



# **MARKET STUDY ON THE TELECOM SECTOR IN INDIA**

## **Key Findings and Observations**

**22.01.2021**

# **Competition Commission of India**

**10th Floor, Office Block - 1, Kidwai Nagar (East),  
New Delhi - 110023, India**

# CONTENTS

CHAPTER 1: INTRODUCTION.....	1
CHAPTER 2: INDUSTRY TRENDS.....	2
CHAPTER 3: COMPETITION ISSUES.....	14
CHAPTER 4: CONCLUSION AND SUMMARY OF OBSERVATIONS.....	25

## Disclaimer

This Report on the Market Study on the Telecom Sector in India and the information contained herein is for general purposes only and is based on broad trends and views that have emerged in the stakeholder consultations. The Report relies on surveys, stakeholder interactions, focused group discussions and written submissions made by stakeholders. It is assumed that the information provided during the course of the market study is complete, accurate, and not misleading.

**This exercise has been carried out as a part of the advocacy measures of the Commission to ensure competitive outcomes** resultant to the Market Study. The views expressed are not binding on the Commission for any legal purpose.

Any comments/feedback should be addressed to [market-study@cci.gov.in](mailto:market-study@cci.gov.in)

## Glossary

AAEC	Appreciable Adverse Effect on Competition
AGR	Adjusted Gross Revenue
ARPU	Average Revenue Per User
BSNL	Bharat Sanchar Nigam Limited
BWA	Broadband Wireless Access
CAGR	Compounded Annual Growth Rate
CCA	Combinatorial Clock Auction
CCI	Competition Commission of India
CDN	Content Delivery Network
COAI	Cellular Operators Association of India
CPP	Calling Party Pays
DoT	Department of Telecom
EBIT	Earnings before Interest and Taxes
FDI	Foreign Direct Investment
FNP	Fixed Line Portability
FTTH	Fiber to the Home
GDP	Gross Domestic Product
GDPR	General Data Privacy Rules
HHI	Herfindahl-Hirschman Index
ICR	Interest Coverage Ratio
ISP	Internet Service Provider
IUC	Interconnection Usage Charge
LTE	Long Term Evolution
MNP	Mobile Number Portability
MoU	Minutes of Use
MVNO	Mobile Virtual Network Operator

NDCP	National Digital Communication Policy
NTP	National Telecom Policy
PAT	Profit after Tax
PDO	Public Data Offices
PPP	Purchasing Power Parity
PRBT	Personal Ring Back Tone
OTT	Over-the-Top
QoS	Quality of Service
RAN	Radio Access Network
ROCE	Return on Capital Employed
ROE	Return on Equity
RoW	Right of Way
SEP	Standard Essential Patents
SMP	Significant Market Power
SMRA	Simultaneous Multiple Round Ascending
STV	Special Tariff Voucher
SUC	Spectrum Usage Charges
TMT	Technology, Media and Telecommunications
TRAI	Telecom Regulatory Authority of India
TSP	Telecom Service Provider
UL	Universal License
UAS	Unified Access Services
VIL	Vodafone-Idea Limited
VNO	Virtual Network Operators

## CHAPTER 1

### INTRODUCTION

1. In January 2020, the Competition Commission of India ('the Commission') launched a Market Study on the Telecom Sector in India ('the study'). This study is a fact-finding exercise, tracing the recent evolution of the industry, analysing threats and challenges to competition, identifying strengths and opportunities in the wake of technological innovations and recommends measures that will secure the growth of a dynamic telecom industry in the future.
2. The objective of the study is to assess the level of concentration and competition in the telecom sector, highlight changes in competition strategies, analyse the dynamics of competition and cooperation between telecom services and related industries such as over-the-top (OTT) services, tower companies and infrastructure providers, and finally, examine regulations and policy developments from a competition standpoint.
3. The study employs mixed methods using both quantitative and qualitative techniques. Data was collected and analysed from published reports and other online resources to present industry trends such as revenue growth, market concentration ratios, financial health and profitability of the telecom companies.
4. Interactions with stakeholders, including operators, equipment manufacturers, content companies, academics, sector experts, business associations and government formed a core part of the analysis. An online survey was designed to capture changing consumer preferences for telecom services in India. This survey includes, among other things, questions on the choice of operator and technology, substitutability between access points and operators.
6. This Report<sup>1</sup> summarises the main findings of the study. The outcomes are based on secondary data analysis, survey responses, and feedback from one-on-one meetings and written submissions from stakeholders. A triangulation exercise was also carried out to ensure the integrity and consistency of data.
7. The report is structured as follows: Chapter two traces the recent history of the industry, highlighting trends and market outcomes, Chapter three discusses the key competition issues facing the industry and those that are likely to emerge in the future. The observations and the way forward are summarised in Chapter 4.

---

<sup>1</sup> Implementation Partner for the study was the Indian Council for Research on International Economic Relations (ICRIER).

## CHAPTER 2

### INDUSTRY TRENDS

#### A. Market Structure and Price-based Competition

8. India's telecom sector is not only one of the largest but also among the fastest-growing networks in the world. The increase in subscriptions has been nothing short of dramatic, on occasions touching 20 million in a month. In the first decade of the 21<sup>st</sup> century, subscribers grew at 33 per cent annually. Technological progress and an enabling policy regime combined to transform the market, expand the network and produce a staggering growth. In 1999, when the New Telecom Policy was announced, there were thirteen 2G technology-based private mobile service providers. By 2019, exits and consolidation had reduced the number of operators to eight. Today, telecom networks are the backbone of India's digital economy with 4G technology firmly *in situ* in all private networks. The country-wide lockdown due to COVID-19 unambiguously established the centrality of communications in maintaining economic activity and elevated its growth impacts. The sector's contribution to India's GDP is estimated to have increased by 5 to 6 times<sup>2</sup> during this time.

**Table 1: A Decadal View of the Telecom Industry**

Parameter	1999	2009	2019
Number of Operators	15	21	8
HHI* by Subscribers (by AGR)	1198	1608 (1790)	2791 (2938)
Primary Services	SMS, Voice	SMS, Voice, Internet	SMS, Calls, Internet, OTT, (Tripleplay/Quadplay bundles)
Mobile Technology	2G	2G, 3G	2G, 3G, 4G
ARPU	1319	205	74.8
MoU	197	484	691
Net Profit Margin for Incumbent** (%)	11.6 (2004)	21	0.5

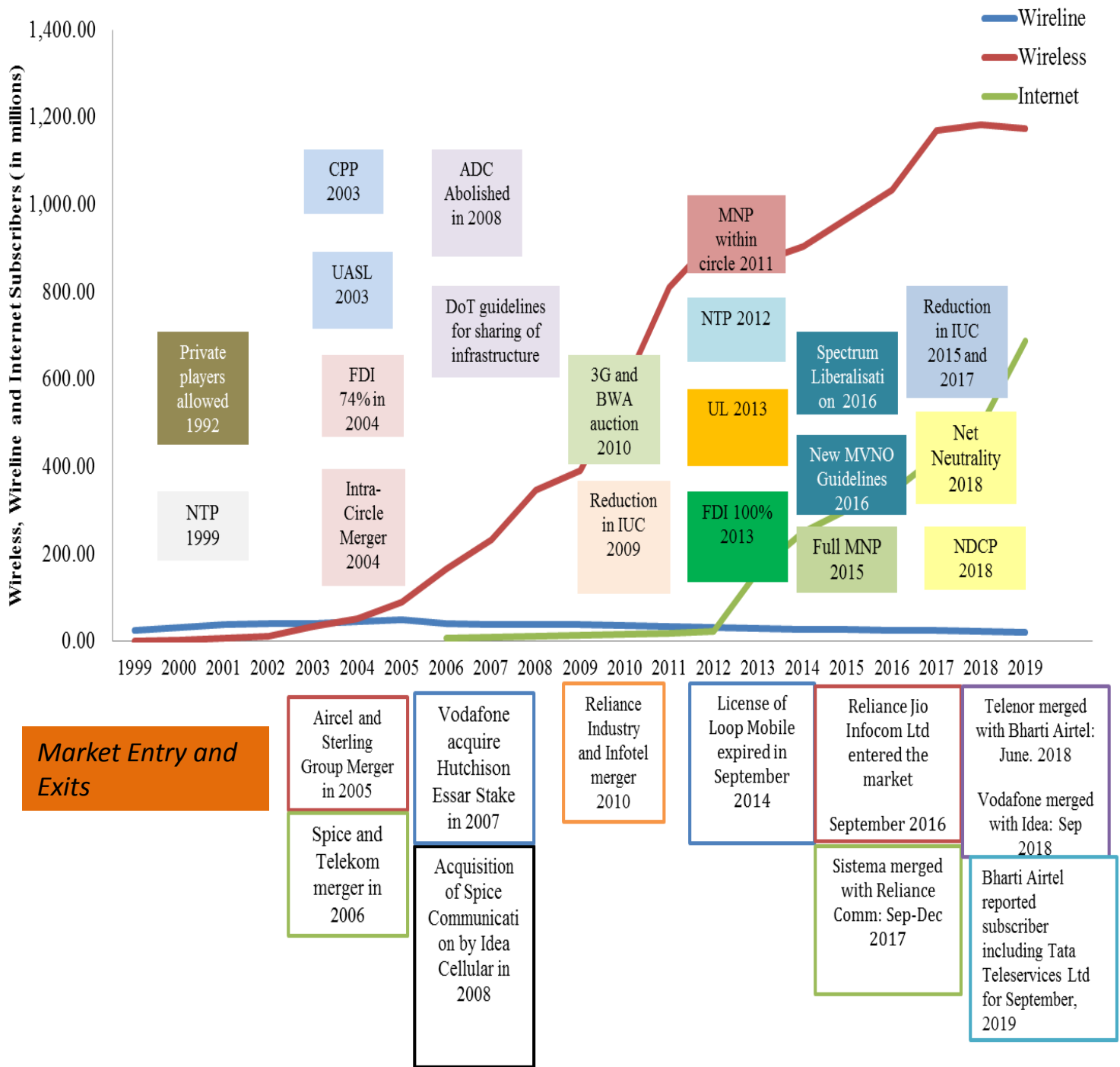
Source: ICRIER's calculation based on TRAI Performance Indicators Report.

Notes: \*The Herfindahl-Hirschman Index (HHI) measures market concentration and is a metric used to determine market competitiveness, often pre- and post- M&A transactions. It is calculated by squaring the market share of each firm competing in a market and then summing the resulting numbers. The EC Screening thresholds for horizontal mergers considers a market with an HHI < 1000 as unconcentrated market and HHI > 2000 as highly concentrated market. It is also unlikely to identify horizontal competition concerns in a merger with a post-merger HHI between 1000 - 2000 and a delta below 250, or a merger with a post-merger HHI above 2000 and a delta below 150.

