Telecom Sector Skill Council

OVERVIEW : INDIAN TELECOM MARKET 2022-23

“India is emerging as one of the most preferred destination for mobile manufacturing. Let us work together to make India a Global hub for Telecom equipment manufacturing, design and development.”

“Deepening connectivity, improving prosperity. Cabinet decision pertaining to a PLI Scheme for the telecom sector will make India a telecom manufacturing hub and generate opportunities for our youth.”

Shri Narendra Modi
Indian Prime Minister

“We should ensure that our workforce is formally skilled and certified under the Skill India Mission. Skilling and Reskilling are playing an important role in helping youth adapt to new opportunities post Covid.”

Shri Dharmendra Pradhan
Minister of Education of India

From the Governing Body's desk

Mr. Akhil Gupta
President, TSSC
Vice Chairman, Bharti Enterprises

The Telecom Sector functioned as the backbone of global economies during COVID crisis. There is unanimity that Telecom will support future generations through its robust infrastructure and innovation-driven approach, since all technological developments and offerings have to necessarily ride on telecom networks giving high capacities and speeds. The growth of all nations is linked directly to the growth of the Telecom Sector and Telecom Sector Skill Council strives to provide the best-in-class skill training to fulfill the needs for digitization of the country and thereby inclusive growth – not just for India but over time across the globe.

Mr. P Balaji
Vice-President, TSSC
Chief Regulatory & Corporate Affairs Officer

The Indian Telecommunications Industry is one of the most rapidly growing sectors in global economy and is poised to develop exponentially with the adoption of 5G and other emergent technologies. One of the key growth drivers for any sector is a skilled frontline workforce that can evolve with the evolving technological landscape and the coming years will see remarkable breakthroughs in service quality and efficiency underlined by this factor. TSSC continues to ensure this demand by bridging the gap between industry and academia.

Mr. Pankaj Mohindroo
Secretary, TSSC
Chairman, India Cellular & Electronics Association (ICEA)

The Telecom industry continues to provide excellent support to the Indian economy through its multiple segments like network solutions, passive infrastructure, handset manufacturing and service providers. Solutions for both single and business users are implemented through these various arms of the sector working synergistically with each other. To drive the growing demands for cutting edge technologies like edge computing and government initiatives like the PLI scheme, we need to keep up with the frontline worker demand and adequately upskill them. TSSC strives to fulfil this requirement through its meticulous work ethic and established track record of providing the highest level of skill training for the youth of our nation.

Mr. Tilak Raj Dua
Treasurer, TSSC
Director General, Digital Infrastructure Providers Association (DIPA)

The Telecom sector continues to be the pillar of support and foundation to the many tele-enabled services launched to effectively tackle the needs of our nation. The new policies laid down by the government to promote in-house innovation in the manufacturing of Telecommunication equipment is the next step in the growth of the Indian Telecom industry. The increase in support infrastructural will lead to increased demand for a skilled workforce in the future. Within the next few years, India is poised to become a Telecommunication superpower and TSSC helps to cater to the needs of the Telecom Sector

“

Skill is the unified force of experience,
intellect and passion in their operation”

From the CEO's desk

We have come a long way since the beginning of the pandemic. The world has never seen economic and socio-cultural disruption at this scale. We were really challenged to our limits in all aspects of our existence. India was not only a leader in saving lives but also in helping maintain global functionality for business and commerce. The telecom industry was brought to the forefront through its rigorous application throughout the pandemic.

As early as the first few months of 2020, telecom was contributing to every sector as a process facilitator. Solutions driven by innovation in our sector were key in bringing about a positive impact in picking ourselves back up from the effects of the lockdown.

As companies started to realise the importance of business consistency, digital adoption skyrocketed across all sectors. This was accompanied by foreign interest in India's telecom sector with major international tech firms announcing strategic partnerships with Indian companies and invested heavily in our telecom industry's future. The next phase of our growth will be influenced by two key factors.

The first are key government initiatives towards the growth of telecom and allied sectors. The recent PLI schemes announced by the government focused on increasing India's manufacturing capability coupled with companies shifting base to India from other countries. This will mean a tremendous boost in indigenous supply of components. Additionally initiatives like the national broadband initiative and the national digital policy will lead to telecom becoming the cornerstone of India's future.

The second factor is adoption of emergent technologies like 5G, AI, Big Data, Drone technology among others. To leverage the increasing use of these technologies, we will need to scale up our frontline worker potential through upskilling. This will increase requirement of higher level of skill development through concepts like centres of excellence

As we get better in uplifting ourselves from the current situation, we can surely bank upon telecom to be the north star to guide us to new heights.

Mr. Arvind Bali

CEO

Telecom Sector Skill Council

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“The telecom industry reaches into every corner of our economies, societies, and private lives, and it is one of the greatest drivers of economic growth and human equality the world has ever seen.”

Executive Summary

The telecommunications sector in India contributes tremendously to the overall functioning and growth of the nation. Serving as a backbone to the economy, its presence in our lives has been bolstered by the sharp increase in digital adoption across India. It has led to the creation of subcategories that are thriving due to telecom. We are seeing a rise in the adoption of new-age technologies like 5G, IoT, M2M communication, drone technology, big data, cloud computing, ML/AI, and robotics that are growing on the bedrock of telecom.

The government has also provided the impetus for this growth through its various schemes and policies that have been launched in the past 5 years. The BharatNet project was one of the key highlights aimed at providing fiber connectivity to 2.5 lac gram panchayats across the country. The PLI scheme on the other hand aimed at boosting the domestic electronics manufacturing market with a promise of 2 lac additional jobs. This report aggregates the demand observed through careful analysis of facts and information from news articles, reports, and industry survey data.

Communication technology is growing at a staggering pace in India. Over the last two years, we have witnessed an unprecedented rise in the number of users in the digital domain. India currently has close to 80.16 crore broadband subscribers with 2.44 crore wireline and 77.72 crore wireless subscribers. The share of rural subscribers has grown from 42.14% in Nov 2015 to 44.58% in Nov 2021 indicating an emergent market for digital India. The BharatNet Project with last-mile connectivity to a total of 7 lac Wi-Fi hotspots will cover all 6.25 lac villages of India by adding 2 to 5 Wi-Fi hotspots per gram panchayat and a minimum of one Wi-Fi hotspot per village, have been created by connecting high-speed 4G base tower stations of commercial telecom operators to BharatNet.

Under the mission, the government plans to lay incremental 30 lakh route km of Optical Fiber Cable, while also increasing tower density from 0.42 to 1 tower per thousand of the population by 2024. Since 2019, there has been a 20.2% growth in the number of towers. To grow from 7.02 lac towers to 11.2 lac would mean an addition of 4.18 lac towers in two years. This means in the passive infrastructure segment, there are as many as 92,000 jobs to install, operate and maintain infrastructure.

Another booming segment in ICT is the handheld devices market. India's smartphone market revenue crossed $38 billion in 2021 with 27 percent (on-year) growth, as shipments grew 11 percent to reach 169 million units. we have 116 crore mobile connections, 70 crore internet users, and 60 crore smartphones, which are increasing by 2.5 crores per quarter. There are as many as 14.33 lac jobs in the handset. Additionally, the Production Linked incentive scheme is expected to add 2 lacs more jobs to the current workforce. The service segment relies heavily on BPOs for CRM and front desk roles. Additionally, there are sales roles that are increasing with the adoption of digital and an increase in subscribers. There are as many as 4.72 lac jobs in this segment.

Apart from this demand, there is future demand in the form of growing new technologies. India is now focusing on roles for drone technology, robotic automation via machine-to-machine communications, Machine Learning/Artificial Intelligence, cloud computing, cyber security, and 5G have the potential to transform not only the telecom sector but also to help create new business and investment opportunities. Given the advancements of the telecom sector, the government is driving the empowerment of skilled labor with the goal that telecom can serve as an efficient and effective mediator for all other sectors. Without a doubt, given the significance of the ICT sector for the actual working of the economy and the size of labor needed, it becomes fundamental that the telecom jobs are focused on among central and state government skilling plans

Telecom Sector
An Overview

Telecom – At a Glance

- PLI Schemes under Atmanirbhar Bharat Abhiyan

  Production Linked Incentive schemes worth INR 12,195 cr for manufacturing of telecom and networking products

- BharatNet Project

  Optical fiber cables laid to 178,247-gram panchayats, out of which 161,870 are service ready.

