1800 Operators Revenue	102	1229	454	429	976	1393	1545
900 Operators 900 + 1800 Spectrum	20	26	25	27	24	27	29
MTNL/BSNL 900 Spectrum	8	6	6	6	6	6	6
MTNL/BSNL 1800 Spectrum		4	4	4	4	4	6
900 Operators 900+1800 Spectrum excl MTNL	12	16	15	17	14	17	16
900 Operators 1800 spectrum (excl MTNL)	2	2	3	4	2	3	2
1800 Operators 900 + 1800 Spectrum (excl MTNL)	16	21	19	25	29	26	27
1800 Operators 900 Spectrum Holding (excl MTNL)							
<b>Key Metrics</b>							
900 Operators Revenue Share	79%	62%	76%	61%	56%	62%	43%
900 Operators Revenue Share excl MTNL/BSNL	69%	56%	62%	58%	50%	57%	41%
900 Operators Share of 900 + 1800 Spectrum excl MTNL/BSNL	34%	34%	34%	33%	27%	32%	29%
% 900 Operators spectrum that is 1800	13%	12%	16%	18%	11%	16%	11%
900 Operators excl MTNL rev/quarter/mhz	27	111	75	38	78	122	69
1800 Operators excl MTNL rev/quarter/mhz	6	58	23	17	34	53	58
900:1800 Rev/Mhz Ratio	436%	191%	319%	221%	230%	232%	120%

Circle Category	C	C	B	B	A	B	B
	NE	Orissa	Punjab	Rajasthan	TN	UP East	UP West
Circle total revenue	476	932	1624	2272	3667	2896	1969
900 Operators Revenue (Rs cr)	393	569	1028	1565	3045	1858	1179
900 Operators Revenue Excl MTNL/BSNL	348	462	927	1448	2810	1683	1081
1800 Operators Revenue	83	363	596	707	622	1038	790
900 Operators 900 + 1800 Spectrum	29	23	22	22	41	27	27
MTNL/BSNL 900 Spectrum	6	6	6	6	6	6	6
MTNL/BSNL 1800 Spectrum	4	4		2	4	4	4
900 Operators 900+1800 Spectrum excl MTNL	19	13	16	14	31	17	17
900 Operators 1800 spectrum (excl MTNL)	5	1		2	11	4	4
1800 Operators 900 + 1800 Spectrum (excl MTNL)	12	21	25	25	14	31	31
1800 Operators 900 Spectrum Holding (excl MTNL)							
<b>Key Metrics</b>							
900 Operators Revenue Share	83%	61%	63%	69%	83%	64%	60%
900 Operators Revenue Share excl MTNL/BSNL	73%	50%	57%	64%	77%	58%	55%
900 Operators Share of 900 + 1800 Spectrum excl MTNL/BSNL	46%	30%	33%	30%	57%	29%	29%
% 900 Operators spectrum that is 1800	23%	7%	#VALUE!	12%	26%	20%	20%
900 Operators excl MTNL rev/quarter/mhz	19	34	59	101	90	101	65
1800 Operators excl MTNL rev/quarter/mhz	7	18	24	28	45	33	25
900:1800 Rev/Mhz Ratio	268%	197%	250%	361%	200%	304%	257%
Circle Category	B						
	West Bengal	All India	Metros	A	B	C	excl Assar
Circle total revenue	1483	44345	7273	16410	15275	5387	
900 Operators Revenue (Rs cr)	1162	28645	4137	11198	10047	3264	2937
900 Operators Revenue Excl MTNL/BSNL	1088	26150	3914	10317	9035	2884	2616
1800 Operators Revenue	321	15699	3136	5212	5228	2123	1674
900 Operators 900 + 1800 Spectrum	29	580	88	146	201	144	122
MTNL/BSNL 900 Spectrum	6	138	19	31	50	39	33
MTNL/BSNL 1800 Spectrum	2	74	16	16	23	19	15
900 Operators 900+1800 Spectrum excl MTNL	21	367	53	99	129	86	74
900 Operators 1800 spectrum (excl MTNL)	8	73	10	22	26	15	13
1800 Operators 900 + 1800 Spectrum (excl MTNL)	22	510	69	115	207	118	99
1800 Operators 900 Spectrum Holding (excl MTNL)		2	0	0	0	2	0
<b>Key Metrics</b>							
900 Operators Revenue Share	78%	65%	57%	68%	66%	61%	64%
900 Operators Revenue Share excl MTNL/BSNL	73%	59%	54%	63%	59%	54%	57%
900 Operators Share of 900 + 1800 Spectrum excl MTNL/BSNL	41%	34%	34%	38%	32%	33%	33%
% 900 Operators spectrum that is 1800	27%	17%	16%	19%	17%	15%	
900 Operators excl MTNL rev/quarter/mhz	52	71	74	105	70	33	35
1800 Operators excl MTNL rev/quarter/mhz	15	31	46	45	25	18	17
900:1800 Rev/Mhz Ratio	351%	231%	161%	231%	278%	186%	

## Appendix 22: Quality of Service Parameters for TSPs

Serial Number	Name of Parameter	Benchmark	Averaged over a period
<b>A</b>	<b>Network Service Quality Parameters:</b>		
(i)	Network Availability		
	(a) BTSs Accumulated downtime (not available for service)	≤ 2%	One Month
	(b) Worst affected BTSs due to downtime	≤ 2%	One Month
(ii)	Connection Establishment (Accessibility)		
	(a) Call Set-up Success Rate (within licensee's own network)	≥ 95%	One Month
	(b) SDCCH/ Paging Channel Congestion	≤ 1%	One Month
	(c) TCH Congestion	≤ 2%	One Month
(iii)	Connection Maintenance (Retainability)		
	(a) Call Drop Rate	≤ 2%	One Month
	(b) Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 5% upto 31.03.2011 ≤ 3% From 01.04.2011	One Month
	(c) connections with good voice quality	≥ 95%	One Month
(iv)	Point of Interconnection (POI) Congestion ( on individual POI)	≤ 0.5%	One Month
<b>B</b>	<b>Customer Service Quality Parameters:</b>		
(v)	Metering and billing credibility – post paid	Not more than 0.1% of bills issued should be disputed over a billing cycle	One Billing Cycle
(vi)	Metering and billing credibility -- pre-paid	Not more than 1 complaint per 1000 customers i.e. 0.1% complaints for metering, charging, credit, and validity	One Quarter

(vii)	(a) Resolution of billing/ charging complaints	100% within 4 weeks	One Quarter
	(b) Period of applying credit/ waiver/ adjustment to customer's account from the date of resolution of complaints	within 1 week of resolution of complaint	One Quarter
(viii)	Response Time to the customer for assistance		
	(a) Accessibility of call centre/ customer care	≥ 95%	One Quarter
	(b) Percentage of calls answered by the operators (voice to voice) within 60 seconds	≥ 90%	One Quarter
(ix)	Termination/ closure of service	≤ 7 days	One Quarter
(x)	Time taken for refund of deposits after closures	100% within 60 days	One Quarter

The following needs to be monitored by the service provider but need not be reported to TRAI

<b>Serial Number</b>	<b>Name of Parameter</b>	<b>Benchmark</b>
1	Service Coverage	For In-door coverage the signal strength at street level shall be $\geq -75$ dBm and In-vehicle shall be $\geq -85$ dBm.

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