\*\* It is the net profit by sale for Bharti Airtel.

<sup>2</sup> Data from techARC. <https://techarc.net/product/techflix-india-telecommunications-amidst-beyond-covid-19-key-takeaways-report/#tab-reviews>

**Figure 1: A Decadal View of the Telecom Industry**



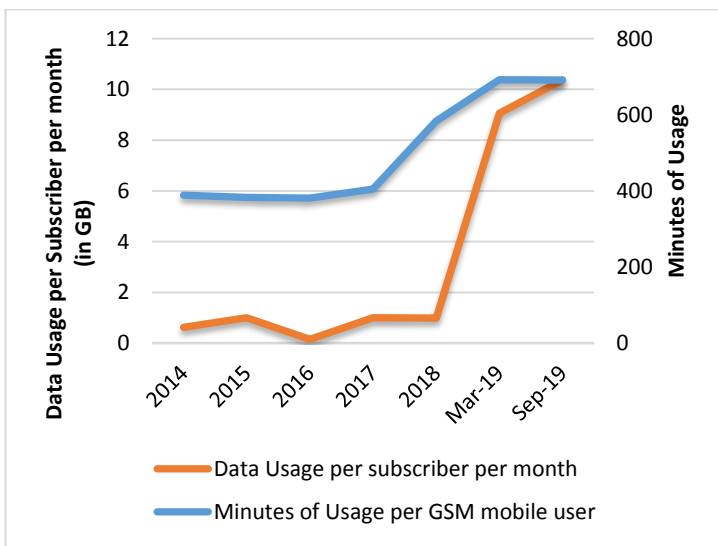
Source: Compiled by ICRIER.

9. In September 2016, the market witnessed the disruptive entry of Reliance Jio in voice and data services using 4G technology. Data prices saw an immediate decline from Rs. 180 per GB in September 2016 to Rs. 160 per GB in December

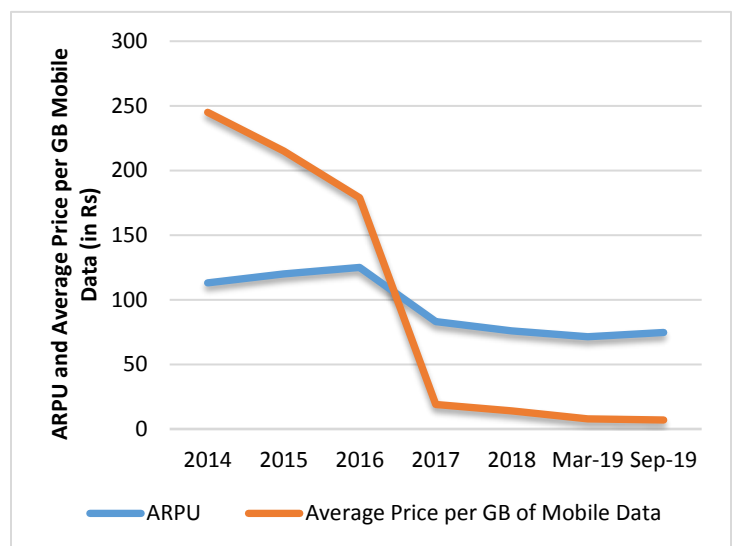
2016 and a secular decline to Rs. 6.98 per GB in 2019.<sup>3</sup> While growth has been robust, price competition has squeezed the bottom line for incumbent operators. To lower costs and improve survival, smaller players were acquired, while big operators like Vodafone and Idea merged. The prevailing market structure validates the empirical finding expressed as the rule of *three*,<sup>4</sup> which predicts that mature markets normally support three main competitors, others who survive, are limited to the fringes or a niche. The three major private sector operators, namely Jio, Airtel and Vodafone-Idea own almost 88.4 per cent of the market. As of April 2020, Reliance Jio has the highest market share with respect to subscribers (33.3 per cent). Reliance Jio also held the highest share with respect to adjusted gross revenue (32.2 per cent), as of March 2020.

- As industry prices, measured by average revenue per user (ARPU) fell, consumption of both voice minutes and GBs of data increased. The growth rates for data were substantially higher, reflecting the low base. While Minutes of Use (MoU) increased at a CAGR of 12 per cent between 2014 and 2019, data usage per subscriber per month increased at a CAGR of 76 per cent during the same time.

**Figure 2.1: Evolution of Data Usage and Minutes of Usage**



**Figure 2.2: Evolution of ARPU and Data Prices**



Source: ICRIER's calculation based on TRAI Performance Indicators Report.

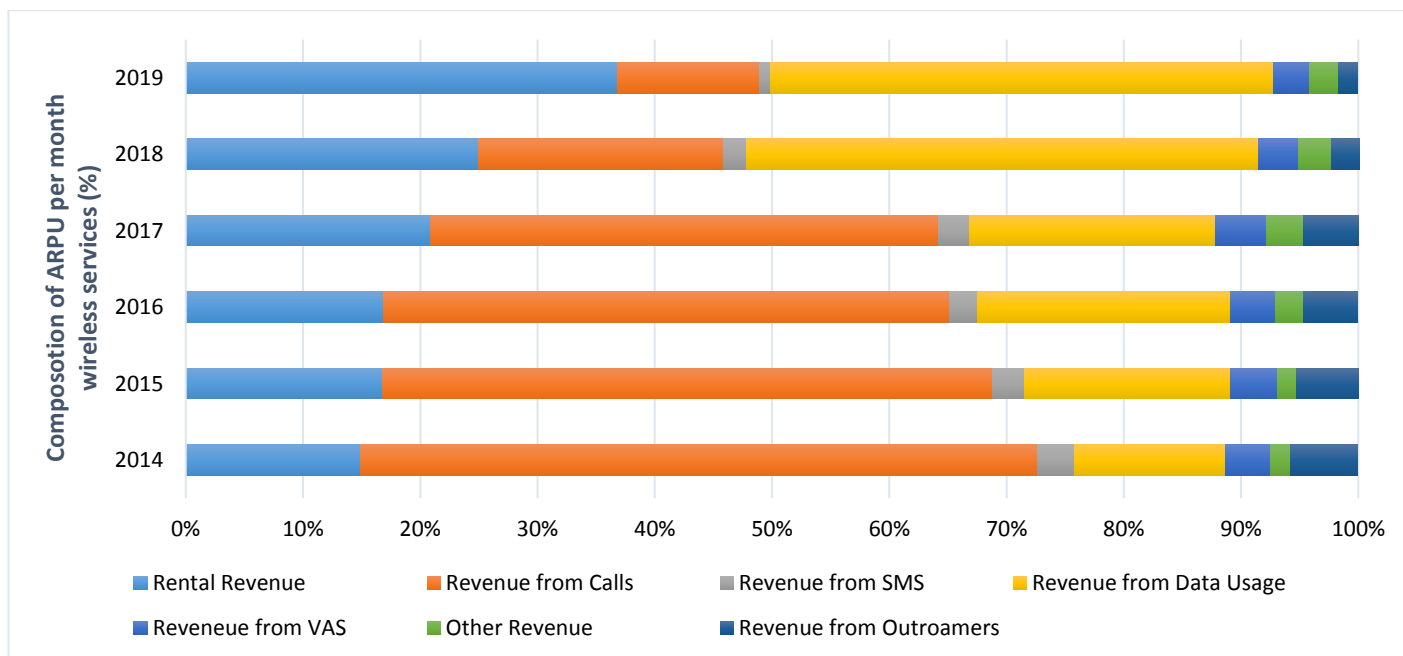
<sup>3</sup> TRAI Performance Indicators Report.

<sup>4</sup> Sheth, J. and Sisodia, R. (2002). *The Rule of Three: Surviving and Thriving in Competitive Markets*. New York: Free Press.



- Data centricity naturally changed the composition of ARPU, with data revenue capturing a higher proportion of the total revenue. Share of data in ARPU increased from 12.9 per cent in 2014 to 42.9 per cent in 2019. Revenue from data increased at a CAGR of 27 per cent between 2014 and 2019 while that from voice and SMS declined at a CAGR of 26 per cent and 21 per cent, respectively.

**Figure 2.3: ARPU Composition over Time**



Source: TRAI Performance Indicators Report.

Note: Other revenue includes interconnect usage charges and roaming settlement charges.

- Internationally, India offers the cheapest data compared at current market exchange rates. Mobile data tariff published by UK-based [cable.co.uk](http://cable.co.uk) using 6,313 data plans across 230 countries estimates the price per GB for data in India to be USD 0.16. Even at Purchasing Power Parity (PPP) exchange rates, the tariffs in India are lower than several other countries including Brazil, Russia, China, Canada, EU and the US. For instance, the average cost of 1 GB data in PPP terms is USD 12.37 in USA, USD 23.39 in Russia, USD 41.45 in China, USD 14.35 in Canada and USD 7.86 in Brazil.
- Competition was compelled to respond to the new tariff regime introduced by Reliance Jio, initially as a promotional feature of their tariff plans. Revenue realisation for Airtel fell from Rs. 0.22 per MB in June 2016 to Rs. 0.06 in June 2017. The corresponding numbers for Vodafone and Idea were Rs. 0.26 per MB

(June 2016) to Rs. 0.09 (June 2017) per MB and from Rs. 0.21 per MB (June 2016) to Rs. 0.05 per MB (June 2017)<sup>5</sup>, respectively.

**Table 2: ARPU Comparisons across Operators**

Operators	Mar-16	Sep-16	Mar-17	Sep-17	Mar-18	Sep-18	Mar-19	Sep-19	Mar-20
Airtel	194	188	158	145	116	101	123	128	154
Vodafone Idea Ltd. (VIL)						92	89	108	109
Idea	179	173	142	132	105				
Vodafone	177	171	142	132	105				
Jio				156	137	132	126	120	131

Source: Cellular Operators Association of India (COAI).

