Infrastructure Planning and Management
Introduction to Power and Telecom Sectors Part 2B
Telecommunications in India

Alright, so group 2 come on over.

Student 1:

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Hi, my name is Sai Kiran. Telecommunication - basic definition of telecommunication is transmission of information and major sectors in telecommunication are telephone, internet and broadband. Telecommunication has huge impact on social networks because recently Facebook, Instagram so many came. Usually we will say friend from school nowadays we are saying he is friend from Facebook, he is friend from Instagram, that much impact is there on social. Economical impact, this is a sector which increased 15 percent, fast growth is there in this sector. In no other sector (has around 10 other sectors) have around 10 percent, in the last two decades, it has increased about 15 percent in economical growth. Tele density - the basic definition of tele density is number of connections per hundred persons. Tele density is a indicator and so many indicators are there in India to tell whether it is developed country or under developed country. It is one of the indicator, tele density is like in a logarithmic graph, tele density and GDP has straight relationship, so that is tele density. And regulation authorities, DOT and TRAI is regulator, regulator authorities, they indicate means, they set the rules and regulations of this sector.

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And public private partnership, BSNL is a main public sector. MTNL is in Mumbai and Delhi, it is there in Mumbai and Delhi only. BSNL is all over India and private networks Airtel, Vodafone, Idea, Jio, actually we can say telecommunication before Jio and after Jio it had a huge impact. Spectrum is the actually the background of telecommunication. I think we do not know anything about spectrum, so government spectrum there are so many things spectrum sharing, spectrum trading and we have 2G spectrum scam also, do not know what is happening in that. Spectrum sharing is, we have 22 telecom circuits in that 21 have spectrum sharing. Spectrum sharing reduces government investment and increase the revenue also it is sharing of services. Spectrum auction happens and the head of that is DOT and the other slides my friend will continue.

Student 2:

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So right now what is happening in India is, after Jio India has become like second largest network with 1.53 billion subscribers. Though it has become the second largest network base but still in terms of tele density it is still 56. So last year 4G has been introduced and recently smart phones have been a lot of increase. After Jio introduced their free mobile data consumption, the mobile data consumption became, in 1 month it was 150 billion gigabytes per month. It was more than what US and China combinely consumed. So after that high competition, though they are only so small number of companies, competition is very high. See first Jio has introduced free data consumption and after that Jio plans were also too less tariff rates and then Airtel decreased its rates and then BSNL decreased its rates. It is like relative if one company decreases the tariff rates the other company has to decrease its tariff rates so yes, India is the second.

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Challenges the digital divide, there is a huge digital divide in India. The data consumption between the rural and urban areas is very large. In urban the tele density was around 174.5 percent because we have 2 or 3 sims for each person and in rural it was really low, 20 percent or something. We have very low quality of services that may be because of, first thing is because of poor technology we do not have that much technology for that but also it is because of the low tariff rates, because of the low tariff rates the companies do not have the incentives to give high quality of services. There is also high call drops similar.

Though we have 4G, it is the lowest speed, we have the lowest speed among the 88 countries which have the 4G connection right now. So we are going to land GSAT 11 satellite from France. Coming to the market structure, it is like a company cannot enter into the market, it has a high entry barrier and also hyper competitive. I said right, Jio has decreased its tariff rates, so Airtel decreased, BSNL, Aircel company. There is an company called Aircel, it came into the market with high goals but after time its market decreased and all. So there is also coming to the health point of view, we all know that the towers have a radiation hazard because of this hazard many times it becomes difficult to find a place to keep these towers. So how the government is handling my friend will continue.

Student 3:

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So basically the problem with India's telecom infrastructure is that we lack connectivity to all areas of the country and we lack the quality of service. So to tackle the service government has come up with the foreign schemes. So the major one is the Bharat Net, through Bharat Net we intend to provide broad band connection to the rural areas, actually Bharat Net comes in the National Optical Fibre Network which has a broad meaning, basically national optical fibre network is something like government will be laying the optical fibres and any one could use it like ISB, telephones, service provider or even the long term cable network could use that.

So Bharath Net will be using that NOFN which comes under digital India. So the next problem is lack of connectivity to all the places in the country, so this involve providing network to left wing extremity areas which involves areas of Bengal, Orissa, Andhra Pradesh and also connecting the northern regions. So another range of reforms that the government will be implementing is the connecting the main line India with island places like Lakshadweep and Andaman Nicobar with optical fibres.

