Valuation of 2G spectrum in India- A real option approach

Sinha, Pankaj and Sathiyanarayanan, Nataraj

Faculty of Management Studies, University of Delhi

21 May 2012

Valuation of 2G spectrum in India- A real option approach

Pankaj Sinha and Nataraj Sathiyanarayanan
Faculty of Management Studies
University of Delhi

Abstract

The phenomenal growth of telecommunication sector in India has largely been possible due to the contributory factors such as the efforts made by private and public telecom service providers to make services affordable to the mass market, reduction in entry barrier due to drastically lowered entry level price for devices, changing demographic profile and the increasing per-capita income. However, it the issue of spectrum pricing that has captured the centre stage with the high prices realized from the 3G and BWA spectrum auction and the outburst of the 2G Spectrum scam in India.

In this paper, we use both the traditional valuation method-Discounted Cash Flow as well as the Real Option approach that takes into consideration managerial flexibility and strategic decision making aspects. The analyses have been done individually as the factors determining revenues and thereby the spectrum values are expected to be different. By dividing the DCF or ROV value thus arrived by the total spectrum allotted so far in the service areas, we obtain the price of 1 MHz of spectrum. A sensitivity analysis has also been done to check the variations arising in the value due to changes in parameters like ARPU and subscriber count. Ignoring the economies of scale arising from usage of a larger block of spectrum, this value gives a reasonable estimate of the price of the spectrum that can be used by both companies and the government. The above analyses have been done to arrive at the price of 1 Mhz of spectrum in each of the 22 telecom circles and also on a pan India level. The spectrum price range for a pan India 1 Mhz of spectrum is Rs.1535 crores to Rs.1876 crores. This is definitely higher than the price discovered in 2001 – Rs.1658 crores for 6.2 Mhz of spectrum. Finally, we also provide a comparison with the prices suggested by TRAI in its consulting paper.

1. Introduction

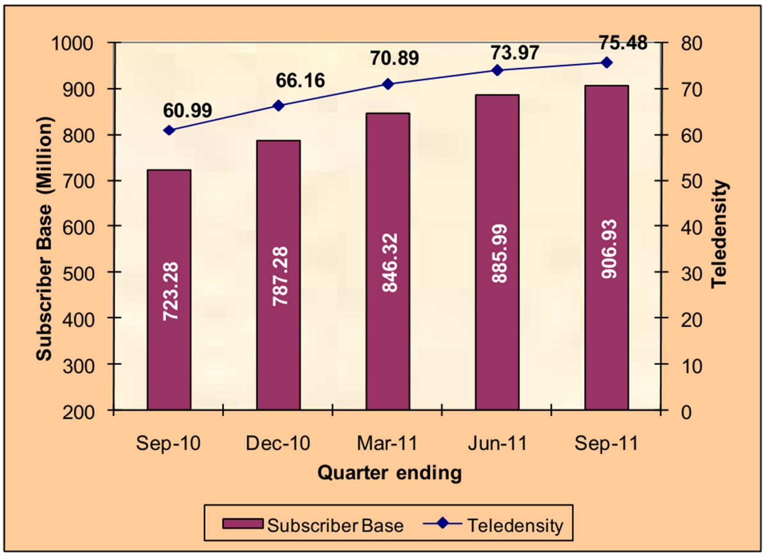
The last two decades have seen India emerging as one of the biggest telecom markets in the world. The Indian telecommunication sector in India is the third largest sector across the globe and the second largest among the emerging economies of Asia[1]. This rapid growth has been possible due to various proactive and positive decisions of the Government and contribution of both the public and the private sector. The rapid strides in the telecom sector have been facilitated by liberal policies of the Government providing the telecom equipments an easy access to the market and a fair regulatory framework for offering telecom services to the Indian consumers at affordable prices. However, it the issue of spectrum pricing that has captured the centre stage with the high prices realized from the 3G and BWA spectrum auction and the outburst of the 2G Spectrum scam.

With the recent cancellation of 122 license awarded in 2008 by the Supreme Court and the impending auction of spectrum, it is imperative for Companies to arrive at a price that they can pay to acquire a piece of the spectrum. Also, from a Government perspective, it is important to set a base price for the auction, given its objectives of overall benefit to the larger mass and maximization of Government revenues.

The number of telephone subscriber in India increased from 885.99 million at the end of Jun-11 to 906.93 million at the end of Sep-11, registering a growth of 2.36% over the previous quarter as against 4.69% during the QE Jun-11. This reflects year-on-year (Y-O-Y) growth of 25.39% over the same quarter of last year. The overall tele-density in India has reached 75.48 as on 30th September 2011[2].

[1] http://ibef.org/industry/telecommunications.aspx, accessed on 13/3/2012
[2] TRAI Performance Indicator Report, Sep 2011

Figure 1: Trends in Telephone subscribers and Teledensity in India

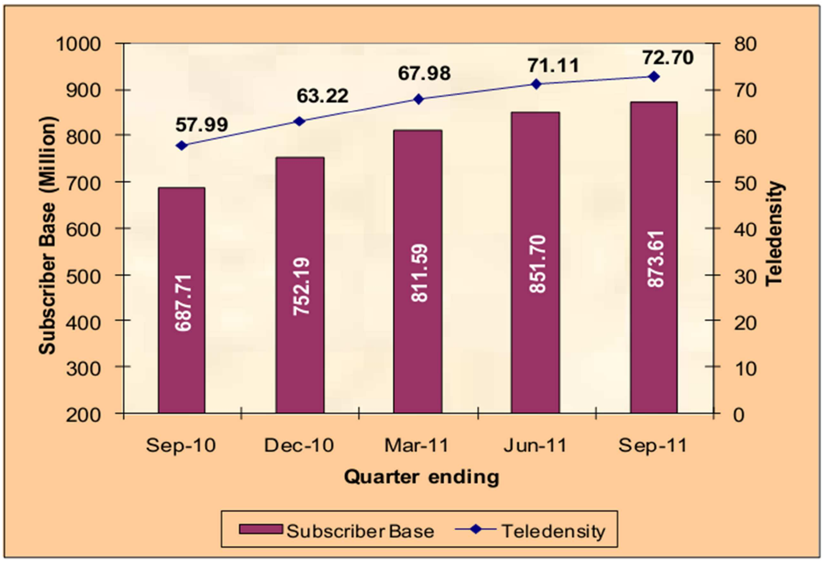


Source: TRAI

1.1.1 Indian Mobile Service

The Wireless segment is much larger than the Wireline segment in India. The segment is growing steadily because of the convenience and utility it offers. The subscriber base of Wireless services stood at 873.61 million as of September 2011 with tele-density of 72.70 percent.

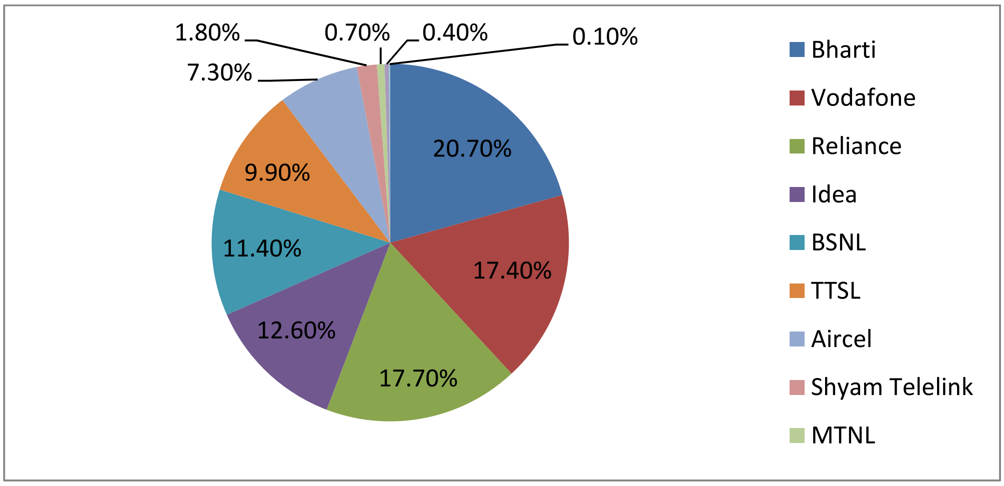
Figure 2: Wireless Subscriber Base and Teledensity



Source: TRAI

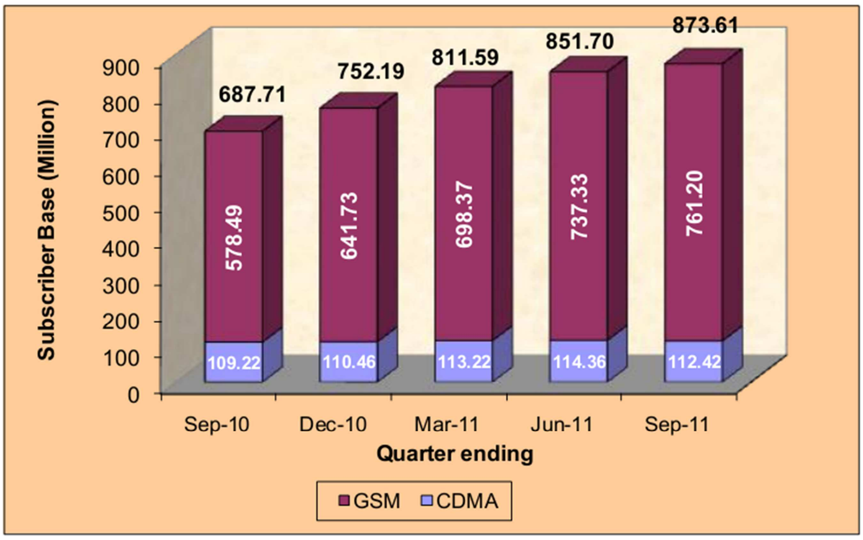
Private players such as Bharti Airtel, Reliance, Vodafone, Tata, BSNL, and Idea Cellular cumulatively hold a major share of the Wireless market. There is a clear distinction between the Global Satellite Mobile Communication (GSM) and Code Division Multiple Access (CDMA) technologies used within the Indian telecom sector. The industry is highly competitive at present with over 10 service providers vying for the pie. This has ensured intense competition and continuously falling ARPU with the introduction of innovative schemes.

Figure 3: Subscribers by Company



Source: TRAI

Figure 4: Wireless Subscription: GSM vs CDMA



Source: TRAI

1.1.2 Near Saturation in Voice business

The voice business of Indian mobile services operators has seen a sharp decline in the past couple of years. The growth is expected to decelerate further, with active mobile penetration having hit ~56% (high given 37% Indians live below the poverty line) and Indian players having exploited price elasticity in the last 3-4 years (hyper-competition). After growing at about ~76%

CAGR over FY05-09, voice growth has slowed to 28% over FY09-11 and is likely to fall further to 12% in FY12[3].

This is a structural shift in voice minutes and a build in volume growth of 8% for FY12-14E.

1.1.3 High Competition in the sector

The Indian wireless market has witnessed very high competition. Typically, the wireless market is an oligopoly of 3-5 players. However, the Indian telecom market has 14 operators with a Harfindahl index of less than 0.2. Although a recent Supreme Court order cancelling 122 licenses issued in January 2008 may reduce the number of players, competitive intensity is likely to remain high with at least 6-7 players with sizeable presence and/ or deep pockets.

1.2 Spectrum Allocation and Pricing

The Country is divided into 22 Service Areas consisting of 19 Telecom Circle Service Areas and 3 Metro Service Areas for providing Cellular Mobile Telephone Service (CMTS).

1.2.1 Supreme Court's Cancellation of 2G UAS license

The Supreme Court of India ordered all the 122 UAS licences issued in January 2008 following 2G spectrum auction. The companies whose licenses were scrapped are Uninor, Sistema Shyam, STel, Videocon, Idea Cellular, Tata Teleservices, Loop Telecom and Etisalat DB. These eight companies invested a total of INR 350-400 mn to acquire 2G license. The court also ordered Tata Teleservices, Unitech Wireless Group and Etisalat DB Telecom to pay INR 50 mn and Loop Telecom Ltd, S Tel Ltd, Allianz Infratech Ltd and Sistema Shyam Teleservices Ltd to pay INR 5 mn as fine each. The cancellation of licenses will release 470 MHz of 2G spectrum across India. Supreme Court also asked Telecom Regulatory Authority of India (TRAI) to prepare fresh recommendations within two months, to grant license and allocate 2G spectrums in 22 service areas via auction, similar to previous 3G auction.

1.2.2 DOT's recent Decisions

In future, the spectrum will not be bundled with the licence. The licence to be issued to telecom operators will be in nature of unified licence and the licence holder will be free to offer any of the multifarious telecom services. In the event the licence holder would like to offer wireless services, it will have to obtain spectrum through a market driven process.

In future, there will be no concept of contracted spectrum and, therefore, no concept of initial or start-up spectrum. Spectrum will be made available only through market driven process.

[3] IDFC – Indian wireless sector report dated 2/3/2012

Additionally, assignment of balance of contracted spectrum may need to be ensured for existing licensees who have so far been allocated only the start up spectrum of 4.4 MHz. Only in respect of the licences that will be found valid after the process is completed, the additional 1.8 MHz will be assigned on their becoming eligible, but the spectrum will be assigned to them at a price determined under the new policy.

No more UAS licences linked with spectrum will be awarded. All future licences will be Unified Licences and allocation of spectrum will be delinked from the licence. Spectrum, if required, will have to be obtained separately. The prescribed limit on spectrum assigned to a service provider will be 2x8 MHz/2x5 MHz for GSM/CDMA technologies for all service areas other than in Delhi and Mumbai where it will be 2x10MHz/2x6.25MHz. However, the licensee can acquire additional spectrum beyond prescribed limits, in the open market, should there be an auction of spectrum subject to the limits prescribed for merger of licences.

In respect of spectrum obtained through auction, spectrum sharing will be permitted only if the auction conditions provide for the same. Spectrum trading will not be allowed in India, at this stage.

1.3 Spectrum Pricing

Given, the above scenario, we have attempted to price the spectrum. We do this by finding the value generated to a potential buyer/operator on acquiring this license. Since, value changes depending on the circle of operation; we have calculated the price of 1 Mhz of spectrum in Metros, Category A and Category B service areas.

2. Literature Review

In this section, we shall first look at the various attempts made to price the 2G telecom spectrum, specifically the consulting papers issued by TRAI and the responses from the telecom companies. Later, we look into how Real Option Valuation Approach is used in valuing assets.

In its report[4] on value of spectrum in the 1800 Mhz Band, TRAI has proposed two methods for finding the economic value of spectrum, viz.

1. Cash Flow Method where the NPV of additional cash flows over a period of 20 years have been discounted to arrive at the suggested price.

[4] TRAI Report on the 2010 Value of Spectrum in the 1800 Mhz Band dated 31 January 2011

2. The Substitution approach where the Cobb-Douglas function is used to arrive at the opportunity cost of spectrum which is treated as an input for supply of mobile services.

Most of the telecom companies have been critical of the suggested price arrived at by TRAI in the above consultation paper. Specifically, Plum Consulting in its report for Vodafone[5] critically examines the shortcomings and also lists down some of the practices applied in some of the other countries in finding the spectrum price. The report talks about two approaches to pricing spectrum viz. Market Benchmarks and Bottom-up approaches. Given the drawbacks of Market Benchmarks, the focus is on the Bottom-up approach. The two approaches, as also used by TRAI, falling under this category are the DCF approach and the cost reduction value. The two approaches give a range of values for pricing the spectrum, the maximum value being determined by the DCF approach and the minimum value determined by the cost reduction approach.

Let us now look at the literature review of the DCF and the Real Options Approach.

Discounted Cash Flow (DCF) valuation is the most common method to value real assets whose future cash flows can be forecasted with certain degree of predictability. The net present value of a project can be calculated by discounting the cash flows which are expected from the project at a certain discount rate which represents the risk of the project. This discount rate is weighted average cost of capital for a project whose risk matches the average risk of the projects of the firm. However if a project's risk differs considerably from the firm's average risk then the WACC is adjusted upwards or downwards to arrive at the new discount rate for the project depending on whether the project is more risky or less risky respectively (Brandao, Dyer, & Hahn, 2005).

DCF method is criticized for one of its inherent and structural weakness which is that the project's value will remain same and unaffected despite any future decisions by the management of the firm or the project (Brandao, Dyer, & Hahn, 2005). As a project runs through its useful life a manager might want to bring about some changes and depart from the original plan of action. Such departure from the initially conceived plan of action is not represented adequately by the DCF model which assumes that the investments are made at predetermined time intervals. We can incorporate Monte-Carlo analysis to vary the shape of the probability distribution of the actual investment; however we can't change the time at which that investment will be made.

[5] Plum Consulting report titled "Methodologies for Valuing Spectrum: Review of the Experts' Report", dated 1 March 2011

Consider an investment where a pharmaceutical company invests in the trial of a new drug, if the trial is successful the company will launch the new drug in the market if it is not then the company would stop further research and development in this new drug. Though this is a pretty straight forward scenario where the financial manager can incorporate decision tree analysis to evaluate the scenario, however actual problems in real life can be very different and in such cases instead of investing all capital upfront a more strategic investment plan might be the need.

Some of the examples of project flexibilities are (Brandao, Dyer, & Hahn, 2005),

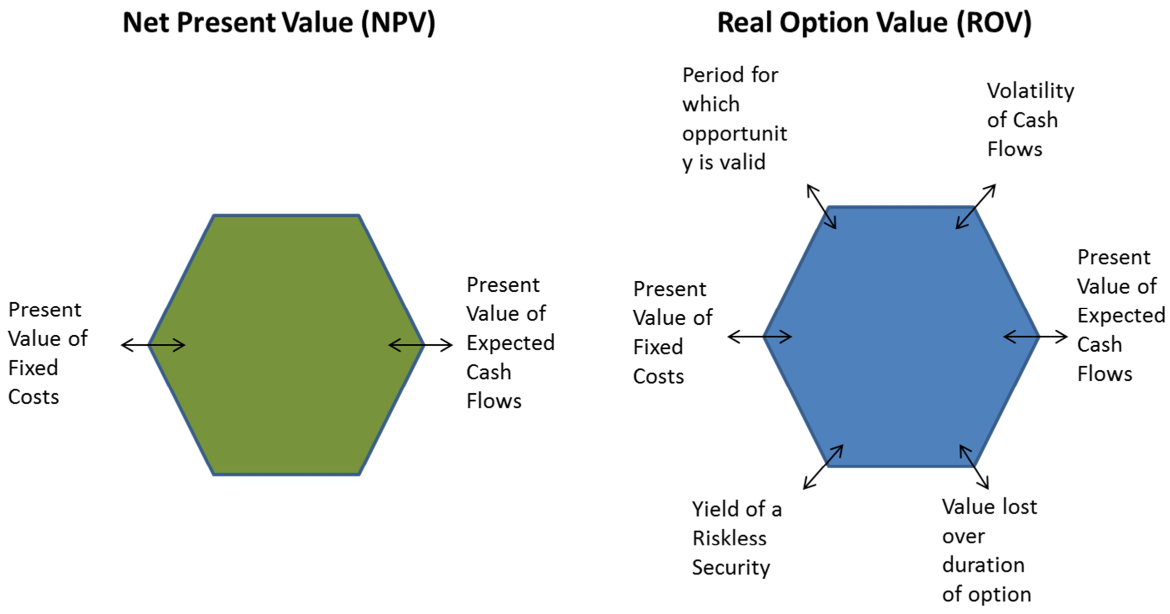
- Expanding operations in response to affirmative response from the market
- Deferring a particular investment or abandoning it completely if it underperforms
- Scaling down the project in case the project has reached a maturity state and the returns have hit the cap.

As the uncertainty in various facets of long term and strategic investments increases Real options will find broad application as a strategic tool. Leslie and Michaels (Leslie & Michaels, 1997) discuss some of the fundamental differences that exist between the traditional discounted cash flow valuation (DCF) and the Real option valuation using Black Scholes & Merton options theory.

They argue that traditional methods like DCF ignore the value of flexibility and strategic decision making and hence they tend to ignore the additional value embedded in investment opportunities where the investment is irreversible and constitutes a huge cost to the company (Leslie & Michaels, 1997). Real option methodology empowers the management to capture the value of this flexibility (Alleman, 2002).

DCF methodology assumes that the capital investment decision is a one-time decision, however when a high amount of capital is involved such huge investment decisions are rarely taken in one go and rather they are strategic decisions and receive a continuous feedback from the limited execution of the project and market forces (Leslie & Michaels, 1997).

Figure 5: Differences between Net Present Value & Real Options Valuation Approach



(Leslie & Michaels, 1997)

Mkhize & Moja in their research discuss the application of real options valuation technique in the cellular telecommunications industry in South Africa (Mkhize & Moja, 2009). They discuss about the evaluation of investment that managers in the telecommunication industry of South Africa might have to make in the next generation technologies.

Investment in the next generation technology incorporates a fair degree of uncertainty and real options theory using Black Scholes method and Binomial models have been found effective while making capital budgeting decisions (Mkhize & Moja, 2009).

Cellular operators are often required to take complex decisions regarding whether to deploy a new technology or keep using the existing one. The sources of volatility while doing capital budgeting decision analysis are the volatile demand of the customer, high initial expenditure and a threat of a new and a better technology.

They calculate the total investment value of the new project as the sum of the passive Net present value (which is the base case discounted cash flow analysis) plus the option value which arises from various strategic opportunities that managers might encounter during the course of the project. They conclude that the value of the project is much more than that calculated using a traditional DCF as a premium was added to it in the form of option value.

Another application of real options valuation technique is explained by Basili & Fontini in their valuation of the 3G license in the United Kingdom (Basili & Fontini, 2003). They calculated the aggregate option value of the 3G licenses which were auctioned in UK in the year 2000.

Telecommunications industry is considered to be one of the central bones of the economy and the application of auction to allocate 3G airwaves to various bidders is considered to be one of the most effective economic paradigms of a real life problem (Basili & Fontini, 2003).

The revenues which were generated in the auction exceeded the government's initial estimate by a far greater amount. Though the government received a windfall in the auction process the operators were tied down under huge debt burden and within 2 years after the auctions European telecommunication firms started doubting the ability of an auction to maximize the total surplus and not just the government's surplus. The stocks of the firms which had bid for the license performed badly after the auctions which led analysts to believe that the market is discounting the future earnings of these firms at a higher discount rate because of the perceived risk because of heavy debt burden (Basili & Fontini, 2003).

The option value of the license is calculated in the article and it has been shown that the value of the project roughly corresponds to the value of the fees extracted from the bidders (Basili & Fontini, 2003).

