Managing natural monopolies: interplay of the regulator and telecom companies in India

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Introduction

India's apex court for justice, i.e. the Supreme court ordered private sector telecom service providers such as Vodafone Idea Ltd and Bharti Airtel Ltd to pay INR 926.4bn (1 INR = 0.013 USD in August, 2020) in adjusted gross revenue (AGR) dues and spectrum usage charges. On 14th February, 2020, the Supreme Court's Justice, Mishra rebuked Indian government for not being able to implement earlier court orders. The Department of Telecommunications of India called for immediate payments from the telecom service providers.

> "The situation is dire – it is a matter of survival for everyone. Vodafone (Idea) is in losses, Airtel is in losses, (state-owned) BSNL (Bharat Sanchar Nigam Ltd) is in losses."
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> "In the quest for being in the market, we have been killing each other for three and a half years."
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> "It is a rare situation where we have written to the Telecom Regulatory Authority of India (TRAI), saying please regulate us, because the industry is killing itself. Tariff needs to go up, industry needs to become viable," Sunil Mittal (Chairman of Bharti Airtel), December 12, 2019.

India's telecom sector was in a rare situation, where the private telecom service providers were asking Mr. R S Sharma, the Chairman of TRAI, to regulate the tariffs for making the sector viable. In the past, tariffs were strongly regulated by TRAI in India, but after deregulation, the private sector service providers ventured in and tariffs were competitively set. Consequently, tariffs in India became one of the lowest in the world, as competition in the sector became fierce. Therefore, the public service providers, i.e. BSNL and Mahanagar Telephone Nigam Limited (MTNL) were on the verge of closure after incurring humongous losses. Similarly, the private sector service providers such as Bharti Airtel and Idea-Vodafone were facing losses and as were under scrutiny for not paying the dues of AGR and spectrum usage charges to the government. The government of India infused money in BSNL and MTNL to keep them afloat. With no further equity investment in Vodafone-Idea by Vodafone Group, the telecom sector in India was heading toward a duopoly. However, the government of India made ambitious plan of launching 5G and "go digital" in near future. In this situation, what should the regulator do?

On December 12, 2019, R. S. Sharma, the TRAI Chairman said, "It is only recently that the telecom companies have together written to us that regulate us, so it's for the first time" he said. "In the past, in 2012, I remember they had opposed tooth and nail the TRAI's proposal to regulate tariffs. They said tariffs must be left under forbearance" (The Financial Express, 2019).

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Is it feasible for Mr. Sharma to propose a price floor for telecom service providers? What measures Mr. Sharma can take to achieve balance between competition and consolidation of the sector that exhibit characteristic of a natural monopoly? Shall Mr. Sharma request the government of India to provide financial aid to the service providers?

Telecommunications sector – a natural monopoly

Spectrum and telecommunications sectors were categorized as natural monopolies, which were subjected to price and entry regulations. The introduction of competition in a natural monopoly was very challenging for policy makers, especially in the telecommunication sector, where "network effect" is very prominent. An appropriate regulatory body was required to reduce social costs of market failure (Joskow, P., 2007). A regulator was also necessary to reduce market power if the monopoly set prices above marginal costs. The regulator in spectrum management and telecommunications industry must create "competition for the sector" by auctioning spectrum and creating "competition in the sector" by allocating spectrum and licenses to more than one service provider. Otherwise, the sector would move toward a monopoly/duopoly by benefitting from the "network effect."

Spectrum was managed by different organizations at the international, regional and national levels. The telecommunication and radiocommunications sectors were internationally managed by International Telecommunication Union (ITU). ITU designed guidelines and fundamental principles for the use of spectrum by different countries. ITU Radio Regulations provided guidelines regarding the use of frequency for radiocommunication services. The standardization of equipment and allocation of frequency to different countries for new services were taken care by the regional organizations. Regional organizations such as European Conference of Postal and Telecommunication Commission, the Asia-Pacific Telecommunity, Arab Council of Ministers for Telecommunication and Information worked toward the promotion of regional markets and acceleration of telecommunication and radiocommunication services. Specialized international organizations dealt with activities such as civil aviation, broadcasting, radio astronomy and research.

At the country level, the state/regulatory authority was responsible for allocating frequency bands to the government and private organizations for carrying out administrative, security and broadcasting functions. It designed a frequency allocation table in accordance with the ITU table and State's international commitments. The regulatory authority was entrusted with the task of granting license to private sector for using frequencies in spectrum. Licensing was given for a certain period of time (generally 20 years extendable to another 10 years) under terms and conditions laid down by the regulatory authority. In India, The Wireless Planning & Coordination (WPC) Wing of the Ministry of Communications & I.T., created in 1952, was responsible for spectrum management. The frequency allocation was done by WPC as per the National Frequency Allocation Plan that needed revision every two years to accommodate the Radio Regulations of ITU and to ensure efficient utilization of spectrum. The Department of Telecommunications (DoT) was established in 1985 for formulating policies, licensing and coordinating matters related to the different forms of communications. TRAI was established to regulate the sector and provide recommendations to the government (Refer to Exhibit 1 for a detailed discussion of history of TRAI and Exhibit 2 for profile of its chairmen).

Facilitation of 'competition for the telecommunications sector' by Telecom Regulatory Authority of India

In a natural monopoly such as the telecommunications sector, the spectrum was auctioned to increase efficiency, introduce "competition for the sector" and earn maximum revenue. In India, the DoT with recommendation from the regulator (TRAI) decided the reserve price for

spectrum. In India, DoT proposed a reserve price of INR 1.6bn, INR 800m and INR 300m for different circles. Apart from the reservation price, service providers were also required to pay spectrum usage charges and fixed license fees (which was shifted to a Revenue Adjusted Scheme in 1999). In some countries, the government employed the "Beauty Contest" method to auction spectrum in which it set some standards and requirements for the allocation of spectrum. In India, the auction of spectrum was carried out under Nation Telecom Policy 1994 subsequently revised in 1997 and 2012. In 1995, the government divided the entire country in 20 circles (later updated to 22 circles) and invited bids for the allocation of spectrum. Bidding was implemented in two stages. First, bidders were evaluated on the basis of financial net worth and experience in the telecom sector. Second, bids were financially valued. The highest bidder who fulfilled the prerequisite criteria was awarded license. For preventing monopolization, other bidders were asked to match the bid of the highest bidder (*H1*) for the allocation of spectrum. This ensured that all successful bidders paid the same amount for the spectrum block. In 2003, Unified Access Service License was introduced by TRAI under the chairmanship of Mr. Pradip Baijal; the license allowed the service providers to offer wireline and wireless services under the same license.