- Growing Demand

  Nominal per capita income recorded a CAGR of 10.4% during 2012-17

- Telecom Sector Reforms

  In 2021, large scale structural and procedural reforms have been brought in to enhance financial crunches in the sector

- Digital India Programme

  India is the 2nd fastest Digitizing Economy Globally

- Digital India Programme

  AI & New age tech to boost annual growth rate of India by 1.3% by 2035 (NITI Aayog white Paper)

- Increased equipment revenues

  268 mobile and components manufacturing units set up across the country

- Make in India

  The government announced Phased Manufacturing Program (PMP) to promote domestic production of mobile handsets

- PM WANI

  Provision of public Wi-Fi service through public data offices spread across India to accelerate broadband services

The Telecom industry in India is the second largest in the world with a subscriber base of 1.18 bn as of December 2021 (wireless + wireline subscribers). India has an overall tele-density of 85.91%, of which, the tele-density of the rural market, which is largely untapped, stands at 58.50% while the tele-density of the urban market is 137.26%. The industry's exponential growth over the last few years is primarily driven by affordable tariffs, wider availability, roll-out of Mobile Number Portability (MNP), expanding 3G and 4G coverage, evolving consumption patterns of subscribers and a conducive regulatory environment.

The Government has emphasized and undertaken initiatives for bolstering India's domestic telecom manufacturing capacity. Efforts are also underway to soon develop a foundational network for 5G technology deployment in India.

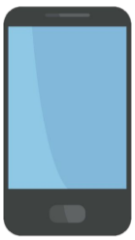
The Telecom sector is the 3rd largest sector in terms of Foreign Direct Investment (FDI) inflows, contributing 7% of total FDI inflow

Digital India is expected to create $1.3T business opportunity by 2025

Number of internet users in India is expected to reach 900 Mn by 2025

410 mn additional smartphone users are expected in India by 2025

100 Smart cities



Highest Subscribers in the world

765 Million

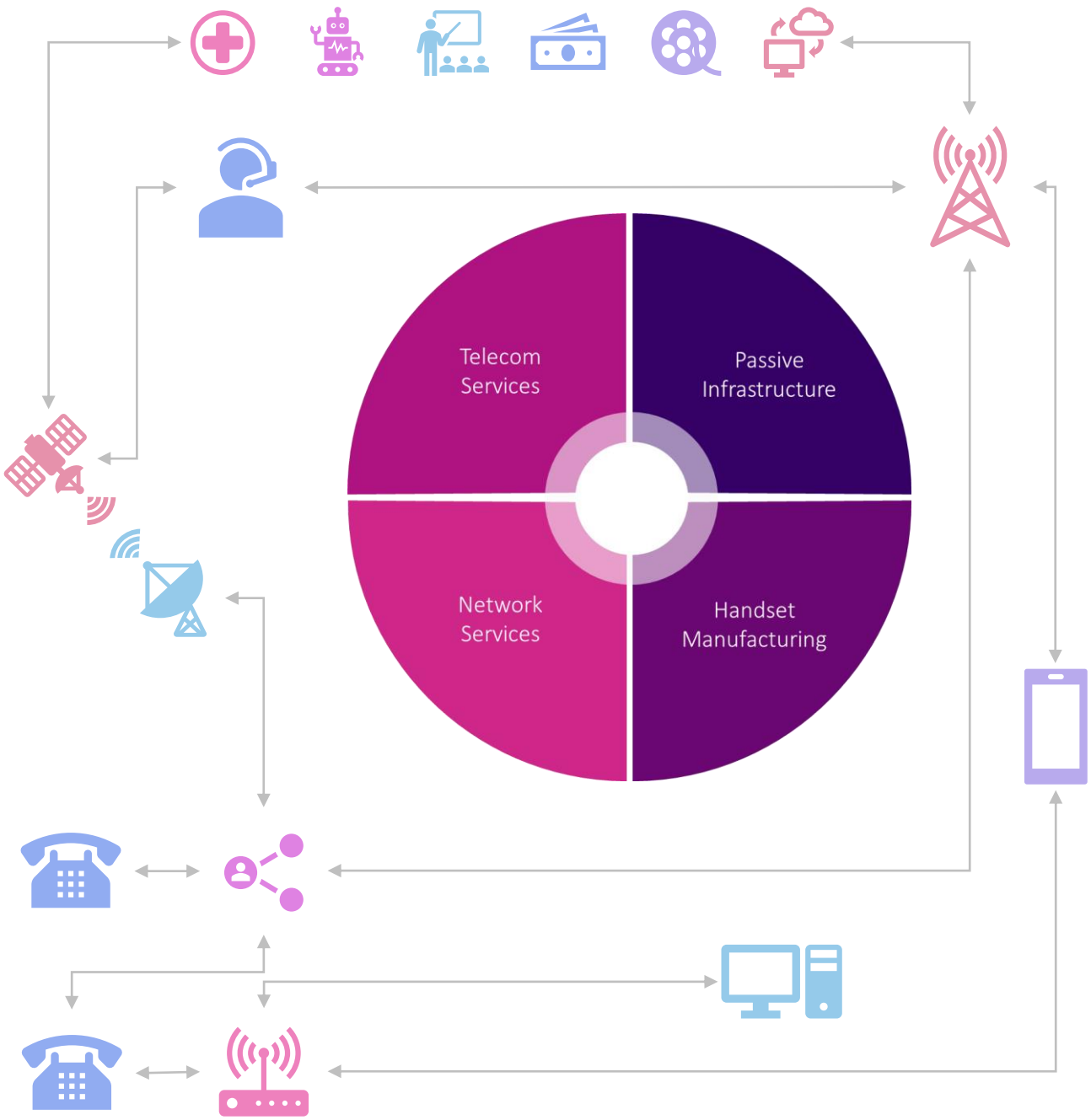
Highest Data Usage per user

17 GB/month

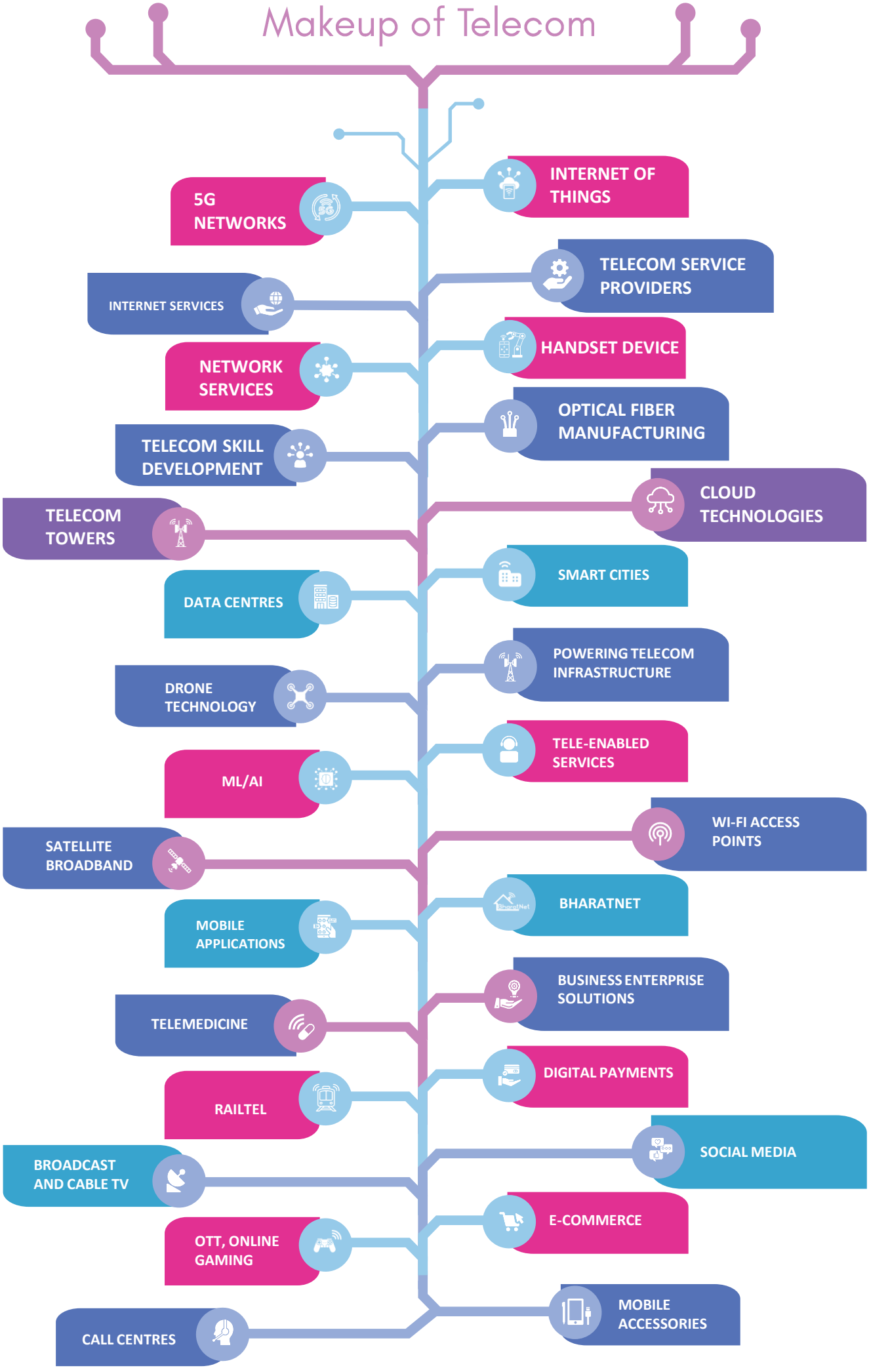
25 GB/month (by 2025)