It is widely believed that the telecommunication firms in the Europe lost a lot market value because of the perceived high price paid for the 3G spectrum, nonetheless, a real option valuation shows that the value extracted from the project is approximately equal to the value paid for the licenses.

The loss in value of the telecom firms could not be explained on the basis of the high prices paid for the license, instead the authors brings in the discussion of a very crucial aspect of the 3G technology which is the killer application that is required to get the users hooked to your network and hence resulting in a higher ARPU. In the absence of such applications and difficulties regarding the handset (Access Device) and the general downward trend in the Economic scenario were given as the probably reasons for the loss in value. They also mentioned that over a long term such as 20 years which is also the term of the license such effects might not remain that relevant and eventually the technology might take off (Basili & Fontini, 2003). Logically too, these possibilities are taken care of by the real options methodology inherently because of the incorporation of the volatility of the future cash flows as an input in the valuation model and hence the added value.

Another recent literature in this field tries to evaluate the value of the transferability value of the telecommunication license. The driver behind such kind of research is the fact that in most of the nation when government allots a telecommunication license it also stipulates that the license could not be transferred to another telecom operators. Stipulation like the one mentioned above might cause inconvenience to the customers and hence removal of the option is the best solution in such cases. When removal is considered there is an added value to the original license and hence an option is embedded in the original license which should be valued to arrive at the final price of the license (Mastroeni & Naldi, 2010).

In most of the countries when the government assigns the telecommunication licenses to various firm, they also set out certain time bound conditions like rollout etc. In case a company is not able to achieve its target within the stipulated time, the government might reassign the spectrum but that would take a lot of time and resources. If the government allows reselling of the spectrum the bidders would look at this as an embedded option in the license which gives them an option to exit the project in case it doesn't suit their operations. This also will increase the value of the license at the time of the auction (Mastroeni & Naldi, 2010).

In their paper Stille, Limme and Brandao analyze the real option methodology in the Decision making process in the Telecommunication Industry. They study the 3G license auctions which allocated 3G spectrums to various operators who wish to operate 3G mobile services in Brazil (Stille, Lemme, & Brandao, 2010). They had calculated 64% premium on the license when the value of the license was calculated using Real options methodology as compared to discounted cash flow methodology.

The degree of similarity that they brought forward between a license and auction so as to justify their methodology of following real options valuation is (Stille, Lemme, & Brandao, 2010),

- There are a large number of factors which make the investment in the rollout of the mobile services a strategic investment which needs to be managed actively as against a passive investment. This gives rise to a volatility which is adequately taken into consideration in a Real options methodology.
- The acquisition of the license gives the operator the right and not the obligation to invest in the rollout of 3G services. The operator can decide to invest at a small scale and then based on the market expectations and expected future demand it may decide to scale up its investment. In short timing of the decision to undertake an irreversible financial decision is very important.

- The third characteristic of the license that increases its option value and thus justifying the use of real options methodology is that the license represents a strong barrier to entry from the competition and hence increases the value of the option.

The methodology that they follow is a pretty straightforward one. The follow the following sequence (Stille, Lemme, & Brandao, 2010),

- Calculate the static NPV of the asset which in this case is license. NPV is calculated using expected level of cash flows generated from the license and the WACC.
- In the next step they calculated the volatility of the returns of the project.
- Once they had the volatility they proceeded to the option valuation step.

So far we have discussed the advantages of real option valuation methodology versus the discounted cash flow valuation methodology; we then discussed some of the relevant literature exploiting the importance of real option valuation methodology.

Though real options have wide applications across various Capital investment decision situations practitioners do get bogged down by the higher mathematics involved in the real options valuation theory. A simple framework which could be applied to various practical situations and is backward compatible with the Discounted Cash Flow valuation method and valuation sheets is provided by Luehrman in an article in *Harvard Business Review* (Luehrman, 1998).

Though the framework is not that effective when the analysis requires absolute precision however it gives a good starting point to analyze strategic decision making under uncertainty. On top of giving a good head start the valuation and insights that the framework provides are definitely better than the base case DCF analysis. Luehrman draws an analogy between an investment opportunity before a company to a call option as the organization has a right to invest but is not under the obligation to do so. Luehrman considers the case of a European Call Option and then he tries to map the parameters of the investment opportunity over the parameters of the European Call Option (Luehrman, 1998). The mapping is displayed in the graphic below.

3. Methodology

This research attempts to find the value of the 2G spectrum in each of the service areas under Metros, Category A and Category B which could serve as a basis for the upcoming auction. To calculate the value of the 2G spectrum allotment, it has been considered as a project and then we have tried to calculate the value of 1 Mhz of spectrum block for which the methodology has been explained below,

- A discounted cash flow analysis has been done on the expected earnings (cash-flows) which would accrue in a service area from 2G operations, considering the current level of revenues. The DCF analysis serves as the base case for our real option valuation purpose and some of the outputs which would be generated in the process of doing DCF would be used to calculate the option value of the project. The projections and assumptions used for estimating the future earnings/cash-flows are explained in a later chapter.
- Sensitivity analysis is done on the NPV obtained from the DCF model to see the risk associated with the project.
- Real option valuation is the last step in the valuation process to calculate the value of the option. The model which is used is explained in a further section.

3.1 Discounted Cash Flow Valuation

Under the purview of discounted cash flow valuation the following two methods are used,

- *Net Present Value Method*. Under NPV method, net present value of the company is calculated by discounting the cash flows from a project at a risk adjusted rate of return. NPV is the difference of the present value of cash inflows from the project and the present value of the investment overlay that will go into the project.

$$NPV = \sum_{n=0}^{n=T} \frac{C_n}{(1+R)^n}$$

Where,

T – Useful life of the project

R – Risk adjusted discount rate of the project

C_n – Net Cash flow in period 'n' inclusive of investment outlays

The above equation could be re-written as,

$$NPV = S - K$$

Where,

S – Net present value of the cash inflows from the project

K – Net present value of the investment overlay for the project

The figure thus arrived gives the value of spectrum. However, the price charged to the operator must allow a reasonable rate of return on their investment. We have taken the value to be 20%[6]. The shadow price of spectrum to be charged is then calculated using the formula.

$$Value = Price + NPV\ over\ 20\ years\ of\ (Price * 20\%)$$

Though we discussed the disadvantages of the DCF valuation in the previous section, just to reiterate, the main disadvantage of using NPV method is aptly highlighted by (Brandao, Dyer, & Hahn, 2005) contending that NPV method doesn't take into consideration managerial flexibility and hence strategies like "wait and see" and "pilot project" can't be taken into account while valuing the project.

Since DCF valuation will serve as a base case scenario we will first try to calculate the NPV of the project before doing a real option valuation.

3.2 Real Option Valuation

We will now discuss the model that we will use to calculate the value of the real option. For calculating the value we will use the Black-Scholes model (Damodaran, 2000),

$$ROV = S.e^{-qt}.N(d_1) - K.e^{-r_f t}.N(d_2)$$

$$d_1 = \frac{\ln\left(\frac{S}{K}\right) + \left(r_f - y + \sigma^2\right)t}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

---

6 TRAI Report on the 2010 value of Spectrum in the 1800 MHz Band

Where,

Parameter	In context of Real Option	In context of Financial Option
S	Present Value of cash flows expected from the project	Stock Price
q	Opportunity Cost of not Expanding (Explained Below)	Dividend Yield
T	Expected Competitive Advantage Period/Rights for Expansion	Time to Expiration
r_f	Risk free rate of return on 10 year GOI bond	Risk free rate of return
K	Present Value of Capital Costs	Strike Price
$(\sigma)^2$	Volatility of Project Value	Volatility of Return on Stock

$N(d_1)$ & $N(d_2)$ are normal cumulative distributions which gives us the range of the likelihood of the real option being viable before expiration date.

In the context of current project the real option is the option to operate, expand and upgrade their 2G systems for the incumbent operators.

The inputs used in the above model are explained below,

1. S – Present value of cash flows is calculated from the assumptions explained in the previous section and the output from DCF model is used as input in this model.
2. K – Present value of capital expenditure required to rollout 2G services. Considering that most of the operators have already installed the required active infrastructure, this is the opportunity cost of holding the infrastructure or the amount required to buy it from another operator.
3. q – Opportunity cost of waiting and not rolling out 2G services. Although we have calculated the cash flows for each year, it is difficult to predict the exact pattern of cash flows which would be lost by waiting to roll out 2G services. To overcome this problem we have assumed a dividend yield of 5%. Since useful life of the project is 20 years, 5% of the value of the present value of cash flows could be considered as the dividend payments which we would not receive in case we don't rollout 2G services immediately. The other cost of waiting is the loss of market to competition which once lost is difficult to recapture.

4. t – This is the time period over which the option should be exercised lest the telecom operators will lose competitive edge. On top of that TRAI has set certain rollout obligations which involve covering 90% of the metro areas and 50% of DHQs within 2 years of allotment of 2G license which effectively translates the expansion of 2G services by a company as a series of call options. However we are taking an approximation here that the telecom operators need to rollout the 2G services within 2 years.

5. r_f – Risk free rate on 10 year GOI. The yield on 10 year GOI bond is 7.94% in March[7].

6. σ – Volatility of project is difficult to estimate and theoretically a Monte-Carlo analysis needs to be done with all relevant probability distributions of the input variables. Since we don't have the relevant probability distribution we have used annualized standard deviation of returns of Bombay Stock Exchange Technology, Media and Telecom Index (BSE TECK) as a proxy which is equal to ~28%.

4. Data & Assumptions

The data for the purpose of valuation has been taken from public sources and sector reports. Data has also been estimated for some of the years by taking assumptions. We will now discuss various data points and assumptions. We will take the example of Maharashtra to show the assumptions used. Assumptions for all the other states can be found in the Appendix.

4.1 Revenue Projections

To calculate future revenues and cash-flows it becomes important for us to look at the drivers of the revenue. In telecommunication industry the important metrics which are looked at are the number of subscribers and the average revenue per user (***ARPU***).

$$Revenue = ARPU \times Number\ of\ Subscribers$$

Now we have two variables to forecast on the basis of above equation. We will look into them one by one. Since, we have both GSM and CDMA operators in a service area, we further split into $Revenues_{GSM}$ and $Revenues_{CDMA}$

$$Revenues_{GSM} = ARPU_{GSM} \times Subs_{GSM}$$

And,

$$Revenues_{CDMA} = ARPU_{CDMA} \times Subs_{CDMA}$$

---

[7] http://www.tradingeconomics.com/Economics/Government-Bond-Yield.aspx?Symbol=INR, accessed on 13/03/2011

4.2 Average Revenue per User (ARPU)

The ARPU figures have been taken from the quarterly performance report published by TRAI.

Figure 6: GSM Metro ARPU Trend

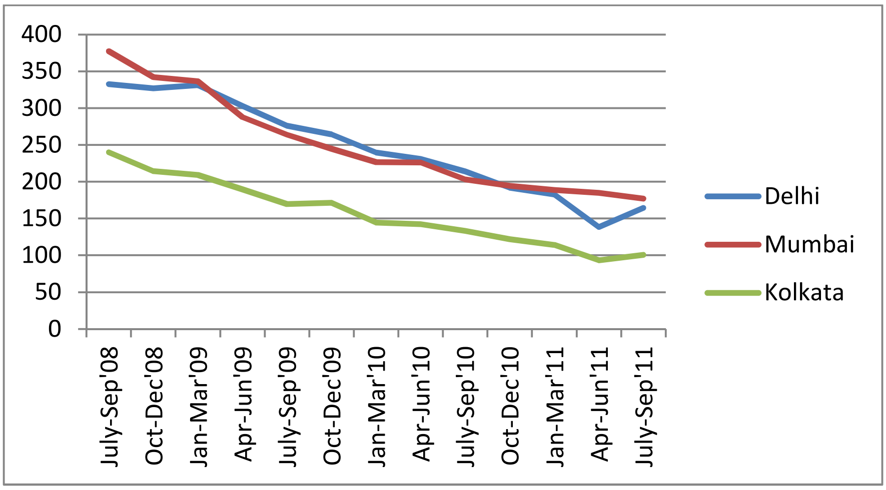


Figure 7: GSM Category-A ARPU Trend

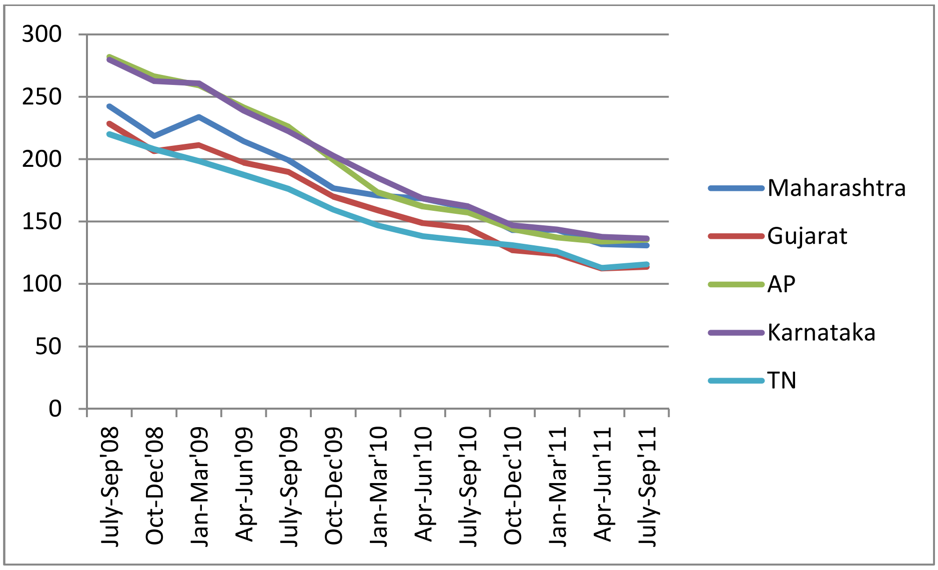


Figure 8: GSM Category-B ARPU Trend

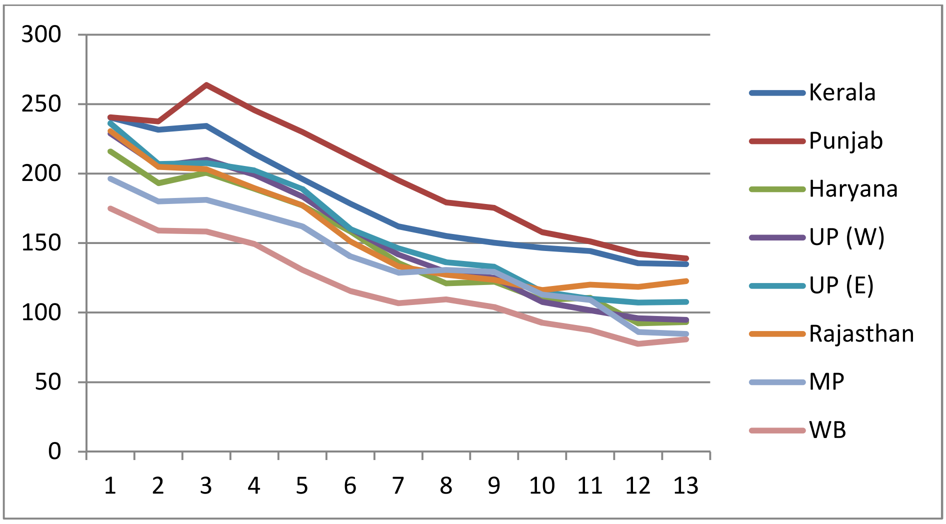
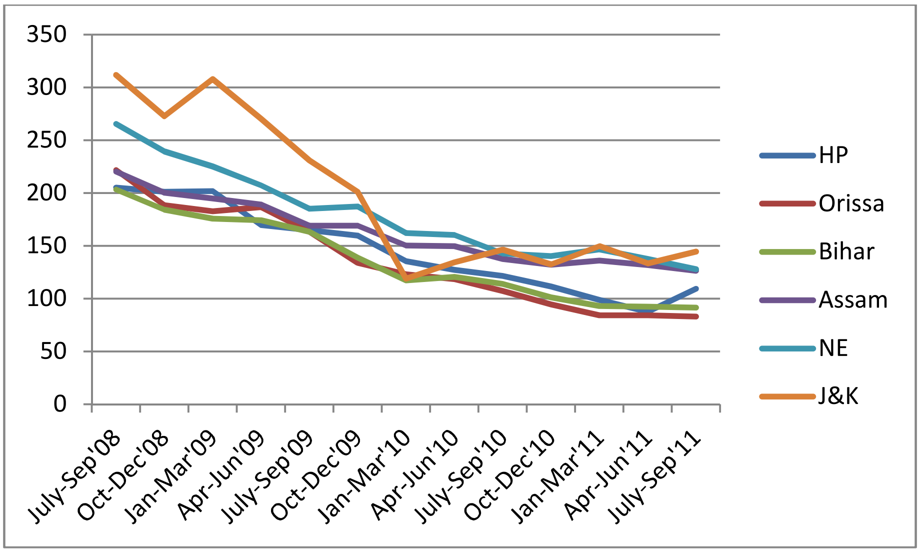


Figure 9: GSM Category-C ARPU Trend



These trends indicate a flattening out of ARPU. Similar trends are observed in CDMA operators also. Going forward, ARPUs are expected to remain stable, as have been covered in various sector reports[8]. Even TRAI, in its valuation of 1800 Mhz spectrum assumes a flat ARPU[9]. For our valuation, we assume that ARPUs fall by 1% in each service area in the next 2 years and remain stable thereafter.

4.3 Subscriber Count

The subscriber count which had been growing at a huge pace has slowed down due to increased penetration and saturation. Going forward the growth rate is expected to drop and remain stable. In this paper, for GSM, we have used Dec'11 monthly growth rate to find the annualized growth. Over time, we assume that the growth rates would stabilize to 2% per annum. In case of CDMA,

[8] IDFC-Indian wireless sector report dated 2/3/12

[9] TRAI Report on 2010 value of spectrum in the 1800 MHz Band, dated Jan 30, 2011

most of the states have experienced very low rated of around 2%-4% and some even negative, we have assumed a flat rate of 2% growth rate.

Figure 10: GSM Service Area wise Subscriber Growth Rat

Service Area	Monthly	Annualized
Andhra Pradesh	4.2%	18%
Assam	5.6%	24%
Bihar	3.5%	15%
Delhi	1.9%	8%
Gujarat	3.4%	14%
Haryana	4.8%	21%
Himachal Pradesh	5.6%	24%
Jammu & Kashmir	-0.3%	-1%
Karnataka	2.1%	9%
Kerala	3.8%	16%
Madhya Pradesh	3.1%	13%
Maharashtra	4.3%	18%
Mumbai	1.1%	5%
North East	4.7%	20%
Orissa	4.8%	21%
Punjab	4.0%	17%
Rajasthan	3.2%	13%
Tamil Nadu	2.8%	12%
UP(E)	2.1%	9%
UP(W)	4.1%	17%
Kolkata	2.6%	11%
West Bengal	2.5%	10%

4.4 Capital Expenditure

Capital expenditure is Indian telecom industry can be broadly divided into two segments,

1. Investment in Passive Infrastructure – Investment in passive infrastructure is not done by telecom companies instead there are separate companies like Reliance Infratel and Indus Towers who create passive infrastructure and then rent it out to various telecom companies.
2. Investment in Active Infrastructure – Telecom companies have to install their Base Transceiver Stations (BTS) to rollout 2G services. The number of BTS installed during the rollout phase shall determine our Capital Expenditure. Other costs include the cost of core network.

The number of BTS installed again depends on the number of subscribers and the type of technology (GSM or CDMA). We get the number of BTS required in each service area by dividing the total number of subscribers in a service area by the Subs per BTS figure.

The number of subscribers supported by a BTS has been calculated by TRAI. For GSM, numbers corresponding to 6.2 Mhz have been taken as this represents the contracted spectrum recommended by TRAI. Similarly for CDMA, numbers corresponding to 5 Mhz have been considered.

Figure 11: GSM Mobile Subscriber Density which can be served with 6.2 MHz

Inter Site Distance (in Metre)	Sq KM Per BTS	BTSs per Sq KM	Traffic per BTS	Subs per BTS	Subs per Sq Km	Total no. of subs. Which can be served
300	0.08	12.81	39.3	983	12596	35989
400	0.14	7.21	39.3	983	7085	20244
500	0.22	4.64	39.3	983	4535	12956
600	0.31	3.21	39.3	983	3149	8997
700	0.42	0.42	39.3	983	2314	6610
800	0.55	0.55	39.3	983	1771	5061
1000	0.87	0.87	39.3	983	1134	3239

Source: TRAI

The total capital expenditure in each service area is thus obtained by multiplying cost of a BTS by the number of BTS required

Figure 12: CDMA Mobile Subscriber Density which can be served with 5 MHz

Inter Site Distance (in Metre)	Sq KM Per BTS	BTSs per Sq KM	Traffic per BTS	Capacity for 3 sector	Total Capacity with 70% loading	Subs per BTS	Subs per Sq Km	Total no. of subs. Which can be served
700	0.42	2.35	104	312	218.4	5460	12857	51429
1000	0.87	1.15	104	312	218.4	5460	6300	25200
1200	1.25	0.8	104	312	218.4	5460	4375	17500
1500	1.95	0.51	104	312	218.4	5460	2800	11200
2000	3.47	0.29	104	312	218.4	5460	1575	6300
2500	5.42	0.18	104	312	218.4	5460	1008	4032
3000	7.8	0.13	104	312	218.4	5460	700	2800
3500	10.62	0.09	104	312	218.4	5460	514	2057

Source: TRAI

Figure 13: Capital Expenditure

Item	Cost (Rs.)
Capex per BTS	600000

4.5 Operating Expenditure

The breakup of the operating expenses for a typical telecom operator in India has been taken from a report prepared by FICCI in which they had given the industry wide cost structure with various heads.

Figure 14: Operating Cost Structure in Typical GSM operator in India

Expense Head	Percentage	Driver
Net Interconnection Charges as % of Gross Revenues	20%	Gross Revenue
Network Operating Expenses	15%	Net Revenue
Sales & Distribution Expenses	7%	Net Revenue
IT Expenses	2%	Net Revenue
Service Expenses	3%	Net Revenue
Billing, Collection and Bad Debt	2%	Net Revenue
Marketing Expenses	3%	Net Revenue
Personnel Administration	5%	Net Revenue
Total Operating Expenses	37%	Net Revenue
Spectrum Usage Charge as % of AGR	4%	Net Revenue

Source: FICCI Report

4.6 Financing of Capital Expenditure and License Fees

Capital expenditure has been assumed to be paid up front. For financing we have assumed a debt equity ratio of 1. For the purpose of valuation we have kept financing separate from the project and have assumed that the industry will tend to maintain the debt and equity in the same ratio. The debt equity ratio is taken as the average debt equity ratio of 3 telecom operators for the last 4 years as shown in figure below.