Facilitation of 'competition in the telecommunications sector' by Telecom Regulatory Authority of India

TRAI formulated policies to facilitate competition in the sector for the greater good of public and economy. Competition in the sector led to decrease in prices and increase in teledensity (Refer Exhibit 7 for growth of subscribers in global system for mobile communications (GSM) and code-division multiple access (CDMA) services).

Some of the policy initiatives taken by different chairmen of TRAI were:

Establishment of universal service obligation fund

TRAI established Universal Service Obligation Fund in 2001 to provide financial support to the service providers operating in the rural areas such as BSNL. Subscriber base in rural areas was lesser than the threshold required to sustain the cost of providing infrastructure. Therefore, TRAI reduced license fees and spectrum usage charges for the service providers operating in those regions. Subsequently, to introduce private sector participation in the rural areas, TRAI reduced the cost of sharing telecom infrastructure/optic fiber lines by dropping interconnect usage charges (IUC) and access deficit charges (ADC) from 2003 onward. To facilitate maintenance of wirelines, TRAI offered a subsidy of INR 20bn from USOF to BSNL in 2008. The funds for USOF were raised from Central government grants/loans and a Universal Service Levy of 5% of AGR. The subsidy grants of INR 15bn and INR 12.5bn were extended to BSNL for maintaining rural wireline connections in 2012 and 2013, respectively. The fund support of INR 12.5bn was extended till 2016 under the chairmanship of Mr. R. S. Sharma (TRAI Annual Report, 2017).

Reduction of access deficit charges

ADC were set up as a mechanism to fund the deficits accruing on fixed-line rentals below cost. These charges were paid by the private service operators to BSNL for using the telecom infrastructure and optic fiber lines established by the government. All the licensees of Unified Access Service paid 1.5% of their AGR as ADC to BSNL. In 2005–2006, ADC on International Long Distance incoming and outgoing calls were reduced to INR 1.6/minute and INR 0.8/minute, respectively, and ADC on domestic calls was removed altogether. In 2007, ADC was subsequently revised to zero and to INR 1 per minute for Outgoing and Incoming International Long Distance calls, respectively (TRAI Annual Report, 2007). A major breakthrough in the sector happened by the end 2008 when the DoT decided to phase out ADC payable by the private sector as a percentage of AGR to BSNL for the

domestic and international calls. The rationale for removing ADC was to provide private sector service providers a fairground of competition and decrease barriers to entry in rural areas, which were previously dominated by BSNL.

Launch of lifetime validity plans

With increasing competitiveness of the sector, the operators launched lucrative schemes such as "lifetime validity" and "two years validity prepaid coupons," which made the sector more affordable. National Long Distance tariff was reduced to a flat rate of INR 1 per minute for a fixed monthly rental of INR 299. Tariff for International Long Distance services declined due to the implementation of new ADC regime. These tariffs were one of the lowest in the world. Bharti Airtel was the market leader with 28.3% market share in GSM segment till 2016, whereas Reliance Infocomm enjoyed a market share of 73.56% in CDMA segment (TRAI Annual Report, 2016).

Setting up of uniform termination charges and time-based charges

The service providers optimized call charges by tweaking the origination charges, IUC and termination charges. Out of the three, TRAI intensely regulated IUC and termination charges. In 2006, TRAI rationalized interconnection charges by setting up a uniform termination charges of INR 0.3 per minute irrespective of the termination network. Apart from that, a ceiling on carriage charges for long-distance calls was fixed at INR 0.65 per minute. In 2009, the termination charges for domestic calls were further reduced to INR 0.20 per minute from INR 0.30 per minute (TRAI Annual Report, 2009). It was further reduced to INR 0.06 per minute for local and national long-distance calls in 2017 under Mr. R.S. Sharma, the current chairman of TRAI. TRAI had further proposed to completely remove it from January 2020.

TRAI did not regulate the origination charges. Therefore, the service providers were setting up competitive origination charges to reduce the overall call rates. In most of the European countries, the telecom regulator standardizes the origination charges and IUC. The termination charges were unregulated, which gave the service providers the opportunity to compete on the termination charges. For this reason, the service providers set their pricing strategy to increase "switching cost" (cost that the customer bears to shift from one service provider to another) of customers. However, in case of Indian telecom service providers, it was difficult to increase the "switching cost" of customers. The packages offered by the service providers were very similar or close substitutes, which left the service providers to compete only on price points; hence, the competition was fierce.

Mobile number portability

TRAI introduced mobile number portability in 2008–2009 to reduce "switching costs" of customers (TRAI Annual Report, 2009). The service allowed the customers to change their existing mobile subscribers without altering the mobile number by paying a nominal charge of INR 19 per porting request. It gave customers the freedom to choose a subscriber that provides the best customer service, network coverage, cheapest tariffs and best service quality.

Termination of roaming charges

The telecom sector was growing at an extraordinary pace, but the roaming charges were still very high. After consulting with various stakeholders such as BSNL, MTNL and consumer organizations, TRAI decided to lay a ceiling on roaming charges. The charges were set at INR 1.4 per minute for outgoing local calls, INR 2.4 per minute for outgoing National Long Distance calls and INR 1.8 per minute for incoming calls in 2007 (TRAI

Annual Report, 2007). The regulation of the roaming charges boosted the minutes of usage in long-distance calls. With time, some of the service providers (Reliance JIO in this case) came up with innovative tariff plans, slashed the calling rates and abolished roaming charges. Other service providers followed the suit and abolished roaming charges in 2017.

Laying out guidelines for merger and acquisition

The year 2009–2010 witnessed consolidation of telecom service providers (Idea and Spice merged and Infotel Broadband Services Limited was taken over by Reliance Infocomm in 2010, Exhibit 8). TRAI issued guidelines on merger and acquisition activities by limiting the market share on 40% of subscriber base or revenue. Merger and Acquisition activities were not allowed if the number of service providers reduces below four. Interestingly, the definition of market power was changed by TRAI over time. In 2012, TRAI recommended that the number of subscribers, share of AGR and share of spectrum should be taken into consideration for calculating market share. The market share of a resultant entity from merger and acquisition in terms of number of subscribers and AGR should not exceed 35%. Further, the limit on spectrum holding by the resultant entity should not exceed 25% of the spectrum assigned (TRAI Annual Report, 2013). Interestingly, the sector underwent further consolidation with entry of JIO in 2016. In view of the above, the cap on spectrum was increased from 25% to 35% by TRAI under the chairmanship of Mr. R.S. Sharma. The guidelines on merger and acquisitions activities ensured a minimum level of competition in the sector.