Telecom Sector Segments

The telecom sector can broadly be divided into four sub-segment. These are classified on the basis of contribution towards the sector and mode of execution.



Makeup of Telecom

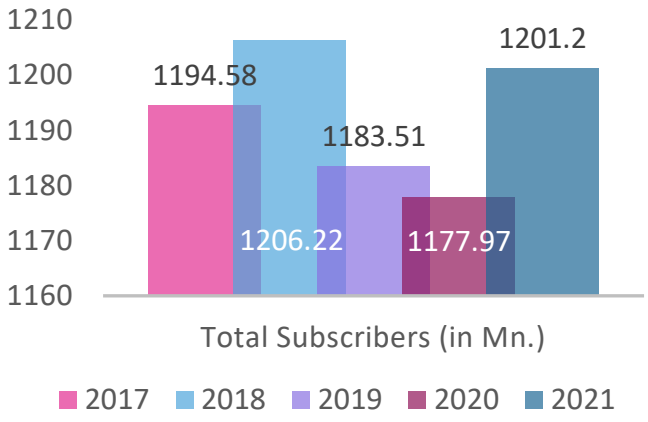


What is the scenario

Effects of COVID-19 on Telecom

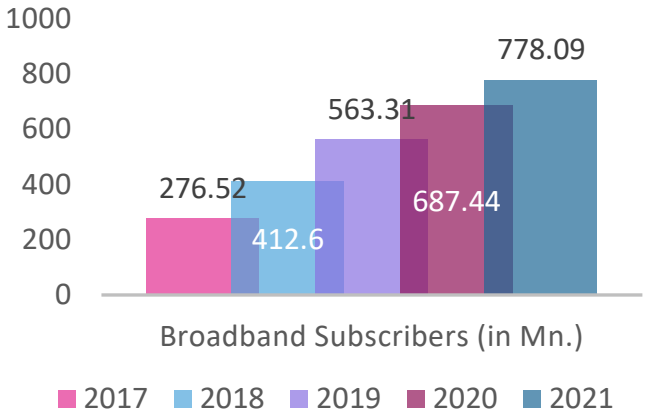
The sudden imposition of a national lockdown due to the COVID-19 pandemic resulted in disruption at both a social and professional level. The lockdown caused setbacks across all segments by overloading the service sector manpower. At this time of crisis, the telecom sector was instrumental in helping helped level the playing field by providing its services to a large gamut of industries. Video-conferencing solutions were used by medial staff for remote treatment, schools and other educational infrastructures for e-learning, businesses for virtual meetings and conferences and the general populous for staying connected with their loved ones. This naturally meant that the usage of data saw a manyfold increase. Where once data usage was high in commercial areas, the work-from-home era saw residential usage sky-rocket. This included online shopping, entertainment platforms like YouTube, Netflix and Amazon Prime, video-conferencing and mobile gaming. The telecom sector was enabling the nation's economy. All-in-all an estimated 35-40% of the GDP was being supported by the telecom industry.

CAGR – 0.11%



When we look at the key parameters in the sector, we have seen a steady rise in the number of users over the years. India has the second largest number of telephone connections in the world. At a total of 1201.20 million connections as of 31st March 2021. ~56.9% of the population uses the internet with the majority using mobile broadband via 2G, 3G and 4G services. The average data traffic per smartphone rose from 13GB per month in 2019 to 14.6 GB in 2020 and current quarterly wireless consumption of data stands at around 34,568 PB. The total mobile traffic was 9.5 exabytes per month and is expected to reach 41 exabytes per month. The telecom sector in India in 2021 is anticipating a robust growth based on an increase in tariff pricing, demand for data, growing number of mobile users and the launch of 5G services. The number of smartphone subscriptions was 81 crore in 2020 and is expected to grow at a CAGR of 7 percent, reaching over 1.2 billion by 2026. Smartphone subscriptions made up 72 percent of our total mobile subscriptions last year and will likely make up over 98 percent in 2026, owing to rapid smartphone adoption across the nation.

CAGR – 22.99%



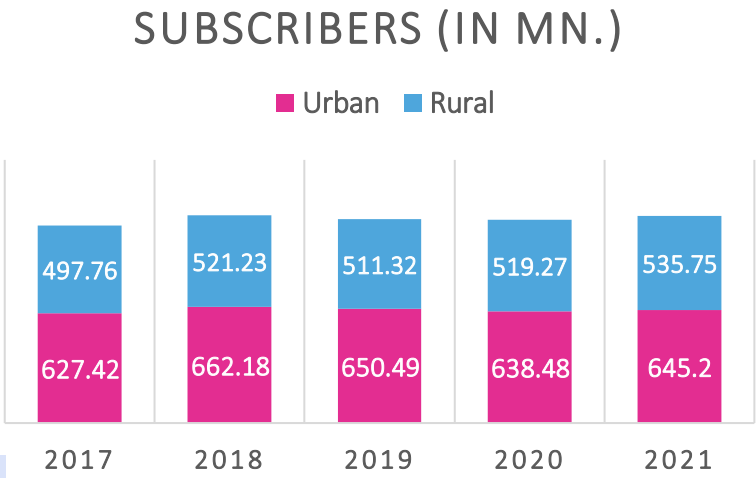
India 2021 – Statistics

- 119.1 crore telephone subscribers as of November 2021 with rural subscribers jump from 52.6 crore last November to 53.09 crore in November 2021 showing a 0.5% growth rate.
- 80.16 crore broadband subscribers with rural broadband penetration increasing through BBNL and govt. flagship program.
- GDP contribution ~ 6.5%
- Data usage monthly average up from 12 GB/person in 2019 to 13.5 GB. May touch 25 GB (reports by Ericsson)

Sector Overview

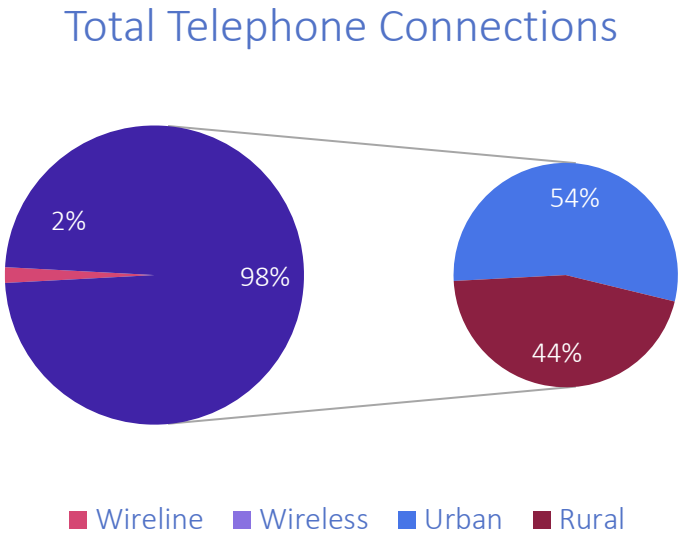
The **telecom tower industry** continues to be a pivotal force in aiding the connectivity revolution. India boasted 400,000[3] telecom towers in 2015. Between 2007 and 2020, the number of towers grew to over double at a CAGR of 7.1% to reach a total of 636,300 with around 2,254,658 total BTS and currently stands at 7,02,641 according to DoT. As data consumption grows and the imminent launch of 5G technology takes center stage, the next decade holds exciting new prospects for infrastructure providers. New opportunities arise for tower companies shifting their attention from a macro tower focused business, towards new business models hinged on fiber, Wi-Fi, Data Centers, smart cities, small cells and beyond. Optical Fiber deployment curve is expected to increase 1.9x touching 28 lac cable kilometers expected in 2023. Outdoor small cell deployment is also slated to reach ~250,000 by 2023 showcasing another exciting opportunity.