And the last one is the Wi-Fi hotspot. So basically India is second largest with respect to population and we share almost one fifth of the total population of the world, but coming to Wi-Fi hotspot, it stats are like one hotspot for 1000 people which is really low. So inorder to avoid this government have come up with the Wi-Fi hotspot schemes which are like Gen Wi-

fi and Nagar Wi-Fi, and the government has assumed, the tied up with the google to set up Wi-Fi hotspot in railway stations called rail one.

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So the future of telecom infrastructure in India next is 5G. 5G is the next generation telecom revolution, we hope that India will be able to unveil it in 2022. Basically 5G is not just a mobile connection, it has far more reach like low power consumption, remote assisted surgeries and better traffic control. So as you may know there was massive leak in data from Facebook, so government of India has come up with the personal protection bill and ask the report of Mr Shree Krishna committee and it has already submit the report. So we hope that with the implementation of this report we could surf the net safe and securely, thank you.

Lecturer:

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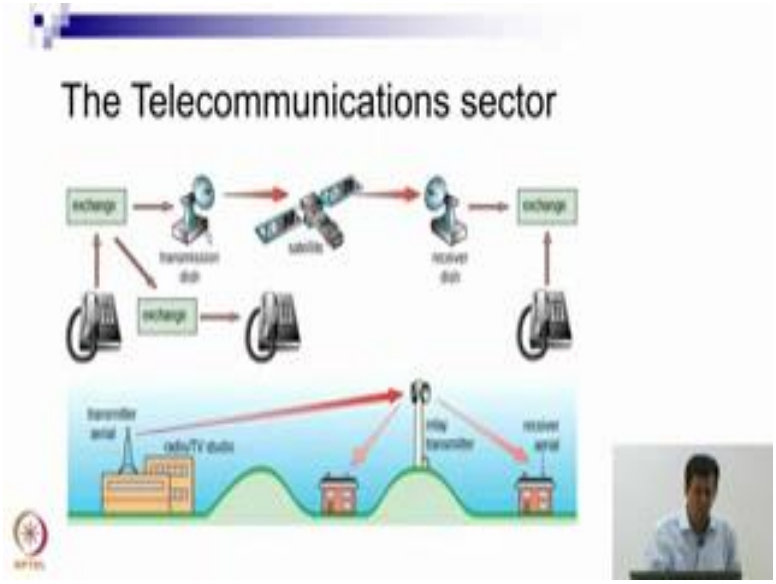

Right, so machine to machine learning IPV4 to IPV6 are all sort of protocols standards, you know innovations out there not necessarily the basic infrastructure, that we want to talk about. So I think telecom is clearly one sector that has changed dramatically within a few peoples lifetimes. If you pick the oldest some of the oldest faculty at IIT and you go and talk to them about their story when they first came to IIT, they will probably tell you that they probably came in the mid 80's or you know late 80's, early 90's applied for a phone connection and it probably took them 7 to 8 years to get a phone connection, go and talk to some of the older faculty at the Koshy Vargheses or even the people who are a bit older than them you know Professor Ramamurthy all of that.

And you will find that this was the case, it took 6, 7 years to get a phone connection and therefore people who had phone connections very prized thing. I remember I had a phone connection at home growing up, people from the neighbourhood would come in and make a call, so it was community infrastructure in some sense. I mean some of them would give 1 rupee whatever it is because it was scarce and you could not really make a call.

When I was a student at IIT, each hostel has one phone which did not work part most of the times, so the idea is somebody would call, there will be one security, the security guy was there in the hostel now, his job was to pick up the phone. So he would pick up the phone and there was an intercom system and he would shout out the room number on the phone. So he would say room number 234 STD call which was very standard trunk dialling because it is the call that comes out of Chennai.

So we all had, we were all reliant on one phone, okay and if we needed to make a phone call, we needed to go to Gurunath and Gurunath had one phone which had what they call is STD, ISD, PCO booth, the standard trunk dialling, international dialling whatever and make a call. So that was how things were and I remember when I first went to the US and I went to Stanford, I got my apartment essentially the day I went there and I was asked to check a box on the form, I checked the box on the form and I had a phone connection and that was just unbelievable at that point.

Now of course thing are very different, you can get a phone connection in minutes. First of all nobody really looks at landline connections that closely anymore, mobile connections as long as you have your papers in order you can walk in right now and get yourself a mobile phone. So the whole connectivity scene has just changed drastically from when you had a relatively thin telephone directory with the number of people in your city who had phones which could actually be listed in a small book to actually now connecting everybody we see all these ads, now phone rings, everyone takes it up, it is not there. It is the poorest person in that setting whose phone is ringing to say that, to show that phones are actually affordable.

So this of course has been possible because of a number of reasons. One is the price of, particularly mobile head handsets have come down possibly because of innovations in manufacturing technology scale and so on. The efficiency with which data can be transferred and voice can be transferred has come down and therefore prices have come down.