Figure 15: Average Debt Equity Ratio of Telecom Operators

Debt Equity Ratio					
Company	2008	2009	2010	2011	Average
Bharti Airtel	0.47	0.33	0.28	0.14	0.305
Idea Cellular	1.95	1.84	0.67	0.57	1.2575
Reliance Communications	0.71	0.82	0.6	0.48	0.6525
Average					0.738

Source: Moneycontrol

4.7 Depreciation & Amortization

For depreciation of capital expenditure and amortization of license fees a period of 20 years has been considered and straight line method has been assumed.

4.8 Cost of Capital

Weighted average cost of capital is calculated using the following formula,

$$WACC = K_e \times W_e + K_d \times W_d \times (1 - t)$$

Where,

K_e – Cost of Equity (Calculated from CAPM)

K_d – Cost of Debt (Assumed to be 9.5%)

W_e – Weight of Equity in Capital Structure

W_d – Weight of Debt in Capital Structure

T – Tax Rate (Assumed to be 30%)

For calculating Cost of Equity, Market Return on Nifty is calculated in 2010 CY. Risk free rate of return is considered as yield on 10 Year GOI bonds which is 7.94% in March. These values have then been substituted in Capital Asset Pricing Model (CAPM),

$$K_e = R_f + \beta \times (R_m - R_f)$$

Where,

β – This is measure of systematic risk of the project.

R_f – Risk free rate of return

R_m – Rate of return on market

For calculating β two methods have been considered,

1. Median beta of telecom companies has been taken.
2. Beta of a portfolio of stocks of telecom companies have been taken with weights of each stock being equal to their weight in the combined market capitalization.

The two methods are illustrated in figure below.

Figure 16: Calculation of Beta

Company (Stock)	Beta	Market Capitalization (Crore)	Weight in Portfolio
Bharti Airtel	0.69	130103	69%
Idea Cellular	0.99	30762	16%
Reliance Communications	1.6	19309	10%
MTNL	1.19	1950	1%
TATA Communications	0.5	6708	4%
Median Beta	**0.99**		
Portfolio Beta	**0.83**		

Source: Reuters

WACC calculations are shown in the figure below.

Figure 17: Cost of Capital Calculations

Debt-Equity Ratio	0.99
Weight of Debt	0.50
Weight of Equity	0.50
Cost of Debt	9%
Tax Rate	30%
Effective Cost of Debt	6%
Cost of Equity Calculations	
Risk Free Rate on 10 Year GOI Bond	8.45%
Market Return	17%
Beta	1.06
Cost of Equity	17.86%
Cost of Capital	12.11%

5. Results

In this chapter first the base case DCF valuation results are presented along with the sensitivity analysis of key variables. After the DCF valuation, real option value of the license has been given which is calculated on the basis of Chapter 4 & 5. The results shown are for Maharashtra service area. Result for other service areas can be found in the Appendix.

5.1 DCF Valuation

5.1.1 NPV

The value of 1 MHz of spectrum is obtained by dividing the DCF value obtained for Maharashtra by the total amount of spectrum allotted so far[10].

We then calculated the shadow price of spectrum using the methodology given in chapter 5.

It is found out to be **Rs. 1077.4 mn** or **107.74 crores**.

This is the price that an operator might be willing to pay for 1 MHz of spectrum in Maharashtra and should be considered while deciding whether to operate in a service area or not.

5.1.2 Sensitivity Analysis

From the understanding of the DCF model, there are many critical factors which decide the outcome of the DCF and hence they need to be checked for the variance that can be seen in case the base assumptions are not met. These critical parameters have been selected as Subscriber adjustment factor and ARPU adjustment factor, amount of capital invested and cost of capital.

Subscriber adjustment factor is important parameter as this decides the number of mobile users which in turn affects the revenues. Similarly ARPU adjustment factor has a direct bearing on the revenues.

Like in any project, cost of capital plays an important role in the values derived from the project (starting 2G telecom operations). Also, since capital investment in infrastructure is a direct outflow of cash, it too has an impact on the value.

[10] TRAI Recommendation on Spectrum Management and Licensing Framework, dated 11 May 2010

Figure 18: Sensitivity analysis using subscriber and ARPU adjustment factor

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	1207	1379	1552	1724	1897	2069	2242
	0.8	1156	1321	1486	1651	1816	1981	2146
	0.9	1104	1262	1420	1578	1736	1893	2051
	1.0	1053	1204	1354	1505	1655	1805	1956
	1.1	1002	1145	1288	1431	1574	1717	1861
	1.2	951	1086	1222	1358	1494	1630	1765
	1.3	899	1028	1156	1285	1413	1542	1670

Figure 19: Sensitivity analysis using Cost of Capital and Capital Investment

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	294	242	202	171	145	124	107
	11%	285	233	193	162	136	115	98
	12%	277	224	184	153	127	106	88
	13%	268	216	175	144	118	97	79
	14%	259	207	167	135	109	88	70

5.2 Real Option Valuation

The value of the Real option was calculated according to the variables as explained in 4th chapter and has been given below:

Figure 20: Real Option Value of 1 MHz in Maharashtra

Parameters	**Value**
S (Bn)	216.258
K (Bn)	99.677
r_f	8.45%
Q	5%
t (years)	2
Σ	28%
Output	**Value**
D1	2.33
D2	1.93
N(D1)	99.005%
N(D2)	97.334%
1 MHz value (mn)	**1324.6**

This is the option price of 1 MHz of spectrum as it gives the operator the option to start its telecom operation. The price takes into account the managerial flexibility and hence is higher than that arrived using the DCF approach.

5.3 Comparison Spectrum value using DCF and ROV approach

A comparison of values obtained for service areas under Category A, Category B and Metros is shown below. The higher values arrived using ROV approach is due to the consideration of managerial flexibility.

Figure 21: DCF and ROV valuation of 1 MHz spectrum

Service Area	Price of 1 Mhz Spectrum (Rs. Mn)	
	DCF Approach	ROV Approach
AndhraPradesh	1505	1818
Delhi	1244	1479
Gujarat	960	1174
Haryana	286	365
Karnataka	1009	1218
Kerala	852	1026
MadhyaPradesh	652	809
Maharashtra	1077	1325
Mumbai	782	932
Punjab	602	732
Rajasthan	700	856
TamilNadu	1465	1776
UP(E)	900	1116
UP(W)	603	766
Kolkata	341	420
WestBengal	423	555
Himachal Pradesh	111	139
Bihar	639	802
Orissa	274	350
Assam	386	465
North East	246	296
Jammu&Kashmir	290	345
Total	**15348**	**18761**

6. Conclusion and Recommendation

The motivation behind this research was to find the intrinsic and option value of the spectrum, 1 MHz in unit in service areas under Metros, Category A and Category B. This achieves greater significance in the light of cancellation of licenses by the Supreme Court and the impending spectrum auction.

The values for spectrum arrived using ROV approach were higher than those arrived using the DCF approach. In other words we can say that Real option analysis has allowed us to look at the option value embedded in the 2G spectrum allotment. This flexibility in the hands of the managers is not adequately represented with a DCF analysis where in the timing of the investment should be known/predicted beforehand. However such kind of information and knowledge is rarely available at the time of planning and moreover in projects with high degree of uncertainty and with irreversible investments. Real options analysis adequately captures this flexibility and hence it results in higher valuation for the aggregate 2G spectrum. It would be prudent for an operator to consider the two values as a range within which it can purchase 2G spectrum. It is also recommended that in future while allocating telecom licenses or licenses in sectors where high and irreversible investment is required and there is a scope for the licensees to invest in phases or in modules, the government should consider real options methodology for setting the price of the license, or the base price of the licenses in case the government decides to follow an auction methodology to allocate the licenses to determine a more accurate price of the license which takes into account the managerial flexibility.

The spectrum price range therefore for a pan India 1 Mhz of spectrum is Rs.1535 crores to Rs.1876 crores. This is definitely higher than the price discovered in 2001 – Rs.1658 crores for 6.2 Mhz of spectrum. However, we do not distinguish between the prices for initial spectrum assignment and incremental spectrum assignment.

TRAI in its consultation paper in February has suggested 7 models for pricing the spectrum[11]. As per the above models the price varies from Rs.620.48 crores (SBI PLR method) to Rs.3350.12 crores (3G auction price). The suggested price for spectrum beyond 6.2 Mhz is Rs.4571.85 crores. Comparing these prices with the values derived in this paper clearly suggest that the high prices suggested by TRAI may be detrimental to the Indian telecom sector.

[11] TRAI consultation paper on Auction of Spectrum dated 7 March 2012

7. References

1. Basili, M., & Fontini, F. (2003). The Option Value of the UK 3G Telecom Licenses. *Info 5,3*, pp. 48-52.

2. Damodaran, A. (2000). The promise of real options. *Journal of Applied Corporate Finance, Vol. 13*, pp. 29-43.

3. Benaroch, M., & Kauffman, R. J. (1999). A Case for Using Real Options Pricing Analysis To Evaluate Information Technology Project Investments. *Information Systems Research, Vol. 10, No. 1*, pp. 70-86.

4. Sinha, P., & Mudgal, H. (2011). Valuation of 3G spectrum license in India: A real option approach., *MRPA Paper No. 31281*

5. TRAI (2011, January 30), Report on the 2010 value of spectrum in the 1800 MHz Band

6. Plum Consulting (2011, March 1), Methodologies for Valuing Spectrum: Review of Experts' Report

7. TRAI (2012, January 9), The Indian Telecom Services Performance Indicators

8. TRAI (2012, March 7), Consultation Paper on Auction of Spectrum

9. Brandao, L. E., Dyer, J. S., & Hahn, W. J. (2005, June). Using Binomial Trees To Solve Real-Option Valuation Problems. Decision Analysis, Vol. 2, No. 2, pp. 69-88

10. Leslie, K. J., & Michaels, M. P. (1997, Number 3). The real power of real options. The McKinsey Quarterly.

11. Luehrman, T. A. (1998, July-August). Investment Oppurtunities as Real Options: Getting Started on the Numbers. Harvard Business Review.

12. Mastroeni, L., & Naldi, M. (2010). A real options model for the transferability value of telecommunication licenses. Ann. Telecommun., 65, pp. 201-210

13. Mkhize, M., & Moja, N. (2009). The application of real option valuation techniques in the cellulartelecommunication industry in South Africa. S. Afr.J.Bus.Manage.

14. IDFC. (2012). Indian Wireless

8. APPENDIX

8.1 Maharashtra

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	63046	72081	80086	87394	93849	99116	102894	104952	107051	109192	111376	113604	115876	118193	120557	122968	125428	127936	130495	133105	135767
GSM																					
No. of subscribers (mn)	56.65	66.85	76.20	83.82	90.53	95.96	99.80	101.80	103.83	105.91	108.03	110.19	112.39	114.64	116.93	119.27	121.66	124.09	126.57	129.10	131.68
Y-o-Y growth rate		18%	14%	10%	8%	6%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	80	79	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Spectrum Usage (Mhz)	69.4																				
CDMA																					
No. of subscribers (mn)	10.17	10.37	10.58	10.79	11.01	11.23	11.45	11.68	11.91	12.15	12.39	12.64	12.90	13.15	13.42	13.69	13.96	14.24	14.52	14.81	15.11
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	71	70	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Spectrum Usage (Mhz)	15																				
Interconnection charges	12609	14416	16017	17479	18770	19823	20579	20990	21410	21838	22275	22721	23175	23639	24111	24594	25086	25587	26099	26621	27153
Net Revenue	50437	57665	64069	69915	75079	79293	82316	83962	85641	87354	89101	90883	92701	94555	96446	98375	100342	102349	104396	106484	108614
Expenses																					
Network Operating Expenses	7566	8650	9610	10487	11262	11894	12347	12594	12846	13103	13365	13632	13905	14183	14467	14756	15051	15352	15659	15973	16292
Sales & Distribution Expenses	3531	4037	4485	4894	5256	5550	5762	5877	5995	6115	6237	6362	6489	6619	6751	6886	7024	7164	7308	7454	7603
IT Expenses	1009	1153	1281	1398	1502	1586	1646	1679	1713	1747	1782	1818	1854	1891	1929	1967	2007	2047	2088	2130	2172
Service Expenses	1513	1730	1922	2097	2252	2379	2469	2519	2569	2621	2673	2726	2781	2837	2893	2951	3010	3070	3132	3195	3258
Billing, Collection and Bad Debt	1009	1153	1281	1398	1502	1586	1646	1679	1713	1747	1782	1818	1854	1891	1929	1967	2007	2047	2088	2130	2172
Marketing Expenses	1513	1730	1922	2097	2252	2379	2469	2519	2569	2621	2673	2726	2781	2837	2893	2951	3010	3070	3132	3195	3258
Personnel Administration	2522	2883	3203	3496	3754	3965	4116	4198	4282	4368	4455	4544	4635	4728	4822	4919	5017	5117	5220	5324	5431
Total Operating Expenses	18662	21336	23705	25869	27779	29338	30457	31066	31687	32321	32967	33627	34299	34985	35685	36399	37127	37869	38627	39399	40187
Spectrum Usage Charge as % of	2017	2307	2563	2797	3003	3172	3293	3358	3426	3494	3564	3635	3708	3782	3858	3935	4014	4094	4176	4259	4345
License Fee as % of AGR	5044	5767	6407	6992	7508	7929	8232	8396	8564	8735	8910	9088	9270	9455	9645	9837	10034	10235	10440	10648	10861
EBITDA	24714	28256	31394	34258	36789	38853	40335	41141	41964	42803	43659	44533	45423	46332	47258	48204	49168	50151	51154	52177	53221
Interest Expense	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711
Depreciation		4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984
EBT		18561	21699	24564	27094	29159	30640	31447	32269	33109	33965	34838	35729	36637	37564	38509	39473	40456	41459	42482	43526
Tax @ 30%		5568	6510	7369	8128	8748	9192	9434	9681	9933	10189	10451	10719	10991	11269	11553	11842	12137	12438	12745	13058
Net Income		12993	15189	17195	18966	20411	21448	22013	22589	23176	23775	24387	25010	25646	26295	26956	27631	28319	29021	29738	30468
Interest	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711	4711
Depreciation		4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984	4984
FCFF	-99677	22688	24884	26889	28661	30106	31143	31707	32283	32871	33470	34081	34705	35341	35989	36651	37326	38014	38716	39432	40163

NPV	116580		
Shadow Price of Spectrum	90933	Real Option Value	111797
Total Spectrum Allotted (Mhz)	84.4	Total Spectrum Allotted (Mhz)	84.4
Price per Mhz (mn)	1077.4	Price per Mhz (mn)	1324.6

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor	0.7	0.8	0.9	1.0	1.1	1.2	1.3
	0.7	375	428	482	536	589	643	696
	0.8	501	573	645	716	788	859	931
	0.9	628	717	807	897	986	1076	1166
	1.0	754	862	970	1077	1185	1293	1401
	1.1	881	1006	1132	1258	1384	1510	1635
	1.2	1007	1151	1295	1439	1582	1726	1870
	1.3	1133	1295	1457	1619	1781	1943	2105

Cost of Capital	Capital Investment Factor	0.7	0.8	0.9	1.0	1.1	1.2	1.3
	10%	1707	1638	1569	1500	1430	1361	1292
	11%	1539	1468	1398	1327	1256	1186	1115
	12%	1389	1317	1245	1173	1101	1029	957
	13%	1255	1181	1108	1035	962	888	815
	14%	1134	1060	985	911	837	762	688

Real Option Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor	0.7	0.8	0.9	1.0	1.1	1.2	1.3
	0.7	500	571	643	714	786	857	928
	0.8	640	731	822	914	1005	1097	1188
	0.9	783	894	1006	1118	1230	1342	1453
	1.0	927	1060	1192	1325	1457	1590	1722
	1.1	1073	1226	1379	1533	1686	1839	1992
	1.2	1219	1393	1567	1741	1915	2089	2264
	1.3	1365	1560	1755	1950	2145	2340	2535

Cost of Capital	Capital Investment Factor	0.7	0.8	0.9	1.0	1.1	1.2	1.3
	10%	2030	1957	1884	1812	1739	1668	1597
	11%	1835	1761	1686	1612	1539	1466	1395
	12%	1661	1585	1509	1434	1360	1288	1217
	13%	1505	1428	1351	1276	1201	1129	1059
	14%	1366	1287	1210	1134	1060	988	919

8.2 Andhra Pradesh

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	81073	92372	103205	111687	118882	124396	127897	129150	130416	131694	132985	134288	135604	136933	138275	139630	140998	142380	143775	145184	146607
GSM																					
No. of subscribers (mn)	56.28	66.41	75.71	83.28	89.94	95.34	99.16	101.14	103.16	105.22	107.33	109.48	111.66	113.90	116.18	118.50	120.87	123.29	125.75	128.27	130.83
Y-o-Y growth rate		18%	14%	10%	8%	6%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	107	104.9	103.81	102.77	101.746	100.73	99.721	98.724	97.736	96.759	95.791	94.834	93.885	92.946	92.017	91.097	90.186	89.284	88.391	87.507	86.632
Spectrum Usage (Mhz)	69.4																				
CDMA																					
No. of subscribers (mn)	8.63	8.81	8.98	9.16	9.35	9.53	9.72	9.92	10.12	10.32	10.52	10.74	10.95	11.17	11.39	11.62	11.85	12.09	12.33	12.58	12.83
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	85	83.3	82.467	81.642	80.8259	80.018	79.217	78.425	77.641	76.8646	76.096	75.335	74.582	73.836	73.098	72.367	71.643	70.926	70.217	69.515	68.82
Spectrum Usage (Mhz)	13.75																				
Interconnection charges	16215	18474	20641	22337	23776	24879	25579	25830	26083	26339	26597	26858	27121	27387	27655	27926	28200	28476	28755	29037	29321
Net Revenue	64858	73898	82564	89349	95106	99517	102317	103320	104333	105355	106388	107430	108483	109546	110620	111704	112798	113904	115020	116147	117286
Expenses																					
Network Operating Expenses	9729	11085	12385	13402	14266	14928	15348	15498	15650	15803	15958	16115	16272	16432	16593	16756	16920	17086	17253	17422	17593
Sales & Distribution Expenses	4540	5173	5779	6254	6657	6966	7162	7232	7303	7375	7447	7520	7594	7668	7743	7819	7896	7973	8051	8130	8210
IT Expenses	1297	1478	1651	1787	1902	1990	2046	2066	2087	2107	2128	2149	2170	2191	2212	2234	2256	2278	2300	2323	2346
Service Expenses	1946	2217	2477	2680	2853	2986	3070	3100	3130	3161	3192	3223	3254	3286	3319	3351	3384	3417	3451	3484	3519
Billing, Collection and Bad Debt	1297	1478	1651	1787	1902	1990	2046	2066	2087	2107	2128	2149	2170	2191	2212	2234	2256	2278	2300	2323	2346
Marketing Expenses	1946	2217	2477	2680	2853	2986	3070	3100	3130	3161	3192	3223	3254	3286	3319	3351	3384	3417	3451	3484	3519
Personnel Administration	3243	3695	4128	4467	4755	4976	5116	5166	5217	5268	5319	5372	5424	5477	5531	5585	5640	5695	5751	5807	5864
Total Operating Expenses	23998	27342	30549	33059	35189	36821	37857	38228	38603	38981	39363	39749	40139	40532	40929	41330	41735	42144	42557	42975	43396
Spectrum Usage Charge as % of	2594	2956	3303	3574	3804	3981	4093	4133	4173	4214	4256	4297	4339	4382	4425	4468	4512	4556	4601	4646	4691
License Fee as % of AGR	6486	7390	8256	8935	9511	9952	10232	10332	10433	10536	10639	10743	10848	10955	11062	11170	11280	11390	11502	11615	11729
EBITDA	31781	36210	40456	43781	46602	48763	50136	50627	51123	51624	52130	52641	53157	53678	54204	54735	55271	55813	56360	56912	57470
Interest Expense	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666
Depreciation		4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937
EBT		26607	30853	34178	36999	39160	40532	41024	41520	42021	42527	43038	43553	44074	44600	45132	45668	46210	46757	47309	47867
Tax @ 30%		7982	9256	10253	11100	11748	12160	12307	12456	12606	12758	12911	13066	13222	13380	13539	13700	13863	14027	14193	14360
Net Income		18625	21597	23925	25899	27412	28373	28717	29064	29415	29769	30126	30487	30852	31220	31592	31968	32347	32730	33116	33507
Interest	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666	4666
Depreciation		4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937	4937
FCFF	-98736	28228	31200	33528	35502	37015	37976	38320	38667	39018	39372	39730	40091	40455	40824	41195	41571	41950	42333	42720	43110

NPV	160384		
Shadow Price of Spectrum	125099	Real Option Value	151155
Total Spectrum Allotted (Mhz)	83.15	Total Spectrum Allotted (Mhz)	83.15
Price per Mhz (mn)	1504.5	Price per Mhz (mn)	1817.9

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor: 0.7	0.8	0.9	1.0	1.1	1.2	1.3
0.7	1207	1379	1552	1724	1897	2069	2242
0.8	1156	1321	1486	1651	1816	1981	2146
0.9	1104	1262	1420	1578	1736	1893	2051
1.0	1053	1204	1354	1505	1655	1805	1956
1.1	1002	1145	1288	1431	1574	1717	1861
1.2	951	1086	1222	1358	1494	1630	1765
1.3	899	1028	1156	1285	1413	1542	1670

Cost of Capital	Capital Investment Factor: 0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	294	242	202	171	145	124	107
11%	285	233	193	162	136	115	98
12%	277	224	184	153	127	106	88
13%	268	216	175	144	118	97	79
14%	259	207	167	135	109	88	70

Real Option Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor: 0.7	0.8	0.9	1.0	1.1	1.2	1.3
0.7	733	837	942	1046	1151	1256	1360
0.8	911	1041	1172	1302	1432	1562	1692
0.9	1092	1247	1403	1559	1715	1871	2027
1.0	1273	1454	1636	1818	2000	2181	2363
1.1	1454	1662	1869	2077	2285	2492	2700
1.2	1635	1869	2103	2336	2570	2803	3037
1.3	1817	2076	2336	2596	2855	3115	3374