The **telecom equipment manufacturing sector** was an instrumental part of the governments mandate to attract FDI from big players on the global market this past year. As import restrictions were placed on telecom equipment, the government encouraged the production of network equipment's locally through a series of incentive schemes for the ICT domain. This of course underlines the shift towards self-reliance or 'Atma-Nirbharta", a key objective of the current government. The government pushed for 100% local sourcing of equipment as early last June to encourage global telecom network manufacturers like Ericsson, Nokia, Samsung, Huawei, etc.. to increase equipment manufacturing in India.[5] Reliance Jio has already developed its own 5G technology inline with the national agenda. Airtel has also claimed to be closely working with equipment manufacturers to produce locally.



Gross revenue of the telecom sector stood at Rs. 64,801 crore (US$ 8.74 billion) in the first quarter of FY22.

Over the next five years, rise in mobile-phone penetration and decline in data costs will add 500 million new internet users in India, creating opportunities for new businesses.



The **India smartphone market** in 2020 sold 15 crore units, a 1.7% YoY decline, since 2017. Work-from-home mandates, remote work, online education, movement restrictions, and manufacturing shutdowns mere the main cause particularly impacting 2020. However, the rebound of the smartphone market in the latter half of 2020 underscores the importance of devices in our day-to-day lives. Despite uncertainty around the launch of 5G services, the shipment of 5G-enabled smartphones crossed 30 lac in 2020.[6]

India emerged as the largest feature phone market in the fourth quarter of 2020 with 38 per cent of the global feature phone shipments. In addition to this, the handset service and repair segment is becoming increasingly organized, with firms investing in setting up after-sales service centres. If we factor in the 'Make in India' initiative, the ICT manufacturing sector in India is about to see a tremendous boom. Companies like Apple Inc. have already begun the process of establishing production lines in India in multiple locations. Contract manufacturers such as Foxconn, Pegatron and Wistron are all well set in the Indian Environment.

> "During the 1st wave, we saw 30-35% of the GDP being enabled by telecommunications in the lockdown out of over 54% of the total services sector contribution."

India at a Glance

Andaman and Nicobar Islands

Population: 4,17,036

Tele density: -

Subscriber Base: 8,74,84,970

Andhra Pradesh

Population: 5,39,03,393

Tele density: 99.56 %

Subscriber Base: 9,01,43,027

Arunachal Pradesh

Population: 15,70,458

Tele density: 81.11 %

Subscriber Base: 8,74,84,970

Assam

Population: 3,56,07,039

Tele density: 70.86 %

Subscriber Base: 2,48,51,659

Bihar

Population: 12,47,99,926

Tele density: 53.61 %

Subscriber Base: 8,67,06,990

Chandigarh

Population: 11,58,473

Tele density: -

Subscriber Base: 8,74,84,970

Chhattisgarh

Population: 2,94,36,231

Tele density: Included in MP

Subscriber Base: 8,74,84,970

Dadra & Nagar Haveli and Daman & Diu

Population: 6,15,724

Tele density: -

Subscriber Base: 8,74,84,970

Delhi

Population: 1,87,10,922

Tele density: 281.25 %

Subscriber Base: 5,79,48,064

Goa

Population: 15,86,250

Tele density: 98.76 %

Subscriber Base: 8,74,84,970

Gujarat

Population: 6,38,72,399

Tele density: 99.18 %

Subscriber Base: 7,03,60,433

Haryana

Population: 2,82,04,692

Tele density: 95.53 %

Subscriber Base: 2,81,93,601

Himachal Pradesh

Population: 74,51,955

Tele density: 152.50 %

Subscriber Base: 1,12,80,717

Jammu & Kashmir

Population: 1,36,06,320

Tele density: 89.01 %

Subscriber Base: 1,22,06,319

Jharkhand

Population: 3,85,93,948

Tele density: Included in Bihar

Subscriber Base: 8,74,84,970

Karnataka

Population: 6,75,62,686

Tele density: 105.85 %

Subscriber Base: 7,07,92,799

Kerala

Population: 3,56,99,443

Tele density: 129.45 %

Subscriber Base: 4,60,44,293

Ladakh

Population: 2,89,023

Tele density: Included in JK

Subscriber Base: 8,74,84,970

Lakshadweep

Population: 73,183

Tele density: -

Subscriber Base: 8,74,84,970

Madhya Pradesh

Population: 8,53,58,965

Tele density: 68.87 %

Subscriber Base: 7,85,94,592

Maharashtra

Population: 12,31,44,223

Tele density: 108.57 %

Subscriber Base: 9,61,74,005

Manipur

Population: 30,91,545

Tele density: 81.11 %

Subscriber Base: 8,74,84,970

Meghalaya

Population: 33,66,710

Tele density: 81.11 %

Subscriber Base: 8,74,84,970

Mizoram

Population: 12,39,244

Tele density: 81.11 %

Subscriber Base: 8,74,84,970

Nagaland

Population: 22,49,695

Tele density: 81.11 %

Subscriber Base: 8,74,84,970

Odisha

Population: 4,63,56,334

Tele density: 78.46 %

Subscriber Base: 3,45,55,692

Puducherry

Population: 14,13,542

Tele density: -

Subscriber Base: 8,74,84,970

Punjab

Population: 3,01,41,373

Tele density: 125.27 %

Subscriber Base: 3,95,41,603

Rajasthan

Population: 8,10,32,689

Tele density: 84.14 %

Subscriber Base: 6,67,67,801

Sikkim

Population: 6,90,251

Tele density: 81.11 %

Subscriber Base: 8,74,84,970

Tamil Nadu

Population: 7,78,41,267

Tele density: 108.53 %

Subscriber Base: 8,46,50,559

Telangana

Population: 3,85,10,982

Tele density: Included in AP

Subscriber Base: 8,74,84,970

Tripura

Population: 41,69,794

Tele density: 81.11 %

Subscriber Base: 8,74,84,970

Uttar Pradesh

Population: 23,45,50,725

Tele density: 68.12 %

Subscriber Base: 16,52,01,318

Uttarakhand

Population: 1,12,50,858

Tele density: Included in UP

Subscriber Base: 8,74,84,970

West Bengal

Population: 9,96,09,303

Tele density: 84.56 %

Subscriber Base: 5,65,74,109

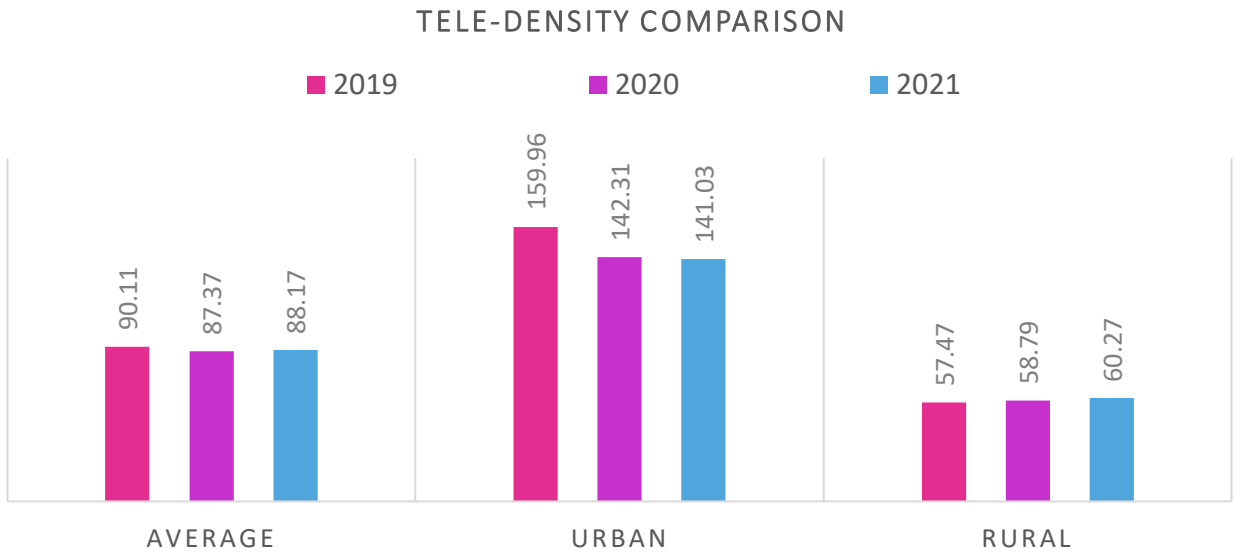

Telecom Service Providers
1
Passive Infrastructure
3
2
Handset Manufacturers
4
Network Services

Telecom Service Providers

There were various factors at play to see such a drastic increase in usage. Firstly, the digitization drive India was undergoing helped migrate business and other communications seamlessly. This meant that a readily available alternative was present to be effectively utilized. Second, the newfound abundance of time led to increased consumption of media content via OTT, audio podcasts and online gaming.