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But I think the the big thing in this sector was that it was one of the sectors that started, that privatized very very early, 1991 was liberalization, 1994 we had a telecom policy and we said bring in the private sector. Why should BSNL be the only one who provides telephonic services let other people come in. Actually what happened in 1994 was not a very happy story because people came in and they said oh India is growing, etc etc and they said you know what we will, so they said, can you pay me a licence fee to get a license and all of these guys over promised. They said they pay huge amounts of money to get a license, they were awarded licenses in the belief that later on they would pay but the demand really did not pick up.

So they opened up competition, there are something called the universal service obligation, small amount of money going into a pot with which you can service rural areas, had problems, auction system led to very high bids. People bid a high amount to be given a spectrum and there was not adequate competition. After while these guys said sorry I do not think I can pay you back that money because I promised to pay you so many thousands of crores or whatever but that is not really going to work out because I have not been able to sell enough handsets or plans or programs or whatever it is.

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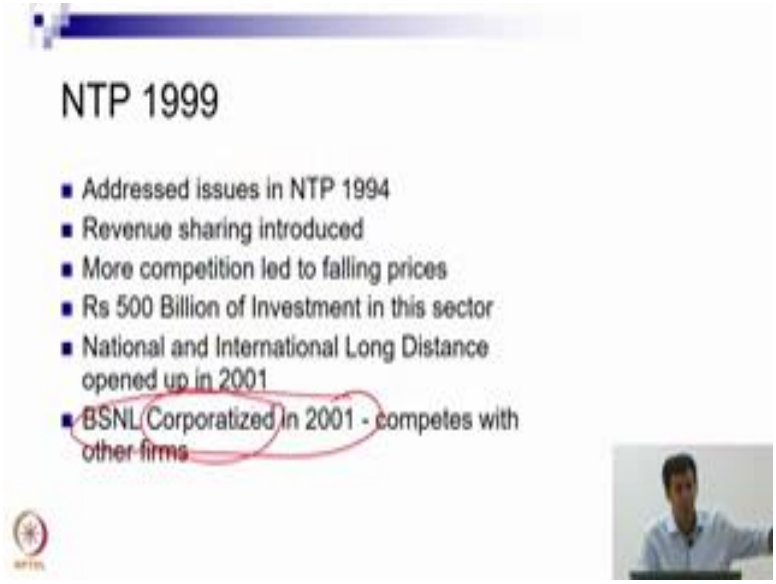

So there was a revised national telecom policy in 1999 but people said oh this sort of guaranteed revenue and all of that does not work. Let us do a revenue sharing, so you do not guarantee a lump sum that you will pay me, you guarantee a revenue share so if you make x you tell me you will pay 20 percent, 30 percent, 40 percent. Let us have some revenue sharing mechanism and so this then took off and a lot of people started coming in.

So more competition obviously leads to falling prices one of you have talked about it. So Aircel comes in and they or Airtel comes in and they say I am going to offer you calls at this rate and that is the cheapest, then I am going to shift to Airtel and you know therefore everyone else has to drop because otherwise everybody will go to Airtel, so todays case that is Jio, is the classic example, so you drop your rates everyone goes to Jio and therefore everyone else has to drop their rates.

Now one of the barriers today is that numbers are not yet completely portable, so if I have a Airtel number and I want to go to Jio I might need to get a different number. But once we get universal portability then that is no longer an issue, I can just change providers. So for a consumer that is great, my prices keep coming down because people are competing with each other. I mean I love Jio for the fact that they gave it, they gave the internet for free because everyone else has to follow suit, so that is great from a consumers perspective.

But the the interesting thing and there is one drawback to this and we will get to the drawback in just a second. So more competition, falling prices, India is a large country lot of investment, etc etc. But here is the thing, at some point the government said look BSNL can

not compete. I mean we are a slow moving public organization with just like our electricity boards we have all this debt, these guys are racking up profits by rolling things out instantaneously how can we compete?

And so they did something called corporatization, which is they said BSNL you are still a government owned organization, but you are going to run as an independent company. You are going to be incharge of your profits, you are going to be incharge of your revenues, you are going to be incharge of your decisions. We will essentially give you a CEO, so you run just like an Airtel or whatever or run as as a corporatized entity is separate company, etc you are 100 percent owned by government.