- While low data tariffs became the hallmark of India’s mobile data revolution, most operators grappled with high costs and technological upgradation. The late entrant Jio offered an all 4G service at significantly lower tariffs. Others built 4G on top of legacy networks, playing catch up. Meanwhile, saturation in markets is now forcing operators such as Airtel and VIL to offer incentives for high-value recharges and for data activations in rural areas, thus narrowing the digital divide in India. Currently, Vodafone-Idea accounts for the highest share of rural subscribers; Reliance Jio is inching closer, with its bundled low-cost 4G Jio feature phone.
- Incumbents are also focusing on customer retention in the premium postpaid category, who are arguably less price-sensitive than the prepaid category; the “premiumisation” strategy of Airtel and VIL reflected in their Platinum and REDX plans, respectively. However, these plans offering higher speeds at higher prices have recently been legally challenged.<sup>6</sup>

## **B. Technology Evolution and Data Based Services**

- Markets in which technology changes rapidly, late entrants could enjoy a ‘late mover advantage’ because it provides an opportunity to leapfrog. While Reliance Jio’s network is all 4G, incumbents have to decide on how to manage and phase out legacy 2G and 3G networks. Interestingly, the 3G that was launched relatively

<sup>5</sup> Data provided by TelecomWatch.

<sup>6</sup> “TDSAT grants interim relief to VIL in premium plan case”. *The Statesman*. July 18, 2020.

<https://www.thestatesman.com/business/tdsat-grants-interim-relief-vil-premium-plan-case-1502909732.html>

late in India in 2008<sup>7</sup> is among the most short-lived technologies. With operators transitioning to 4G, 3G is being wound down faster than 2G.<sup>8</sup> The reason to discontinue older technologies is based on the emerging availability of spectral efficient technologies such as 4G. With 4G, voice and data are progressively becoming technologically indistinguishable.

17. Spectrum is one of the most critical inputs for mobile communications and access to it bestows competitive advantage to operators. Larger quantity of contiguous spectrum improves operational efficiency. Spectrum liberalisation in 2016 enabled operators to efficiently allocate spectrum bands across 2G, 3G and 4G services. This was especially beneficial for incumbent operators who service a heterogeneous group of subscribers across different generations of mobile technologies. At the same time, incumbents hold more dispersed bands of spectrum than Reliance Jio (RJio). For example, Airtel holds spectrum in 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, and 2300 MHz frequency bands, while RJio's<sup>9</sup> holdings are concentrated within 800 MHz, 1800 MHz and 2300 MHz bands. The current spectrum holdings for Airtel<sup>10</sup>, VIL, RJio and BSNL across all circles and spectrum bands are 862.7 MHz, 931.7 MHz, 602.5 MHz, and 388.2 MHz, respectively.
  
18. In 2010, RJio purchased pan-India Broadband Wireless Access (BWA) spectrum (2300 MHz) as part of its internet license. In 2012, a unified licensing regime was introduced that allowed RJio to provide both voice and data services on the BWA spectrum, increasing its underlying value. It was a material policy shift. When RJio launched 4G in 2016, 3G was less than 8 years old in India, and a substantial number of 2G subscribers also existed on the network. Meanwhile, Airtel, an incumbent operator, also purchased spectrum in the 2300 MHz band in 2010 but had only begun testing the market for 4G, as managing legacy networks and the emerging 3G technology were immediate challenges at hand. The need to manage multiple technologies added to the cost of doing business for incumbents. According to Vodafone as of May 2020, its 2G, 3G and 4G subscribers were 19.08 million, 15.78 million and 97.27 million, respectively. The corresponding numbers for Airtel in April 2020 were 24.97 million, 2.95 million and 139.37 million, respectively.<sup>11</sup> The mix of technologies is likely to stick around for at least a few more years, impacting the competitive strength of incumbent operators.

---

<sup>7</sup> Launched by MTNL in 2008. Private sector operators Airtel and Vodafone launched 3G services in 2011.

<sup>8</sup> Murray, C. (2015, October 19). Decommissioning 2G and 3G will force operators to share networks at a national scale, *Analysys Mason*. <https://www.analysismason.com/about-us/news/insight/decommissioning-2g-and-3g-will-force-operators-to-share-networks-at-a-national-scale/>

<sup>9</sup> Including Reliance Communications.

<sup>10</sup> Including Airtel and Tata.

<sup>11</sup> Numbers provided by Airtel and Vodafone.

19. During the initial years following the liberalisation of the sector, spectrum came bundled with the license that acted as an entry barrier. In 2010, spectrum in the 2100 MHz and 2300 MHz bands was assigned for the first time through an online auction. The 2010 auction was successful in that the entire spectrum put up for sale was acquired at prices that far exceeded the reserve price. Since reserve prices for subsequent auctions were continuously indexed to previous rounds, the price of spectrum remained high. Operators have paid upwards of Rs. 3.5 lakh crores across 6 auctions between 2010 and 2016. Consultations with experts revealed that the spectrum costs in India are approximately 7.6 per cent of their aggregate revenue, making them amongst the most expensive in the world, followed by Thailand at 7.3 per cent and Bangladesh at 7 per cent.<sup>12</sup> Besides, spectrum holding in India is also limited. The average spectrum an Indian operator holds is 31 MHz compared to the global average of 50 MHz.<sup>13</sup>

### C. Price and Non-Price Parameters of Competition

20. The combination of regulatory forbearance for retail tariffs and intense competition in the market for subscribers obtained for India a characterisation of being the lowest priced telecom market in the world. This moniker is not without a trade-off. While India is undoubtedly a price-sensitive market and price elasticity of mobile services is known to be much higher than most other countries,<sup>14</sup> the quality of service has been a victim, with call drops finding mention in the Parliament as well.<sup>15</sup> Rjio's launch offer in September 2016 introduced unlimited data and voice, video and messaging services along with a full bouquet of Jio applications and content at a very low price.<sup>16</sup> The shock to data prices followed by the downward revision of mobile termination charges in 2017 from 14p per min to 6p per min adversely impacted the competitive position of incumbent operators.

---

<sup>12</sup> Sanjai, P.R. and Saxena, R. (2019, November 1). "This is how India Ruined its Mobile Phone Companies." *The Print*, available at: <https://theprint.in/economy/this-is-how-india-ruined-its-mobile-phone-companies/314208/> (last accessed on May 7, 2020).

<sup>13</sup> *Ibid.*

<sup>14</sup> Kedia, M. (2019). "Testing the waterbed effect for India's telecom industry". *Ind. Econ. Rev.* 54, 121-148. <https://doi.org/10.1007/s41775-019-00044-7>.

<sup>15</sup> Lakshman, R. (2016, July 25). "MP Rajeev Chandrasekhar presents Call Drop issue in Parliament, Government assures TRAI Act amendment." *TelecomTalk*. <https://telecomtalk.info/mp-rajeev-chandrasekhar-presents-call-drop-issue-in-parliament-government-assures-trai-act-amendment/155418/>

<sup>16</sup> RIL (2016, September 1). Launch of Digital Services by Reliance Jio Infocomm Limited, Media Release. <https://www.ril.com/DownloadFiles/CorporateAnnouncements/Media%20Release%20-%20Jio%20-%2001092016.pdf>

21. In submissions made to TRAI, Airtel reported cost per GB to be Rs. 30 while Vodafone estimated it at Rs. 26.8 (excluding ROCE).<sup>17</sup> The estimated realisation at Rs. 2.70 was thus below cost. Even with sufficient margins of error, there seemed to be a need to increase prices, for immediate industry viability and for longer term consumer interest.
22. An industry price hike inevitably ensued. Pre-paid tariffs were increased, by up to 50 per cent by the three major private operators.<sup>18</sup> Airtel and VIL revised their basic plans that offered both voice and data from for Rs. 35 to Rs. 49, a 40 per cent jump. VIL also increased tariffs by 50 per cent on some of its other popular plans. For instance, a Rs. 399 plan offering subscribers 1 GB per day for 84 days was revised to Rs. 500, offering 1.5 GB a day for a similar period.<sup>19</sup> RJio, on the other hand, introduced its All in One (AIO) plan which was priced 40 per cent higher than its previous plans; however, the benefits offered were also increased.<sup>20</sup> Similarly, some postpaid plans by Airtel and VIL saw a 10 per cent hike.<sup>21,22</sup> The tariff hike reduced the urgency of the floor price proposal that incumbents had brought before TRAI in response to the unviable price levels resulting from the disruptive pricing introduced by RJio.<sup>23</sup>
23. As stated above, Quality of Service (QoS) received scant attention within the telecom ecosystem in the initial years following liberalisation. Much of the focus of the sector regulator, operators and consumers was on price and price-based competition. With the market moving towards data-based applications and services, there is a noticeable change in the demand for QoS. Stakeholder consultations revealed the importance of QoS. Open Signal, an independent agency measuring mobile connectivity globally, reports that 4G availability has improved for all operators in India.<sup>24</sup> While Jio's LTE network is placed ahead of

<sup>17</sup> Jain, S. (2020, March 9). "After eating 900 mice, cat goes on Haj! RJio joins Airtel and Vodafone Idea in asking for a floor tariff." *The Financial Express*. <https://www.financialexpress.com/opinion/after-eating-900-mice-cat-goes-on-haj-rjio-joins-airtel-and-vodafone-idea-in-asking-for-a-floor-tariff/1893292/>

<sup>18</sup> "Telecom Providers of India are Increasing Tariff by 40% to Cut Down on Losses." *Business APAC*. <https://www.businessapac.com/business-coverage/business-coverage/telecom-providers-increasing-tariff/>

<sup>19</sup> ET Bureau (2019, December 2). "Low tariff regime over, telcos up rates by 40-50 per cent." *The Economic Times*. [https://economictimes.indiatimes.com/industry/telecom/telecom-news/low-tariff-regime-over-telcos-up-rates-by-40/articleshow/72321975.cms?utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](https://economictimes.indiatimes.com/industry/telecom/telecom-news/low-tariff-regime-over-telcos-up-rates-by-40/articleshow/72321975.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)

<sup>20</sup> ET Telecom (2019, December 1). "Reliance Jio hikes prepaid price by up to 40%; launching new plans on Dec 6." *The Economic Times*. <https://telecom.economictimes.indiatimes.com/news/reliance-jio-hikes-prepaid-price-by-up-to-40-launching-new-plans-on-dec-6/72319526>

<sup>21</sup> Sarwar, N. (2020, February 17). "Airtel Increases Price of Add-On Connection for Postpaid Customers From Rs. 149 to Rs. 249: Reports." *Gadgets 360*. <https://gadgets.ndtv.com/telecom/news/airtel-price-hike-add-on-postpaid-rs-149-to-rs-249-effective-2181413>

<sup>22</sup> Pardiwala, A. (2020, May 11). "Vodafone RedX Postpaid Plan Price Hiked by Rs. 100, Now Costs Rs. 1,099 per Month." *Gadgets 360*. <https://gadgets.ndtv.com/telecom/news/vodafone-redx-postpaid-plan-price-hike-rs-1099-2226923>

<sup>23</sup> Press Trust of India (2019, December 12). "Looking at telecom industry demand to fix floor price: TRAI." *The Economic Times*. [https://economictimes.indiatimes.com/industry/telecom/telecom-news/looking-at-telecom-industry-demand-to-fix-floor-pricetrai/articleshow/72492751.cms?utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](https://economictimes.indiatimes.com/industry/telecom/telecom-news/looking-at-telecom-industry-demand-to-fix-floor-pricetrai/articleshow/72492751.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)

<sup>24</sup> Open signal measures the real-world experience of consumers on mobile networks. They collect 3 billion individual measurements every day from tens of millions of smartphones worldwide. The measurements are collected at all hours of

the rest in 4G availability. The October 2019 reporting by Open Signal shows that Airtel offered the best download and video experience. A preference for better quality also underlines Airtel and VIL's recent strategy to charge higher for higher speeds.