Cost of Capital	Capital Investment Factor: 0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	349	288	242	205	176	151	131
11%	339	279	232	196	166	142	122
12%	329	269	223	186	157	133	113
13%	320	259	213	177	147	123	104
14%	310	250	204	167	138	114	95

8.3 Gujarat

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	53885	59745	64755	69004	72257	74316	76437	77186	77942	78706	79477	80256	81043	81837	82639	83449	84266	85092	85926	86768	87619
GSM																					
No. of subscribers (mn)	45.30	51.64	56.81	61.35	65.03	67.63	70.34	71.75	73.18	74.64	76.14	77.66	79.21	80.80	82.41	84.06	85.74	87.46	89.21	90.99	92.81
Y-o-Y growth rate		14%	10%	8%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	92	90.16	89.258	88.366	87.4822	86.607	85.741	84.884	84.035	83.1947	82.363	81.539	80.724	79.916	79.117	78.326	77.543	76.767	76	75.24	74.487
Spectrum Usage (Mhz)	60.4																				
CDMA																					
No. of subscribers (mn)	4.82	4.91	5.01	5.11	5.21	5.32	5.42	5.53	5.64	5.76	5.87	5.99	6.11	6.23	6.36	6.48	6.61	6.74	6.88	7.02	7.16
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	67	65.66	65.003	64.353	63.7098	63.073	62.442	61.818	61.199	60.5874	59.982	59.382	58.788	58.2	57.618	57.042	56.471	55.907	55.348	54.794	54.246
Spectrum Usage (Mhz)	12.5																				
Interconnection charges	10777	11949	12951	13801	14451	14863	15287	15437	15588	15741	15895	16051	16209	16367	16528	16690	16853	17018	17185	17354	17524
Net Revenue	43108	47796	51804	55203	57805	59453	61149	61748	62354	62965	63582	64205	64834	65469	66111	66759	67413	68074	68741	69415	70095
Expenses																					
Network Operating Expenses	6466	7169	7771	8280	8671	8918	9172	9262	9353	9445	9537	9631	9725	9820	9917	10014	10112	10211	10311	10412	10514
Sales & Distribution Expenses	3018	3346	3626	3864	4046	4162	4280	4322	4365	4408	4451	4494	4538	4583	4628	4673	4719	4765	4812	4859	4907
IT Expenses	862	956	1036	1104	1156	1189	1223	1235	1247	1259	1272	1284	1297	1309	1322	1335	1348	1361	1375	1388	1402
Service Expenses	1293	1434	1554	1656	1734	1784	1834	1852	1871	1889	1907	1926	1945	1964	1983	2003	2022	2042	2062	2082	2103
Billing, Collection and Bad Debt	862	956	1036	1104	1156	1189	1223	1235	1247	1259	1272	1284	1297	1309	1322	1335	1348	1361	1375	1388	1402
Marketing Expenses	1293	1434	1554	1656	1734	1784	1834	1852	1871	1889	1907	1926	1945	1964	1983	2003	2022	2042	2062	2082	2103
Personnel Administration	2155	2390	2590	2760	2890	2973	3057	3087	3118	3148	3179	3210	3242	3273	3306	3338	3371	3404	3437	3471	3505
Total Operating Expenses	15950	17684	19168	20425	21388	21998	22625	22847	23071	23297	23525	23756	23989	24224	24461	24701	24943	25187	25434	25683	25935
Spectrum Usage Charge as % of	1724	1912	2072	2208	2312	2378	2446	2470	2494	2519	2543	2568	2593	2619	2644	2670	2697	2723	2750	2777	2804
License Fee as % of AGR	4311	4780	5180	5520	5781	5945	6115	6175	6235	6296	6358	6420	6483	6547	6611	6676	6741	6807	6874	6941	7009
EBITDA	21123	23420	25384	27050	28325	29132	29963	30257	30553	30853	31155	31460	31769	32080	32394	32712	33032	33356	33683	34013	34346
Interest Expense	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298
Depreciation		3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489
EBT		16633	18597	20263	21538	22345	23176	23470	23767	24066	24368	24674	24982	25293	25608	25925	26246	26569	26896	27226	27560
Tax @ 30%		4990	5579	6079	6461	6704	6953	7041	7130	7220	7311	7402	7495	7588	7682	7778	7874	7971	8069	8168	8268
Net Income		11643	13018	14184	15077	15642	16224	16429	16637	16846	17058	17272	17487	17705	17925	18148	18372	18599	18827	19059	19292
Interest	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298	3298
Depreciation		3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489	3489
FCFF	-	18430	19805	20971	21863	22428	23010	23216	23423	23633	23845	24058	24274	24492	24712	24934	25159	25385	25614	25845	26079

NPV	89738		
Shadow Price of Spectrum	69995	Real Option Value	85555
Total Spectrum Allotted (Mhz)	72.9	Total Spectrum Allotted (Mhz)	72.9
Price per Mhz (mn)	960.16	Price per Mhz (mn)	1173.6

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	346	396	445	495	544	594	643
	0.8	455	520	585	650	715	780	845
	0.9	564	644	725	805	886	966	1047
	1.0	672	768	864	960	1056	1152	1248
	1.1	781	892	1004	1115	1227	1338	1450
	1.2	889	1016	1143	1270	1397	1524	1651
	1.3	998	1140	1283	1425	1568	1710	1853

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	202	166	138	115	97	82	70
	11%	195	159	130	108	90	75	62
	12%	188	151	123	101	83	68	55
	13%	181	144	116	93	75	60	48
	14%	174	137	109	86	68	53	40

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	452	516	581	645	710	775	839
	0.8	573	655	737	819	901	983	1065
	0.9	697	796	896	995	1095	1195	1294
	1.0	822	939	1056	1174	1291	1408	1526
	1.1	947	1082	1217	1353	1488	1623	1758
	1.2	1072	1226	1379	1532	1685	1838	1992
	1.3	1198	1369	1540	1712	1883	2054	2225

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	240	198	165	140	119	101	87
	11%	233	190	158	132	111	94	80
	12%	225	183	150	124	103	87	73
	13%	217	175	142	117	96	79	66
	14%	210	167	135	109	89	73	59

8.4 Karnataka

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	64144	67989	72235	75495	78912	81091	83332	84149	84974	85806	86647	87496	88354	89220	90094	90977	91869	92769	93678	94596	95523
GSM																					
No. of subscribers (mn)	45.65	49.76	53.74	56.96	60.38	62.80	65.31	66.61	67.95	69.30	70.69	72.10	73.55	75.02	76.52	78.05	79.61	81.20	82.83	84.48	86.17
Y-o-Y growth rate		9%	8%	6%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	103	100.9	99.931	98.931	97.942	96.963	95.993	95.033	94.083	93.1418	92.21	91.288	90.375	89.472	88.577	87.691	86.814	85.946	85.087	84.236	83.393
Spectrum Usage (Mhz)	69.4																				
CDMA																					
No. of subscribers (mn)	6.70	6.84	6.97	7.11	7.26	7.40	7.55	7.70	7.85	8.01	8.17	8.33	8.50	8.67	8.84	9.02	9.20	9.39	9.57	9.76	9.96
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	96	94.08	93.139	92.208	91.2857	90.373	89.469	88.574	87.689	86.8118	85.944	85.084	84.233	83.391	82.557	81.732	80.914	80.105	79.304	78.511	77.726
Spectrum Usage (Mhz)	13.75																				
Interconnection charges	12829	13598	14447	15099	15782	16218	16666	16830	16995	17161	17329	17499	17671	17844	18019	18195	18374	18554	18736	18919	19105
Net Revenue	51315	54391	57788	60396	63130	64873	66666	67319	67979	68645	69318	69997	70683	71376	72075	72782	73495	74215	74942	75677	76418
Expenses																					
Network Operating Expenses	7697	8159	8668	9059	9469	9731	10000	10098	10197	10297	10398	10500	10602	10706	10811	10917	11024	11132	11241	11352	11463
Sales & Distribution Expenses	3592	3807	4045	4228	4419	4541	4667	4712	4759	4805	4852	4900	4948	4996	5045	5095	5145	5195	5246	5297	5349
IT Expenses	1026	1088	1156	1208	1263	1297	1333	1346	1360	1373	1386	1400	1414	1428	1442	1456	1470	1484	1499	1514	1528
Service Expenses	1539	1632	1734	1812	1894	1946	2000	2020	2039	2059	2080	2100	2120	2141	2162	2183	2205	2226	2248	2270	2293
Billing, Collection and Bad Debt	1026	1088	1156	1208	1263	1297	1333	1346	1360	1373	1386	1400	1414	1428	1442	1456	1470	1484	1499	1514	1528
Marketing Expenses	1539	1632	1734	1812	1894	1946	2000	2020	2039	2059	2080	2100	2120	2141	2162	2183	2205	2226	2248	2270	2293
Personnel Administration	2566	2720	2889	3020	3156	3244	3333	3366	3399	3432	3466	3500	3534	3569	3604	3639	3675	3711	3747	3784	3821
Total Operating Expenses	18987	20125	21382	22346	23358	24003	24666	24908	25152	25399	25648	25899	26153	26409	26668	26929	27193	27460	27729	28000	28275
Spectrum Usage Charge as % of	2053	2176	2312	2416	2525	2595	2667	2693	2719	2746	2773	2800	2827	2855	2883	2911	2940	2969	2998	3027	3057
License Fee as % of AGR	5131	5439	5779	6040	6313	6487	6667	6732	6798	6865	6932	7000	7068	7138	7208	7278	7349	7422	7494	7568	7642
EBITDA	25144	26652	28316	29594	30934	31788	32666	32986	33310	33636	33966	34299	34635	34974	35317	35663	36012	36365	36722	37082	37445
Interest Expense	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083
Depreciation		3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262
EBT		20307	21971	23249	24589	25443	26321	26641	26965	27291	27621	27954	28290	28629	28972	29318	29667	30020	30377	30737	31100
Tax @ 30%		6092	6591	6975	7377	7633	7896	7992	8089	8187	8286	8386	8487	8589	8692	8795	8900	9006	9113	9221	9330
Net Income		14215	15380	16274	17212	17810	18425	18649	18875	19104	19334	19567	19803	20040	20280	20523	20767	21014	21264	21516	21770
Interest	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083	3083
Depreciation		3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262	3262
FCFF	-65237	20560	21725	22619	23557	24155	24770	24994	25220	25449	25679	25912	26148	26385	26625	26868	27112	27359	27609	27861	28115

NPV	107539		
Shadow Price of Spectrum	83880	Real Option Value	101288
Total Spectrum Allotted (Mhz)	83.15	Total Spectrum Allotted (Mhz)	83.15
Price per Mhz (mn)	1008.8	Price per Mhz (mn)	1218.1

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	393	449	505	561	617	673	729
	0.8	497	568	639	710	781	852	923
	0.9	602	688	774	859	945	1031	1117
	1.0	706	807	908	1009	1110	1211	1311
	1.1	811	926	1042	1158	1274	1390	1505
	1.2	915	1046	1177	1307	1438	1569	1700
	1.3	1020	1165	1311	1457	1602	1748	1894

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	209	174	146	125	107	93	80
	11%	203	168	141	119	101	87	74
	12%	197	162	135	113	95	81	69
	13%	191	156	129	107	89	75	63
	14%	186	150	123	101	83	69	57

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	492	562	633	703	773	844	914
	0.8	612	699	786	874	961	1048	1136
	0.9	732	836	941	1046	1150	1255	1359
	1.0	853	975	1096	1218	1340	1462	1584
	1.1	974	1113	1252	1391	1530	1669	1808
	1.2	1095	1251	1408	1564	1720	1877	2033
	1.3	1216	1390	1563	1737	1911	2085	2258

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	247	206	175	150	129	112	98
	11%	241	200	168	143	123	106	92
	12%	235	194	162	137	117	100	86
	13%	228	187	156	130	110	94	80
	14%	222	181	149	124	104	87	74

8.5 Tamil Nadu

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	88541	96503	102770	107569	112603	115795	119080	120247	121425	122615	123817	125030	126256	127493	128742	130004	131278	132565	133864	135176	136500
GSM																					
No. of subscribers (mn)	67.33	75.41	81.45	86.33	91.51	95.17	98.98	100.96	102.98	105.04	107.14	109.28	111.47	113.70	115.97	118.29	120.66	123.07	125.53	128.04	130.60
Y-o-Y growth rate		12%	8%	6%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	101	98.98	97.99	97.01	96.0402	95.08	94.129	93.188	92.256	91.3333	90.42	89.516	88.621	87.734	86.857	85.988	85.129	84.277	83.435	82.6	81.774
Spectrum Usage (Mhz)	67																				
CDMA																					
No. of subscribers (mn)	7.05	7.19	7.33	7.48	7.63	7.78	7.94	8.10	8.26	8.42	8.59	8.76	8.94	9.12	9.30	9.48	9.67	9.87	10.07	10.27	10.47
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	82	80.36	79.556	78.761	77.9732	77.193	76.422	75.657	74.901	74.1518	73.41	72.676	71.949	71.23	70.518	69.812	69.114	68.423	67.739	67.062	66.391
Spectrum Usage (Mhz)	12.5																				
Interconnection charges	17708	19301	20554	21514	22521	23159	23816	24049	24285	24523	24763	25006	25251	25499	25748	26001	26256	26513	26773	27035	27300
Net Revenue	70833	77203	82216	86055	90083	92636	95264	96198	97140	98092	99054	100024	101004	101994	102994	104003	105022	106052	107091	108140	109200
Expenses																					
Network Operating Expenses	10625	11580	12332	12908	13512	13895	14290	14430	14571	14714	14858	15004	15151	15299	15449	15600	15753	15908	16064	16221	16380
Sales & Distribution Expenses	4958	5404	5755	6024	6306	6485	6668	6734	6800	6866	6934	7002	7070	7140	7210	7280	7352	7424	7496	7570	7644
IT Expenses	1417	1544	1644	1721	1802	1853	1905	1924	1943	1962	1981	2000	2020	2040	2060	2080	2100	2121	2142	2163	2184
Service Expenses	2125	2316	2466	2582	2702	2779	2858	2886	2914	2943	2972	3001	3030	3060	3090	3120	3151	3182	3213	3244	3276
Billing, Collection and Bad Debt	1417	1544	1644	1721	1802	1853	1905	1924	1943	1962	1981	2000	2020	2040	2060	2080	2100	2121	2142	2163	2184
Marketing Expenses	2125	2316	2466	2582	2702	2779	2858	2886	2914	2943	2972	3001	3030	3060	3090	3120	3151	3182	3213	3244	3276
Personnel Administration	3542	3860	4111	4303	4504	4632	4763	4810	4857	4905	4953	5001	5050	5100	5150	5200	5251	5303	5355	5407	5460
Total Operating Expenses	26208	28565	30420	31841	33331	34275	35248	35593	35942	36294	36650	37009	37372	37738	38108	38481	38858	39239	39624	40012	40404
Spectrum Usage Charge as % of	2833	3088	3289	3442	3603	3705	3811	3848	3886	3924	3962	4001	4040	4080	4120	4160	4201	4242	4284	4326	4368
License Fee as % of AGR	7083	7720	8222	8606	9008	9264	9526	9620	9714	9809	9905	10002	10100	10199	10299	10400	10502	10605	10709	10814	10920
EBITDA	34708	37829	40286	42167	44141	45392	46679	47137	47599	48065	48536	49012	49492	49977	50467	50962	51461	51965	52475	52989	53508
Interest Expense	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643
Depreciation		4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912
EBT		28274	30730	32612	34585	35836	37124	37582	38043	38510	38981	39457	39937	40422	40912	41406	41906	42410	42919	43434	43953
Tax @ 30%		8482	9219	9784	10376	10751	11137	11274	11413	11553	11694	11837	11981	12127	12274	12422	12572	12723	12876	13030	13186
Net Income		19792	21511	22828	24210	25085	25987	26307	26630	26957	27287	27620	27956	28295	28638	28984	29334	29687	30044	30403	30767
Interest	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643	4643
Depreciation		4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912	4912
FCFF	-98243	29347	31067	32384	33765	34641	35542	35862	36186	36512	36842	37175	37511	37851	38193	38540	38889	39242	39599	39959	40322

NPV	149343		
Shadow Price of Spectrum	116487	Real Option Value	141162
Total Spectrum Allotted (Mhz)	79.5	Total Spectrum Allotted (Mhz)	79.5
Price per Mhz (mn)	1465.3	Price per Mhz (mn)	1775.6

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	558	638	717	797	877	956	1036
	0.8	714	816	918	1020	1122	1224	1326
	0.9	870	994	1118	1242	1367	1491	1615
	1.0	1026	1172	1319	1465	1612	1758	1905
	1.1	1182	1350	1519	1688	1857	2026	2194
	1.2	1338	1529	1720	1911	2102	2293	2484
	1.3	1493	1707	1920	2134	2347	2560	2774

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	306	253	213	181	154	133	114
	11%	297	244	203	171	145	123	105
	12%	288	235	194	162	136	114	96
	13%	278	225	185	152	126	104	86
	14%	269	216	175	143	117	95	77

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	707	808	909	1010	1111	1211	1312
	0.8	884	1010	1136	1263	1389	1515	1641
	0.9	1063	1215	1367	1518	1670	1822	1974
	1.0	1243	1420	1598	1776	1953	2131	2308
	1.1	1423	1627	1830	2033	2237	2440	2643
	1.2	1604	1833	2062	2292	2521	2750	2979
	1.3	1785	2040	2295	2550	2805	3060	3315

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	363	301	254	217	187	162	140
	11%	353	291	244	207	177	152	131
	12%	343	281	234	197	167	142	121
	13%	333	271	224	187	157	132	112
	14%	323	261	214	177	147	123	103

8.6 Delhi

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	62368	65343	68122	69911	70597	71288	71987	72693	73405	74124	74851	75584	76325	77073	77828	78591	79361	80139	80924	81717	82518
GSM																					
No. of subscribers (mn)	30.81	33.28	35.27	36.68	37.42	38.17	38.93	39.71	40.50	41.31	42.14	42.98	43.84	44.72	45.61	46.52	47.45	48.40	49.37	50.36	51.37
Y-o-Y growth rate		8%	6%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	138	135.2	133.89	132.55	131.223	129.91	128.61	127.33	126.05	124.792	123.54	122.31	121.09	119.87	118.68	117.49	116.31	115.15	114	112.86	111.73
Spectrum Usage (Mhz)	53.6																				
CDMA																					
No. of subscribers (mn)	10.50	10.71	10.93	11.15	11.37	11.60	11.83	12.07	12.31	12.55	12.80	13.06	13.32	13.59	13.86	14.14	14.42	14.71	15.00	15.30	15.61
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	90	88.2	87.318	86.445	85.5804	84.725	83.877	83.039	82.208	81.3861	80.572	79.766	78.969	78.179	77.397	76.623	75.857	75.099	74.348	73.604	72.868
Spectrum Usage (Mhz)	15																				
Interconnection charges	12474	13069	13624	13982	14119	14258	14397	14539	14681	14825	14970	15117	15265	15415	15566	15718	15872	16028	16185	16343	16504
Net Revenue	49894	52274	54497	55929	56477	57031	57590	58154	58724	59299	59881	60467	61060	61658	62263	62873	63489	64111	64739	65374	66015
Expenses																					
Network Operating Expenses	7484	7841	8175	8389	8472	8555	8638	8723	8809	8895	8982	9070	9159	9249	9339	9431	9523	9617	9711	9806	9902
Sales & Distribution Expenses	3493	3659	3815	3915	3953	3992	4031	4071	4111	4151	4192	4233	4274	4316	4358	4401	4444	4488	4532	4576	4621
IT Expenses	998	1045	1090	1119	1130	1141	1152	1163	1174	1186	1198	1209	1221	1233	1245	1257	1270	1282	1295	1307	1320
Service Expenses	1497	1568	1635	1678	1694	1711	1728	1745	1762	1779	1796	1814	1832	1850	1868	1886	1905	1923	1942	1961	1980
Billing, Collection and Bad Debt	998	1045	1090	1119	1130	1141	1152	1163	1174	1186	1198	1209	1221	1233	1245	1257	1270	1282	1295	1307	1320
Marketing Expenses	1497	1568	1635	1678	1694	1711	1728	1745	1762	1779	1796	1814	1832	1850	1868	1886	1905	1923	1942	1961	1980
Personnel Administration	2495	2614	2725	2796	2824	2852	2879	2908	2936	2965	2994	3023	3053	3083	3113	3144	3174	3206	3237	3269	3301
Total Operating Expenses	18461	19341	20164	20694	20897	21101	21308	21517	21728	21941	22156	22373	22592	22814	23037	23263	23491	23721	23954	24188	24425
Spectrum Usage Charge as % of	1996	2091	2180	2237	2259	2281	2304	2326	2349	2372	2395	2419	2442	2466	2491	2515	2540	2564	2590	2615	2641
License Fee as % of AGR	4989	5227	5450	5593	5648	5703	5759	5815	5872	5930	5988	6047	6106	6166	6226	6287	6349	6411	6474	6537	6601
EBITDA	24448	25614	26704	27405	27674	27945	28219	28495	28775	29057	29341	29629	29919	30213	30509	30808	31110	31414	31722	32033	32347
Interest Expense	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935
Depreciation		2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047
EBT		21632	22721	23422	23691	23962	24236	24513	24792	25074	25359	25646	25937	26230	26526	26825	27127	27432	27740	28050	28364
Tax @ 30%		6489	6816	7027	7107	7189	7271	7354	7438	7522	7608	7694	7781	7869	7958	8047	8138	8229	8322	8415	8509
Net Income		15142	15905	16396	16584	16774	16965	17159	17354	17552	17751	17952	18156	18361	18568	18777	18989	19202	19418	19635	19855
Interest	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935	1935
Depreciation		2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047	2047
FCFF	-40950	19125	19887	20379	20567	20756	20948	21142	21337	21535	21734	21935	22138	22344	22551	22760	22972	23185	23400	23618	23838

NPV	109431		
Shadow Price of Spectrum	85356	Real Option Value	101490
Total Spectrum Allotted (Mhz)	68.6	Total Spectrum Allotted (Mhz)	68.6
Price per Mhz (mn)	1244.3	Price per Mhz (mn)	1479.4

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	288	330	371	412	453	494	536
	0.8	386	288	288	288	288	288	288
	0.9	483	288	288	288	288	288	288
	1.0	580	288	288	288	288	288	288
	1.1	677	288	288	288	288	288	288
	1.2	775	288	288	288	288	288	288
	1.3	872	288	288	288	288	288	288