What this does is, now it gives BSNL the flexibility to take the same decisions that Airtel and Reliance and Vodafone and in those days Hutch and all of these fellows the names keep changing, were taking. So BSNL also started becoming very competitive in this game and even today BSNL still provides good service. I have a landline at home that is BSNL, it works well whenever there is a problem the guy responds to it, in fact possibly faster than my Airtel fellow response to my internet connection. So they are actually able to compete also the government organization is able to compete because they have been corporatized and because they have been put into a playing field where everyone is aggressive and therefore in order for them to survive they have to be aggressive, otherwise nobody will take a BSNL connection. So those were significant reforms in the telecom sector.

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So but because you have so much competition you need a regulator. You need a regulator to ensure that spectrum is given in an equitable fashion, that prices are somewhat you know within a certain price band that people do not start colluding. The fear is, big companies buy out small companies and they have got 2, 3 players that is sort of what we have today. So who are your choices now? You have got Airtel, you have got Reliance, who else can go to and find a buy a phone today?

Vodafone, right Idea, you have got a handful. What if those guys sat around the table and said boss why are we giving it at 1 Rs, why not we all give it at 5 Rs and as long as we all give it at 5 Rs, the public is forced to pay 5 Rs. So that is called collusion. So how do you prevent that kind of collusion? Have a regulator. So the regulator looks at it and sees their colluding behaviour.

So the regulator serves a variety of functions that are extremely important. So it regulates prices, manages spectrum licences and so on. There are some criticisms of of TRAI and we will talk about it much later in the class when we talk about regulators, but the question is, the regulator a real regulator or are they what we call a toothless tiger. So you have given them, you splash their photos on the front pages but they are the stooges of the political party in power or they are unable to make any decisions, it is a bit of criticisms in terms of how forth coming or forth right can these the regulator be.

And that is sort of one of the, again somebody brought out brought out the 2G scam and essentially the story there was, the spectrum was being sold for seem to be sold for a very low price and so the question was why are you selling it for a low price, the spectrum is something that is the property of the country, if you sold it for a very high price couldn't you make a lot of money which you could then put into infrastructure upgradation.

The counter response was, the reason you are paying 40 paisa per call or whatever is because I sold it at a low price, if I had asked this guy to pay such a high price for that spectrum, you think he will give you call rates this cheap? So I am actually giving it at a low price in order for telephony to be you know prevalent across the country. So it is very difficult, so you need a regulator to step in to help understand what is going on here. So that is essentially what is happening with telecom.

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Lots of players BSNL, private players, etc.

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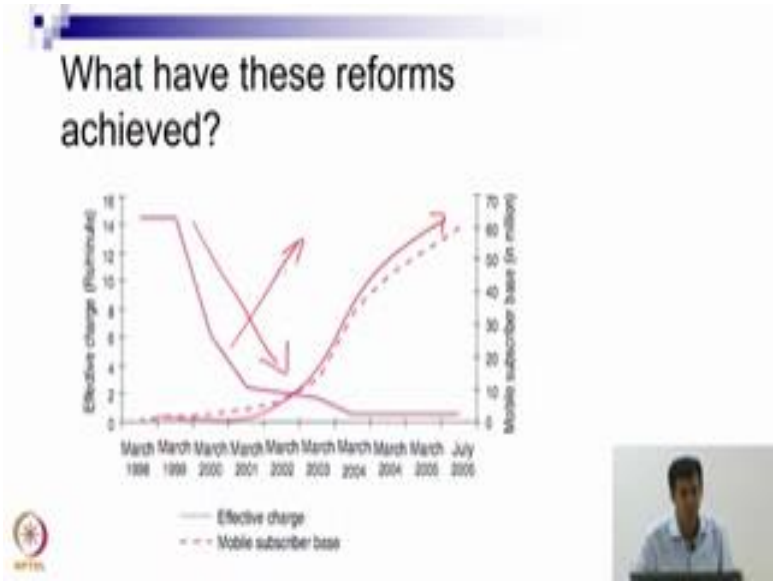

And this is a nice sort of graph. So look at the dotted line, it is the mobile subscriber base and this is by the way heavily dated. This is 2005, 10 years ago but it is nice graph and I have not found a nicer one to put it, but just look at this curve. Sort of look at the rate at which it increases and interestingly look at the charges. These are amazing, just the steepness of the curve that slope, the rate at which people have adopted and the rate at which charges have dipped, you need to be a very wealthy person at 1.2 own a cell phone.

When mobile phones came up, person with the mobile phone was clearly crème de la creme of society. We had one such person in my school. School sports day many years ago, parents said here is a cell phone, if you are in trouble give us a call. I do not think anyone participated in any sports, everyone was just borrowing the phone, pushing the buttons and it was like a brick, it was like your textbook essentially the phone.