24. Survey findings confirm customer preference for QoS. Consumers ranked network coverage (rank 1) followed by customer service, tariff packaging and lower tariffs (rank 4) as the most important factors for preference of a particular network. Jio subscribers were most satisfied with their wireless connections, followed by Airtel and VIL subscribers. More specifically, Airtel subscribers were satisfied with tariff offerings and internet speeds while Jio subscribers ranked voice quality, lesser call drops and customer service as most satisfying. For VIL subscribers, network coverage ranked on top. These responses suggest that competition has moved away from a unidimensional focus on price.
25. Operators are also competing through their design of innovative tariff packages and product bundling is reportedly an important competition parameter. The current *combo offers* include voice, data and over-the-top (OTT) services. An analysis of tariff data available on the TRAI website<sup>25</sup> finds seven different categories of tariff products for prepaid subscribers and three different categories for postpaid subscribers.

#### **D. Vertical Convergence**

26. The introduction of over-the-top (OTT) services in 2009 upended the secure industry equilibrium. The fact that OTT services made inroads into traditional sources of revenue of operators without having to bear the licensing and regulatory burden, while accurate, has no straightforward resolution. On the one hand, OTT services that substitute for traditional SMS and voice, create revenue pressure, but on the other hand, their existence expands the market for operators and increases data revenue. Unlicensed and qualitatively different OTT services provide a wide range of functionalities that go beyond communication.
27. After the initial disruption, Telecom Service Providers (TSPs) have accepted the new business reality that internet-based OTT applications and services bring revenue, more content and spur investments in network upgradation. The

---

the day, every day of the year, under conditions of normal usage, including inside buildings and outdoors, in cities and the countryside, and everywhere in between. By analysing on-device measurements recorded in the places where subscribers actually live, work and travel, they report on mobile network service the way users truly experience it.

<sup>25</sup> <https://traai.gov.in/tariff>

interactions between TSPs and OTT companies are now symbiotic, as operators bundle OTT services to push more data through telecom pipes, and OTT services benefit from the large subscriber base of telecom providers. As mentioned above, tariff packages now routinely include OTT services, giving rise to voice, video and data or in other words, the so called 'triple play' services. Engagements between telcos and Internet-based services companies have moved beyond contractual agreements to other forms of strategic transactions. For instance, Reliance Jio has bought stakes in video content provider Eros and Balaji Telefilms.<sup>26</sup> Airtel and Vodafone have sealed content deals with Hotstar and Amazon, respectively.<sup>27</sup> Most recently, Facebook has invested in Reliance Jio.<sup>28</sup> Many TSPs have also ventured into building their own digital content, for example, Airtel's Hike, Reliance's Jio Cinema, etc.

28. Interestingly, the experts we spoke to did not view technology convergence and the resulting integration across the infrastructure and content value chain as a competitive concern by itself. In fact, these are believed to be pro-competitive that trigger a virtuous cycle within the digital economy. In general, across the digital economy and arguably elsewhere, the relationship between size and antitrust has become more subtle.

## **E. Financial Distress of the Sector**

29. High costs of spectrum acquisition, as mentioned above, and the demands of network upgradation had increased the industry debt burden. Technological disruption and tariff competition triggered by the entry of Reliance Jio jointly aggravated the financial distress reflected in the unprecedented decline in revenue of the industry through the years 2017 and 2019. The average revenue of the industry decreased from 5.49 per cent in 2012-2013 to 2.51 per cent in 2015-2016 which further declined to -2.82 per cent in 2018-2019. The industry estimates for weighted average Return on Equity (ROE) decreased from 7.46 per cent in 2015-2016 to -7.59 per cent in 2017-2018.

---

<sup>26</sup> Jha, L. (2018, April 2). "Reliance strengthens content bid for Jio." *Live Mint*.  
<https://www.livemint.com/Companies/BeNtqhte9PzK7D4I4NZaxJ/Reliance-strengthens-content-bid-for-Jio.html>

<sup>27</sup> Accenture (2018). Calling the data shot. *Accenture Business Journal for India*.  
[https://www.accenture.com/t20180827t015416z\\_w\\_/in-en/acnmedia/accenture/in-en/abji2018/pdf/accenture-calling-the-data-shots.pdf](https://www.accenture.com/t20180827t015416z_w_/in-en/acnmedia/accenture/in-en/abji2018/pdf/accenture-calling-the-data-shots.pdf)

<sup>28</sup> ET Bureau (2020, April 23). "Facebook buys 9.99% stake in Reliance Jio for Rs. 43,574 crore."  
[https://economictimes.indiatimes.com/tech/internet/facebook-buys-9-99-stake-in-reliance-jio-for-5-7-billion/articleshow/75283735.cms?utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](https://economictimes.indiatimes.com/tech/internet/facebook-buys-9-99-stake-in-reliance-jio-for-5-7-billion/articleshow/75283735.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)

**Table 3: Growth Trends in Industry Revenue**

Year	Average (%)	Weighted Average (%)	Highest Revenue Growth in the Year (%)	Lowest Revenue Growth in the Year (%)
2012-13	5.49	10.28	56.63	-38.31
2013-14	9.59	8.67	45.56	-5.79
2014-15	12.68	13.25	37.10	-10.52
2015-16	2.51	2.50	14.46	-7.38
2016-17	-10.55	-7.20	5.35	-68.71
2017-18	-29.19	-14.15	-12.27	-75.63
2018-19	-2.82	20.35	92.67	-36.22

Source: ICRIER's calculation based on Financial Reports of the Operators.

30. Rising leverage is among the principal challenges facing the sector. The ICR<sup>29</sup> for the industry is considerably depressed due to the presence of heavily indebted operators. An ICR of less than 1 implies that the Earnings before Interest and Taxes (EBIT) are insufficient to cover repayment of interest and taxes. Industry estimates since 2014-15 show a declining trend for ICR, reflecting the industry's general inability to service debt and pay taxes.
31. A negative Profit after Tax (PAT), implies that ROE is also negative for most operators for several years since 2011-12. This presents difficulties for the long-term viability of telecom businesses. Recent investments in RJio and the rights issued by Airtel and VIL reflect long-term intent and are positive signals for the industry.<sup>30</sup> By themselves, these are, however, inadequate to address the sustainable future for the industry.

## F. Way forward and Launch of 5G

32. Globally, the transition from 4G to 5G is underway and gaining momentum. In fact, the 5G revolution is happening faster than the transition to any previous

<sup>29</sup> The Interest Coverage Ratio (ICR) indicates the ability of a company to meet its interest payments on outstanding debt. For our analysis, we have calculated the ICR as the ratio of Earnings before Interest and Taxes (EBIT) to Financing Costs. We have not used ratios where ICR is negative to enable a meaningful analysis.

<sup>30</sup> Financial Reports of the Operators.



access technology.<sup>31</sup> Operators around the world are investing in the spectrum and next-generation mobile network infrastructure. The frontrunner in global 5G deployment, South Korea, is on track to reach 12 million 5G subscribers in 2020 and 36 million—or 90 per cent penetration—by 2026.<sup>32</sup>

33. For India, spectrum allocation will be key to the successful launch of 5G services. Based on available information, the spectrum for 5G in India will be relatively more expensive than other countries. The learning from India’s experience also suggests that the quantum of the spectrum will also determine the quality of 5G offerings; scarcity increases costs and makes operations inefficient.
34. Technology standards for 5G, as for all other communication technologies are globally coordinated and developed. Technology availability is, therefore, not a concern for telecom operators. Creating a competitive market for 5G will be crucial to its success in India. This will imply ensuring assignment of the spectrum at a reasonable cost balancing revenue realisation and industry viability. This will ensure that the capital market remains interested in funding network upgradation and expansion, including the acquisition of spectrum. The current financial health of the sector as a whole could result in an uneven speed of adoption of 5G by operators, the more profitable ones are likely to be faster off the block. In case this scenario unfolds, it will have implications for the level of competition in the long-run.

---

<sup>31</sup> Indo-Asian News Service (2019). “Indian Masses Will Have to Wait 5-6 Years for a True 5G Experience.” *Gadgets 360*. <https://gadgets.ndtv.com/telecom/features/indian-masses-will-have-to-wait-5-6-years-for-a-true-5g-experience-2105793>

<sup>32</sup> GSMA (2020, March). “Realising 5G’s Full Potential: Setting Policies for Success.” [https://www.gsma.com/publicpolicy/wpcontent/uploads/2020/03/Realising\\_5Gs\\_full\\_potential\\_setting\\_policies\\_for\\_success\\_MARCH20.pdf](https://www.gsma.com/publicpolicy/wpcontent/uploads/2020/03/Realising_5Gs_full_potential_setting_policies_for_success_MARCH20.pdf)

## CHAPTER 3

### COMPETITION ISSUES

35. The need for regulation has evolved for Indian telecoms. From being a tightly controlled duopoly, the sector is now lightly regulated, entry is open, tariffs are subject to forbearance, and spectrum has been delinked from the license and is available in the secondary market. Over time, most entry restrictions have been lowered. One significant step was the unbundling of the spectrum from the license in 2012.<sup>33</sup> Spectrum sharing and trading, permitted in 2015,<sup>34</sup> was the next step enabling harmonisation and efficient utilisation of existing spectrum. Interconnection tariffs, net neutrality rules and mobile number portability (MNP) are some of the explicit *ex-ante* regulations in the sector that shape competition.
36. The sector has been in the throes of an aggressive price war over the last three years, leading to demands for the institution of a price floor to prevent predatory conduct. Price floors are a part of competition regulation toolkit, to be used especially when there is an incumbent with disproportionate market power and who chooses to exercise it. The extreme is a price cap regime that is also typically used to prevent abuse of market power by a dominant incumbent. Initially, price caps were common in Indian telecom but as competition became adequate and effective, the regulator deferred to the market, using tariff reporting and monitoring to preserve and foster competition. In general, the presence of strong players is good for competition, however, a heterogeneous market with a few weakened debt-ridden operators may be inimical to it. The issues impacting industry competition are discussed in subsections below.