Unified licensing in 2003

In view of scarcity of spectrum in 2003, TRAI recommended that all future licenses should be unified and spectrum must be delinked from license. The Authority also recommended a uniform license fees and charged @ 6% of AGR. A discount of about 2% on the annual license fees was offered to the service providers operating in the rural areas with a population of 500–2,000. This discount was funded from licensee's contribution toward USOF. An entry fee of INR 200m was levied for Nationwide Unified License (TRAI Annual Report, 2004).

Performance of telecommunications sector in India

India was the second-largest market of wireless and internet subscribers in the world after China in 2019 (Refer Exhibit 4 for data on growth of internet subscribers). Internet subscribers grew at a CAGR of 45.74% during 2006–2019 (IBEF, 2019). The internet subscriber base reached 493.96 million in 2018 with total subscriber base and teledensity of 1,183.41 million and 92.84%, respectively (Exhibits 4 and 5). It was estimated that the telecom industry would contribute 8.2% to GDP by 2020 (The Economic Times, 2019a). However, in 2019, the telecom sector in India was going through a rough phase. The performance of service providers in telecom sector over the years is given below:

Teledensity

Teledensity grew with a phenomenal 17.8% CAGR for the period 2006–2018. The subscriber base in wireless segment grew with a CAGR of 23%, but the subscriber base decreased in the wireline segment owing to negative growth rates (Exhibit 4). Tremendous increase in teledensity was observed for both the urban and rural areas. Increase in teledensity over a period of time contributed significantly to India's GDP. It further facilitated achievement of the objectives of "cashless economy" and "digital India" programs of the Government of India. Minutes of usage per subscriber for GSM operators increased from 349 per month in 2010 to 584 per month in 2019 but the average revenue per user declined

from INR 131 in 2010 to INR 72.5 in 2019 (TRAI Annual Report, 2019). The decrease in average revenue per user was a result of decrease in prices, which was one of the prime causes for losses faced by telecom service providers during 2016–2019.

Capital investments, revenue and operating expenditure ratio

The share of capital investments by private service providers increased from INR 2,268.1bn in 2009–2010 to INR 3,589.2bn in 2015–2016, whereas it decreased for the public service providers from INR 1,896.15bn to INR 478.7bn (Exhibit 6). Over a period of time, the health of public sector service providers worsened with reduction in capital investments. Similarly, the revenue of public and private service operators reached a peak in 2014–2015 and started declining thereafter. The sector observed very high (i.e. more than 80%) operating expenditure ratio for both the private and public sectors from 2010–2011 to 2013–2014, thus meaning that the costs of operations was very high compared to the revenues.

EBITDA, DE ratio

Debt equity ratio for the private sector went up from 0.7 in 2010–2011 to 1.9 in 2015–2016. In case of the public sector, it went up from 0.02 to 0.5 during the same period. The sector was very high on debt, especially for the private sector service providers (Exhibit 6). EBITDA (earnings before interest, taxes, depreciation and amortization) of the public sector service providers reported a decline of 149.8% against a growth of 24.5% for the private sector service providers in 2012–2013. Public sector service providers reported negative EBITDA for three consecutive years from 2011–2012 to 2013–2014 (Exhibit 6). During the same period, the telecom sector witnessed a lot of controversies on auction of 2G spectrum. The telecom minister was accused of favoring a handful of service providers. Subsequently, the allocation of spectrum to various service providers was canceled and Comptroller and Auditor General of India estimated a loss of INR 1,760bn to the exchequer. Therefore, most of the service providers registered a negative growth rate of subscribers in the year (Exhibit 8).

Adjusted gross revenue

The service providers were required to pay steep license fees to the Government. In 1999, the regime was shifted to the payment of certain share of AGR by the service providers to the Government as annual license fee and spectrum usage charges. The service providers were required to pay 15% of AGR as license fee, which was reduced to 13% and subsequently to 8% in 2013 (Krishnan, M., 2019). With regard to the spectrum usage charges, the service providers were required to pay 3%–5% of AGR. AGR was defined by the Ministry of Communication & Information Technology, DoT as the revenue collected by the service providers, which included installation charges, late fees, sale proceeds of handsets, revenue on account of interest, dividend, value-added services, supplementary services, access or interconnection charges, roaming charges, revenue from sharing of infrastructure and any other miscellaneous revenue. The access charges paid to other service providers, roaming revenues passed on to other service providers and service tax paid to the Government were excluded from gross revenue to arrive at AGR (Tangirala, M., 2019). License fees based on AGR was to be paid quarterly by the Licensee on accrual basis.

There were disputes between the service providers and DoT on the definition of AGR since 2002. DoT argued that the definition of AGR must include all revenues as defined above, i.e. both the telecom and non-telecom revenues. However, service providers argued that revenues from the non-telecom services must be excluded from the definition of AGR. In 2003, the service providers with the aid of Cellular Operators Association of India filed a petition in TDSAT (The Telecom Disputes Settlement and Appellate Tribunal) to reconsider

the definition of AGR and exclude non-core elements such as dividend income, interest income on short term investment and reimbursements under Universal Service Fund. The definition of AGR was set by the Department of Telecommunication without consulting TRAI. In view of this, TDSAT remitted the matter to TRAI in 2006. However, the Union of India challenged this order in the Supreme Court of India. In 2007, the Supreme Court of India asked the Union of India to raise the issue in the civil court before TDSAT. The Union of India challenged that the validity of definition of AGR in the license agreement could not be questioned in TDSAT. However, in 2007, TDSAT did not allow the Union of India to raise the aforementioned issue and ruled that its earlier order of excluding the revenue from activities outside the license from the definition of AGR to be final. The order was passed by TDSAT after taking the recommendations of TRAI into account. By the end of 2007, the Supreme Court of India allowed the Union of India to raise the issues of the definition of AGR and compelled TDAST to interpret the terms and conditions of the license agreement. In 2011, the Supreme Court of India ordered TDSAT to set aside its order and allow licensee to challenge. In 2015, TDSAT ruled in favor of telecom service providers and excluded non-core elements from the definition of AGR (Business Standard, 2020).