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	258	219	189	165	145	129	115
	11%	254	215	184	160	141	124	111
	12%	249	210	180	156	136	120	106
	13%	245	206	175	151	132	115	102
	14%	240	201	171	147	127	111	97

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	500	571	643	714	786	857	928
	0.8	640	500	500	500	500	500	500
	0.9	783	500	500	500	500	500	500
	1.0	927	500	500	500	500	500	500
	1.1	1073	500	500	500	500	500	500
	1.2	1219	500	500	500	500	500	500
	1.3	1365	500	500	500	500	500	500

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	303	258	223	195	172	153	137
	11%	298	253	218	190	167	148	132
	12%	293	248	213	185	162	143	127
	13%	289	243	208	180	157	139	123
	14%	284	238	203	175	153	134	118

8.7 Mumbai

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	53108	54317	55702	57125	57685	58250	58821	59397	59980	60567	61161	61760	62366	62977	63594	64217	64846	65482	66124	66772	67426
GSM																					
No. of subscribers (mn)	28.58	30.01	31.21	32.45	33.10	33.76	34.44	35.13	35.83	36.55	37.28	38.02	38.79	39.56	40.35	41.16	41.98	42.82	43.68	44.55	45.44
Y-o-Y growth rate		5%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	122	119.6	118.36	117.18	116.009	114.85	113.7	112.56	111.44	110.323	109.22	108.13	107.05	105.98	104.92	103.87	102.83	101.8	100.78	99.774	98.777
Spectrum Usage (Mhz)	72.4																				
CDMA																					
No. of subscribers (mn)	8.39	8.55	8.73	8.90	9.08	9.26	9.45	9.63	9.83	10.02	10.22	10.43	10.64	10.85	11.07	11.29	11.51	11.74	11.98	12.22	12.46
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	112	109.8	108.66	107.58	106.5	105.44	104.38	103.34	102.3	101.28	100.27	99.265	98.272	97.29	96.317	95.354	94.4	93.456	92.521	91.596	90.68
Spectrum Usage (Mhz)	15																				
Interconnection charges	10622	10863	11140	11425	11537	11650	11764	11879	11996	12113	12232	12352	12473	12595	12719	12843	12969	13096	13225	13354	13485
Net Revenue	42487	43454	44561	45700	46148	46600	47057	47518	47984	48454	48929	49408	49892	50381	50875	51374	51877	52386	52899	53417	53941
Expenses																					
Network Operating Expenses	6373	6518	6684	6855	6922	6990	7059	7128	7198	7268	7339	7411	7484	7557	7631	7706	7782	7858	7935	8013	8091
Sales & Distribution Expenses	2974	3042	3119	3199	3230	3262	3294	3326	3359	3392	3425	3459	3492	3527	3561	3596	3631	3667	3703	3739	3776
IT Expenses	850	869	891	914	923	932	941	950	960	969	979	988	998	1008	1018	1027	1038	1048	1058	1068	1079
Service Expenses	1275	1304	1337	1371	1384	1398	1412	1426	1440	1454	1468	1482	1497	1511	1526	1541	1556	1572	1587	1603	1618
Billing, Collection and Bad Debt	850	869	891	914	923	932	941	950	960	969	979	988	998	1008	1018	1027	1038	1048	1058	1068	1079
Marketing Expenses	1275	1304	1337	1371	1384	1398	1412	1426	1440	1454	1468	1482	1497	1511	1526	1541	1556	1572	1587	1603	1618
Personnel Administration	2124	2173	2228	2285	2307	2330	2353	2376	2399	2423	2446	2470	2495	2519	2544	2569	2594	2619	2645	2671	2697
Total Operating Expenses	15720	16078	16488	16909	17075	17242	17411	17582	17754	17928	18104	18281	18460	18641	18824	19008	19195	19383	19573	19764	19958
Spectrum Usage Charge as % of	1699	1738	1782	1828	1846	1864	1882	1901	1919	1938	1957	1976	1996	2015	2035	2055	2075	2095	2116	2137	2158
License Fee as % of AGR	4249	4345	4456	4570	4615	4660	4706	4752	4798	4845	4893	4941	4989	5038	5088	5137	5188	5239	5290	5342	5394
EBITDA	20818	21292	21835	22393	22612	22834	23058	23284	23512	23742	23975	24210	24447	24687	24929	25173	25420	25669	25920	26175	26431
Interest Expense	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704
Depreciation		1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802
EBT		17786	18329	18887	19107	19328	19552	19778	20006	20237	20469	20704	20942	21181	21423	21667	21914	22163	22415	22669	22925
Tax @ 30%		5336	5499	5666	5732	5798	5866	5933	6002	6071	6141	6211	6282	6354	6427	6500	6574	6649	6724	6801	6878
Net Income		12451	12830	13221	13375	13530	13686	13845	14004	14166	14329	14493	14659	14827	14996	15167	15340	15514	15690	15868	16048
Interest	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704	1704
Depreciation		1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802	1802
FCFF	-	15956	16336	16727	16880	17036	17192	17350	17510	17671	17834	17999	18165	18333	18502	18673	18846	19020	19196	19374	19553

NPV	87606		
Shadow Price of Spectrum	68333	Real Option Value	81447
Total Spectrum Allotted (Mhz)	87.4	Total Spectrum Allotted (Mhz)	87.4
Price per Mhz (mn)	781.84	Price per Mhz (mn)	931.88

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor 0.7	0.8	0.9	1.0	1.1	1.2	1.3
0.7	330	377	424	471	518	565	612
0.8	402	460	517	575	632	689	747
0.9	475	543	610	678	746	814	882
1.0	547	625	704	782	860	938	1016
1.1	620	708	797	885	974	1063	1151
1.2	692	791	890	989	1088	1187	1286
1.3	765	874	983	1093	1202	1311	1421

Cost of Capital	Capital Investment Factor 0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	165	140	120	105	92	82	73
11%	162	137	117	102	89	78	70
12%	159	133	114	98	86	75	66
13%	155	130	111	95	83	72	63
14%	152	127	108	92	80	69	60

Real Option Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor 1	1	1	1	1	1	1
0.7	400	457	515	572	629	686	743
0.8	484	553	622	692	761	830	899
0.9	568	649	731	812	893	974	1055
1.0	652	746	839	932	1025	1118	1211
1.1	736	842	947	1052	1157	1262	1368
1.2	821	938	1055	1172	1290	1407	1524
1.3	905	1034	1163	1292	1422	1551	1680

Cost of Capital	Capital Investment Factor 0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	194	164	142	124	109	97	87
11%	190	161	139	121	106	94	83
12%	187	158	135	117	103	90	80
13%	184	154	132	114	99	87	77
14%	180	151	128	110	96	84	73

8.8 Kolkata

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	22415	24046	25482	26588	27298	28028	28303	28580	28860	29143	29429	29717	30008	30302	30599	30899	31202	31508	31817	32128	32443
GSM																					
No. of subscribers (mn)	19.61	21.76	23.51	24.92	25.91	26.95	27.49	28.04	28.60	29.17	29.75	30.35	30.96	31.58	32.21	32.85	33.51	34.18	34.86	35.56	36.27
Y-o-Y growth rate		11%	8%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	79	77.42	76.646	75.879	75.1205	74.369	73.626	72.889	72.16	71.4389	70.725	70.017	69.317	68.624	67.938	67.258	66.586	65.92	65.261	64.608	63.962
Spectrum Usage (Mhz)	60.4																				
CDMA																					
No. of subscribers (mn)	4.31	4.40	4.48	4.57	4.67	4.76	4.85	4.95	5.05	5.15	5.25	5.36	5.47	5.58	5.69	5.80	5.92	6.03	6.16	6.28	6.40
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	74	72.52	71.795	71.077	70.3661	69.662	68.966	68.276	67.593	66.9174	66.248	65.586	64.93	64.281	63.638	63.001	62.371	61.748	61.13	60.519	59.914
Spectrum Usage (Mhz)	13.75																				
Interconnection charges	4483	4809	5096	5318	5460	5606	5661	5716	5772	5829	5886	5943	6002	6060	6120	6180	6240	6302	6363	6426	6489
Net Revenue	17932	19237	20386	21271	21838	22423	22642	22864	23088	23314	23543	23774	24007	24242	24480	24719	24962	25206	25453	25703	25955
Expenses																					
Network Operating Expenses	2690	2885	3058	3191	3276	3363	3396	3430	3463	3497	3531	3566	3601	3636	3672	3708	3744	3781	3818	3855	3893
Sales & Distribution Expenses	1255	1347	1427	1489	1529	1570	1585	1600	1616	1632	1648	1664	1680	1697	1714	1730	1747	1764	1782	1799	1817
IT Expenses	359	385	408	425	437	448	453	457	462	466	471	475	480	485	490	494	499	504	509	514	519
Service Expenses	538	577	612	638	655	673	679	686	693	699	706	713	720	727	734	742	749	756	764	771	779
Billing, Collection and Bad Debt	359	385	408	425	437	448	453	457	462	466	471	475	480	485	490	494	499	504	509	514	519
Marketing Expenses	538	577	612	638	655	673	679	686	693	699	706	713	720	727	734	742	749	756	764	771	779
Personnel Administration	897	962	1019	1064	1092	1121	1132	1143	1154	1166	1177	1189	1200	1212	1224	1236	1248	1260	1273	1285	1298
Total Operating Expenses	6635	7118	7543	7870	8080	8296	8378	8460	8543	8626	8711	8796	8882	8970	9057	9146	9236	9326	9418	9510	9603
Spectrum Usage Charge as % of	717	769	815	851	874	897	906	915	924	933	942	951	960	970	979	989	998	1008	1018	1028	1038
License Fee as % of AGR	1793	1924	2039	2127	2184	2242	2264	2286	2309	2331	2354	2377	2401	2424	2448	2472	2496	2521	2545	2570	2595
EBITDA	8787	9426	9989	10423	10701	10987	11095	11203	11313	11424	11536	11649	11763	11879	11995	12113	12231	12351	12472	12594	12718
Interest Expense	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337
Depreciation		1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414
EBT		6675	7238	7671	7950	8236	8343	8452	8562	8673	8785	8898	9012	9127	9244	9361	9480	9600	9721	9843	9967
Tax @ 30%		2002	2171	2301	2385	2471	2503	2536	2569	2602	2635	2669	2704	2738	2773	2808	2844	2880	2916	2953	2990
Net Income		4672	5067	5370	5565	5765	5840	5917	5993	6071	6149	6229	6308	6389	6471	6553	6636	6720	6805	6890	6977
Interest	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337	1337
Depreciation		1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414	1414
FCFF	-	7424	7818	8121	8316	8516	8592	8668	8745	8822	8901	8980	9060	9140	9222	9304	9387	9471	9556	9641	9728

NPV	32453		
Shadow Price of Spectrum	25313	Real Option Value	31161
Total Spectrum Allotted (Mhz)	74.15	Total Spectrum Allotted (Mhz)	74.15
Price per Mhz (mn)	341.38	Price per Mhz (mn)	420.24

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	118	135	152	168	185	202	219
	0.8	158	181	203	226	249	271	294
	0.9	199	227	255	284	312	340	369
	1.0	239	273	307	341	376	410	444
	1.1	279	319	359	399	439	479	519
	1.2	320	365	411	457	502	548	594
	1.3	360	412	463	514	566	617	669

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	77	63	52	44	37	31	26
	11%	74	60	49	41	34	28	23
	12%	71	57	47	38	31	25	21
	13%	68	54	44	35	28	22	18
	14%	65	52	41	32	25	20	15

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	158	181	203	226	248	271	293
	0.8	202	231	260	289	318	347	376
	0.9	248	283	319	354	390	425	461
	1.0	294	336	378	420	462	504	546
	1.1	341	389	438	487	535	584	633
	1.2	387	443	498	553	609	664	719
	1.3	434	496	558	620	682	744	806

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	91	75	63	53	45	39	33
	11%	88	72	60	50	42	36	30
	12%	85	69	57	47	39	33	27
	13%	82	66	54	44	36	30	25
	14%	79	63	51	41	34	27	22

8.9 Kerala

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	43864	49465	54559	58160	60916	62660	63274	63894	64520	65152	65791	66436	67087	67744	68408	69078	69755	70439	71129	71826	72530
GSM																					
No. of subscribers (mn)	29.68	34.43	38.56	41.64	44.14	45.91	46.82	47.76	48.71	49.69	50.68	51.70	52.73	53.79	54.86	55.96	57.08	58.22	59.38	60.57	61.78
Y-o-Y growth rate		16%	12%	8%	6%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	115	112.7	111.57	110.46	109.353	108.26	107.18	106.1	105.04	103.993	102.95	101.92	100.9	99.896	98.897	97.908	96.929	95.959	95	94.05	93.109
Spectrum Usage (Mhz)	61.2																				
CDMA																					
No. of subscribers (mn)	3.85	3.93	4.00	4.08	4.17	4.25	4.33	4.42	4.51	4.60	4.69	4.78	4.88	4.98	5.08	5.18	5.28	5.39	5.50	5.61	5.72
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	63	61.74	61.123	60.511	59.9063	59.307	58.714	58.127	57.546	56.9703	56.401	55.837	55.278	54.725	54.178	53.636	53.1	52.569	52.043	51.523	51.008
Spectrum Usage (Mhz)	15																				
Interconnection charges	8773	9893	10912	11632	12183	12532	12655	12779	12904	13030	13158	13287	13417	13549	13682	13816	13951	14088	14226	14365	14506
Net Revenue	35091	39572	43647	46528	48733	50128	50619	51115	51616	52122	52633	53148	53669	54195	54726	55263	55804	56351	56903	57461	58024
Expenses																					
Network Operating Expenses	5264	5936	6547	6979	7310	7519	7593	7667	7742	7818	7895	7972	8050	8129	8209	8289	8371	8453	8536	8619	8704
Sales & Distribution Expenses	2456	2770	3055	3257	3411	3509	3543	3578	3613	3649	3684	3720	3757	3794	3831	3868	3906	3945	3983	4022	4062
IT Expenses	702	791	873	931	975	1003	1012	1022	1032	1042	1053	1063	1073	1084	1095	1105	1116	1127	1138	1149	1160
Service Expenses	1053	1187	1309	1396	1462	1504	1519	1533	1548	1564	1579	1594	1610	1626	1642	1658	1674	1691	1707	1724	1741
Billing, Collection and Bad Debt	702	791	873	931	975	1003	1012	1022	1032	1042	1053	1063	1073	1084	1095	1105	1116	1127	1138	1149	1160
Marketing Expenses	1053	1187	1309	1396	1462	1504	1519	1533	1548	1564	1579	1594	1610	1626	1642	1658	1674	1691	1707	1724	1741
Personnel Administration	1755	1979	2182	2326	2437	2506	2531	2556	2581	2606	2632	2657	2683	2710	2736	2763	2790	2818	2845	2873	2901
Total Operating Expenses	12984	14642	16150	17215	18031	18547	18729	18913	19098	19285	19474	19665	19858	20052	20249	20447	20648	20850	21054	21261	21469
Spectrum Usage Charge as % of	1404	1583	1746	1861	1949	2005	2025	2045	2065	2085	2105	2126	2147	2168	2189	2211	2232	2254	2276	2298	2321
License Fee as % of AGR	3509	3957	4365	4653	4873	5013	5062	5112	5162	5212	5263	5315	5367	5420	5473	5526	5580	5635	5690	5746	5802
EBITDA	17195	19390	21387	22799	23879	24563	24803	25046	25292	25540	25790	26043	26298	26556	26816	27079	27344	27612	27883	28156	28432
Interest Expense	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244
Depreciation		2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374
EBT		14773	16770	18181	19261	19945	20186	20429	20674	20922	21172	21425	21680	21938	22198	22461	22726	22994	23265	23538	23814
Tax @ 30%		4432	5031	5454	5778	5983	6056	6129	6202	6277	6352	6428	6504	6581	6659	6738	6818	6898	6979	7061	7144
Net Income		10341	11739	12727	13483	13961	14130	14300	14472	14645	14821	14998	15176	15357	15539	15723	15908	16096	16285	16477	16670
Interest	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244	2244
Depreciation		2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374	2374
FCFF	-	14959	16356	17344	18101	18579	18748	18918	19090	19263	19438	19615	19794	19974	20156	20340	20526	20714	20903	21094	21288

NPV	83188		
Shadow Price of Spectrum	64886	Real Option Value	78161
Total Spectrum Allotted (Mhz)	76.2	Total Spectrum Allotted (Mhz)	76.2
Price per Mhz (mn)	851.53	Price per Mhz (mn)	1025.7

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	337	385	433	481	529	577	625
	0.8	423	483	544	604	665	725	786
	0.9	510	582	655	728	801	874	946
	1.0	596	681	766	852	937	1022	1107
	1.1	683	780	878	975	1073	1170	1268
	1.2	769	879	989	1099	1209	1318	1428
	1.3	856	978	1100	1222	1345	1467	1589

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	172	143	121	103	88	76	66
	11%	168	139	116	98	84	72	62
	12%	163	134	111	93	79	67	57
	13%	158	129	107	89	74	62	52
	14%	154	124	102	84	69	57	47

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	419	479	539	598	658	718	778
	0.8	518	592	666	740	814	888	962
	0.9	618	706	794	883	971	1059	1148
	1.0	718	821	923	1026	1128	1231	1333
	1.1	818	935	1052	1169	1286	1403	1520
	1.2	919	1050	1181	1312	1443	1575	1706
	1.3	1019	1164	1310	1456	1601	1747	1892

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	204	170	144	123	106	92	81
	11%	199	165	139	118	101	87	76
	12%	194	160	134	113	96	82	71
	13%	189	155	129	108	91	77	66
	14%	184	150	124	103	86	73	61

8.10 Punjab

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	34244	36756	39180	41770	43752	45831	47146	48499	49892	51326	52802	54321	55885	57495	59152	60857	62613	64420	66280	68194	70165
GSM																					
No. of subscribers (mn)	28.57	31.42	33.94	36.65	38.85	41.18	42.83	44.54	46.32	48.18	50.10	52.11	54.19	56.36	58.61	60.96	63.40	65.93	68.57	71.31	74.16
Y-o-Y growth rate		10%	8%	8%	6%	6%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
ARPU	94	92.12	91.199	90.287	89.3839	88.49	87.605	86.729	85.862	85.0032	84.153	83.312	82.479	81.654	80.837	80.029	79.229	78.436	77.652	76.875	76.107
Spectrum Usage (Mhz)	63.2																				
CDMA																					
No. of subscribers (mn)	2.55	2.60	2.66	2.71	2.76	2.82	2.87	2.93	2.99	3.05	3.11	3.17	3.24	3.30	3.37	3.44	3.50	3.57	3.65	3.72	3.79
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	66	64.68	64.033	63.393	62.7589	62.131	61.51	60.895	60.286	59.6831	59.086	58.495	57.91	57.331	56.758	56.19	55.629	55.072	54.522	53.976	53.437
Spectrum Usage (Mhz)	15																				
Interconnection charges	6849	7351	7836	8354	8750	9166	9429	9700	9978	10265	10560	10864	11177	11499	11830	12171	12523	12884	13256	13639	14033
Net Revenue	27395	29405	31344	33416	35001	36664	37716	38799	39914	41061	42242	43457	44708	45996	47321	48686	50090	51536	53024	54555	56132
Expenses																					
Network Operating Expenses	4109	4411	4702	5012	5250	5500	5657	5820	5987	6159	6336	6519	6706	6899	7098	7303	7514	7730	7954	8183	8420
Sales & Distribution Expenses	1918	2058	2194	2339	2450	2567	2640	2716	2794	2874	2957	3042	3130	3220	3312	3408	3506	3608	3712	3819	3929
IT Expenses	548	588	627	668	700	733	754	776	798	821	845	869	894	920	946	974	1002	1031	1060	1091	1123
Service Expenses	822	882	940	1002	1050	1100	1131	1164	1197	1232	1267	1304	1341	1380	1420	1461	1503	1546	1591	1637	1684
Billing, Collection and Bad Debt	548	588	627	668	700	733	754	776	798	821	845	869	894	920	946	974	1002	1031	1060	1091	1123
Marketing Expenses	822	882	940	1002	1050	1100	1131	1164	1197	1232	1267	1304	1341	1380	1420	1461	1503	1546	1591	1637	1684
Personnel Administration	1370	1470	1567	1671	1750	1833	1886	1940	1996	2053	2112	2173	2235	2300	2366	2434	2505	2577	2651	2728	2807
Total Operating Expenses	10136	10880	11597	12364	12950	13566	13955	14356	14768	15193	15629	16079	16542	17018	17509	18014	18533	19068	19619	20186	20769
Spectrum Usage Charge as % of	1096	1176	1254	1337	1400	1467	1509	1552	1597	1642	1690	1738	1788	1840	1893	1947	2004	2061	2121	2182	2245
License Fee as % of AGR	2740	2941	3134	3342	3500	3666	3772	3880	3991	4106	4224	4346	4471	4600	4732	4869	5009	5154	5302	5456	5613
EBITDA	13424	14408	15358	16374	17151	17966	18481	19012	19558	20120	20698	21294	21907	22538	23187	23856	24544	25253	25982	26732	27505
Interest Expense	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
Depreciation		2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120
EBT		10284	11234	12249	13026	13841	14356	14887	15433	15995	16574	17169	17782	18413	19063	19731	20419	21128	21857	22607	23380
Tax @ 30%		3085	3370	3675	3908	4152	4307	4466	4630	4799	4972	5151	5335	5524	5719	5919	6126	6338	6557	6782	7014
Net Income		7199	7864	8574	9118	9689	10049	10421	10803	11197	11602	12018	12448	12889	13344	13812	14294	14789	15300	15825	16366
Interest	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004	2004
Depreciation		2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120
FCFF	-	11323	11988	12699	13243	13813	14174	14546	14928	15321	15726	16143	16572	17014	17469	17937	18418	18914	19425	19950	20491

NPV	60354		
Shadow Price of Spectrum	47076	Real Option Value	57228
Total Spectrum Allotted (Mhz)	78.2	Total Spectrum Allotted (Mhz)	78.2
Price per Mhz (mn)	602	Price per Mhz (mn)	731.82

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

	Subscriber Adjustment Factor							
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	225	257	289	321	353	385	417
	0.8	290	332	373	415	456	498	539
	0.9	356	407	458	508	559	610	661
	1.0	421	482	542	602	662	722	783
	1.1	487	557	626	696	765	835	904
	1.2	553	631	710	789	868	947	1026
	1.3	618	706	795	883	971	1060	1148