#### A. Price-based Competition and Value Destruction

37. *Ex-ante* competition analysis by TRAI relies heavily on the definition of Significant Market Power (SMP). Only an entity with SMP can engage in conduct that is anti-competitive, is the received wisdom. A new entrant with no presence in the relevant market is thus at once precluded from such conduct. Reliance's entry into telecom through Jio did not merit regulatory attention despite its discounted

---

<sup>33</sup> PIB (2012, May 31). National Telecom Policy-2012 and Unified Licensing Regime, available at: <https://pib.gov.in/newsite/mbErel.aspx?relid=84613> (last accessed on May 11, 2020).

<sup>34</sup> DOT (2015, October 12). Guidelines on Spectrum Trading, Department of Telecommunications (DOT), available at: <https://dot.gov.in/accessservices/guidelines-spectrum-trading> (last accessed on May 7, 2020).

pricing strategy. Based on TRAI's definition of SMP,<sup>35</sup> Jio did not qualify as an entity with SMP and by definition 'predatory'.<sup>36</sup>

38. Response by the incumbents to the tariff decline was along predictable lines. They matched the new tariffs with voice that accounted for 70 per cent of the revenue, becoming free and data prices plummeting by approximately 85 per cent.<sup>37,38</sup> The sharp decline in prices led to several exits, and industry revenue in 2018-19 amounted to nearly the same as the revenue from almost a decade ago. Meanwhile, an appeal to the Telecom Regulatory Authority of India (TRAI) to institute floor prices was made by the incumbents.<sup>39</sup> It was a difficult demand for TRAI to accept as in the 25 years since liberalisation floor prices had never formed part of the regulatory toolkit. The CCI's advice to TRAI on the issue was to continue with the forbearance regime.<sup>40</sup> Floor prices ensure a minimum amount of profit to telecom operators but it also runs the risk of making them complacent about their service offerings and subsequently depriving the market of innovations that can make services affordable. Moreover, pricing strategies in the emerging multi-sided market are complex. Eventually in December 2019,<sup>41</sup> the tariffs increased by about 40 per cent.
39. Where there is technological convergence, bundling of services and pre-eminence of data, a pure cost-based regime in form of fixing telecom retail price would be inadequate and, indeed, undesirable. Telecom falls in the category of two-sided markets with service providers operating as a platform using which content providers and subscribers connect. Subscribers are better off with the content, and content providers are better off due to their expanded reach. In multi-sided markets it is not the price of individual service(s) that has to be determined in a market, it is the entire pricing structure of various sides of the market that operators compete on. So, it is quite possible that some markets with very high elasticity may be zero priced but monetisation from the inelastic market can compensate for below-cost pricing. Therefore, certain value-added services can be priced above the marginal cost and certain baseline services can be priced at

---

<sup>35</sup> The Telecommunication Tariff (Sixty Third Amendment) Order, 2018, Pg. 26-27, Feb 16, 2018, Telecom Regulatory Authority of India, available at: [https://traai.gov.in/sites/default/files/TTO\\_Amendment\\_Enq\\_16022018.pdf](https://traai.gov.in/sites/default/files/TTO_Amendment_Enq_16022018.pdf) (last accessed on May 6, 2020).

<sup>36</sup> Ibid.

<sup>37</sup> Kaushik, M. (2018, July 1). "A Losing Battle." *Business Today* (online). <https://www.businesstoday.in/magazine/the-hub/telecom-sector-docomo-tata-teleservices-telenor-unitech-jio-idea/story/278879.html> (last accessed on May 5, 2020).

<sup>38</sup> Kathuria, R. (2020). "Dominance in the Telecom Sector can sometimes mean Accommodating Opponents, Cushioning their Fall." *The Indian Express* (online). <https://indianexpress.com/article/opinion/editorials/sc-judgement-on-telecom-sector-jio-reliance-airtel-6222114/> (last accessed on May 5, 2020).

<sup>39</sup> TRAI (2019, December 17). Consultation Paper on Tariff Issues of Telecom Services. Consultation Paper No. 22/2019, available at: [https://www.traai.gov.in/sites/default/files/CP\\_17122019.pdf](https://www.traai.gov.in/sites/default/files/CP_17122019.pdf)

<sup>40</sup> CCI's Comments on Tariff Issues in Telecom Sector, available at: [https://traai.gov.in/sites/default/files/Competition\\_Commission\\_of\\_India\\_04032020.pdf](https://traai.gov.in/sites/default/files/Competition_Commission_of_India_04032020.pdf) (last accessed on Jul 4, 2020).

<sup>41</sup> "Telecom Providers of India are Increasing Tariff by 40% to Cut Down on Losses." *Business APAC*. <https://www.businessapac.com/business-coverage/business-coverage/telecom-providers-increasing-tariff/>

or below marginal cost. Moreover, telecom operators may generate other sources of revenue than user charges. For competition law assessment also, two-sided markets raise a regulatory challenge because they do not fit neatly into the existing standard approaches for assessing market definition and power. Their relative newness and almost complete absence of precedent makes the regulators task much harder.

40. The overall welfare implications of such price shocks are hard to judge since they depend on the relative weights attached to consumer and producer welfare and to the short versus the long term. What is certain though is that weakened competition will delay access to new technologies such as 5G. The extent of price and non-price competition among players will vary over time and is likely to be a function of several elements such as nature of the market rivalry, expected response from a rival following a competitive move and the like. While it is difficult to generalise, as the market matures and as tariffs become similar across operators, non-price parameters would begin to play an important role in driving competition.

## **B. Non-Price Based Competition**

41. The report supports findings that demonstrate an important role for non-price factors in driving competition in the Indian telecom market, partly reflecting the maturing nature of competition and in part the recognition that price competition has its intrinsic limits. Even though the average consumer remains price-sensitive, other factors such as QoS, data speeds and bundled offerings are shown to influence consumer choice. Further, the increase in wireless data subscribers from 281.5 million in 2014 to 664.8 million at the end of 2019<sup>42</sup> points towards the shifting focus of competition from voice to data. Data has several more dimensions than voice and has given rise to “bundled offerings” which include, *inter alia*, voice, data, SMS, and content. Based on the stakeholder interactions and interviews with sectoral experts, supported by secondary research, the study envisages that bundled offerings will drive differentiation in the market. The dynamic nature of telecom market ensures that what is a differentiator at one point in time becomes common at another.
42. With tremendous product parity in the telecom industry, retaining customers is a continuous challenge. A pan-India mobile network and data packages are no longer the product or service differentiators. Service bouquets are a likely choice

---

<sup>42</sup> TRAI (2019, December 17). Consultation Paper on Tariff Issues of Telecom Services. Consultation Paper No. 22/2019, available at: [https://www.trai.gov.in/sites/default/files/CP\\_17122019.pdf](https://www.trai.gov.in/sites/default/files/CP_17122019.pdf) (last accessed on May 7, 2020).

to improve customer retention. For instance, Bharti Airtel's strategy is focused on "bundling", "upgradation", and "premiumisation". It recently launched "Airtel Thanks",<sup>43</sup> a programme which offers exclusive benefits to its customers by linking subscriber ARPU to free rewards.<sup>44</sup> Through this strategy, it plans to tie-up with third party content producers along with variegated products, and services and offer them as "bundled" offerings at zero-cost to subscribers.<sup>45</sup> Bundled offerings also give operators an opportunity to identify new ways of monetisation. Reliance Jio has already made significant investments across the value chain (discussed later). Jio's Giga Fiber is being developed as a comprehensive package for user customisation.<sup>46</sup> Further industry pricing is moving towards longer validity plans (70-90 days).<sup>47</sup> Bundled offerings coupled with longer validity plans and timely discounts are likely to nudge consumers to stick.

43. Almost all stakeholders were of the view that partnerships between telcos and OTT companies are symbiotic in nature, and even though the terms of negotiations between different parties remain privileged, there is no reported abuse of market power. In fact, it offers a win-win situation for both consumers as well as service providers. OTT players also emphasised on the availability of safeguards through net neutrality principles that are likely to prevent future discrimination against them.

### C. Vertical Integration

44. Technology convergence has inspired vertical integration in the industry, helping forge strategic partnerships between telecom operators and digital solutions providers including content providers, e-commerce platforms, digital payment platforms and other cloud-based technology solutions. Such integration is a market reality in which fixed-line, mobile, internet/broadband and television could be bundled to provide what is now popularly known as 'quad play'. Such bundling is designed to create dependency but is also a tool to reduce consumer search

---

<sup>43</sup> "Airtel launches Airtel Thanks to delight customers with exclusive benefits," available at: <https://www.airtel.in/press-release/10-2018/airtel-launches-airtel-thanks-to-delight-customers-with-exclusive-benefits> (last accessed on Jun 25, 2020).

<sup>44</sup> Dharmakumar, R. and Vandana (2019, April 12). "The Dethroning, Liberation and Reinvention of Bharti Airtel." *The Ken*, available at: <https://the-ken.com/story/airtels-fightback-plan/> (last accessed on May 7, 2020).

<sup>45</sup> *Ibid.*

<sup>46</sup> Times of India (2019, September 5). "Reliance announces JioFiber Plans Starting Rs. 699: All you Need to Know," available at: <https://timesofindia.indiatimes.com/business/india-business/reliance-announces-jiofiber-plans-starting-rs-699-all-you-need-to-know/articleshow/70993255.cms> (last accessed on May 11, 2020).

<sup>47</sup> PTI (2019). "Tough 2018 for telcos as Reliance Jio price cut to delay Arpu recovery." *The Economic Times*. [https://economictimes.indiatimes.com/news/company/corporate-trends/tough-2018-for-telcos-as-reliance-jio-price-cut-to-delay-arpu-recovery/articleshow/62432890.cms?utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](https://economictimes.indiatimes.com/news/company/corporate-trends/tough-2018-for-telcos-as-reliance-jio-price-cut-to-delay-arpu-recovery/articleshow/62432890.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)

costs and thereby enhance welfare. The challenge for competition authorities is to isolate instances of market abuse to the detriment of competition or to consumer welfare.