In 2015, TRAI under the chairmanship of Dr. R. S. Sharma proposed to reduce the rate of license fee from 8% to 6% and exclude non-core items from the calculation of AGR. Thereafter, the government claimed that the private service operators had under-reported the revenues. The Comptroller and Auditor General of India estimated the understated revenues to be INR 610.64bn. In 2019, the Supreme Court of India ordered that the definition of AGR stipulated by DoT/the Union of India should be considered as final. The judgment caused the telecom operators to pay INR 926.4bn to the government, which included the original charges (INR 231.9bn), interest (INR 416.5bn) and penalties on delayed payments (INR 109.2bn) and interest on penalty (INR 168.8bn) (Fernandes, J., 2019). Apart from this, the service providers had to pay INR 550.5bn in outstanding spectrum usage charges. Most of the service providers faulted on the payment of AGR within the stipulated time period. According to the revised estimates in 2020, Vodafone-Idea, Bharti Airtel, Tata Teleservices and JIO had to pay INR 582.5bn, INR 439.8bn, INR 168bn and INR 705.3m, respectively, as AGR dues. By February 2020, Vodafone-Idea, Bharti Airtel, Tata Teleservices and JIO paid AGR dues of INR 68.5bn, INR 180bn, INR 42bn and INR 1.9bn, respectively (Saxena, 2020). After the partial payment of AGR dues, DoT asked all service providers to come up with self-assessment of AGR dues. The service providers Vodafone-Idea, Bharti Airtel, Tata Teleservices and JIO presented self-assessed AGR dues, which amounted to INR 215.3bn, INR 130bn, INR 22bn and INR 1.9bn, respectively. The wide divergence of the calculated AGR dues between service providers and DoT was attributed to the differences in accounting procedures, deductions disallowed by the Government, etc (O'Grady, 2020). In March 2020, the Supreme Court of India rejected the exercise of self-assessment of AGR carried out by the service providers and asked DoT to withdraw the move by calling the purpose of doing the numbers again a fraud on the court. Thereafter, the government requested the Supreme Court of India to allow service providers to pay the dues over an extended 20-year period (Loe and Majimdar, 2020) and at a reduced interest rate of 8% in view of their adverse financial condition (Singh, A. & Rautray, S., 2020). To boost the service providers, the Cellular Operators Association of India insisted the Government to come up with a minimum price floor and further requested the Government to adjust GST credits of worth INR 400bn against AGR dues. Apart from this, it appealed the Government to set up a fund for granting loans equivalent to AGR at 6% interest. The Supreme Court of India in its judgment on 18th June, 2020 had asked the service providers to furnish financial statements and books of account of past 10 years for checking their financial health and future capability of payment of dues (Bindra, J., 2020).

Major service providers in telecommunications sector

Chronology of entry and exit of major service providers have been discussed in detail in Exhibit 3.

Bharat Sanchar Nigam Limited

BSNL was established in 1981 for providing telegraph services in the British era, with huge optic fiber network across India because it was the only service provider. It gradually became the government sector monopoly. BSNL continued to be the largest service provider in wireline segment, especially in the rural areas. BSNL launched its mobile services on 1st October 2000 and thereafter grew at a phenomenal rate till 2008. The mobile services in metropolitan cities of Delhi and Mumbai were provided by MTNL. BSNL was a late entrant in the wireless segment, but it continued to collect revenue from private sector service providers for offering its infrastructure. With its large infrastructure base of communication towers and wireline network, BSNL became one of the leading wireless service providers in the second year of its operation. It offered discounted rates to its existing wireline subscribers. Apart from this, BSNL exploited its existing infrastructure, especially in the rural areas, and charged lesser per pulse as compared to its contemporaries for local and roaming calls. However, the market share of BSNL declined after 2008 owing to lack of innovation in tariff packages, poor network connectivity, lack of value-added services and promotional schemes, and unclear voice quality (Exhibit 8). Other issues such as lack of efficient leadership, non-accountability, non-performance of workers accentuated the problem. It was reported that the tenders for procuring 93 million-GSM lines of worth INR 45m and 5.5m GSM lines of worth INR 95m were canceled by the management in 2008 and 2010, respectively. Central Vigilance Commission recommended BSNL to scrap the tender and invite fresh bids. BSNL ran out of the allocated cellular capacity in 2007 and could not place new orders for equipment owing to cancellation of the tenders, which led to sharp decline in its market share. MTNL and BSNL launched 3G operations in 2008 and 2009, respectively, but BSNL did not procure adequate equipment for modernization and upgradation till 2012. The losses in revenue skyrocketed after entry of JIO in 2016. The revenue of BSNL decreased from INR 315.3bn in 2016–2017 to INR 193bn in 2018–2019 (The Economic Times, 2019b).

Bharti Airtel

Bharti is the largest telecom service provider in India in terms of its subscriber base. It was founded by Sunil Bharti Mittal in 1995. Bharti was the first telecom service provider to launch 4G services in 2012. Since inception, Bharti made a lot of acquisitions, such as Loop mobile, Qualcom, Videocon Telecom, Telenor, Augere Wireless and Tikona Digital to increase the number of subscribers and network base (Pandey, N. & Kumar, A., 2018). It always benefited for being the first mover in telecom sector.

Reliance JIO

Reliance Industries bought 95% stake in an unlisted company, namely, Infotel Broadband Services Limited (IBSL) for INR 48bn in 2010 (The Economic Times, 2010 c). IBSL was the only company that won broadband spectrum in 4G auction in all 22 circles in 2010. In 2012, TRAI removed the “data share” from the definition of “market power” and allowed companies with only internet license to upgrade to unified license (TRAI annual report, 2012). In 2013, Reliance JIO Platforms became the first company to take advantage of the above-mentioned recommendations. TRAI came under sharp criticism for changing the definition of market power. IBSL was renamed as Reliance JIO Platforms in 2013 (BGR, 2020). Within three years, Reliance JIO Platforms was permitted by TRAI to upgrade to full-mobility after paying a small fraction of the cost of a full-mobility license. Reliance JIO Infocomm Limited popularly known as JIO (a wholly-owned subsidiary of JIO Platforms) was launched in 2016 for providing 4G services and voice services using VoLTE (Voice over Long Term Evolution). VoLTE technology-enabled high definition voice and high-speed internet access. In 2016, JIO launched its smartphones named LYF with VoLTE technology. JIO saw new heights in the sector with a large number of customers shifting to JIO from

other service providers. It became the 4th largest operator in terms of number of subscribers in its 2nd year of operation (Exhibit 8). The biggest advantage of JIO was its existing optic fiber network of over 250,000 km. It subsequently launched other smartphones, such as JIO phone at cheap prices. To capture the market, JIO offered its 4G services free of cost because the competitors such as Bharti and Vodafone had already launched 4G services in 2012 and 2015, respectively. This started a price war among the service providers. JIO reached the mark of 50 million subscribers within 83 days of its launch (Exhibit 8).