Although 60-70% of the migrants have returned to the cities after lockdown curbs were eased in the second quarter, rural mobile data consumption grew upwards of 30% sequentially in the April-September period compared with 15-20% for urban areas, contributing strongly to overall data usage levels Overall rural wireless broadband availability has widened too. As a result, rural consumption now accounts for roughly 45% of overall mobile data usage and urban usage makes up 55%, compared with a 40:60 ratio before the Covid-19 outbreak.

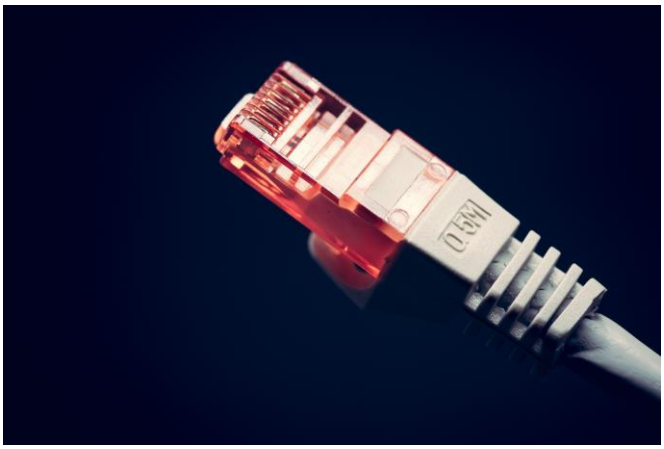
All these factors are strong indicators to the virility of the sector. To keep operating at optimum levels, it is imperative to have a skilled frontline workforce, capable of executing complex tasks aiding is the longevity of these systems as well as supplying service level assistance for both consumers and enterprises. An operations scalability is precariously based on the workforce executing it.



Major TSPs in India

airtel Jio Vi BSNL Connecting India

Internet Services



TRAI reports internet usage has been the highest ever with over 82.5 crore internet users, India is the second largest online market in the world, ranked only behind China. The broadband Internet subscriber base increased by 4.11 per cent from 74.74 crore at the end of December 2020 to 77.80 crore at the end of March 2021. Despite the large base of internet users, the internet penetration rate in the country stood at around 50 percent in 2020. This meant that around half of the 137 crore Indians had access to internet that year. There has been a consistent increase in internet accessibility compared to five years ago, when the internet penetration rate was around 27 Percent. $37.62 bn FDI inflow in the telecommunication sector between August 2020 and December 2020. India is expected to have as many as 90 crore internet subscribers by 2025.

Mobile payments

Aadhar Pay, BHIM app, UPI to connect masses to provide banking interfaces, security and storage

Non-traditional telecom services

OTT, digital content, e-banking, e-education, e-health, e-commerce

Start-ups

India ranked #2 start-up ecosystem in the world. Focus sectors: Fintech, EdTech, Enterprise tech & HealthTech

4G and 5G ecosystem

High data rates, low latency, high reliability and low energy consumption

Industry 4.0

Automation and data exchange with technologies including IoT, VR, AR and cloud computing

Wired subscribers + Mobile devices users (Phones and dongles) + Fixed Wireless subscribers (Wi-Fi, Wi-Max, Point-to Point Radio & VSAT)

Total 765.09 mn

Handset and Device Manufacturers

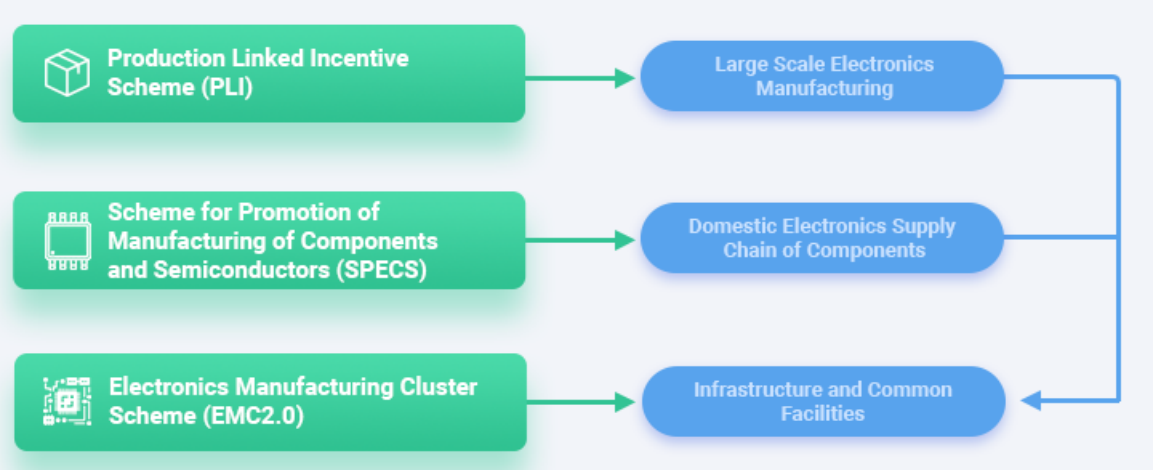
The PLI scheme provides incentives in the range of 4-6 per cent to mobile phone and electronic component makers in India.
Current employment is about 7.5 lakh people
"In 2021, we will be hiring about 50,000-60,000 people. This could turn into a $19,000 crore opportunity by 2025 with the country looking to export 60 crore mobile phones worth Rs 8 lakh crore, both in the entry level as well as high-priced segments, to markets like Europe, North America and Africa," Pankaj Mohindroo, chairman, India Cellular and Electronics Association (ICEA) [14]

Electronics manufacturing in India has grown rapidly with a CAGR of around 23% during the last 5 years, with domestic production of electronics hardware touching $7,600 crore in 2019-20. The electronics manufacturing industry currently provides employment for over 2 million people in India.

To further facilitate large-scale manufacturing, development of a supply chain ecosystem, and building of new manufacturing clusters in the country, each electronic manufacturing scheme has been carefully constructed to incentivize the electronics manufacturing industry.

Major Handset Manufacturers

FOXCONN
NOKIA
SAMSUNG
flex
oppo
wistron



Passive Infrastructure

Government allocates Rs 14,200 crore for telecom infra roll out in 2021-22 hat entails completion of optical fiber cable-based network for Defense services, rolling out broadband in 2.2 lakh panchayats and improving mobile services in the Northeast.
The government had approved Rs 24,664 crore for an advanced communications network for defense services in lieu of their vacating spectrum for mobile telephony in May 2018. The project was to be completed within 24 months.

According to the budget document, the finance ministry has earmarked an outlay of Rs 5,200 crore to rollout the entire optical fiber cable (OFC) required for setting up the Defense communications network, issue purchase order for all equipment components for the entire project to commission nationwide dedicated full-fledged communication network.

The finance ministry has allocated Rs 9,000 crore to boost telecom connectivity across the country which includes high-speed OFC or satellite-based broadband services across the 2.2 lakh village panchayats in the next financial year.
The government has set a target to lay 6.7 lakh kilometer of OFC, 1.2 lakh Wi-Fi access points and 6.5 lakh fiber-to-the-home (FTTH) connections to be installed in 2021-22.
Andaman and Nicobar Island installed OFC in August, will get 124 mobile towers for 4G service, Naxal affected areas will get 1,000 mobile towers, aspirational districts will get 350 mobile towers and 354 villages uncovered in Ladakh, Jammu and Kashmir and in border areas will get one mobile tower each.