	Capital Investment Factor							
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	116	95	79	66	56	47	40
	11%	112	91	75	62	51	43	36
	12%	108	87	70	58	47	39	32
	13%	104	83	66	54	43	35	27
	14%	100	78	62	49	39	31	23

Real Option Sensitivity Analysis

	Subscriber Adjustment Factor							
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	288	329	370	411	452	493	534
	0.8	362	413	465	517	568	620	672
	0.9	437	499	561	624	686	749	811
	1.0	512	585	659	732	805	878	951
	1.1	588	672	756	840	924	1008	1092
	1.2	664	759	854	949	1043	1138	1233
	1.3	740	846	951	1057	1163	1269	1374

	Capital Investment Factor							
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	138	113	95	80	68	58	50
	11%	133	109	90	75	63	54	46
	12%	129	104	86	71	59	50	42
	13%	124	100	81	67	55	46	38
	14%	120	96	77	63	51	42	34

8.11 Haryana

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	18054	21083	23970	26403	28124	29442	30278	30574	30874	31177	31482	31791	32102	32417	32735	33055	33379	33706	34037	34370	34707
GSM																					
No. of subscribers (mn)	19.14	23.16	26.86	30.09	32.49	34.44	35.82	36.54	37.27	38.01	38.77	39.55	40.34	41.15	41.97	42.81	43.67	44.54	45.43	46.34	47.27
Y-o-Y growth rate		21%	16%	12%	8%	6%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	71	69.58	68.884	68.195	67.5134	66.838	66.17	65.508	64.853	64.2046	63.563	62.927	62.298	61.675	61.058	60.447	59.843	59.244	58.652	58.065	57.485
Spectrum Usage (Mhz)	63.8																				
CDMA																					
No. of subscribers (mn)	2.75	2.80	2.86	2.92	2.97	3.03	3.09	3.16	3.22	3.28	3.35	3.42	3.48	3.55	3.63	3.70	3.77	3.85	3.92	4.00	4.08
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	53	51.94	51.421	50.906	50.3973	49.893	49.394	48.9	48.411	47.9274	47.448	46.974	46.504	46.039	45.578	45.123	44.671	44.225	43.782	43.345	42.911
Spectrum Usage (Mhz)	12.5																				
Interconnection charges	3611	4217	4794	5281	5625	5888	6056	6115	6175	6235	6296	6358	6420	6483	6547	6611	6676	6741	6807	6874	6941
Net Revenue	14443	16866	19176	21122	22499	23554	24222	24460	24699	24941	25186	25433	25682	25933	26188	26444	26703	26965	27229	27496	27766
Expenses																					
Network Operating Expenses	2166	2530	2876	3168	3375	3533	3633	3669	3705	3741	3778	3815	3852	3890	3928	3967	4006	4045	4084	4124	4165
Sales & Distribution Expenses	1011	1181	1342	1479	1575	1649	1696	1712	1729	1746	1763	1780	1798	1815	1833	1851	1869	1888	1906	1925	1944
IT Expenses	289	337	384	422	450	471	484	489	494	499	504	509	514	519	524	529	534	539	545	550	555
Service Expenses	433	506	575	634	675	707	727	734	741	748	756	763	770	778	786	793	801	809	817	825	833
Billing, Collection and Bad Debt	289	337	384	422	450	471	484	489	494	499	504	509	514	519	524	529	534	539	545	550	555
Marketing Expenses	433	506	575	634	675	707	727	734	741	748	756	763	770	778	786	793	801	809	817	825	833
Personnel Administration	722	843	959	1056	1125	1178	1211	1223	1235	1247	1259	1272	1284	1297	1309	1322	1335	1348	1361	1375	1388
Total Operating Expenses	5344	6241	7095	7815	8325	8715	8962	9050	9139	9228	9319	9410	9502	9595	9689	9784	9880	9977	10075	10174	10273
Spectrum Usage Charge as % of	578	675	767	845	900	942	969	978	988	998	1007	1017	1027	1037	1048	1058	1068	1079	1089	1100	1111
License Fee as % of AGR	1444	1687	1918	2112	2250	2355	2422	2446	2470	2494	2519	2543	2568	2593	2619	2644	2670	2697	2723	2750	2777
EBITDA	7077	8265	9396	10350	11025	11541	11869	11985	12103	12221	12341	12462	12584	12707	12832	12958	13085	13213	13342	13473	13605
Interest Expense	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682
Depreciation		1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780
EBT		4803	5934	6888	7563	8079	8407	8523	8641	8759	8879	9000	9122	9245	9370	9496	9623	9751	9880	10011	10143
Tax @ 30%		1441	1780	2066	2269	2424	2522	2557	2592	2628	2664	2700	2737	2774	2811	2849	2887	2925	2964	3003	3043
Net Income		3362	4154	4822	5294	5656	5885	5966	6048	6131	6215	6300	6385	6472	6559	6647	6736	6826	6916	7008	7100
Interest	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682	1682
Depreciation		1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780	1780
FCFF	-	6824	7616	8284	8756	9118	9347	9428	9510	9593	9677	9762	9847	9934	10021	10109	10198	10288	10378	10470	10562

NPV	27999		
Shadow Price of Spectrum	21839	Real Option Value	27825
Total Spectrum Allotted (Mhz)	76.3	Total Spectrum Allotted (Mhz)	76.3
Price per Mhz (mn)	286.23	Price per Mhz (mn)	364.68

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	80	91	103	114	125	137	148
	0.8	120	137	154	171	189	206	223
	0.9	160	183	206	229	252	275	297
	1.0	200	229	258	286	315	343	372
	1.1	241	275	309	344	378	412	447
	1.2	281	321	361	401	441	481	521
	1.3	321	367	413	458	504	550	596

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	62	49	39	31	24	19	14
	11%	59	45	35	27	20	15	11
	12%	55	42	32	23	17	11	7
	13%	52	38	28	20	13	8	3
	14%	48	35	25	16	10	4	0

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	126	144	162	180	198	216	234
	0.8	167	191	215	239	263	287	311
	0.9	211	241	271	301	331	361	391
	1.0	255	292	328	365	401	438	474
	1.1	301	344	387	430	472	515	558
	1.2	347	396	446	495	545	594	644
	1.3	393	449	505	561	617	673	729

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	75	60	48	39	31	25	21
	11%	71	56	44	35	28	22	18
	12%	68	52	41	32	25	19	15
	13%	64	49	37	29	22	17	13
	14%	60	45	34	26	19	15	11

8.12 Uttar Pradesh (W)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	41632	47184	51946	55316	57897	59534	60118	60707	61302	61903	62509	63122	63740	64365	64996	65633	66276	66926	67581	68244	68912
GSM																					
No. of subscribers (mn)	44.46	52.02	58.26	62.92	66.70	69.37	70.75	72.17	73.61	75.08	76.59	78.12	79.68	81.27	82.90	84.56	86.25	87.97	89.73	91.53	93.36
Y-o-Y growth rate		17%	12%	8%	6%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	71	69.58	68.884	68.195	67.5134	66.838	66.17	65.508	64.853	64.2046	63.563	62.927	62.298	61.675	61.058	60.447	59.843	59.244	58.652	58.065	57.485
Spectrum Usage (Mhz)	61.2																				
CDMA																					
No. of subscribers (mn)	6.65	6.78	6.92	7.06	7.20	7.34	7.49	7.64	7.79	7.95	8.11	8.27	8.43	8.60	8.77	8.95	9.13	9.31	9.50	9.69	9.88
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	47	46.06	45.599	45.143	44.692	44.245	43.803	43.365	42.931	42.5016	42.077	41.656	41.239	40.827	40.419	40.014	39.614	39.218	38.826	38.438	38.053
Spectrum Usage (Mhz)	13.75																				
Interconnection charges	8326	9437	10389	11063	11579	11907	12024	12141	12260	12381	12502	12624	12748	12873	12999	13127	13255	13385	13516	13649	13782
Net Revenue	33305	37747	41557	44253	46318	47627	48094	48566	49041	49522	50007	50497	50992	51492	51997	52506	53021	53540	54065	54595	55130
Expenses																					
Network Operating Expenses	4996	5662	6234	6638	6948	7144	7214	7285	7356	7428	7501	7575	7649	7724	7800	7876	7953	8031	8110	8189	8269
Sales & Distribution Expenses	2331	2642	2909	3098	3242	3334	3367	3400	3433	3467	3501	3535	3569	3604	3640	3675	3711	3748	3785	3822	3859
IT Expenses	666	755	831	885	926	953	962	971	981	990	1000	1010	1020	1030	1040	1050	1060	1071	1081	1092	1103
Service Expenses	999	1132	1247	1328	1390	1429	1443	1457	1471	1486	1500	1515	1530	1545	1560	1575	1591	1606	1622	1638	1654
Billing, Collection and Bad Debt	666	755	831	885	926	953	962	971	981	990	1000	1010	1020	1030	1040	1050	1060	1071	1081	1092	1103
Marketing Expenses	999	1132	1247	1328	1390	1429	1443	1457	1471	1486	1500	1515	1530	1545	1560	1575	1591	1606	1622	1638	1654
Personnel Administration	1665	1887	2078	2213	2316	2381	2405	2428	2452	2476	2500	2525	2550	2575	2600	2625	2651	2677	2703	2730	2756
Total Operating Expenses	12323	13966	15376	16373	17138	17622	17795	17969	18145	18323	18503	18684	18867	19052	19239	19427	19618	19810	20004	20200	20398
Spectrum Usage Charge as % of	1332	1510	1662	1770	1853	1905	1924	1943	1962	1981	2000	2020	2040	2060	2080	2100	2121	2142	2163	2184	2205
License Fee as % of AGR	3331	3775	4156	4425	4632	4763	4809	4857	4904	4952	5001	5050	5099	5149	5200	5251	5302	5354	5407	5459	5513
EBITDA	16320	18496	20363	21684	22696	23337	23566	23797	24030	24266	24504	24744	24986	25231	25478	25728	25980	26235	26492	26752	27014
Interest Expense	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399
Depreciation		3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596
EBT		11502	13369	14690	15701	16343	16572	16803	17036	17272	17509	17750	17992	18237	18484	18734	18986	19241	19498	19757	20020
Tax @ 30%		3451	4011	4407	4710	4903	4972	5041	5111	5182	5253	5325	5398	5471	5545	5620	5696	5772	5849	5927	6006
Net Income		8051	9358	10283	10991	11440	11600	11762	11925	12090	12257	12425	12594	12766	12939	13114	13290	13468	13648	13830	14014
Interest	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399	3399
Depreciation		3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596	3596
FCFF	-	15045	16352	17277	17985	18434	18595	18756	18919	19084	19251	19419	19589	19760	19933	20108	20284	20463	20643	20824	21008

NPV	57920		
Shadow Price of Spectrum	45178	Real Option Value	57401
Total Spectrum Allotted (Mhz)	74.95	Total Spectrum Allotted (Mhz)	74.95
Price per Mhz (mn)	602.77	Price per Mhz (mn)	765.86

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	171	195	220	244	269	293	318
	0.8	255	291	327	364	400	437	473
	0.9	338	387	435	483	532	580	628
	1.0	422	482	542	603	663	723	784
	1.1	506	578	650	722	794	867	939
	1.2	589	673	758	842	926	1010	1094
	1.3	673	769	865	961	1057	1153	1250

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	140	112	90	73	59	47	37
	11%	133	105	83	65	51	40	30
	12%	126	97	75	58	44	32	22
	13%	119	90	68	51	37	25	15
	14%	112	83	61	44	29	18	8

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	266	304	342	380	418	456	494
	0.8	352	403	453	504	554	604	655
	0.9	443	506	570	633	696	759	823
	1.0	536	613	689	766	842	919	996
	1.1	631	721	811	901	991	1081	1171
	1.2	726	830	934	1038	1141	1245	1349
	1.3	822	940	1057	1175	1292	1410	1527

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	169	136	110	91	75	62	51
	11%	161	128	103	83	68	55	45
	12%	153	120	95	76	61	49	39
	13%	146	113	88	69	54	43	34
	14%	138	106	81	63	48	37	29

8.13 Uttar Pradesh (E)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	63723	67779	72218	75617	77769	78532	79301	80078	80863	81655	82456	83264	84080	84904	85736	86576	87424	88281	89146	90020	90902
GSM																					
No. of subscribers (mn)	61.21	66.71	72.05	76.38	79.43	81.02	82.64	84.29	85.98	87.70	89.45	91.24	93.07	94.93	96.82	98.76	100.74	102.75	104.81	106.90	109.04
Y-o-Y growth rate		9%	8%	6%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	81	79.38	78.586	77.8	77.0223	76.252	75.49	74.735	73.987	73.2475	72.515	71.79	71.072	70.361	69.658	68.961	68.271	67.589	66.913	66.244	65.581
Spectrum Usage (Mhz)	62.4																				
CDMA																					
No. of subscribers (mn)	7.66	7.82	7.97	8.13	8.30	8.46	8.63	8.80	8.98	9.16	9.34	9.53	9.72	9.91	10.11	10.32	10.52	10.73	10.95	11.17	11.39
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	46	45.08	44.629	44.183	43.7411	43.304	42.871	42.442	42.018	41.5973	41.181	40.77	40.362	39.958	39.559	39.163	38.771	38.384	38	37.62	37.244
Spectrum Usage (Mhz)	13.75																				
Interconnection charges	12745	13556	14444	15123	15554	15706	15860	16016	16173	16331	16491	16653	16816	16981	17147	17315	17485	17656	17829	18004	18180
Net Revenue	50979	54223	57774	60493	62215	62825	63441	64063	64690	65324	65965	66611	67264	67923	68589	69261	69940	70625	71317	72016	72722
Expenses																					
Network Operating Expenses	7647	8133	8666	9074	9332	9424	9516	9609	9704	9799	9895	9992	10090	10188	10288	10389	10491	10594	10698	10802	10908
Sales & Distribution Expenses	3569	3796	4044	4235	4355	4398	4441	4484	4528	4573	4618	4663	4708	4755	4801	4848	4896	4944	4992	5041	5091
IT Expenses	1020	1084	1155	1210	1244	1257	1269	1281	1294	1306	1319	1332	1345	1358	1372	1385	1399	1412	1426	1440	1454
Service Expenses	1529	1627	1733	1815	1866	1885	1903	1922	1941	1960	1979	1998	2018	2038	2058	2078	2098	2119	2140	2160	2182
Billing, Collection and Bad Debt	1020	1084	1155	1210	1244	1257	1269	1281	1294	1306	1319	1332	1345	1358	1372	1385	1399	1412	1426	1440	1454
Marketing Expenses	1529	1627	1733	1815	1866	1885	1903	1922	1941	1960	1979	1998	2018	2038	2058	2078	2098	2119	2140	2160	2182
Personnel Administration	2549	2711	2889	3025	3111	3141	3172	3203	3235	3266	3298	3331	3363	3396	3429	3463	3497	3531	3566	3601	3636
Total Operating Expenses	18862	20063	21377	22382	23020	23245	23473	23703	23935	24170	24407	24646	24888	25132	25378	25627	25878	26131	26387	26646	26907
Spectrum Usage Charge as % of	2039	2169	2311	2420	2489	2513	2538	2563	2588	2613	2639	2664	2691	2717	2744	2770	2798	2825	2853	2881	2909
License Fee as % of AGR	5098	5422	5777	6049	6222	6283	6344	6406	6469	6532	6596	6661	6726	6792	6859	6926	6994	7062	7132	7202	7272
EBITDA	24980	26569	28309	29642	30486	30784	31086	31391	31698	32009	32323	32639	32959	33282	33608	33938	34270	34606	34945	35288	35634
Interest Expense	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969
Depreciation		4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198
EBT		18402	20142	21475	22319	22617	22919	23224	23531	23842	24156	24472	24792	25115	25441	25771	26103	26439	26778	27121	27467
Tax @ 30%		5521	6043	6442	6696	6785	6876	6967	7059	7153	7247	7342	7438	7535	7632	7731	7831	7932	8034	8136	8240
Net Income		12882	14100	15032	15623	15832	16043	16257	16472	16689	16909	17131	17355	17581	17809	18040	18272	18507	18745	18985	19227
Interest	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969	3969
Depreciation		4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198	4198
FCFF	-	21049	22267	23199	23790	23999	24210	24424	24639	24856	25076	25298	25522	25748	25976	26207	26439	26674	26912	27152	27394

NPV	87909		
Shadow Price of Spectrum	68569	Real Option Value	84972
Total Spectrum Allotted (Mhz)	76.15	Total Spectrum Allotted (Mhz)	76.15
Price per Mhz (mn)	900.44	Price per Mhz (mn)	1115.9

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	298	341	384	426	469	511	554
	0.8	409	467	526	584	643	701	760
	0.9	520	594	668	742	817	891	965
	1.0	630	720	810	900	990	1081	1171
	1.1	741	847	953	1059	1164	1270	1376
	1.2	852	973	1095	1217	1338	1460	1582
	1.3	962	1100	1237	1375	1512	1650	1787

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	208	169	140	117	98	82	69
	11%	199	161	132	108	89	73	60
	12%	191	153	123	100	81	65	52
	13%	183	145	115	92	72	57	43
	14%	175	136	107	83	64	48	35

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	411	470	529	587	646	705	763
	0.8	531	607	683	759	835	911	987
	0.9	655	749	842	936	1030	1123	1217
	1.0	781	893	1004	1116	1227	1339	1451
	1.1	908	1038	1167	1297	1427	1557	1686
	1.2	1036	1184	1331	1479	1627	1775	1923
	1.3	1164	1330	1496	1662	1828	1995	2161

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	2030	1957	1884	1812	1739	1668	1597
	11%	1835	1761	1686	1612	1539	1466	1395
	12%	1661	1585	1509	1434	1360	1288	1217
	13%	1505	1428	1351	1276	1201	1129	1059
	14%	1366	1287	1210	1134	1060	988	919

8.14 Rajasthan

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	45851	50299	53517	55983	57551	58115	58685	59260	59841	60427	61019	61617	62221	62831	63447	64068	64696	65330	65971	66617	67270
GSM																					
No. of subscribers (mn)	38.36	43.35	46.81	49.62	51.61	52.64	53.69	54.77	55.86	56.98	58.12	59.28	60.47	61.67	62.91	64.17	65.45	66.76	68.09	69.46	70.84
Y-o-Y growth rate		13%	8%	6%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	90	88.2	87.318	86.445	85.5804	84.725	83.877	83.039	82.208	81.3861	80.572	79.766	78.969	78.179	77.397	76.623	75.857	75.099	74.348	73.604	72.868
Spectrum Usage (Mhz)	63.8																				
CDMA																					
No. of subscribers (mn)	7.37	7.52	7.67	7.82	7.98	8.14	8.30	8.47	8.64	8.81	8.99	9.17	9.35	9.54	9.73	9.92	10.12	10.32	10.53	10.74	10.96
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	50	49	48.51	48.025	47.5447	47.069	46.599	46.133	45.671	45.2145	44.762	44.315	43.872	43.433	42.999	42.569	42.143	41.721	41.304	40.891	40.482
Spectrum Usage (Mhz)	15																				
Interconnection charges	9170	10060	10703	11197	11510	11623	11737	11852	11968	12085	12204	12323	12444	12566	12689	12814	12939	13066	13194	13323	13454
Net Revenue	36681	40239	42813	44787	46041	46492	46948	47408	47873	48342	48815	49294	49777	50265	50757	51255	51757	52264	52776	53294	53816
Expenses																					
Network Operating Expenses	5502	6036	6422	6718	6906	6974	7042	7111	7181	7251	7322	7394	7467	7540	7614	7688	7764	7840	7916	7994	8072
Sales & Distribution Expenses	2568	2817	2997	3135	3223	3254	3286	3319	3351	3384	3417	3451	3484	3519	3553	3588	3623	3658	3694	3731	3767
IT Expenses	734	805	856	896	921	930	939	948	957	967	976	986	996	1005	1015	1025	1035	1045	1056	1066	1076
Service Expenses	1100	1207	1284	1344	1381	1395	1408	1422	1436	1450	1464	1479	1493	1508	1523	1538	1553	1568	1583	1599	1614
Billing, Collection and Bad Debt	734	805	856	896	921	930	939	948	957	967	976	986	996	1005	1015	1025	1035	1045	1056	1066	1076
Marketing Expenses	1100	1207	1284	1344	1381	1395	1408	1422	1436	1450	1464	1479	1493	1508	1523	1538	1553	1568	1583	1599	1614
Personnel Administration	1834	2012	2141	2239	2302	2325	2347	2370	2394	2417	2441	2465	2489	2513	2538	2563	2588	2613	2639	2665	2691
Total Operating Expenses	13572	14888	15841	16571	17035	17202	17371	17541	17713	17886	18062	18239	18417	18598	18780	18964	19150	19338	19527	19719	19912
Spectrum Usage Charge as % of	1467	1610	1713	1791	1842	1860	1878	1896	1915	1934	1953	1972	1991	2011	2030	2050	2070	2091	2111	2132	2153
License Fee as % of AGR	3668	4024	4281	4479	4604	4649	4695	4741	4787	4834	4882	4929	4978	5026	5076	5125	5176	5226	5278	5329	5382
EBITDA	17974	19717	20978	21946	22560	22781	23004	23230	23458	23687	23920	24154	24391	24630	24871	25115	25361	25609	25860	26114	26370
Interest Expense	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601
Depreciation		2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752
EBT		14364	15625	16592	17207	17428	17651	17877	18104	18334	18566	18801	19037	19276	19518	19762	20008	20256	20507	20761	21017
Tax @ 30%		4309	4688	4978	5162	5228	5295	5363	5431	5500	5570	5640	5711	5783	5855	5928	6002	6077	6152	6228	6305
Net Income		10055	10938	11615	12045	12200	12356	12514	12673	12834	12996	13161	13326	13494	13662	13833	14005	14179	14355	14532	14712
Interest	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601	2601
Depreciation		2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752	2752
FCFF	-	15408	16291	16968	17398	17553	17709	17867	18026	18187	18350	18514	18679	18847	19016	19186	19359	19533	19708	19886	20065

NPV	70726		
Shadow Price of Spectrum	55166	Real Option Value	67432
Total Spectrum Allotted (Mhz)	78.8	Total Spectrum Allotted (Mhz)	78.8
Price per Mhz (mn)	700.08	Price per Mhz (mn)	855.73