Tata Teleservices Ltd.

Tata Teleservices Ltd. (TTL) was incorporated in 1995. In 2002, it acquired Hughes Tele.com Limited and launched "Tata Indicom" with CDMA technology in 2003 (ET Market, 2020). In 2007, TTL introduced dual SIM card wireless phones that worked on both the CDMA and GSM technology (Business Standard, 2020). TTL launched "Tata Docomo" in collaboration with NTT Docomo of Japan to provide telecom services using the GSM technology in 2008. In 2011, TTL merged its CDMA and GSM division under a single brand Tata Docomo (Telecomlead, 2011), which was done in view of the regulations issued by TRAI and the global phenomenon of using the GSM technology. Thereafter, many customers opted for competing service providers instead of migrating from Tata Indicom to Tata Docomo. In 2014, NTT Docomo exited the Indian Telecom industry after selling their shares to TTL. By 2016, TTL had negligible customer base, poor brand image, and a debt of INR 500bn (Business Line (a), 2017). Bharti Airtel proposed to acquire TTL in 2017, and the deal was finalized in 2019 (Business Line (b), 2019).

Vodafone

Vodafone started its operation in India in 1994. It is a subsidiary of a UK-based Telecom Company under the Vodafone group. It acquired 67% of the controlling stake of Hutch Essar in 2007. Vodafone India acquired Essar's mobile in 2011 and You Broadband in 2017 to increase its subscriber base. It launched 4G service in India in 2015. However, with the entry of JIO in 4G and VoLTE segment, the other service providers were facing stiff competition including Vodafone India; hence, it merged with Idea in 2017.

Idea

Idea Cellular was launched in 1995 with Aditya Birla Group, Tata Group and AT&T Wireless Services, wherein each one of them had one-third of the shares. AT&T sold its shares in 2004, thereafter, Aditya Birla Group and Tata Group held equal shares (Value Stocks, 2019). However, Tata group directly entered the telecom market with its subsidiary Tata Indicom, a CDMA-based mobile operator. Hence, Birla group acquired the 48.2% shares held by Tata Group in 2006 and became majority shareholder in the company (Kittilaksanawong & Kandaswamy, 2018). It was the third-largest service provider after Bharti and Vodafone. Idea Cellular launched 3G services in 2010 by acquiring spectrum in 11 circles after payment of INR 127,980m and launched 4G services in 2018. As mention above, Vodafone-Idea merged in 2017.

Competition in telecommunications sector-price war

In response to the tariff plans offered by JIO, Bharti and Vodafone-Idea also reduced their prices by 80% and came up with innovative data plans such as offering 14 GB data for INR 149. These plans were comparable to JIO's plans. The data plans with reduced roaming charges and 1 GB/day for 70 days at INR 399 were introduced by Bharti Airtel[9]. In a similar move, Vodafone offered a plan with 1 GB data/day for 52 days at INR 352 and Idea cellular

offered 1 GB data/day for 70 days at INR 297 (Deccan Chronicle, 2017). The huge discount in prices benefitted the customers, but service providers faced many challenges in maintaining their revenues and declining operating margins, which was followed by complains filed by other service providers such as Vodafone, Idea and Bharti against JIO for predatory pricing in Competition Commission of India and TRAI. JIO also complained against other service providers for not providing the points of interconnection[12]. In response to these complains, TRAI under chairmanship of Mr. R. S. Sharma advised DoT to impose a fine of INR 0.5bn per circle on Bharti Airtel, Vodafone and Idea Cellular, respectively (Aulakh, 2016). Idea Cellular reported a net loss for the first time in 2017 since its inception. JIO also reported a net loss of INR 225m in 2017, but it was ready to face the losses for gaining a huge market share in data segment[11]. Further, its' parent company Reliance Industry, one of the largest conglomerates in India, was largely profitable and provided for the financial requirements of JIO. Finally, to recover the losses, the service providers such as Idea/Vodafone and Airtel increased tariffs for data usage and other services from December 1, 2019. JIO followed the suit and increased the prices for its services from December 6, 2019.

Path ahead

With most of the service providers registering losses in revenue, the increase in debt-equity ratio and operating expenditure resulted in the decrease of EBIDTA, as well as humongous AGR dues and spectrum usage charges; hence, the telecom sector came to a halt and headed toward a duopoly. The government decided to pump money into BSNL for its revival. TRAI under chairmanship of Mr. R. S. Sharma recommended that the telecom sector should have at least three private service providers and one public service provider to prevent monopolization of the sector. However, the private service providers such as Bharti Airtel, Idea-Vodafone and Tata teleservices failed to comply with the payment of AGR dues because of the decrease in revenue collection and negative profit growth. The case against private telecom operators was pending in the honorable Supreme Court of India. Recently, a timeline for the payment of AGR dues was set by the court. JIO was only capable of meeting the deadline, and the remaining private service providers requested for a bailout package from the government. What should Mr. R. S. Sharma, chairman of TRAI do to maintain a fair competition in the market of telecom sector that exhibits the characteristics of a natural monopoly? Can Mr. Sharma suggest a price floor to prevent a price war? Can he recommend the private sector service providers to come up with new pricing mechanism? Is it feasible for Mr. Sharma to suggest a new method of calculating AGR to boost the investment environment?

Keywords:
Pricing policy,
Financial performance,
Government,
Regulatory policy

Note

1. http://dot.gov.in/objectives

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Exhibit 1. Brief history of the regulator (TRAI) in telecommunications sector in India

Telecommunications sector was set up in India by The British government in 1851. Telephone services were introduced in 1881 and were merged with The Postal System in 1883. After independence, all the telecommunication companies were nationalized and a single company was formed in the name of Posts, Telephone and Telegraph under Ministry of Communications. In 1985, DoT was separated from Department of Post. It was established under the aegis of Ministry of Communications with an aim of formulating policies, licensing and coordinating matters related to telegraphs, telephones, wireless, data and other forms of communications [1]. Two public sector undertakings, namely, MTNL and Videsh Sanchar Nigam Limited (VSNL now BSNL) were established in 1981. MTNL provided international telecom services in the megacities, Mumbai and Delhi and VSNL served the rest of India.