Today, you know, phones are wonderful, you have got smart phones they do more than just so telecommunication is not only about phones, it is about communication, bandwidth speeds have increased, the microprocessors on your phones do all kinds of wonderful things. You have got more power you know in a small thing in each of our pockets than we did in large computers when I was a student here, so all of that is so technology has certainly helped leapfrog forward.

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These are just data, I won't really look through all of this.

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There is we talked about the new telecom policy, there are the universal service obligation fund essentially to fund investments in rural areas all of that. There is a broadband policy I think one of you just brought that up. The digital India program that you brought up, is here all of that.

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So what are some of the issues, so here is one of the issue the average revenue, so competition is a good thing I am very glad that I am paying very little, okay but is that a good thing for the industry? At what point can these guys continue to sustain business because in order for Airtel, Reliance, Idea whoever to be in business they have got to atleast make a marginal profit.

So one concern is, is this Average Revenue Per User ARPU the factor is falling, is that critical? Is the price war between service providers putting a lot of stress on margins and will that have an impact later on, will these guys become like our state electricity boards unable to invest in upgrading their towers etc because their balance sheets are very thin. They are forced to give at low prices, they are not making enough profits and therefore the quality of the infrastructure suffers.

So this is something to think about it may or may not happen, but what does seem to be happening is because the prices have been reduced so much, you have put more customers into the network. Many of these customers are no longer using these phones to make calls, in fact I think when I look at my usage probably 5 percent of the usage of my mobile phone is on calls, a lot of it is checking my emails, browsing, whatsapp you know whatever it is.

So and a lot of people are now essentially downloading movies, watching movies, sending song clips, this, that. So the amount of stress that we are now putting on the infrastructure on the towers is huge and we are not necessarily investing at the same rate in that infrastructure. So all your your fibre, your cable, your towers etc are not keeping up necessarily with the rate

at which this is going and therefore I think in my opinion and I have seen this clarified elsewhere as well we seem to be saying slight increase in call drops, these kinds of things.

I mean now it is, compare to a couple of years ago, now I find it more difficult to get people on the phone. It is sort of keeps going in and it does not sort of seem to go through, classic case at IIT is exactly at that 10:50, 11:50, 9:50 when you guys come out of class and everyone switches on their phones, it is chaos. I have never been able to communicate with people between 8:50 and 9, 9:50 and 10, 10:50 and 11 because all of you guys are switching on your phones, tower can not take the load, they bump it off from one tower to the other, etc I do not know how the switching algorithms work.

So there is a little bit of concern in terms of telecom is a super success story, it was an industry which nobody had any access to infrastructure that nobody had access to, we did some smart things. We privatized it and privatization worked because we had a large market and we were able to lower prices, we corporatized the state own entities so they were also competitive and they were also a player. Hardware prices came down, innovation happens, smart phones, etc and essentially we have a telecom revolution. Everybody has a cell phone today, it might be a feature phone, it might be a smart phone but very challenging to find people who have absolutely no phone. I mean of course there is a certain level of society where you know rag pickers and so on which who may not have, but even maids, drivers, cooks, nannies you know these kinds of people all carry cell phones.

So that is great, we have really enabled access to information to data, once upon a time people use to you know there was business plan there was a company called Gramin Phone in Bangladesh which started off by saying I will give a phone to a person in a village and that lady or person or man will actually charge the entire village for calls and the village will be ready to pay because they need information, they need to know what price fish is selling for in this market, they need to communicate with somebody else because there has been a death in the family.

So essentially at that time the the communication infrastructure was so bad that one phone became a business model. Today everyone is connected so it is a huge success, but question is have we, do we have now the question of too many customers and at one point infrastructure was outpacing customers, now our customers outpacing infrastructure, judging by call drops and the fact that videos and all of that take too long to load because bandwidth is scarce, etc are we, are we running into that problem or will 5G and other things actually

come in and and save us? So this is sort of one of the questions that is opened with regards to telecom. Okay, so we are going to stop here again.

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Bottom line in Indian telecom, competition has led to enormous increase in usage, telecommunication drives information flows and this has driven economic growth. Today I am much more productive because of telecommunication, I do not have to travel all the way to Delhi spend the whole day for a 1 hour meeting, I can just get on to go to meeting or Skype or whatever it is, finish my meeting, wonderful speeds, clear communication and do ten other things that day, rather than essentially do one thing because I did not have telecommunication infrastructure.

Because my, I have smartphones that are internet enabled I can as I am going somewhere type communicate and information back and forth so productivity has certainly increased but not without challenges and radio activity and you know affecting the psychology of young children and all of that are issues that are coming up that society has to deal with. Alright so we stop here, it's been bit of a whirlwind tour of power and telecom but hopefully you understand what some of the main issues are.