45. It may be premature to declare that vertical integration creates a *cul-de-sac* from which users find it hard to switch. Some empirical studies do, however, seem to suggest that consumers are likely to become 'locked-in' even in seemingly open ecosystems. For instance, a US-based study found that only 1 per cent of Amazon Prime members are likely to consider competitor retail sites, while non-Prime members are eight times more likely than Prime members to shop between both Amazon and Target in the same session. In the words of one former Amazon employee who worked on the Prime team, "It was never about the US\$ 79,<sup>48</sup> it was really about changing people's mentality so they wouldn't shop anywhere else."<sup>49</sup> Similarly, Facebook's recent announcement to integrate the company's messaging services – WhatsApp, Instagram and Facebook Messenger – was to keep users highly engaged inside the company's ecosystem. Such integration may reduce users' appetite for rival messaging services, like those offered by Apple and Google.<sup>50</sup>
46. With technological convergence, such 'walled-gardens' may become the standard. Customers who are drawn into such an arrangement might prefer to 'stay in', either because there is no real need for them to go 'outside' or because the costs of migration are high. From the competition standpoint, the distinction is important. It is also important to determine whether effective competition can exist between 'walled gardens' or whether the existence of network effects implies a 'winner takes it all' outcome? If it is the latter, a vertically integrated service provider will have the 'ability' to hinder competition, and abuse its market power. However, if there is sufficient facilities-based competition it will not have an 'incentive' to do so. Therefore, whether the service provider indulges in discriminatory treatment has to be ascertained on a case by case basis and going forward the role of the Competition Authorities will increase in assessing the impact of these newly emerging business models with telecom operators acting as platforms to various applications ranging from entertainment to retail to payment systems, etc. World over, M&As in the Technology, Media and Telecommunications Sector (TMT) exceed the volume of transactions in any other sector and currently account for nearly one quarter of the total M&A activities

---

<sup>48</sup> Amazon began by offering consumers unlimited 2 days shipping for US\$ 79.

<sup>49</sup> Khan, Lina M. (2017, January). "Amazon's Antitrust Paradox." *The Yale Law Journal*, 126 (3): 564-907, available at: <https://www.yalelawjournal.org/note/amazons-antitrust-paradox> (last accessed on May 4, 2020).

<sup>50</sup> Isaac, Mike (2019, January 25). "Zuckerberg Plans to Integrate WhatsApp, Instagram and Facebook Messenger." *The New York Times*, <https://www.nytimes.com/2019/01/25/technology/facebook-instagram-whatsapp-messenger.html>

around the world.<sup>51</sup> Moreover, the volume of potentially anti-competitive mergers within the TMT sector accounts for 16 per cent of the total volume of merger interventions around the world.<sup>52</sup> In India, Reliance Jio has acquired stakes in various companies including Balaji Telefilms, Hathaway and Den Networks paving the way to become the country's first vertically integrated digital services provider.<sup>53</sup> Moreover, with investments from internet giants such as Facebook and Google, RJio will further strengthen its platform and the corresponding suite of services that can be made available to customers. Apart from RJio, Airtel's potential to integrate is illustrated by its presence across all communications technologies, Direct to Home broadcast as well as a handful of OTT applications. Vodafone-Idea experimented with integrating m-pesa as a payments service, which was discontinued in 2019 due to the deteriorating financial health of the sector and regulatory changes in the payments' banks business.<sup>54</sup>

47. The stakeholders in India do not yet perceive vertical integration as a threat to competition. However, cross-country examples do suggest a need for deeper scrutiny. According to the popular view of the stakeholders, since net neutrality requirements forbid telecom operators from differential pricing, it keeps discrimination and anti-competitive conduct in check. Adherence to net-neutrality is essential for fair play, especially in light of the move towards convergence. Current TRAI rules on net neutrality prohibit service providers from shaping traffic towards its own products at the expense of rivals who may not enjoy similar access to the distribution channel.

#### **D. Content Delivery and Traffic Management**

48. With mobile connections having crossed a billion and data collective becoming an increasingly mobile phenomenon, aggregate data traffic on the three major private networks was estimated at 250 petabytes per day as of December 2019.<sup>55</sup> The nationwide lockdown necessitated by the ongoing pandemic increased daily

---

<sup>51</sup> OECD (2019, June 7). Vertical Mergers in the Technology, Media and Telecom Sector. Background Note by the Secretariat.

<sup>52</sup> *Ibid.*

<sup>53</sup> Kumar, Deepak (2016, September 2). "Reliance Jio set to move the cheese with a vertical-integration play: Here's how." *ET Telecom.com* (online), available at: <https://telecom.economictimes.indiatimes.com/tele-talk/reliance-jio-set-to-move-the-cheese-with-a-vertical-integration-play-here-s-how/1765> (last accessed on May 2, 2020).

<sup>54</sup> PTI (2019, July 29). "Vodafone Idea to close m-pesa business, writes off Rs. 210 crore for payments bank closure," available at: <https://economictimes.indiatimes.com/industry/banking/finance/banking/vodafone-idea-to-close-m-pesa-business-writes-off-rs-210-crore-for-payments-bank-closure/articleshow/70439910.cms> (last accessed on May 4, 2020).

<sup>55</sup> Parth, Shubhendu (2020, April 13). "Vodafone registered nearly one year of traffic growth in first week of lockdown." *Voice and Data*, <https://www.voicendata.com/vodafone-registered-one-year-traffic-growth-first-week-lockdown/>

traffic to nearly 360-380 petabytes.<sup>56</sup> Internet companies often utilise Content Delivery Networks (CDNs), such as Akamai and Cloudflare that provide geographically distributed servers, to facilitate faster delivery of their content to users. In turn, CDNs have agreements with ISPs or TSPs to host servers on their network. CDNs reduce congestion in the last mile, lower transit costs and improve overall network utilisation. With data traffic set to grow and a limited number of players controlling a significant proportion of internet traffic, there is a potential for anti-competitive agreements between CDNs, ISPs/TSPs and internet companies.<sup>57</sup> Current TRAI regulations exempt CDNs from restrictions on non-discriminatory treatment. Since commercial arrangements between internet companies, CDNs and ISPs/TSPs are not disclosed, monitoring of such arrangements and traffic patterns would help in ensuring net neutrality principles and fair competition.

49. In order to maximise traffic efficiency ISPs/TSPs also enter into peering arrangements that allow them to exchange traffic without using the public internet. Such peering arrangements between ISPs are not regulated and are usually settlement-free. However, in some cases, smaller ISPs may have to pay a transit cost to a larger network provider.<sup>58</sup> Even though, in principle, peering seems like a good solution to tackle network congestion, there have been concerns related to differential treatment of internet traffic.<sup>59</sup> For instance, a few reports have highlighted that certain broadband providers in India are using peering arrangements to provide faster speeds to specific services.<sup>60</sup> Moreover, with vertical consolidation on the rise and operators such as Reliance Jio and Airtel building their own OTT platforms, traffic management practices can be used to prioritise own content over that of competitors. Though net neutrality rules apply, issues related to their implementation in peering arrangements are still under consultation.<sup>61</sup>

---

<sup>56</sup> Singh, Pratap Vikram (2020, April 2). "Telecom Networks Teeter as India's Lockdown Spikes Data Traffic." *The Ken*, <https://the-ken.com/story/telecom-networks-teeter-as-indias-lockdown-spikes-data-traffic/> (last accessed on May 7, 2020).

<sup>57</sup> Deep, Aroon (2017, December 14). "Opinion: The Curiously Absent Voice in the Net Neutrality Debate." *The Medianama*, available at: <https://www.medianama.com/2017/12/223-opinion-net-neutrality-cdns/> (last accessed on May 19, 2020).

<sup>58</sup> Shukla, Sidhartha (2018, February 22). "India's Growing Web of Peering and the Looming Threat to Net Neutrality." *The Ken*, available at: <https://the-ken.com/story/peering-and-threat-to-net-neutrality/> (last accessed on May 7, 2020).

<sup>59</sup> *Ibid.*

<sup>60</sup> Deep, Aroon (2017, July 24). "Some Indian ISPs are Violating Net Neutrality with Fast Lanes." *The Medianama*, available at: <https://www.medianama.com/2017/07/223-indian-isps-violating-net-neutrality-fast-lanes/> (last accessed on May 7, 2020).

<sup>61</sup> TRAI (2020, January 2). Consultation Paper on Traffic Management Practices (TMPs) and Multistakeholder Body for Net Neutrality. TRAI, available at: [https://traai.gov.in/sites/default/files/CP\\_02012020\\_0.pdf](https://traai.gov.in/sites/default/files/CP_02012020_0.pdf) (last accessed on May 11, 2020).



## E. Unbundling Service and Infrastructure

50. The licensing regime has undergone several changes since liberalisation to keep pace with technological change and market developments. The unified licensing (UL) regime, introduced in 2013, allowed all telecom services to be provided under one license. This facilitated economies of scope, i.e. the use of the same network for providing different services, creating efficiencies in the system.
51. The UL regime, however, does not practicably segregate the infrastructure, network and service layers, except for limited unbundling of the infrastructure layer in the form of the Infrastructure Provider Category – 1 (IP 1) license. The network layer is integrated with the service layer. Consequently, licensees are responsible for establishing and maintaining the network, servicing the consumer, managing the tariffs and QoS. Considering likely future developments, the National Digital Communications Policy (NDCP 2018) recommended unbundling of different layers through a revised differential licensing regime. In 2019, the telecom regulator released a pre-consultation paper to discuss the issue of enabling unbundling of different layers through differential licensing,<sup>62</sup> and to seek industry views on unbundling of different elements of the telecoms supply chain.<sup>63</sup> Many other jurisdictions are modifying their telecommunications regulations to support the expansion of markets and competition. For example, the licensing regime in Singapore has two distinct types of licenses, namely (i) Facilities Based Operator for TSPs deploying their own infrastructure, and (ii) Service Based Operator for entities intending to lease the telecom network equipment from any Facilities Based Operator. The Australian Telecommunications Act distinguishes between Carriers (entities which own their telecommunications infrastructure on which content and carriage services are provided) and Carriage Service Providers (entities which have direct contact with consumers) and Content Service Providers.<sup>64</sup>
52. A differential licensing regime will bolster competition by enabling entities to focus on their competitive advantage. The public sector through the Bharat Net programme can become the primary infrastructure provider especially in rural areas. Perhaps the unbundled retail service layer of the public sector can infuse more private sector investments for improving efficiency. During the stakeholder

---

<sup>62</sup> *Ibid.*

<sup>63</sup> PTI (2019, December 9). "TRAI seeks Industry's Views on Unbundled Licensing Regime in Telecom." *The Economic Times*, available at: <https://economictimes.indiatimes.com/industry/telecom/telecom-news/trai-seeks-industrys-views-on-unbundled-licensing-regime-in-telecom/articleshow/72444715.cms?from=mdr#:~:text=NEW%20DELHI%3A%20Sector%20regulator%20Trai,s%20recommendation%20on%20the%20issue> (last accessed on Jun 26, 2020).