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	253	289	325	361	397	433	469
	0.8	332	379	426	474	521	569	616
	0.9	411	470	528	587	646	704	763
	1.0	490	560	630	700	770	840	910
	1.1	569	651	732	813	894	976	1057
	1.2	648	741	834	926	1019	1112	1204
	1.3	728	832	935	1039	1143	1247	1351

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	155	128	107	90	77	66	56
	11%	150	123	102	85	72	60	51
	12%	145	118	97	80	66	55	45
	13%	140	113	91	75	61	50	40
	14%	135	107	86	69	56	44	35

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	329	376	424	471	518	565	612
	0.8	418	478	537	597	657	716	776
	0.9	508	581	653	726	798	871	944
	1.0	599	685	770	856	941	1027	1112
	1.1	690	789	888	986	1085	1184	1282
	1.2	782	894	1005	1117	1229	1341	1452
	1.3	874	998	1123	1248	1373	1498	1623

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	185	153	129	109	94	80	70
	11%	179	147	123	104	88	75	64
	12%	173	142	117	98	82	69	59
	13%	168	136	112	92	77	64	54
	14%	162	130	106	87	72	59	49

8.15Madhya Pradesh

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	44569	48989	52177	54619	56167	56717	57273	57834	58401	58974	59552	60135	60724	61320	61920	62527	63140	63759	64384	65015	65652
GSM																					
No. of subscribers (mn)	42.88	48.46	52.33	55.47	57.69	58.85	60.02	61.23	62.45	63.70	64.97	66.27	67.60	68.95	70.33	71.74	73.17	74.63	76.13	77.65	79.20
Y-o-Y growth rate		13%	8%	6%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	80	78.4	77.616	76.84	76.0714	75.311	74.558	73.812	73.074	72.3432	71.62	70.904	70.195	69.493	68.798	68.11	67.429	66.754	66.087	65.426	64.772
Spectrum Usage (Mhz)	63																				
CDMA																					
No. of subscribers (mn)	6.03	6.15	6.27	6.40	6.53	6.66	6.79	6.93	7.07	7.21	7.35	7.50	7.65	7.80	7.96	8.12	8.28	8.44	8.61	8.79	8.96
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	47	46.06	45.599	45.143	44.692	44.245	43.803	43.365	42.931	42.5016	42.077	41.656	41.239	40.827	40.419	40.014	39.614	39.218	38.826	38.438	38.053
Spectrum Usage (Mhz)	12.5																				
Interconnection charges	8914	9798	10435	10924	11233	11343	11455	11567	11680	11795	11910	12027	12145	12264	12384	12505	12628	12752	12877	13003	13130
Net Revenue	35655	39191	41742	43695	44934	45374	45819	46268	46721	47179	47641	48108	48580	49056	49536	50022	50512	51007	51507	52012	52521
Expenses																					
Network Operating Expenses	5348	5879	6261	6554	6740	6806	6873	6940	7008	7077	7146	7216	7287	7358	7430	7503	7577	7651	7726	7802	7878
Sales & Distribution Expenses	2496	2743	2922	3059	3145	3176	3207	3239	3270	3303	3335	3368	3401	3434	3468	3502	3536	3570	3605	3641	3677
IT Expenses	713	784	835	874	899	907	916	925	934	944	953	962	972	981	991	1000	1010	1020	1030	1040	1050
Service Expenses	1070	1176	1252	1311	1348	1361	1375	1388	1402	1415	1429	1443	1457	1472	1486	1501	1515	1530	1545	1560	1576
Billing, Collection and Bad Debt	713	784	835	874	899	907	916	925	934	944	953	962	972	981	991	1000	1010	1020	1030	1040	1050
Marketing Expenses	1070	1176	1252	1311	1348	1361	1375	1388	1402	1415	1429	1443	1457	1472	1486	1501	1515	1530	1545	1560	1576
Personnel Administration	1783	1960	2087	2185	2247	2269	2291	2313	2336	2359	2382	2405	2429	2453	2477	2501	2526	2550	2575	2601	2626
Total Operating Expenses	13192	14501	15444	16167	16625	16788	16953	17119	17287	17456	17627	17800	17974	18151	18328	18508	18689	18873	19058	19244	19433
Spectrum Usage Charge as % of	1426	1568	1670	1748	1797	1815	1833	1851	1869	1887	1906	1924	1943	1962	1981	2001	2020	2040	2060	2080	2101
License Fee as % of AGR	3566	3919	4174	4370	4493	4537	4582	4627	4672	4718	4764	4811	4858	4906	4954	5002	5051	5101	5151	5201	5252
EBITDA	17471	19204	20453	21411	22017	22233	22451	22671	22893	23118	23344	23573	23804	24037	24273	24511	24751	24993	25238	25486	25736
Interest Expense	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887
Depreciation		3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054
EBT		13263	14512	15469	16076	16292	16510	16730	16952	17176	17403	17632	17863	18096	18332	18570	18810	19052	19297	19545	19794
Tax @ 30%		3979	4354	4641	4823	4888	4953	5019	5086	5153	5221	5290	5359	5429	5499	5571	5643	5716	5789	5863	5938
Net Income		9284	10159	10829	11253	11404	11557	11711	11866	12024	12182	12342	12504	12667	12832	12999	13167	13337	13508	13681	13856
Interest	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887	2887
Depreciation		3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054	3054
FCFF	-	15225	16100	16770	17195	17346	17498	17652	17808	17965	18123	18283	18445	18608	18773	18940	19108	19278	19449	19622	19797

NPV	63157		
Shadow Price of Spectrum	49262	Real Option Value	61107
Total Spectrum Allotted (Mhz)	75.5	Total Spectrum Allotted (Mhz)	75.5
Price per Mhz (mn)	652.48	Price per Mhz (mn)	809.36

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	215	246	276	307	338	368	399
	0.8	296	338	380	422	464	507	549
	0.9	376	430	484	537	591	645	699
	1.0	457	522	587	652	718	783	848
	1.1	537	614	691	768	844	921	998
	1.2	618	706	795	883	971	1059	1148
	1.3	699	798	898	998	1098	1198	1297

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	151	123	102	85	71	59	50
	11%	145	117	96	78	65	53	43
	12%	139	111	89	72	58	47	37
	13%	133	105	83	66	52	41	31
	14%	127	99	77	60	46	35	25

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	297	340	382	425	467	510	552
	0.8	385	440	495	550	605	660	715
	0.9	475	543	611	679	746	814	882
	1.0	567	647	728	809	890	971	1052
	1.1	659	753	847	941	1036	1130	1224
	1.2	752	859	967	1074	1182	1289	1396
	1.3	845	966	1087	1207	1328	1449	1569

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	180	148	123	103	87	74	63
	11%	173	141	116	97	81	68	57
	12%	167	135	110	90	75	62	51
	13%	160	128	104	84	69	56	46
	14%	154	122	97	78	63	51	41

8.16 West Bengal

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	31576	33851	36052	37737	38805	39905	40296	40691	41090	41493	41899	42310	42725	43143	43566	43993	44424	44859	45299	45743	46191
GSM																					
No. of subscribers (mn)	38.60	42.46	45.85	48.61	50.55	52.57	53.62	54.70	55.79	56.91	58.04	59.20	60.39	61.60	62.83	64.09	65.37	66.67	68.01	69.37	70.76
Y-o-Y growth rate		10%	8%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	63	61.74	61.123	60.511	59.9063	59.307	58.714	58.127	57.546	56.9703	56.401	55.837	55.278	54.725	54.178	53.636	53.1	52.569	52.043	51.523	51.008
Spectrum Usage (Mhz)	53																				
CDMA																					
No. of subscribers (mn)	4.44	4.53	4.62	4.71	4.80	4.90	5.00	5.10	5.20	5.30	5.41	5.52	5.63	5.74	5.85	5.97	6.09	6.21	6.34	6.46	6.59
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	45	44.1	43.659	43.222	42.7902	42.362	41.939	41.519	41.104	40.693	40.286	39.883	39.484	39.09	38.699	38.312	37.929	37.549	37.174	36.802	36.434
Spectrum Usage (Mhz)	11.25																				
Interconnection charges	6315	6770	7210	7547	7761	7981	8059	8138	8218	8299	8380	8462	8545	8629	8713	8799	8885	8972	9060	9149	9238
Net Revenue	25261	27081	28841	30189	31044	31924	32237	32553	32872	33194	33519	33848	34180	34515	34853	35194	35539	35888	36239	36594	36953
Expenses																					
Network Operating Expenses	3789	4062	4326	4528	4657	4789	4836	4883	4931	4979	5028	5077	5127	5177	5228	5279	5331	5383	5436	5489	5543
Sales & Distribution Expenses	1768	1896	2019	2113	2173	2235	2257	2279	2301	2324	2346	2369	2393	2416	2440	2464	2488	2512	2537	2562	2587
IT Expenses	505	542	577	604	621	638	645	651	657	664	670	677	684	690	697	704	711	718	725	732	739
Service Expenses	758	812	865	906	931	958	967	977	986	996	1006	1015	1025	1035	1046	1056	1066	1077	1087	1098	1109
Billing, Collection and Bad Debt	505	542	577	604	621	638	645	651	657	664	670	677	684	690	697	704	711	718	725	732	739
Marketing Expenses	758	812	865	906	931	958	967	977	986	996	1006	1015	1025	1035	1046	1056	1066	1077	1087	1098	1109
Personnel Administration	1263	1354	1442	1509	1552	1596	1612	1628	1644	1660	1676	1692	1709	1726	1743	1760	1777	1794	1812	1830	1848
Total Operating Expenses	9347	10020	10671	11170	11486	11812	11928	12045	12163	12282	12402	12524	12646	12770	12896	13022	13150	13278	13409	13540	13673
Spectrum Usage Charge as % of	1010	1083	1154	1208	1242	1277	1289	1302	1315	1328	1341	1354	1367	1381	1394	1408	1422	1436	1450	1464	1478
License Fee as % of AGR	2526	2708	2884	3019	3104	3192	3224	3255	3287	3319	3352	3385	3418	3451	3485	3519	3554	3589	3624	3659	3695
EBITDA	12378	13270	14132	14793	15212	15643	15796	15951	16107	16265	16425	16585	16748	16912	17078	17245	17414	17585	17757	17931	18107
Interest Expense	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570
Depreciation		2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719
EBT		7981	8843	9504	9923	10354	10507	10662	10818	10976	11136	11297	11459	11623	11789	11956	12125	12296	12468	12642	12818
Tax @ 30%		2394	2653	2851	2977	3106	3152	3199	3246	3293	3341	3389	3438	3487	3537	3587	3638	3689	3740	3793	3845
Net Income		5587	6190	6653	6946	7248	7355	7463	7573	7683	7795	7908	8021	8136	8252	8369	8488	8607	8728	8850	8973
Interest	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570	2570
Depreciation		2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719	2719
FCFF	-	10875	11479	11942	12235	12537	12644	12752	12862	12972	13084	13197	13310	13425	13541	13658	13777	13896	14017	14139	14262

NPV	34871		
Shadow Price of Spectrum	27199	Real Option Value	35657
Total Spectrum Allotted (Mhz)	64.25	Total Spectrum Allotted (Mhz)	64.25
Price per Mhz (mn)	423.34	Price per Mhz (mn)	554.98

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	98	112	126	140	154	168	182
	0.8	164	187	211	234	258	281	304
	0.9	230	263	296	329	362	395	427
	1.0	296	339	381	423	466	508	550
	1.1	363	414	466	518	570	621	673
	1.2	429	490	551	612	674	735	796
	1.3	495	566	636	707	778	848	919

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	109	86	68	55	43	34	26
	11%	102	80	62	48	37	27	19
	12%	96	73	56	42	30	21	13
	13%	90	67	49	35	24	14	6
	14%	83	61	43	29	17	8	0

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	183	210	236	262	288	314	340
	0.8	248	283	319	354	390	425	460
	0.9	317	362	407	453	498	543	588
	1.0	388	444	499	555	610	666	721
	1.1	462	528	594	660	726	792	858
	1.2	537	613	690	767	843	920	997
	1.3	612	700	787	875	962	1050	1137

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	131	105	85	69	56	46	38
	11%	125	98	78	63	50	41	33
	12%	118	92	72	57	45	35	28
	13%	111	85	66	51	40	31	24
	14%	105	79	60	46	35	26	20

8.17 Himachal Pradesh

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	7117	7635	8134	8517	8760	9009	9097	9187	9277	9368	9459	9552	9646	9740	9836	9932	10029	10128	10227	10327	10428
GSM																					
No. of subscribers (mn)	7.18	7.90	8.54	9.05	9.41	9.79	9.98	10.18	10.39	10.59	10.80	11.02	11.24	11.47	11.70	11.93	12.17	12.41	12.66	12.91	13.17
Y-o-Y growth rate		10%	8%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	77	75.46	74.705	73.958	73.2188	72.487	71.762	71.044	70.334	69.6303	68.934	68.245	67.562	66.887	66.218	65.556	64.9	64.251	63.608	62.972	62.343
Spectrum Usage (Mhz)	57.6																				
CDMA																					
No. of subscribers (mn)	0.54	0.55	0.56	0.57	0.58	0.59	0.61	0.62	0.63	0.64	0.66	0.67	0.68	0.70	0.71	0.72	0.74	0.75	0.77	0.78	0.80
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	74	72.52	71.795	71.077	70.3661	69.662	68.966	68.276	67.593	66.9174	66.248	65.586	64.93	64.281	63.638	63.001	62.371	61.748	61.13	60.519	59.914
Spectrum Usage (Mhz)	10																				
Interconnection charges	1423	1527	1627	1703	1752	1802	1819	1837	1855	1874	1892	1910	1929	1948	1967	1986	2006	2026	2045	2065	2086
Net Revenue	5694	6108	6508	6814	7008	7207	7278	7349	7421	7494	7568	7642	7717	7792	7869	7946	8024	8102	8182	8262	8343
Expenses																					
Network Operating Expenses	854	916	976	1022	1051	1081	1092	1102	1113	1124	1135	1146	1157	1169	1180	1192	1204	1215	1227	1239	1251
Sales & Distribution Expenses	399	428	456	477	491	505	509	514	519	525	530	535	540	545	551	556	562	567	573	578	584
IT Expenses	114	122	130	136	140	144	146	147	148	150	151	153	154	156	157	159	160	162	164	165	167
Service Expenses	171	183	195	204	210	216	218	220	223	225	227	229	231	234	236	238	241	243	245	248	250
Billing, Collection and Bad Debt	114	122	130	136	140	144	146	147	148	150	151	153	154	156	157	159	160	162	164	165	167
Marketing Expenses	171	183	195	204	210	216	218	220	223	225	227	229	231	234	236	238	241	243	245	248	250
Personnel Administration	285	305	325	341	350	360	364	367	371	375	378	382	386	390	393	397	401	405	409	413	417
Total Operating Expenses	2107	2260	2408	2521	2593	2667	2693	2719	2746	2773	2800	2827	2855	2883	2911	2940	2969	2998	3027	3057	3087
Spectrum Usage Charge as % of	228	244	260	273	280	288	291	294	297	300	303	306	309	312	315	318	321	324	327	330	334
License Fee as % of AGR	569	611	651	681	701	721	728	735	742	749	757	764	772	779	787	795	802	810	818	826	834
EBITDA	2790	2993	3189	3339	3434	3532	3566	3601	3636	3672	3708	3744	3781	3818	3856	3893	3932	3970	4009	4048	4088
Interest Expense	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476
Depreciation		503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503
EBT		2014	2210	2360	2455	2553	2587	2622	2658	2693	2729	2766	2802	2839	2877	2915	2953	2991	3030	3069	3109
Tax @ 30%		604	663	708	736	766	776	787	797	808	819	830	841	852	863	874	886	897	909	921	933
Net Income		1410	1547	1652	1718	1787	1811	1836	1860	1885	1910	1936	1962	1988	2014	2040	2067	2094	2121	2149	2176
Interest	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476	476
Depreciation		503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503	503
FCFF	-	2389	2526	2631	2697	2766	2790	2814	2839	2864	2889	2915	2940	2966	2993	3019	3046	3073	3100	3127	3155

NPV	9619		
Shadow Price of Spectrum	7503	Real Option Value	9369
Total Spectrum Allotted (Mhz)	67.6	Total Spectrum Allotted (Mhz)	67.6
Price per Mhz (mn)	110.99	Price per Mhz (mn)	138.59

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	35	40	45	50	55	60	65
	0.8	49	56	63	70	77	85	92
	0.9	63	73	82	91	100	109	118
	1.0	78	89	100	111	122	133	144
	1.1	92	105	118	131	144	158	171
	1.2	106	121	136	152	167	182	197
	1.3	120	137	155	172	189	206	223

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	26	21	17	14	12	10	8
	11%	25	20	16	13	11	9	7
	12%	24	19	15	12	9	7	6
	13%	22	18	14	11	8	6	5
	14%	21	16	13	10	7	5	3

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	50	57	64	71	79	86	93
	0.8	65	75	84	93	103	112	121
	0.9	81	93	104	116	127	139	150
	1.0	97	111	125	139	152	166	180
	1.1	113	129	146	162	178	194	210
	1.2	130	148	167	185	204	222	241
	1.3	146	167	188	209	229	250	271

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	31	25	21	17	15	12	10
	11%	30	24	20	16	13	11	9
	12%	28	23	18	15	12	10	8
	13%	27	22	17	14	11	9	7
	14%	26	20	16	13	10	8	6

8.18 Bihar

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	50179	53727	57168	59806	61482	63207	63826	64451	65083	65721	66365	67015	67672	68335	69005	69681	70364	71054	71750	72453	73163
GSM																					
No. of subscribers (mn)	51.25	56.38	60.89	64.54	67.12	69.81	71.20	72.63	74.08	75.56	77.07	78.62	80.19	81.79	83.43	85.10	86.80	88.53	90.30	92.11	93.95
Y-o-Y growth rate		10%	8%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	74	72.52	71.795	71.077	70.3661	69.662	68.966	68.276	67.593	66.9174	66.248	65.586	64.93	64.281	63.638	63.001	62.371	61.748	61.13	60.519	59.914
Spectrum Usage (Mhz)	66.8																				
CDMA																					
No. of subscribers (mn)	7.63	7.78	7.93	8.09	8.25	8.42	8.59	8.76	8.93	9.11	9.30	9.48	9.67	9.86	10.06	10.26	10.47	10.68	10.89	11.11	11.33
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	51	49.98	49.48	48.985	48.4955	48.011	47.53	47.055	46.585	46.1188	45.658	45.201	44.749	44.302	43.859	43.42	42.986	42.556	42.13	41.709	41.292
Spectrum Usage (Mhz)	13.75																				
Interconnection charges	10036	10745	11434	11961	12296	12641	12765	12890	13017	13144	13273	13403	13534	13667	13801	13936	14073	14211	14350	14491	14633
Net Revenue	40143	42982	45735	47845	49185	50565	51061	51561	52066	52577	53092	53612	54138	54668	55204	55745	56291	56843	57400	57962	58531
Expenses																					
Network Operating Expenses	6022	6447	6860	7177	7378	7585	7659	7734	7810	7887	7964	8042	8121	8200	8281	8362	8444	8526	8610	8694	8780
Sales & Distribution Expenses	2810	3009	3201	3349	3443	3540	3574	3609	3645	3680	3716	3753	3790	3827	3864	3902	3940	3979	4018	4057	4097
IT Expenses	803	860	915	957	984	1011	1021	1031	1041	1052	1062	1072	1083	1093	1104	1115	1126	1137	1148	1159	1171
Service Expenses	1204	1289	1372	1435	1476	1517	1532	1547	1562	1577	1593	1608	1624	1640	1656	1672	1689	1705	1722	1739	1756
Billing, Collection and Bad Debt	803	860	915	957	984	1011	1021	1031	1041	1052	1062	1072	1083	1093	1104	1115	1126	1137	1148	1159	1171
Marketing Expenses	1204	1289	1372	1435	1476	1517	1532	1547	1562	1577	1593	1608	1624	1640	1656	1672	1689	1705	1722	1739	1756
Personnel Administration	2007	2149	2287	2392	2459	2528	2553	2578	2603	2629	2655	2681	2707	2733	2760	2787	2815	2842	2870	2898	2927
Total Operating Expenses	14853	15903	16922	17702	18199	18709	18892	19078	19265	19453	19644	19837	20031	20227	20425	20626	20828	21032	21238	21446	21656
Spectrum Usage Charge as % of	1606	1719	1829	1914	1967	2023	2042	2062	2083	2103	2124	2144	2166	2187	2208	2230	2252	2274	2296	2318	2341
License Fee as % of AGR	4014	4298	4573	4784	4919	5057	5106	5156	5207	5258	5309	5361	5414	5467	5520	5574	5629	5684	5740	5796	5853
EBITDA	19670	21061	22410	23444	24101	24777	25020	25265	25513	25763	26015	26270	26527	26787	27050	27315	27583	27853	28126	28402	28680
Interest Expense	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429
Depreciation		3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628
EBT		14004	15353	16387	17044	17720	17963	18208	18456	18706	18958	19213	19470	19730	19993	20258	20526	20796	21069	21345	21623
Tax @ 30%		4201	4606	4916	5113	5316	5389	5462	5537	5612	5687	5764	5841	5919	5998	6077	6158	6239	6321	6403	6487
Net Income		9803	10747	11471	11931	12404	12574	12746	12919	13094	13271	13449	13629	13811	13995	14181	14368	14557	14748	14941	15136
Interest	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429	3429
Depreciation		3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628
FCFF	-	16860	17804	18528	18988	19461	19631	19803	19976	20151	20328	20506	20686	20868	21052	21238	21425	21614	21805	21998	22193

NPV	66020		
Shadow Price of Spectrum	51496	Real Option Value	64593
Total Spectrum Allotted (Mhz)	80.55	Total Spectrum Allotted (Mhz)	80.55
Price per Mhz (mn)	639.3	Price per Mhz (mn)	801.9

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

	Subscriber Adjustment Factor						
ARPU Adjustment Factor	0.7	0.8	0.9	1.0	1.1	1.2	1.3
0.7	197	225	253	281	309	337	365
0.8	280	320	360	400	440	480	520
0.9	364	416	468	520	572	624	676
1.0	448	511	575	639	703	767	831
1.1	531	607	683	759	835	911	986
1.2	615	703	790	878	966	1054	1142
1.3	698	798	898	998	1098	1197	1297

	Capital Investment Factor						
Cost of Capital	0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	150	122	99	82	68	56	46
11%	144	115	93	75	61	49	39
12%	137	108	86	68	54	42	32
13%	130	101	79	61	47	35	25
14%	123	94	72	55	40	28	18