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. Incumbent operators in India hived off tower segments into separate telecom infrastructure companies. 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 emphasized the need for further enabling infrastructure, especially in the lead up to 5G to lower costs of investments.
Telecom infrastructure and OEM sectors employed a total of 76,000 personnel (direct and indirect) in 2019

1133 passive infrastructure companies are registered with TRAI

Tower Companies

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AMERICAN TOWER®

GTL INFRASTRUCTURE

TowerVision® Infrastructure Sharing

Network Services

5G, IoT to drive talent demand in India's telecom sector by 20% in 2022.

According to Vohra, the telecom industry witnessed a 15% increase in demand for talent-driven by telecom infrastructure companies, mobile-enabled services, and telecom OEM.

The talent demand in India's telecom sector is expected to grow by 18-20% in 2021 on account of wide-spread adoption of internet services, demand for better telecom networks, and the rollout of fifth generation or 5G technology.

The telecom industry witnessed a 15% increase in demand for talent-driven by telecom infrastructure companies, mobile-enabled services, and telecom OEM.

Initiatives like the production-linked incentive and the government's thrust on the domestic telecom equipment manufacturing will provide further impetus to the hiring of talent in the industry and would lead to job creation in sectors such as transmission equipment, RAN, wireless equipment, CPE, IoT, enterprise equipment manufacturing hubs in India.

It can also lead to an increase in the number of R&D centers and even semiconductors catchments[17]

The Department of Telecommunications (DoT) opened applications for telecom equipment and networking products manufacturers to apply for the production-linked incentive (PLI) scheme under which ten large manufacturers and ten MSMEs will be selected to receive rewards.

According to the guidelines released on Thursday, Rs 12,195 crore will be disbursed as incentives to the qualifying companies over a five-year period by achieving stipulated production targets. Of this, Rs 1,000 crore have been set aside for the ten MSMEs, three out of which will be domestic

Local companies HFCL, Coral Telecom, Sterlite, Dixon and VVDN Technologies plan to expand their facilities. Bharti Enterprises said separately it is forming a joint venture with Dixon to make telecom equipment and avail of the benefits of the scheme.

As per the guidelines, non-MSMEs will be eligible for incentives ranging from 4% to 6% of incremental production in a year. The scheme offers a higher incentive of 4%-7% to micro, small and medium enterprises that must invest Rs 10 crore, while large companies have an investment threshold of Rs 100 crore. FY19-20 will be treated as the base year, while the five-year period will begin from April 1, 2021. The last date to apply is July 3, 2021. The scheme will cover products such as 4G/5G next-generation radio access networks, IoT devices, customer premises equipment, routers and switches.

The WLAN market in India grew marginally by 3.1 per cent YoY. The market for Wi-Fi 6 also witnessed significant traction in the Indian market. While the revenue contribution of Wi-Fi 6 differed by vendors, there was a significant jump in the sales of Wi-Fi 6 access points across all the major vendors in the segment.

adoption of emerging technologies such as cloud, Internet of Things (IoT), mobility, etc.. would drive incremental revenues in the coming years. IDC also expects large investments for 5G rollouts in the next couple of years.

Network Services Companies

Data Centers

Large-scale Data Centers Global players have increased their investments in India, such as Amazon Web Services, which is investing $1.6 billion to build two datacenters in Hyderabad, NTT Limited, which has announced a four-year investment of $2 billion in India, and Yotta, which is building multiple facilities in Maharashtra and Noida. By 2025, India is estimated to attract $4.6 billion in investment from both domestic and international firms. The Indian government is also promoting policies that encourage the establishment of hyperscale datacenters in the country, with plans to invest more than $1 billion over the next five years as part of a hyperscale Data Center scheme.

Data Center operators aspire to lessen their reliance on telecommunications providers: Limited dark fiber access to datacenter operators and end users is proving to be a stumbling issue for India's datacenter expansion. As a result, datacenter operators are vying for the right to build their own enterprise-grade fiber networks.

The India Data Center Market is expected to grow at a CAGR of 10.7% from 2021 to 2027, according to a report.

In addition, due to the rise in popularity and accessibility of OTT and streaming platforms, India's average Internet data usage has climbed from 1.24 GB per month in 2018 to 14.1 GB in June 2021. As the volume of data grows, corporations, OTT players, cloud service providers, and global offshore centers will need more resilient digital infrastructure in the form of datacenters to meet consumer demand. The rise of edge datacenters is expected to accelerate as 5G services become commercially available in the country. As 5G infrastructure improves data speeds, data consumption will rise, especially for high-latency apps.

Data Centre Companies

nxtra by airtel

YOTTA

sify

NTT Communications

cisco

CtrlS

Optical Fiber Manufacturing

The India optical fiber and accessories market was valued at $461.6 million in 2018 and is expected to increase at a CAGR of 17.2 percent from 2019 to 2026, reaching $1.66 billion. Optical fiber is the medium and technology for transmitting data from one source to another through a plastic or glass thread. Optic Fiber is utilized in telecom, utility, community access television (CATV), military, and other communication applications, as well as non-communication applications such as sensor, fiber optic lighting, and others.

Optical Fiber Market is expected to increase at a CAGR of 11.7 percent, from $303.2 million in 2018 to $741.9 million in 2026.

Several factors influence the India optical fiber and accessories market, including widespread 5G deployment, increased adoption of fiber-to-the-home (FTTH) connectivity, the emergence of the Internet of Things (IoT), technological advancements in fiber optic cable technology, and increased investments in optical fiber cable (OFC) network infrastructure. These elements, taken together, present prospects for market expansion. During the projection period, however, the market is likely to be hampered by high installation costs and an increase in the deployment of wireless communication systems. As a result, each element has a distinct impact on the optical fiber and accessories market in India.

The demand for faster and better networking and network services, as well as an increase in broadband penetration in India, are expected to be the primary drivers of the India optical fiber market. Furthermore, increased demand for optical communication and sensing applications for a variety of applications, high demand for optical fiber cable (OFC) in the IT & telecom sector, increased internet penetration, and increased adoption of fiber to the home (FTTH) connectivity all contribute to the industry's growth. The market's growth is projected to be hampered by high installation costs and increased adoption of wireless communication solutions.

Increasing government investments in fiber optic network cable (OFC network) infrastructures, on the other hand, are likely to create significant potential for the growth of the India optical fiber and accessories market during the forecast period. The Indian government, for example, has been investing in OFC network infrastructure to boost internet coverage across the country, in accordance with government initiatives such as Digital India and the Smart Cities Mission.

Optical Fiber Companies

STL

Finolex
gets people together

Live Smart

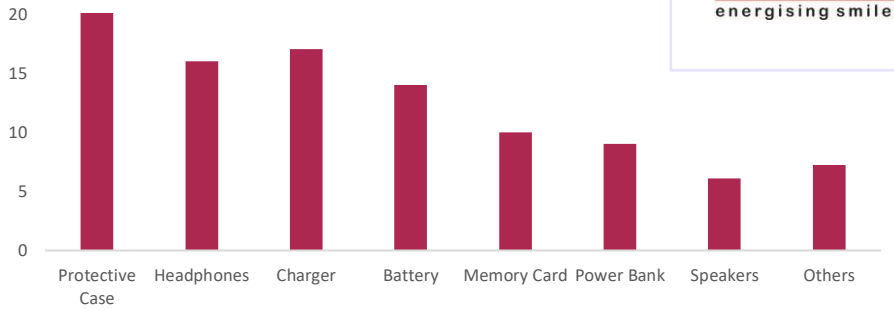
HFCL LIMITED

BIRLA CABLE LTD.
(Formerly Birla Ericsson Optical Ltd.)

Mobile Accessory Manufacturers

External batteries, USB cables, mobile cases and covers, chargers, and earbuds are among the most popular smartphone accessories. The distinctiveness of the distribution channels is where the market's players get a competitive advantage. It is made up of a variety of national, regional, and micro-distributors. Manufacturers can reach a large consumer base by marketing their products through one or more distribution partners and retailers. The mobile accessories market in India is predicted to reach INR 252.80 billion by 2023, thanks to a significant increase in the adoption of smartphones and tablets.

The market's expansion is being fueled by rising disposable income, mobile penetration, and a growing urban population. In 2021, the Indian mobile phone accessories market is predicted to be worth US$ 2,115.2 million, with a CAGR of 11.2 percent during the forecast period (2021-2028). By 2028, the market is expected to be worth USD 4376.8 million.