<sup>64</sup> *Ibid.*

discussions, experts endorsed unbundling of licenses to foster competition. With the advent of 5G networks, business models based on network-as-a-service are likely to become a reality and an unbundled regime may be critical to realise the full potential of 5G networks.

## **F. Active and Passive Infrastructure Sharing**

53. The essential facilities doctrine (EFD) lies at the core of telecom regulation. Such facilities are essential inputs in the production or delivery of final services and cannot be economically duplicated. The earliest essential facilities concerns were dealt through interconnection regulations (2003). A difficult task in this respect has been designing terms and conditions of access to the designated essential facilities such as interconnection or the local loop. Examples from other industries include the transmission grid in electricity, the network of pipelines in natural gas, the track in railroads, access to airport terminals and slots and berthing services in a port. In telecommunications, interconnection regulations are aimed at lowering barriers to entry, promoting infrastructure investment and facilitating competition. As networks expanded, other infrastructure bottlenecks were addressed through regulations for sharing facilities. For example, India was amongst the first countries to permit passive infrastructure sharing in 2008.<sup>65</sup> Incumbent operators in India hived off tower segments into separate telecom infrastructure companies.<sup>66</sup> Currently, India has more than 900 IP-1 registered holders indicating that there are no significant regulatory barriers to enter the business. Enabling infrastructure availability through sharing obviates unnecessary duplication of infrastructure, helps the roll out of telecommunication services and improves efficiency. Stakeholders emphasised the need for further enabling infrastructure, especially in the lead up to 5G to lower costs of investments.
54. NDCP 2018 has underlined the need for sharing of active infrastructure as well. According to the existing licensing conditions, sharing of active infrastructure is permitted among service providers based on mutual agreements,<sup>67</sup> subject to payment of license fee as a percentage of AGR and spectrum usage charges (SUC). These arrangements are commercial and do not fall within the scope of essential facilities, however, they do improve business efficiency. The additional

---

<sup>65</sup> ITU News (2018, February 20). "India's experience in passive network infrastructure sharing." *ITU News*, available at: <https://news.itu.int/indias-experience-in-passive-network-infrastructure-sharing/> (last accessed on May 11, 2020).

<sup>66</sup> Ram, Jayant Raghu (2017, April). When Sharing isn't always Caring: Understanding Telecom Infrastructure Sharing in the Multilateral Context, Centre for WTO Studies Working Paper No. WP/CWS/200/38, available at: <http://wtocentre.iift.ac.in/workingpaper/Working%20Paper%2038.pdf> (last accessed on May 11, 2020).

<sup>67</sup> DOT (2017). *Annual Report 2016-17*. Department of Telecommunications, available at: <https://dot.gov.in/sites/default/files/Annual%20Report%202016-17.pdf> (last accessed on May 11, 2020).

costs related to sharing discouraged its take off in India. The need to encourage active infrastructure sharing with minimal regulatory hurdles was highlighted by stakeholders as a means to provide last-mile connectivity.

55. Sharing of active infrastructure and roaming is permitted only under the Unified License, Cellular Mobile Telephone Service License, and the UAS License. Consequently, ISPs have been unable to venture into such sharing arrangements.<sup>68</sup> In 2017, the telecom regulator proposed to amend the terms of the ISP license to allow sharing of active infrastructure. It was felt this would encourage the growth of Wi-Fi infrastructure, easing congestion on mobile networks in high density public areas and also enhance internet penetration in rural areas.
56. The telecom regulator has also recommended setting up of Public Data Offices (PDOs) to provide public Wi-Fi services.<sup>69</sup> During consultations, it was pointed out that by setting up of public Wi-Fi hotspots, reducing import duty on Wi-Fi equipment, enabling infrastructure sharing and authentication of users through the e-KYC process, the cost of providing internet through Wi-Fi can be reduced to 2 paise per MB as opposed to approximately 23 paise per MB using mobile networks. The model so proposed enables users to buy data for small denominations as per their needs, somewhat similar to yesteryear's PCOs or *chota* (small) recharge which brought in mobile revolution in India. In addition to significantly reducing capital and revenue expenditure, it would also lower barriers to entering the market.

## **G. The Argument for Same Service Same Rule**

57. Telecom Service Providers initial reaction to the rapid success of OTT communication services was to demand a regulatory level playing field, TRAI began public consultations the 'Regulation of OTT Players' in 2015 and subsequently in 2018, but the consultations have not concluded in recommendations.<sup>70</sup> Even though the consultations began as an issue of 'financial

---

<sup>68</sup> TRAI (2017, March 9). Recommendations on Proliferation of Broadband through Public Wi-Fi Networks, available at: [https://www.trai.gov.in/sites/default/files/WiFi\\_Recommendation\\_09032017.pdf](https://www.trai.gov.in/sites/default/files/WiFi_Recommendation_09032017.pdf) (last accessed on May 11, 2020).

<sup>69</sup> FE Bureau (2017, March 10). "To give Internet Penetration in Rural Areas a Boost, TRAI wants Wi-Fi hotspots, Sharing of Infrastructure, eKYC-cleared IDs." *The Financial Express*, available at: <https://www.financialexpress.com/economy/trai-recommends-wi-fi-hotspots-sharing-of-infra/581457/> (last accessed on May 11, 2020).

<sup>70</sup> Abbas, Muntazir (2020, January 30). "Regulating OTT Players Complicated: TRAI." *The Economic Times*, available at: <https://economictimes.indiatimes.com/industry/telecom/telecom-policy/regulating-ott-players-complicated-trai/articleshow/73759307.cms> (last accessed on Jul 5, 2020)

arbitrage' the focus has now shifted to security and lawful interception since the regulator is of the view that the issue is beyond mere financial arbitrage.<sup>71</sup>

58. The delivery of OTT services is dependent on the availability of telecom infrastructure. On the one hand, OTT services that substitute for traditional SMS and voice create revenue pressure, but on the other hand, their existence expands the market for operators and increases data revenue. OTT services provide a wide range of functionalities that go beyond communication. Companies such as WhatsApp, Amazon Prime, Netflix, are not required to pay any fee to the government for any of the services they offer. Over time the relationship between telcos and OTT players has become symbiotic and pro-competitive. For instance, in the United States, Verizon is currently offering the Disney+ streaming service for 12 months to its 'Unlimited' or '5G Home Service' customers.<sup>72</sup> Similarly, HBO's Max streaming service is being offered by AT&T to all of its premium wireless customers and its top-tier home broadband subscribers at no additional cost.<sup>73</sup>
59. On balance experts feel a separate regulatory framework is not necessary for OTTs and excessive regulation may stifle technological innovation, and therefore be counterproductive. While TSPs can develop their own OTT services and content, OTT service providers did not have the flexibility to build infrastructure or deploy networks. At the same time, TSPs pay a license fee on all revenue, including revenues earned through in-house content apps, whereas OTT companies such as WhatsApp, Amazon Prime, Netflix, are not required to pay any part of their revenue to the government to stream content.

---

<sup>71</sup> *Ibid.*

<sup>72</sup> <https://www.verizon.com/solutions-and-services/disneyplus/> (last accessed on Jul 5, 2020).

<sup>73</sup> <https://www.att.com/hbo-max/> (last accessed on Jul 5, 2020).

## CHAPTER 4

### SUMMARY OF OBSERVATIONS

60. The analysis in Chapters 2 and 3 reflects the rapid transformation of the industry both in terms of market structure and technology. Consumer preferences have also evolved as data-rich content has replaced the voice dominated telecom market. The dynamic nature of the industry and constantly evolving business interactions between and across industries have led to new competition issues. Technology-led convergence has made services less distinguishable, raising new challenges in defining relevant markets and establishing a level playing field. With the rule of three to prevail for maintaining competition in the industry (in light of the current financial distress that the industry faces), any exit would mean a virtual duopoly. In the long-term interest of competition and to reap spillover benefits that telecom affords for other sectors, survival is necessary. A strong and competitive sector augurs well for the deployment of new technology such as 5G, a weak sector will dull the incentives to innovate and compete.

#### A. Summary of Competition Issues

61. **Parameters of Competition:** Tariffs have been the centre-piece of competition in the price-sensitive Indian market. Episodes of intense price wars have been witnessed and there might be a recognition now that the intense recent tariff war that began in 2016 has eroded the sector of its financial stability. Almost all stakeholders agreed that remaining the cheapest telecom market in the world would be an untenable option for the sector going forward. While the consultation on floor prices is still underway, operators have moved up tariffs by almost 40 per cent from the unsustainable levels of 2017-18 and 2018-19. With data at the centre of the industry, smartphones have become multi-utility devices offering a range of services including voice, video, chat, social media, banking, entertainment, etc. The consumer survey confirms this shift in user behaviour. Therefore, non-price factors such as QoS, data speeds and bundled offerings are likely to be the new drivers of competitive rivalry between service providers in addition to *just* price. The report envisages that a pan-India mobile network and data packages are no longer the product or service differentiators, rather bundled offerings (which include, *inter alia*, voice, data, SMS, and content) will be the focus of differentiation among service providers with service bouquets to be the likely choice for improving customer retention.

62. **Net Neutrality:** As data loaded bundled offerings become the industry norm, adherence to net-neutrality principles will be instrumental in ensuring healthy competition. According to existing TRAI regulations, TSPs are forbidden from discriminating on the basis of content, sender or receiver, protocols or user equipment based on prior arrangements, by slowing down one application or providing fast lanes to another.
63. The principles of net neutrality are also going to gain prominence as technology convergence drives further integration across the value chain. Telecom operators are investing in digital content companies, digital payments platforms, and social media firms and *vice versa*, which may lead to a preference for their own content or network. However, most stakeholders in India currently view these partnerships as a 'win-win' situation for operators, companies as well as consumers. They did not anticipate any imminent threat of vertical consolidation on the competition. OTT companies clarified that these relationships have proven to be mutually beneficial since net-neutrality regulations in India prevent discriminatory treatment. From a competition standpoint, there is a parallel to the principle of search neutrality that bars search engines from promoting their own business in response to queries. The CCI has to be vigilant that such vertically integrated infrastructure providers do not indulge in actions that could or have the potential to foreclose entry in the application layer. If any conflict of interest arises because of such agreements, it could be looked at by the CCI on a case by case basis under the Competition Act, 2002.
64. **Traffic Management:** Network capacity management is a key challenge for operators with the rapidly mounting burden of rich content. According to existing practice, public peering in India is permitted with the National Internet Exchange of India (NIXI) at a fixed charge. Private peering is based on bilateral negotiations. The terms of the agreement are confidential and not available publicly. While stakeholders did not see this as an area of concern there have been instances of companies discriminating between internet traffic depending on whether they have a peering arrangement with a company. Experts recommend that peering arrangements be made more transparent without compromising forbearance in commercial terms and conditions.
65. **Infrastructure Sharing:** Sharing has become a preferred option among operators to optimise infrastructure utilisation. Passive infrastructure (e.g. non-electronic infrastructure at cell sites) can be created and shared by infrastructure providers through IP-1 registrations on a non-discriminatory basis as per the requirement built into their registration certificates. Feedback received from the

industry points towards healthy competition in the passive infrastructure segment. However, active infrastructure sharing though permitted needs to be incentivised. Policy enabling active infrastructure sharing under a light-touch regulatory framework may have the desirable effect. In certain service segments, some ISPs are still to be granted infrastructure sharing provisions under their license. As recommended by the telecom regulator, infrastructure sharing will enable the creation of Wi-Fi hotspots, an excellent substitute to decongest mobile networks.