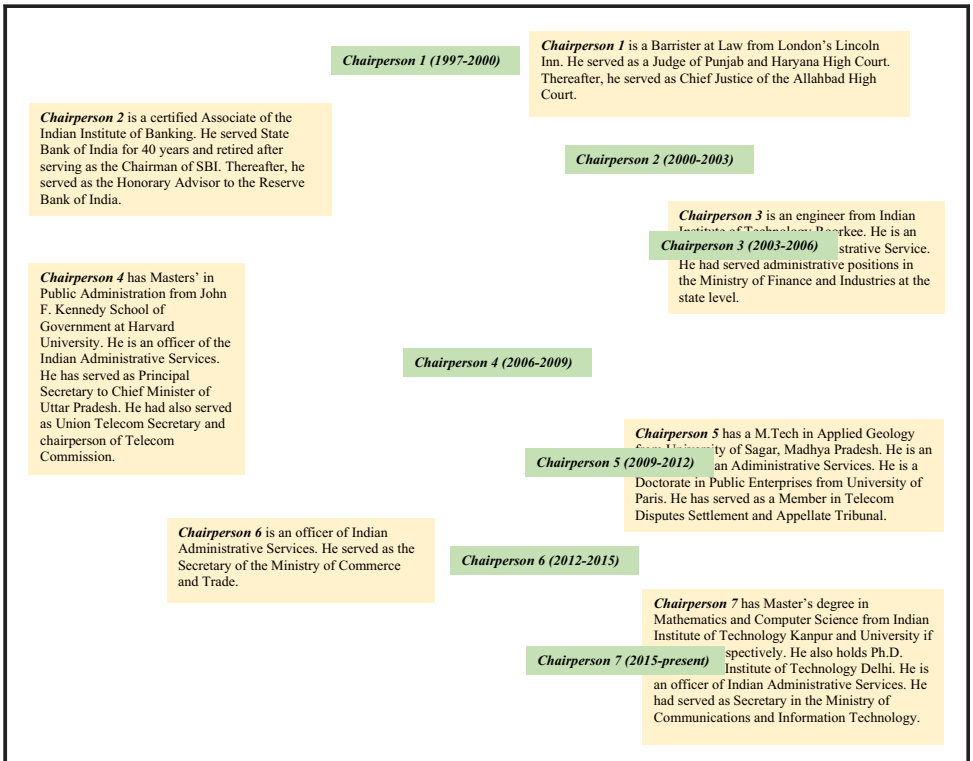
First set of reforms in the Telecom sector started in 1980s when private sector was permitted to participate in equipment manufacturing. Major reforms in the Telecom sector started in 1990s after liberalization. National Telecom Policy was formulated in 1994. The policy aimed at providing universal service coverage for all villages at affordable and reasonable prices. It emphasized the role of private sector in infusing capital for expansion of telecom services. To manage the private sector, there was a need of a regulator to take care of licensing and policy functions. As a result, TRAI was formulated under The TRAI Act in 1997 headed by Justice S. Sodhi. Thereafter, New Telecom Policy of 1999 laid down the path for strengthening TRAI and opening up of National long-distance and International Long Distance services to private sector. The act also paved way for providing license to private telecom operators on revenue sharing basis plus one-time entry fee. Subsequently, TRAI deregulated the sector by introducing Unified Access licensing, lowering ADC and IUC (TRAI Annual Report, 2017) under chairmanship of Mr. M.S. Verma. TRAI deregulated tariff in a gradual manner by adopting a "Hands Off" approach by regulating tariff only in rural areas because competition was insufficient. While, in urban areas, tariff was largely deregulated.

TRAI was entrusted with the functions of promoting growth of the telecom sector, resolve disputes, create a level playing field for public and private sector service providers, promote competition, regulate tariffs as and when required and ensure quality of service to consumers. It also provided recommendation on terms and conditions of license and management of spectrum (Department of Telecommunications, 1997). TRAI (Amendment) Act, 2000 paved the way for Telecom Dispute Settlement Appellate Tribunal (TDSAT) to deal with the issues of dispute resolution. Under chairmanship of Mr. M.S. Verma, TRAI Act was modified and thereafter Central government had to ask for recommendations from TRAI for deciding terms and condition of license and granting license to the private operators but the recommendations of TRAI were not binding. Central Government was vested with the power to accept, reject or ask for modifications of the recommendation by TRAI.

TRAI under the chairmanship of Mr. R.S. Sharma, had recommended the Government on many issues related to auction and allocation of spectrum, telecom equipment manufacturing, In-flight connectivity, public protection and disaster relief communication network, mobile number portability, non-predation of tariff among others (TRAI, 2018). Protecting consumers' rights and maintaining quality of service were of prime importance to TRAI. All the service providers were required to provide Quarterly Performance Monitoring Reports to TRAI to ensure Quality of service.

Exhibit 2. Profile of Chairpersons of TRAI in the past 20 years

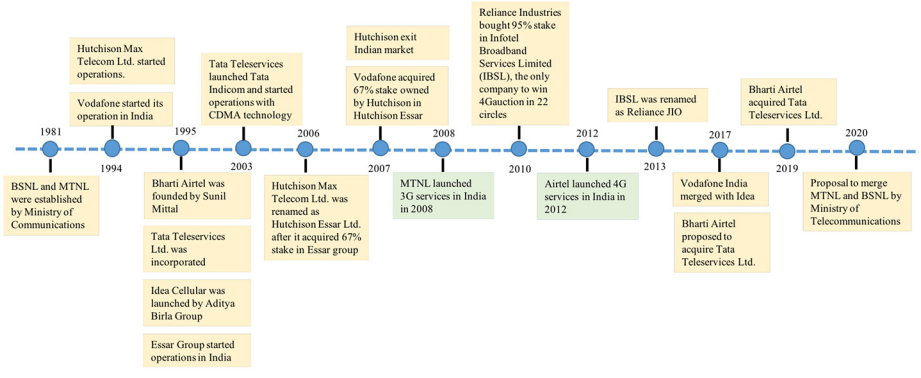
Figure E1



Source: Compiled from a report on Twenty Year Odyssey 1997-2017 of TRAI

Exhibit 3. Progress of technology and entry-exit of key service provides in telecom industry