In India, the growing urban population has resulted in a huge increase in demand for advanced mobile accessories such as power banks, luxury headphones, and high-end phone cases. Rapid migration from rural to urban areas, particularly in North India, and young upper-middle-class consumers becoming more aware of the various brands available in the market and willing to buy mobile phone accessories are expected to drive the India mobile phone accessories market growth.

On a worldwide basis, India and China are two of the most important demand generators for mobile accessories. The increasing number of mobile phones in the Asia Pacific area is one of the primary factors contributing to the region's high demand for mobile accessories. In addition, many manufacturing companies in China, Taiwan, and Japan are assisting the Asia Pacific mobile accessory market in maintaining its leadership position.

Mobile Accessories Mfg. Companies

belkin

EON ELECTRIC energising smiles

SAMSUNG

RailTel

RailTel, which has provided fiber optic connectivity at over 5,900 stations across the country and mostly in rural areas, is now planning to provide broadband and Wi-Fi facilities in remote villages, sources said on Friday.

As we already have optic fiber cables in 58,742 route km and proper Internet Wi-Fi services at 5,900 railway stations, we have shared a proposal with the Department of Telecommunications (DoT) for providing broadband and Wi-Fi services in remote villages," a RailTel source connected to the development told IANS.

The source said that RailTel, which has a presence even in the remote areas of the country, has the capacity to provide broadband and Wi-Fi services in the villages, which will be a mega boost for the government's Digital India program.

The source said that once permission is granted by the DoT, then the work for providing the broadband and Wi-Fi services will start taking shape.

The source said that RailTel plans to provide broadband service with a basic phone and Wi-Fi services. It clarified that it has no plans to enter into the voice calling services.

The source said that RailTel has the infrastructure and equipment in place at 5,900 stations across the country and they just need to extend their services to the villages, while it would take time for the private operators.

The source said that considering the fact that many operators services are not available in many remote areas so laying the cables and setting up mobile towers will take time for them. "And our services are already available at the nearest railway stations there, so we just need to extend the services to the villages," the source added.

RailTel already provides free wi-fi service at more than 5,950 stations in the country, and the facility can be availed by anyone with a smartphone and an active connection after an OTP-based verification.

Government Policies

Government Policies

The telecom sector has been the backbone for various initiatives taken by the Government for transformation of the nation into a digital economy. With the Government's vision of enabling the entire country to have same access to e-services, communication facilities and digital resources, the sector has rightly been recognized as key enabler for growth and employment generation.

Budget 2022 had 3 main highlights for the Telecom Sector with 5G, Design-led manufacturing under PLI Scheme and contracts to lay will be awarded under Bharat Net Projects in FY 22- 23

National Broadband Mission

To enable fast track growth of digital communications infrastructure, bridge the digital divide for digital empowerment and inclusion, provide affordable and universal access of broadband for all.

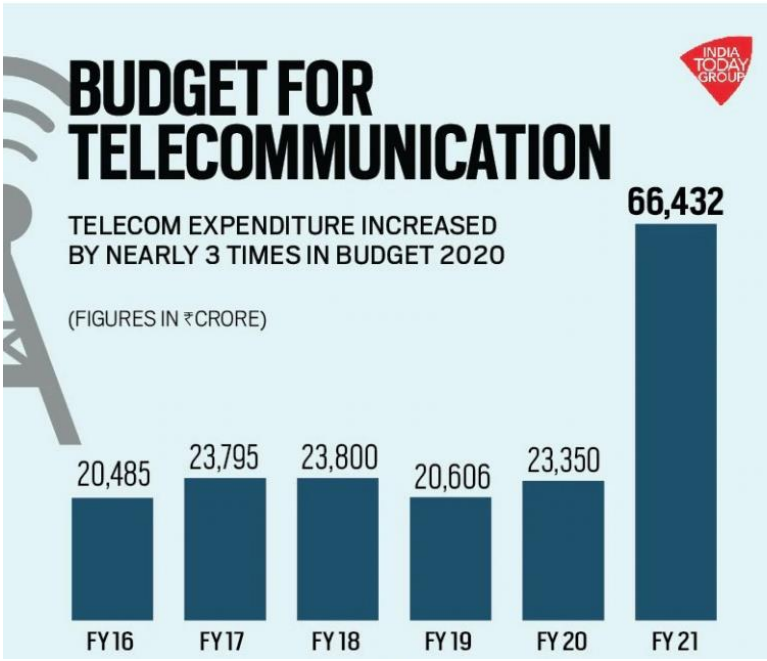
Digital India Programme

- Digital Infrastructure as a Utility to Every Citizen
- Governance & Services on Demand
- Digital Empowerment of Citizens

National Digital Communications Policy

Provide Universal broadband connectivity at 50Mbps to every citizen b. Provide 1 Gbps connectivity to all Gram Panchayats of India by 2020 and 10 Gbps by 2022 c. Enable100 Mbps broadband on demand to all key development institutions; including all educational institutions d. Enable fixed line broadband access to 50% of households e. Achieve 'unique mobile subscriber density' of 55 by 2020 and 65 by 2022 f. Enable deployment of public Wi-Fi Hotspots; to reach 10 million by 2022. Ensure connectivity to all uncovered areas.

Out of the total budget allocated to the Ministry, the expenditure target for telecommunications was raised to Rs 66,431.7 crore year-on-year in Budget 2020.



Budget Outlay

Budget 2022 charters the path to further evolution of the sector with key focus area being 5G and connecting remote areas. While the said proposals open new doors of opportunities, the same also warrant extensive investment in infrastructure. To fuel this outlay, the sector was anticipating relief measures such as liquidation of blocked working capital in form of GST credits and reduction of custom duty rates on import of telecom gear. Further, clarification on tax issues leading to litigation, such as eligibility of GST credit on passive infrastructure and non-levy of royalty-based taxation on telecom charges, in particular cross border payment of bandwidth and interconnect charges, was much awaited by the industry. Budget 2022 certainly reflects the commitment of Government to promote R&D and build a strong domestic ecosystem for 5G.

The sector shall look forward to fine print of design-led manufacturing scheme and prospects created by 5G rollout.

Under the Bharatnet project, contracts for laying optical fiber in all villages, including remote areas to be awarded through PPP in 2022-23.

Budget 2022 has however reinforced the spirits of telecom players by announcing the Government's commitment towards digital economy. The Finance Minister has also proposed allocation of 5% of annual collections under USOF towards affordable broadband and mobile service proliferation in rural areas. This will promote R&D and commercialization of technologies and solutions.

The overall budget reflects a positive momentum for the sector in terms of its focus on the digital economy and tapping the potential of the rural market. The telecom players would now need to focus on meeting the capital requirements to fuel the transition to the 5G era.