66. **Unbundling Infrastructure and Service:** Infrastructure utilisation can also be optimised through unbundling of network components. Almost all sector experts were of the view that infrastructure, network, service and application layers must be completely segregated to induce competition within the market. Unbundling would allow telcos to reduce their costs by outsourcing specific services to independent license holders. This will also increase competition within each layer. Experts suggest that this unbundling will become inevitable with the launch of 5G, with a huge potential to hive off specific parts of the license and sell them as a separate service – for instance, “network-as-a service” would be a market unto itself as would be the service layer. The application layer can continue to be governed through light-touch regulation.
67. **Spectrum Acquisition:** With regard to spectrum, India has evolved towards a market-based approach (through licensed auction), though other regimes such as command and control models (e.g. assignment of bands for public service use) as well as generic licensing or common use models (i.e. any user can access the band provided that and for as long as the user complies with the technical specifications set out in the generic license) continue to prevail in other countries. Since 2010, the Department of Telecommunication has applied the auction-based method for spectrum allocation. Over the six auctions held during the period 2010 to 2016, the Government has auctioned only subsets of the total frequencies and the average reserve price in every subsequent auction has witnessed an upward revision. In the upcoming auctions, the regulator has proposed a steep cut in the reserve price of the 700 MHz band, which saw no demand in the previous auctions and has also recommended making the entire spectrum available for auctions.<sup>74</sup> Spectrum ownership creates a competitive advantage for operators providing wireless access services and access to a larger quantum of the contiguous spectrum can increase operational efficiency. With the average spectrum holding for an Indian operator lower (31 MHz) than the global average of 50 MHz, the

---

<sup>74</sup> Business Today (2018, September 19). “TRAI proposes steep price cuts for next spectrum auction, proposes new 5G band,” <https://www.businesstoday.in/sectors/telecom/trai-5g-spectrum-auction-price-cut-telecom-operators/story/280896.html>

battered financial health will continue to impact operators' ability to acquire new spectrum and the subsequent launch of 5G in India.

68. **Vertical Integration (M&A):** Industry experts are of the view that competition assessment of merged/ integrated entities in multi-sided markets must consider the 'combined data power' of the new entity in establishing dominance. Given network effects, access to data has the potential to become a significant barrier to entry. Incipient claims that digital data can be an essential facility have been enunciated, if for nothing else, to show the significance that data is likely to command in the future.<sup>75</sup> Big firms could for example utilise data from one service to undermine rivals in another related service and therefore combined data share should also be one of the factors while ascertaining the dominant position of the merged entities.<sup>76</sup> A note of caution is however appropriate. Data is not homogeneous and the ability to use it to distort competition is likely to be contextual. The guidelines on competition assessment in such instances are still evolving. Most platforms can effectively act as gatekeepers, and can influence and potentially enter multiple markets by attracting online customers. The market power of the combined data share can result in entry barriers for potential entrants and also harm the incumbents present in the digital markets as they may not be able to match the combined data thereby providing it with opportunities to advantage their own related businesses. While, it may be true that, such vertical integration can lead to efficiencies that can further enhance networks effects, it is also undeniable that such network effects can also lead to increased switching costs, and new players may be deterred from entering the market. Hence, the CCI would need to examine whether the collection of 'excessive' amount of data can be anti-competitive and thus warrant such conducts to be scrutinised on a case by case basis.
69. The new business models that are based on vertical convergence in the telecom industry will necessitate the application of competition tools developed for multi-sided markets. These platforms due to network effects and demand-side efficiencies tend to be naturally large. Size, therefore, ceases to be a sufficient condition for antitrust action. Another peculiar feature of platforms is that acquisition of data has become an important factor of competition. Though the global jurisprudence is still evolving in addressing the concerns arising out of new age digital markets, the Competition Act, 2002 is robust enough in dealing with such challenges through in-built flexibilities in the Statute. Countries such as the

---

<sup>75</sup> Graef, I. (2016). "Data as an Essential Facility: Competition and Innovation on Online Platforms." *Kluwer Law International*, Vol. 68, International Competition Law Series.

<sup>76</sup> Khan, Lina M. (2017, January). "Amazon's Antitrust Paradox." *The Yale Law Journal*, 126 (3): 564-907, available at: <https://www.yalelawjournal.org/note/amazons-antitrust-paradox> (last accessed on May 4, 2020).



UK and the EU are exploring *ex-ante* regulation of online platforms having significant market power, recognising the limitations of traditional antitrust tools to assess anti-competitive practices by digital markets.<sup>77</sup> The European Commission has acknowledged the need to develop appropriate *ex-ante* tools to intervene even before an infringement takes place, i.e. set out clear rules about what dominant platforms can do and what they cannot. It is likely to explore *ex-ante* rules for large platforms with significant network effects.<sup>78</sup> Examples of *ex-ante* antitrust tools would include platform access, data portability, data sharing and non-discriminatory ranking.<sup>79</sup> However, these potential tools should be proportionate in nature to avoid stifling of innovation in the market. A balance must be struck between *ex-ante* regulation and what could be addressed by ex-post enforcement.

70. **Data Privacy and Competition:** Another aspect of data in the context of competition in digital communications market is the conflict between allowing access and protecting consumer privacy. Privacy can take the form of non-price competition. In the era of data aggregation, competition analysis must also focus on the extent to which a consumer can 'freely consent' to action by a dominant player. Abuse of dominance can take the form of lowering the privacy protection and therefore fall within the ambit of antitrust as low privacy standard implies lack of consumer welfare. Privacy degradation can lead to an objective detriment to consumers. Lower data protection can also lead to the standard legal category of exclusionary behaviour which undermines the competitive process. Tying with other digital products will further strengthen the data advantage enjoyed by the dominant incumbent by cross-linking the data collected across services, creating a vicious circle. Thus, anti-trust law framework is broad enough to address the exploitative and exclusionary behaviour arising out of privacy standards, of entities commanding market power. No doubt, there is a school of thought, which construes privacy as fundamentally a consumer protection issue.

71. Japan has finalised guidelines, which state that any use of personal information, including users' purchase history and location, without their consent would

---

<sup>77</sup> Deutscher, Elias (2019, April 24). "Is Furman Right to Propose Ex-ante Platform Regulation as the best way to Address Competition Concerns in the Digital Economy?" *Competition Policy Blog*, Centre for Competition Policy, University of East Anglia, available at: <https://competitionpolicy.wordpress.com/2019/04/24/is-furman-right-to-propose-ex-ante-platform-regulation-as-the-best-way-to-address-competition-concerns-in-the-digital-economy/> (last accessed on May 11, 2020).

<sup>78</sup> Höppner, Thomas (2020, March 9). "Digital Upgrade of German Antitrust Law - Blueprint for Regulating Systemic Platforms in Europe and Beyond?" *Hausfeld*, available at: <https://www.hausfeld.com/news-press/digital-upgrade-of-german-antitrust-law-blueprint-for-regulating-systemic-platforms-in-europe-and-beyond> (last accessed on May 11, 2020).

<sup>79</sup> Sanden, Mariska van de and Beetstra, Tialda (2019, December 2). "Digitalisation, Online Platforms and Competition law: An Overview of Regulatory Developments in the Netherlands." *Kluwer Competition Law Blog*, available at: [http://competitionlawblog.kluwercompetitionlaw.com/2019/12/02/digitalisation-online-platforms-and-competition-law-an-overview-of-regulatory-developments-in-the-netherlands-2019/?doing\\_wp\\_cron=1593088685.2200210094451904296875](http://competitionlawblog.kluwercompetitionlaw.com/2019/12/02/digitalisation-online-platforms-and-competition-law-an-overview-of-regulatory-developments-in-the-netherlands-2019/?doing_wp_cron=1593088685.2200210094451904296875) (last accessed on Jun 25, 2020).

constitute an “abuse of a superior bargaining position,” a violation specified under Japan’s Anti-Monopoly Act.<sup>80</sup> India is still to legislate on a domestic Data Protection Law. However, as pointed out, the existing antitrust tools can address the competition issues arising out of privacy standards. India is at a critical stage in its digital evolution, and for India to realise its stated digital ambitions,<sup>81</sup> it is vital to lay the foundations for a strong and competitive telecommunications sector.

72. Telecommunications industry has evolved from being a rudimentary voice service to being a complex data-centric converged service. Going forward, formal and informal lines of communication between DoT, TRAI, CCI and the envisaged Data Protection Authority will be important to ensure that regulatory decisions are robust and consistent. There could be potential abuse of dominance cases, which might also involve a breach of data protection rules. While overlapping jurisdiction between institutions cannot be completely eliminated, it ought to be harmonised through better regulatory design and improved lines of communication. The inter-regulatory consultation mechanism as provided in Sections 21 and 21A of the Competition Act, 2002 allows for formal lines of communication between the CCI and other relevant regulators, which going forward will be extremely important. The CCI will remain the body to resolve antitrust and competition related issues.

---

<sup>80</sup> JFTC (2019, December 17). Guidelines Concerning Abuse of a Superior Bargaining Position under the Antimonopoly Act on the Transactions between Digital Platformer Operators and Consumers that provide Personal Information, etc. (the Draft Guidelines) (Translation). Japan Fair Trade Commission (JFTC), available at: <https://www.jftc.go.jp/en/pressreleases/yearly-2019/December/191217DPconsumerGL.pdf> (last accessed on July 5, 2020).

<sup>81</sup> India’s Trillion-Dollar Digital Opportunity. Ministry of Electronics and Information Technology (MeitY), Government of India. [https://www.meity.gov.in/writereaddata/files/india\\_trillion-dollar\\_digital\\_opportunity.pdf](https://www.meity.gov.in/writereaddata/files/india_trillion-dollar_digital_opportunity.pdf)