Figure E2



Source: Author

Exhibit 4

Table E1 Subscriber base and growth rate in mobile and wireline telephony

Year	*Subscriber base in mobile telephony (in Million)*	*Growth rate of subscribers in mobile telephony*	*Subscriber base in Wireline services (in Million)*	*Growth rate of subscribers in wireline telephony*	*Teledensity (%)*
2006	98.8	72.6	50.2	8.6	13.0
2007	165.1	67.2	40.8	−18.8	18.2
2008	261.1	58.1	39.4	−3.3	26.2
2009	391.8	50.1	37.9	−3.7	37.0
2010	584.3	49.2	36.9	−2.6	52.7
2011	811.6	38.9	34.7	−6.0	70.9
2012	919.2	13.3	32.2	−7.4	78.7
2013	867.8	-5.6	30.2	−6.1	73.3
2014	904.5	4.2	28.5	−5.7	75.2
2015	969.9	7.2	26.6	−6.7	79.4
2016	1033.6	6.6	25.2	−5.2	83.4
2017	1170.2	13.2	24.4	−3.3	93.0
2018	1183.4	1.1	22.8	−6.5	92.8

Source: Compiled from annual reports of TRAI (2006–2007 to 2018–2019) and author's calculation

Exhibit 5

Table E2 Internet subscriber base and growth rate

Year	*Internet subscribers (in Million)*	*Growth rate of internet subscribers*
2016	342.7	
2017	422.2	23.2
2018	493.9	17.0

Exhibit 6. Performance of public and private service providers

Table E3

Year	EBITDA (in crores)		Revenue (in crores)		Operating expenditure ratio (%)		Capital investment (in crores)		Capital employed turnover ratio (%)		DE ratio	
	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public
2009–2010	23,479	5,868	113,270	37,390	79.3	84.3	226,814	189,615	57.5	33.1	0.7	0.02
2010–2011	20,472	2,974	132,776	33,976	84.6	91.8	281,946	197,332	51.0	34.8	1.0	0.1
2011–2012	23,883	−662	147,952	31,962	83.9	102.1	318,613	206,951	60.1	35.7	1.4	0.8
2012–2013	31,728	−1,370	175,988	31,509	82.0	104.4	347,019	209,482	72.3	40.3	1.8	0.3
2013–2014	44,532	−794	186,938	32,615	76.2	102.4	366,068	196,871	105.4	47.3	1.8	0.3
2014–2015	59,619	782	209,567	33,333	71.6	97.7	431,597	198,859	73.9	65.0	1.6	0.5
2015–2016	65,013	4,332	207,362	37,989	68.7	88.6	358,922	47,873	56.4	68.2	2.0	0.6

Note: Annual Reports of TRAI do not provide data on above parameters from 2016–2017 onward. EBITDA: EBITDA stands for Earnings before Interest, Taxes, Depreciation and Amortization and is a metric used to evaluate a company's operating performance. It is used a proxy for cash flow from the entire company's operations (https://corporatefinanceinstitute.com/resources/knowledge/finance/what-is-ebitda/). Operating Expenditure ratio: The operating ratio is a measure of efficiency that is used by management to determine day-to-day operational performance. The desired outcome is a lower ratio of operating expenses (https://corporatefinanceinstitute.com/resources/knowledge/finance/operating-ratio/). Capital employed turnover ratio: Capital turnover ratio indicates the efficiency of the organization with which the capital employed is being used. A high capital turnover ratio indicates the capability of the organization to achieve maximum sales with minimum amount of capital employed. Higher the capital turnover ratio better will be the situation (https://www.careerride.com/fa-capital-turnover-ratio-explained.aspx)

Source: Compiled from annual reports of TRAI (2006–2007 to 2015–2016)

Exhibit 7. Subscriber base (in million) of mobile (GSM and CDMA) services

Table E4

Service providers	*2001–2002*	*2002–2003*	*2003–2004*	*2004–2005*	*2005–2006*	*2006–2007*	*2007–2008*	*2008–2009*	*2009–2010*	*2010–2011*	*2011–2012*	*2012–2013*	*2013–2014*	*2014–2015*	*2015–2016*	*2016–2017*	*2017–2018*
Bharti	1.4	3.1	6.5	11.0	19.6	37.1	62.0	93.9	127.6	162.2	181.3	188.2	205.39	226.0	251.2	273.7	304.2
Reliance/ RCOM	0.4	0.5	7.3	10.5	17.3	28.0	45.8	72.7	102.4	135.7	153.3	123.0	110.9	109.5	102.4	83.5	0.2
BSNL	0.04	2.3	5.5	9.9	17.6	31.0	40.8	52.2	69.5	91.8	98.5	101.2	94.7	77.2	86.4	101.0	111.7
Hutch	1.3	2.3	5.2	7.8	15.4	26.4	44.1	68.8	100.9	134.6	150.5	152.4	166.6	183.8	197.9	209.1	222.7
Idea	0.8	1.3	2.7	5.07	7.37	14.0	24.0	38.9	63.8	89.5	112.7	121.6	135.8	157.8	175.1	195.4	211.2
Escotel	0.5	0.6	1.0														
BPL Group	0.9	1.1	1.9	2.6	1.3	1.1	1.3										
Aircel	0.5	0.7	1.3	1.8	2.6	5.5	10.6	18.5	36.9	54.8	62.6	60.1	70.2	81.4	87.1	91.0	74.2
Spice	0.5	0.6	1.2	1.4	1.9	2.7	4.2	4.1									
Tata	0.05	0.2	0.6	1.1	4.9	16.0	24.3	35.1	65.9	89.1	81.8	66.4	63.0	66.3	60.1	49.0	31.2
MTNL	0.2	0.4	0.5	1.1	2.1	2.9	3.5	4.5	5.1	5.5	5.8	5.0	3.4	3.5	3.6	3.6	3.6
HFCL	0.01	0.03	0.03	0.05	0.06	0.2	0.3	0.4	0.3	1.5	1.3						
Shyam	0.004	0.03	0.03	0.03	0.03	0.1	0.1										
Loop							1.3	2.2	2.8	3.1	3.3	3.0	2.9				
Sistema							0.1	0.6	3.8	10.1	15.7	11.9	9.0	8.9	7.7	4.9	
Quadrant							0.3	0.4	0.3	1.5	1.3	1.4	2.2	2.7	3.2		
Unitech									4.3	22.8	42.4	31.7	35.6				
S Tel									1.0	2.8	3.4						
Videocon									0.03	7.1	5.9	2.0	5.0	7.1	6.6		
Etisalat									0.0004	1.0	0.8						
Telenor											42.4	31.7	35.6	45.6	52.5	50.5	38.0
JIO																108.7	186.6