Real Option Sensitivity Analysis

	Subscriber Adjustment Factor						
ARPU Adjustment Factor	1	1	1	1	1	1	1
0.7	286	327	368	409	450	491	532
0.8	375	429	482	536	589	643	696
0.9	467	534	601	667	734	801	868
1.0	561	642	722	802	882	962	1042
1.1	657	750	844	938	1032	1126	1220
1.2	753	860	968	1075	1183	1290	1398
1.3	849	971	1092	1213	1334	1456	1577

	Capital Investment Factor						
Cost of Capital	0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	2030	1957	1884	1812	1739	1668	1597
11%	1835	1761	1686	1612	1539	1466	1395
12%	1661	1585	1509	1434	1360	1288	1217
13%	1505	1428	1351	1276	1201	1129	1059
14%	1366	1287	1210	1134	1060	988	919

8.19 Orissa

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	20297	21804	23256	24365	25067	25789	26042	26297	26555	26815	27078	27343	27611	27882	28155	28431	28710	28991	29275	29562	29852
GSM																					
No. of subscribers (mn)	23.01	25.31	27.33	28.97	30.13	31.34	31.96	32.60	33.25	33.92	34.60	35.29	35.99	36.71	37.45	38.20	38.96	39.74	40.54	41.35	42.17
Y-o-Y growth rate		10%	8%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	70	68.6	67.914	67.235	66.5625	65.897	65.238	64.586	63.94	63.3003	62.667	62.041	61.42	60.806	60.198	59.596	59	58.41	57.826	57.248	56.675
Spectrum Usage (Mhz)	59.4																				
CDMA																					
No. of subscribers (mn)	1.72	1.76	1.79	1.83	1.87	1.90	1.94	1.98	2.02	2.06	2.10	2.14	2.19	2.23	2.27	2.32	2.37	2.41	2.46	2.51	2.56
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	47	46.06	45.599	45.143	44.692	44.245	43.803	43.365	42.931	42.5016	42.077	41.656	41.239	40.827	40.419	40.014	39.614	39.218	38.826	38.438	38.053
Spectrum Usage (Mhz)	11.25																				
Interconnection charges	4059	4361	4651	4873	5013	5158	5208	5259	5311	5363	5416	5469	5522	5576	5631	5686	5742	5798	5855	5912	5970
Net Revenue	16238	17443	18604	19492	20054	20631	20834	21038	21244	21452	21662	21875	22089	22305	22524	22745	22968	23193	23420	23650	23881
Expenses																					
Network Operating Expenses	2436	2617	2791	2924	3008	3095	3125	3156	3187	3218	3249	3281	3313	3346	3379	3412	3445	3479	3513	3547	3582
Sales & Distribution Expenses	1137	1221	1302	1364	1404	1444	1458	1473	1487	1502	1516	1531	1546	1561	1577	1592	1608	1623	1639	1655	1672
IT Expenses	325	349	372	390	401	413	417	421	425	429	433	437	442	446	450	455	459	464	468	473	478
Service Expenses	487	523	558	585	602	619	625	631	637	644	650	656	663	669	676	682	689	696	703	709	716
Billing, Collection and Bad Debt	325	349	372	390	401	413	417	421	425	429	433	437	442	446	450	455	459	464	468	473	478
Marketing Expenses	487	523	558	585	602	619	625	631	637	644	650	656	663	669	676	682	689	696	703	709	716
Personnel Administration	812	872	930	975	1003	1032	1042	1052	1062	1073	1083	1094	1104	1115	1126	1137	1148	1160	1171	1182	1194
Total Operating Expenses	6008	6454	6884	7212	7420	7634	7708	7784	7860	7937	8015	8094	8173	8253	8334	8416	8498	8581	8665	8750	8836
Spectrum Usage Charge as % of	650	698	744	780	802	825	833	842	850	858	866	875	884	892	901	910	919	928	937	946	955
License Fee as % of AGR	1624	1744	1860	1949	2005	2063	2083	2104	2124	2145	2166	2187	2209	2231	2252	2274	2297	2319	2342	2365	2388
EBITDA	7957	8547	9116	9551	9826	10109	10208	10308	10410	10512	10615	10719	10824	10930	11037	11145	11254	11364	11476	11588	11702
Interest Expense	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523
Depreciation		1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611
EBT		5413	5982	6417	6692	6975	7074	7174	7275	7377	7480	7584	7689	7795	7902	8011	8120	8230	8342	8454	8568
Tax @ 30%		1624	1795	1925	2008	2093	2122	2152	2183	2213	2244	2275	2307	2339	2371	2403	2436	2469	2502	2536	2570
Net Income		3789	4187	4492	4684	4883	4952	5022	5093	5164	5236	5309	5382	5457	5532	5607	5684	5761	5839	5918	5997
Interest	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523	1523
Depreciation		1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611	1611
FCFF	-	6923	7322	7626	7819	8017	8086	8156	8227	8298	8370	8443	8517	8591	8666	8742	8818	8895	8973	9052	9132

NPV	24810		
Shadow Price of Spectrum	19352	Real Option Value	24720
Total Spectrum Allotted (Mhz)	70.65	Total Spectrum Allotted (Mhz)	70.65
Price per Mhz (mn)	273.91	Price per Mhz (mn)	349.9

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	75	86	97	107	118	129	139
	0.8	114	130	147	163	179	195	212
	0.9	153	175	197	218	240	262	284
	1.0	192	219	247	274	301	329	356
	1.1	231	264	297	329	362	395	428
	1.2	269	308	346	385	423	462	500
	1.3	308	352	396	441	485	529	573

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	67	53	43	35	28	23	18
	11%	63	50	40	32	25	19	15
	12%	60	47	36	28	21	16	11
	13%	57	43	33	25	18	12	8
	14%	53	40	29	21	15	9	4

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	120	138	155	172	189	206	224
	0.8	160	183	206	229	252	274	297
	0.9	202	231	260	288	317	346	375
	1.0	245	280	315	350	385	420	455
	1.1	289	330	371	413	454	495	536
	1.2	333	381	428	476	523	571	619
	1.3	378	432	486	540	594	648	702

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	80	65	53	44	36	30	25
	11%	77	61	49	40	33	27	22
	12%	73	58	46	37	29	24	19
	13%	69	54	42	33	26	21	16
	14%	66	51	39	30	24	18	14

8.20 Assam

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	18823	20214	21555	22580	23229	23896	24130	24367	24606	24847	25090	25336	25585	25835	26088	26344	26602	26863	27126	27392	27661
GSM																					
No. of subscribers (mn)	13.16	14.47	15.63	16.57	17.23	17.92	18.28	18.64	19.02	19.40	19.79	20.18	20.58	21.00	21.42	21.84	22.28	22.73	23.18	23.65	24.12
Y-o-Y growth rate		10%	8%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	113	110.7	109.63	108.54	107.451	106.38	105.31	104.26	103.22	102.185	101.16	100.15	99.15	98.158	97.177	96.205	95.243	94.29	93.348	92.414	91.49
Spectrum Usage (Mhz)	55																				
CDMA																					
No. of subscribers (mn)	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.30	0.30	0.31	0.31	0.32	0.33	0.33	0.34	0.35
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	350	343	339.57	336.17	332.813	329.48	326.19	322.93	319.7	316.501	313.34	310.2	307.1	304.03	300.99	297.98	295	292.05	289.13	286.24	283.38
Spectrum Usage (Mhz)	10																				
Interconnection charges	3765	4043	4311	4516	4646	4779	4826	4873	4921	4969	5018	5067	5117	5167	5218	5269	5320	5373	5425	5478	5532
Net Revenue	15058	16171	17244	18064	18583	19117	19304	19494	19685	19878	20072	20269	20468	20668	20871	21075	21282	21490	21701	21914	22128
Expenses																					
Network Operating Expenses	2259	2426	2587	2710	2787	2868	2896	2924	2953	2982	3011	3040	3070	3100	3131	3161	3192	3224	3255	3287	3319
Sales & Distribution Expenses	1054	1132	1207	1264	1301	1338	1351	1365	1378	1391	1405	1419	1433	1447	1461	1475	1490	1504	1519	1534	1549
IT Expenses	301	323	345	361	372	382	386	390	394	398	401	405	409	413	417	422	426	430	434	438	443
Service Expenses	452	485	517	542	557	574	579	585	591	596	602	608	614	620	626	632	638	645	651	657	664
Billing, Collection and Bad Debt	301	323	345	361	372	382	386	390	394	398	401	405	409	413	417	422	426	430	434	438	443
Marketing Expenses	452	485	517	542	557	574	579	585	591	596	602	608	614	620	626	632	638	645	651	657	664
Personnel Administration	753	809	862	903	929	956	965	975	984	994	1004	1013	1023	1033	1044	1054	1064	1075	1085	1096	1106
Total Operating Expenses	5572	5983	6380	6684	6876	7073	7143	7213	7283	7355	7427	7500	7573	7647	7722	7798	7874	7951	8029	8108	8188
Spectrum Usage Charge as % of	602	647	690	723	743	765	772	780	787	795	803	811	819	827	835	843	851	860	868	877	885
License Fee as % of AGR	1506	1617	1724	1806	1858	1912	1930	1949	1968	1988	2007	2027	2047	2067	2087	2108	2128	2149	2170	2191	2213
EBITDA	7379	7924	8449	8851	9106	9367	9459	9552	9645	9740	9835	9932	10029	10127	10227	10327	10428	10530	10634	10738	10843
Interest Expense	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864
Depreciation		914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914
EBT		6146	6672	7074	7328	7590	7681	7774	7868	7962	8058	8154	8251	8350	8449	8549	8650	8753	8856	8960	9065
Tax @ 30%		1844	2002	2122	2198	2277	2304	2332	2360	2389	2417	2446	2475	2505	2535	2565	2595	2626	2657	2688	2720
Net Income		4302	4670	4952	5130	5313	5377	5442	5507	5574	5640	5708	5776	5845	5914	5984	6055	6127	6199	6272	6346
Interest	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864	864
Depreciation		914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914	914
FCFF	-	6080	6448	6729	6907	7090	7155	7220	7285	7351	7418	7486	7554	7623	7692	7762	7833	7905	7977	8050	8123

NPV	32156		
Shadow Price of Spectrum	25082	Real Option Value	30208
Total Spectrum Allotted (Mhz)	65	Total Spectrum Allotted (Mhz)	65
Price per Mhz (mn)	385.87	Price per Mhz (mn)	464.75

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

		Subscriber Adjustment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
ARPU Adjustment Factor	0.7	153	174	196	218	240	262	283
	0.8	192	219	247	274	301	329	356
	0.9	231	264	297	330	363	396	429
	1.0	270	309	347	386	424	463	502
	1.1	309	353	398	442	486	530	574
	1.2	348	398	448	498	548	597	647
	1.3	388	443	498	554	609	664	720

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	81	67	57	49	42	37	32
	11%	79	65	55	47	40	34	30
	12%	76	63	53	45	38	32	28
	13%	74	61	51	42	36	30	26
	14%	72	59	48	40	34	28	23

Real Option Sensitivity Analysis

		Subscriber Adjustment Factor						
		1	1	1	1	1	1	1
ARPU Adjustment Factor	0.7	190	217	244	271	298	326	353
	0.8	235	268	302	335	369	403	436
	0.9	280	320	360	400	440	480	520
	1.0	325	372	418	465	511	558	604
	1.1	371	424	477	530	583	635	688
	1.2	416	476	535	594	654	713	773
	1.3	461	527	593	659	725	791	857

		Capital Investment Factor						
		0.7	0.8	0.9	1.0	1.1	1.2	1.3
Cost of Capital	10%	95	80	68	58	51	44	39
	11%	93	77	65	56	48	42	37
	12%	91	75	63	54	46	40	34
	13%	88	73	61	51	44	37	32
	14%	86	71	59	49	41	35	30

8.21 North East

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	11574	12415	13228	13850	14244	14650	14793	14938	15085	15232	15382	15532	15685	15838	15994	16150	16309	16468	16630	16793	16957
GSM																					
No. of subscribers (mn)	7.89	8.68	9.37	9.93	10.33	10.74	10.96	11.18	11.40	11.63	11.86	12.10	12.34	12.59	12.84	13.10	13.36	13.63	13.90	14.18	14.46
Y-o-Y growth rate		10%	8%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	114	111.7	110.6	109.5	108.402	107.32	106.24	105.18	104.13	103.089	102.06	101.04	100.03	99.027	98.037	97.056	96.086	95.125	94.174	93.232	92.3
Spectrum Usage (Mhz)	53.2																				
CDMA																					
No. of subscribers (mn)	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.32	0.33
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	293	287.1	284.27	281.43	278.612	275.83	273.07	270.34	267.63	264.957	262.31	259.68	257.09	254.52	251.97	249.45	246.96	244.49	242.04	239.62	237.23
Spectrum Usage (Mhz)	10																				
Interconnection charges	2315	2483	2646	2770	2849	2930	2959	2988	3017	3046	3076	3106	3137	3168	3199	3230	3262	3294	3326	3359	3391
Net Revenue	9259	9932	10582	11080	11395	11720	11835	11951	12068	12186	12305	12426	12548	12671	12795	12920	13047	13175	13304	13434	13566
Expenses																					
Network Operating Expenses	1389	1490	1587	1662	1709	1758	1775	1793	1810	1828	1846	1864	1882	1901	1919	1938	1957	1976	1996	2015	2035
Sales & Distribution Expenses	648	695	741	776	798	820	828	837	845	853	861	870	878	887	896	904	913	922	931	940	950
IT Expenses	185	199	212	222	228	234	237	239	241	244	246	249	251	253	256	258	261	263	266	269	271
Service Expenses	278	298	317	332	342	352	355	359	362	366	369	373	376	380	384	388	391	395	399	403	407
Billing, Collection and Bad Debt	185	199	212	222	228	234	237	239	241	244	246	249	251	253	256	258	261	263	266	269	271
Marketing Expenses	278	298	317	332	342	352	355	359	362	366	369	373	376	380	384	388	391	395	399	403	407
Personnel Administration	463	497	529	554	570	586	592	598	603	609	615	621	627	634	640	646	652	659	665	672	678
Total Operating Expenses	3426	3675	3915	4100	4216	4336	4379	4422	4465	4509	4553	4598	4643	4688	4734	4780	4827	4875	4922	4971	5019
Spectrum Usage Charge as % of	370	397	423	443	456	469	473	478	483	487	492	497	502	507	512	517	522	527	532	537	543
License Fee as % of AGR	926	993	1058	1108	1140	1172	1183	1195	1207	1219	1231	1243	1255	1267	1279	1292	1305	1317	1330	1343	1357
EBITDA	4537	4867	5185	5429	5584	5743	5799	5856	5913	5971	6030	6089	6148	6209	6269	6331	6393	6456	6519	6583	6647
Interest Expense	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519
Depreciation		549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549
EBT		3799	4118	4362	4516	4675	4731	4788	4846	4904	4962	5021	5081	5141	5202	5263	5326	5388	5451	5515	5580
Tax @ 30%		1140	1235	1309	1355	1403	1419	1436	1454	1471	1489	1506	1524	1542	1561	1579	1598	1616	1635	1655	1674
Net Income		2659	2882	3053	3161	3273	3312	3352	3392	3433	3474	3515	3557	3599	3641	3684	3728	3772	3816	3861	3906
Interest	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519	519
Depreciation		549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549
FCFF	-	3727	3950	4121	4229	4340	4379	4419	4459	4500	4541	4582	4624	4666	4709	4752	4795	4839	4883	4928	4973

NPV	19906		
Shadow Price of Spectrum	15526	Real Option Value	18678
Total Spectrum Allotted (Mhz)	63.2	Total Spectrum Allotted (Mhz)	63.2
Price per Mhz (mn)	245.67	Price per Mhz (mn)	295.54

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor						
	0.7	0.8	0.9	1.0	1.1	1.2	1.3
0.7	98	112	126	140	154	168	182
0.8	123	140	158	175	193	210	228
0.9	147	168	189	210	231	252	274
1.0	172	197	221	246	270	295	319
1.1	197	225	253	281	309	337	365
1.2	221	253	285	316	348	379	411
1.3	246	281	316	352	387	422	457

Cost of Capital	Capital Investment Factor						
	0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	51	43	36	31	27	23	20
11%	50	41	35	30	26	22	19
12%	49	40	34	28	24	21	18
13%	47	39	32	27	23	19	16
14%	46	38	31	26	22	18	15

Real Option Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor						
	1	1	1	1	1	1	1
0.7	121	139	156	173	191	208	226
0.8	150	171	193	214	235	257	278
0.9	178	204	229	255	280	306	331
1.0	207	236	266	296	325	355	384
1.1	236	269	303	336	370	404	437
1.2	264	302	340	377	415	453	491
1.3	293	335	376	418	460	502	544

Cost of Capital	Capital Investment Factor						
	0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	60	51	43	37	32	28	25
11%	59	49	42	36	31	27	23
12%	58	48	40	34	29	25	22
13%	56	46	39	33	28	24	21
14%	55	45	37	31	27	23	19

8.22Jammu & Kashmir

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Gross Revenues (mn)	11429	12269	13078	13698	14091	14494	14636	14780	14925	15071	15218	15368	15518	15670	15824	15979	16136	16294	16453	16615	16777
GSM																					
No. of subscribers (mn)	5.61	6.17	6.66	7.06	7.35	7.64	7.79	7.95	8.11	8.27	8.44	8.61	8.78	8.95	9.13	9.31	9.50	9.69	9.88	10.08	10.28
Y-o-Y growth rate		10%	8%	6%	4%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	160	156.8	155.23	153.68	152.143	150.62	149.12	147.62	146.15	144.686	143.24	141.81	140.39	138.99	137.6	136.22	134.86	133.51	132.17	130.85	129.54
Spectrum Usage (Mhz)	49.4																				
CDMA																					
No. of subscribers (mn)	0.20	0.20	0.21	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29
Y-o-Y growth rate		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
ARPU	276	270.5	267.78	265.1	262.446	259.82	257.22	254.65	252.11	249.584	247.09	244.62	242.17	239.75	237.35	234.98	232.63	230.3	228	225.72	223.46
Spectrum Usage (Mhz)	10																				
Interconnection charges	2286	2454	2616	2740	2818	2899	2927	2956	2985	3014	3044	3074	3104	3134	3165	3196	3227	3259	3291	3323	3355
Net Revenue	9143	9815	10463	10959	11272	11595	11709	11824	11940	12057	12175	12294	12415	12536	12659	12783	12908	13035	13163	13292	13422
Expenses																					
Network Operating Expenses	1371	1472	1569	1644	1691	1739	1756	1774	1791	1808	1826	1844	1862	1880	1899	1917	1936	1955	1974	1994	2013
Sales & Distribution Expenses	640	687	732	767	789	812	820	828	836	844	852	861	869	878	886	895	904	912	921	930	940
IT Expenses	183	196	209	219	225	232	234	236	239	241	243	246	248	251	253	256	258	261	263	266	268
Service Expenses	274	294	314	329	338	348	351	355	358	362	365	369	372	376	380	383	387	391	395	399	403
Billing, Collection and Bad Debt	183	196	209	219	225	232	234	236	239	241	243	246	248	251	253	256	258	261	263	266	268
Marketing Expenses	274	294	314	329	338	348	351	355	358	362	365	369	372	376	380	383	387	391	395	399	403
Personnel Administration	457	491	523	548	564	580	585	591	597	603	609	615	621	627	633	639	645	652	658	665	671
Total Operating Expenses	3383	3631	3871	4055	4171	4290	4332	4375	4418	4461	4505	4549	4593	4638	4684	4730	4776	4823	4870	4918	4966
Spectrum Usage Charge as % of	366	393	419	438	451	464	468	473	478	482	487	492	497	501	506	511	516	521	527	532	537
License Fee as % of AGR	914	981	1046	1096	1127	1160	1171	1182	1194	1206	1217	1229	1241	1254	1266	1278	1291	1303	1316	1329	1342
EBITDA	4480	4809	5127	5370	5523	5682	5737	5794	5850	5908	5966	6024	6083	6143	6203	6264	6325	6387	6450	6513	6577
Interest Expense	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369
Depreciation		391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391
EBT		4049	4367	4610	4764	4922	4977	5034	5090	5148	5206	5264	5323	5383	5443	5504	5565	5627	5690	5753	5817
Tax @ 30%		1215	1310	1383	1429	1477	1493	1510	1527	1544	1562	1579	1597	1615	1633	1651	1670	1688	1707	1726	1745
Net Income		2835	3057	3227	3334	3445	3484	3524	3563	3603	3644	3685	3726	3768	3810	3853	3896	3939	3983	4027	4072
Interest	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369	369
Depreciation		391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391	391
FCFF	-7814	3594	3817	3987	4094	4205	4244	4284	4323	4363	4404	4445	4486	4528	4570	4613	4656	4699	4743	4787	4832

NPV	22096		
Shadow Price of Spectrum	17235	Real Option Value	20465
Total Spectrum Allotted (Mhz)	59.4	Total Spectrum Allotted (Mhz)	59.4
Price per Mhz (mn)	290.15	Price per Mhz (mn)	344.53

Cost of 1 MHz of spectrum (Rs. mn)

DCF Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor						
	0.7	0.8	0.9	1.0	1.1	1.2	1.3
0.7	125	143	161	179	197	215	232
0.8	151	173	194	216	237	259	281
0.9	177	202	228	253	278	304	329
1.0	203	232	261	290	319	348	377
1.1	229	262	295	327	360	393	425
1.2	255	292	328	364	401	437	474
1.3	281	321	361	402	442	482	522

Cost of Capital	Capital Investment Factor						
	0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	58	49	42	37	32	28	25
11%	57	48	41	36	31	27	24
12%	56	47	40	35	30	26	23
13%	55	46	39	34	29	25	22
14%	54	45	38	33	28	24	21

Real Option Sensitivity Analysis

ARPU Adjustment Factor	Subscriber Adjustment Factor						
	1	1	1	1	1	1	1
0.7	151	172	194	215	237	258	280
0.8	181	207	233	258	284	310	336
0.9	211	241	271	301	332	362	392
1.0	241	276	310	345	379	413	448
1.1	271	310	349	388	426	465	504
1.2	301	345	388	431	474	517	560
1.3	332	379	426	474	521	569	616

Cost of Capital	Capital Investment Factor						
	0.7	0.8	0.9	1.0	1.1	1.2	1.3
10%	68	57	49	43	38	34	30
11%	67	56	48	42	37	33	29
12%	66	55	47	41	36	32	28
13%	64	54	46	40	35	31	27
14%	63	53	45	39	34	30	26