Source: Compiled from annual reports of TRAI (2006–2007 to 2018–2019)

Exhibit 8. Market share of wireless service providers (GSM and CDMA) (%)

Table E5

Service providers	*2005–2006*	*2006–2007*	*2007–2008*	*2008–2009*	*2009–2010*	*2010–2011*	*2011–2012*	*2012–2013*	*2013–2014*	*2014–2015*	*2015–2016*	*2016–2017*	*2017–2018*
Bharti	21.7	22.5	23.7	24.0	21.8	20.0	19.7	21.7	22.7	23.3	23.0	23.4	25.7
BSNL	19.6	18.8	15.6	13.3	11.9	11.3	10.7	11.7	10.5	8.0	8.4	8.6	9.4
Reliance	19.2	17.0	17.5	18.6	17.5	16.7	16.7	14.2	12.3	11.3	9.9	7.1	0.02
Hutch/Vodafone after 2008	17.0	16.0	16.9	17.6	17.3	16.6	16.4	17.6	18.4	19.0	19.2	17.9	18.8
Idea	8.2	8.5	9.2	9.9	10.9*	11.0	12.3	14.0	15.0	16.3	16.9	16.7	17.9
BPL Group	1.5	0.7	0.5										
Aircel	2.9	3.3	4.1	4.7	6.3	6.8	6.8	6.9	7.8	8.4	8.4	7.8	6.3
Spice	2.1	1.7	1.6	1.1									
Tata Teleservice	5.4	9.7	9.3	9.0	11.3	11.0	8.9	7.7	7.0	6.8	4.9	4.2	2.6
MTNL	2.3	1.8	1.4	1.1									
HFCL	0.1	0.1	0.1	0.1									
Shyam	0.03	0.1	0.04										
Sistema				0.3									
Loop				0.6									
JIO											6.4	9.3	15.8
Others					2.9**	6.6**	8.6**	6.3***	6.4****	7****	2.9*****	5.0******	3.5******

Notes: *Idea and Spice merged in 2010. **Others include MTNL, Unitech, Sistema, Loop, S Tel, HFCL, Videocon & Etisalat in the years 2009–2010, 2010–2011 and 2011–2012. ***Others include Unitech, Sistema, MTNL, Loop, Videocon, Quadrant. ****Others include Unitech/ Telewings, Sistema, Videocon, MTNL, Loop, Quadrant 2013–2014 and 2014–2015. *****Others include Sistema, Videocon, MTNL and Quadrant. ******Others include Sistema, MTNL, Telenor, #### others include MTNL and Telenor

Source: Compiled from annual reports of TRAI (2006–2007 to 2018–2019) and author's calculation.

Appendix

Definitions:

AGR Adjusted gross revenue (as defined by Telecom Regulatory Authority of India)

Gross revenue: the gross revenue shall be inclusive of installation charges, late fees, sale proceeds of handsets (or any other terminal equipment, etc.), revenue on account of interest, dividend, value-added services, supplementary services, access or interconnection charges, roaming charges, revenue from permissible sharing of infrastructure and any other miscellaneous revenue, without any set-off for related item of expense, etc. For the purpose of arriving at the "AGR" the following shall be excluded from the gross revenue to arrive at the AGR:

- access charges actually paid to other eligible/entitled telecommunication service providers within India;
- roaming revenues actually passed on to other eligible/entitled telecommunication service providers; and
- service tax on provision of service and sales tax actually paid to the government if gross revenue had included as component of sales tax and service tax.

USOF – Universal service obligation fund (department of telecommunications, ministry of communications, government of India)

USOF came into force from 1st April, 2002, the USO Fund is to be used exclusively for meeting the Universal Service Obligation. Universal Service Levy (USL) is collected from the Service Providers at a defined percentage of AGR as a component of Licence Fee. The collections of USL are credited to the consolidated fund of India and allocation of funds to USOF is through Parliamentary approval.

- Provide widespread and non-discriminatory access to quality ICT services at affordable prices to people in rural and remote areas.
- Provide an effective and powerful linkage to the hinterland thereby mainstreaming the population of rural and remote parts of the country.
- Ensure that universal services are provided in an economically efficient manner.
- Ensure that by developing hitherto unconnected areas, the benefits of inclusive growth are reaped by our nation, bringing in its wake rapid socio-economic development and improved standards of living.

IUC Interconnection user charges (as defined by Telecom Regulatory Authority of India)

The term interconnection refers to the technical and commercial arrangement under which service providers connect their equipment, networks and services to enable their subscribers to have access to the subscribers, services and networks of other service providers. Interconnection is the lifeline of telecommunications. It is one of the foundations of viable competition, which, in turn, is the main driver for growth and innovation in telecommunication markets. Interconnection usage charges (IUC) are wholesale charges payable by a telecom service provider (TSP) to another TSP for origination, transiting or termination of the calls. The IUC mainly consists of origination, termination, carriage and transit charges.

Access deficit charges (as defined by Telecom Regulatory Authority of India)

ADC is supposed to be a charge paid by operators for those calls where the payment for access does not cover the cost of providing the service. In other words, it compensates basic telecom operators for the services on which they do not recover the cost of operation. These include telecom services in rural areas, local call charges, provision for free calls, etc. This is considered essential to make basic telecom services affordable to the common man. The estimated amount of ADC was significant and the contribution was mainly from

calls involving fixed-line subscribers either at one end or both ends. This meant that the IUC/ADC charges differed widely for calls from and to fixed and mobile networks. With ADC being levied only on calls involving fixed line, the mobile service providers had greater flexibility in offering lower tariffs in comparison to fixed lines especially when fixed lines were involved at both ends.

Abbreviations

ADC = Access Deficit Charges;
AGR = Adjusted Gross Revenues;
BSNL = Bharat Sanchar Nigam Limited;
CDMA Code = division multiple access;
DoT = Department of Telecommunications;
EBITDA = Earnings before interest, taxes, depreciation, and amortization;
GDP = Gross Domestic Product;
GSM = Global System for Mobile Communications;
ITU = International Telecommunication Union;
IUC = Interconnect Usage Charges;
MTNL = Mahanagar Telephone Nigam Limited;
TDSAT = The Telecom Disputes Settlement and Appellate Tribunal;
TRAI = Telecom Regulatory Authority of India;
USOF = Universal Service Obligation Fund; and
WPC = Wireless Planning & Coordination.

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