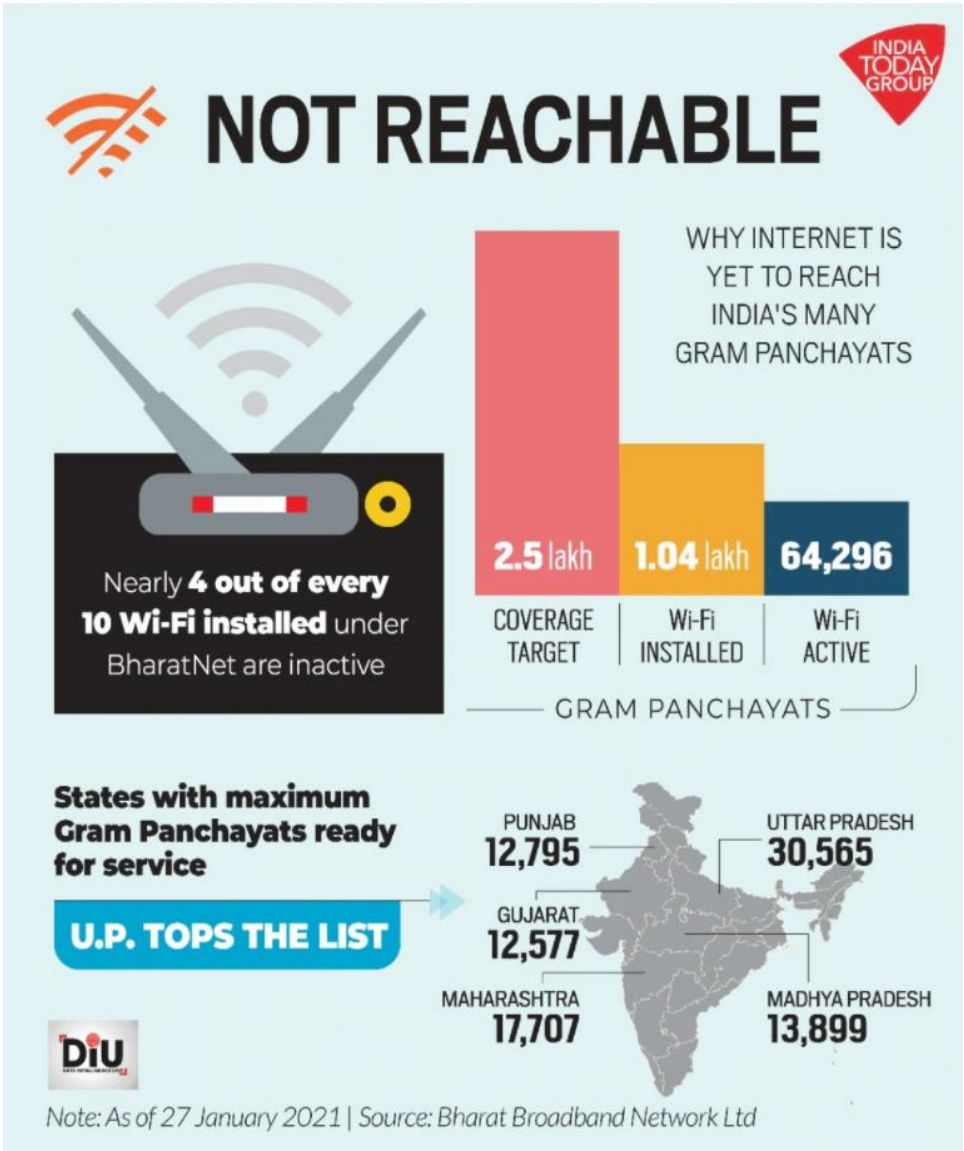
BharatNet

Broadband penetration in the hinterlands caters to about 77.6 crore people with access to the internet in India. Rural users make up 30.2 crore of the total users. This means that only 34 out of every 100 people in villages have access to the internet, compared to 101.7 per cent internet penetration in urban areas. To facilitate the growth of internet usage, the government had announced its flagship project BharatNet. This was aimed at providing 1.6 lakh gram panchayats across the country with optical fiber driven broadband internet.

Length of OFC Laid
5,58,022 km

Number of GPs where OFC Laid
1,81,024

GPs with functional internet
1,71,675



Wi-Fi Hotspot GPs:
Installed: 1,04,337
Active: 53,913

FTTH Connections:
Commissioned: 1,95,054

Dark fiber (KM):
33,698.84

Usage (Wi-Fi/FTTH):
Bandwidth: 4,098.25 (GB)
No of active Users: 15,94,556
Data Consumption (December 2021) 4,929.4 TB

State Name	Number of GPs in Phase 2	Number of Existing BSNL Towers	Wireless from BSNL Towers	Satellite Recommendation	Total GPs (not connected)	Total fiber	
						Route Length (km)	length (km)
Andaman & Nicobar Islands	0	0	0	0	0	0	0
Andhra Pradesh	19303	3065	4557	42	46	56476.27	63366.37
Arunachal Pradesh	924	86	139	117	47	2972.81	3335.493
Assam	33	91	24	0	0	50	56.1
Bihar	1326	668	239	7	8	4591.78	5151.977
Chandigarh	0	0	0	0	0	0	0
Chhattisgarh	5211	954	1165	131	243	13248.23	14864.51
Dadra And Nagar Haveli	11	0	0	0	0	66	74.052
Daman & Diu	15	0	0	0	0	48	53.856
Goa	0	0	0	0	0	0	0
Gujarat	7942	1946	2187	32	209	22092.53	24787.82
Himachal Pradesh	2888	474	737	11	348	8777.42	9848.265
Jammu & Kashmir	1807	185	280	136	143	3180.64	3568.678
Jharkhand	2545	1058	582	37	55	9130.54	10244.47
Karnataka	0	0	0	0	0	0	0
Kerala	0	0	0	0	0	0	0
Lakshadweep	0	0	0	0	0	0	0

State Name	Number of GPs in Phase 2	Number of Existing BSNL Towers	Wireless from BSNL Towers	Satellite Recommendation	Total GPs (not connected)	Total fiber	
						Route Length (km)	length (km)
Madhya Pradesh	6197	2053	2171	26	474	13449.55	15090.4
Maharashtra	7815	2387	961	24	194	24082.02	27020.03
Manipur	0	0	0	0	0	0	0
Meghalaya	0	0	0	0	0	0	0
Mizoram	438	33	11	17	129	1863.34	2090.667
Nagaland	249	140	101	20	6	607	681.054
Nct Of Delhi	0	0	0	0	0	0	0
Odisha	2328	891	735	67	23	10481.11	11759.81
Puducherry	0	0	0	0	0	0	0
Punjab	6469	2039	2455	0	7	10564.01	11852.82
Rajasthan	2069	2235	603	1	120	10769.82	12083.74
Sikkim	0	0	0	0	0	0	0
Tamil Nadu	7982	3599	2080	0	79	19476.92	21853.1
Tripura	19	117	13	0	0	32	35.904
Uttar Pradesh	33653	2696	7014	69	1431	39511.39	44331.78
Uttarakhand	5735	743	634	150	328	15117.1	16961.39
West Bengal	0	0	0	0	0	0	0
Total	114959	25460	26688	887	3890	266588.48	299112.3
UNPROCESSED Gps	35041	-	-	-	-	140164	157264
Grand Total	150000	25460	26688	887	3890	406752.5	456376.3

Smart Cities

Smart Cities Mission was launched by the Hon' Prime Minister on 25 June 2015. The main objective of the Mission is to promote cities that provide core infrastructure, clean and sustainable environment and give a decent quality of life to their citizens through the application of 'Smart solutions'.

- 100 cities have been selected to be developed as Smart Cities.
- Central Government will give financial support to the extent of Rs. 48,000 crores over 5 years.
- In line with the mission, public–private partnerships (PPP) are expected to bring efficiency in the overall development of smart cities. 110 PPP projects have been completed and 203 projects are underway with investments worth ~Rs. 22,000 crore (US$ 3.04 billion).
- 62 urban space projects have been completed, with an emphasis on city parks such as river/lake fronts, parks & playgrounds and tourism attractions, and 82 projects are in progress with investments worth > Rs. 8,000 crore (US$ 1.10 billion).
- 85 smart water and 46 smart solar projects have been completed to make the cities more livable and sustainable. The project pipeline includes 138 smart water and 36 smart solar projects.

Current National Status of Smart Cities Projects

100 Cities | 5151 Projects | Rs. 2,05,108 Cr

Key programmes	Description
Ease of Living Index and Municipal Performance Index	Models for outcome and performance evaluation to measure the quality of life and effectiveness of cities have been implemented in 114 cities. As part of the Citizen Perception Survey, over 31 lakh citizens have actively engaged with the survey.
Urban Learning and Internship Programme (TULIP)	It aims to align opportunity for potential graduates in ULBs/smart cities with learning objectives. Over 13,000 internships have been registered by 284 Smart Cities/ULBs; of this, 828 candidates are interns and 81 have completed their internships.
DataSmart Cities and Data Maturity Assessment Framework (DMAF)	To help cities build an ecosystem for data-driven governance. It was rolled out in the initial plan for 100 Smart Cities and now, the government plans to expand the 'DataSmart Cities Strategy' to 500 cities.
Climate Smart Cities Assessment Framework (CSCAF)	It was implemented in 100 cities to help cities look at urban planning and governance from a climate change viewpoint.
Open Data Platform/India Urban Data Exchange (IUDX)	The government plans to enable 500 cities with Open Data Platform/India Urban Data Exchange (IUDX).

Investment

In 2020, the total allocated investments for the 'Smart City Mission' stood at ~Rs. 205,018 crore (US$ 28.31 billion). Of the total investments, 5,331 projects worth ~Rs. 176,059 crore (US$ 24.31 billion)—86% of the total—have been tendered as of 2020. Work orders have been issued for 4,540 projects worth ~Rs. 139,969 crore (US$ 19.33 billion)—68% of the total—and 2,122 projects worth ~Rs. 34,986 crore (US$ 4.83 billion) have been completed (17% of the total) as of 2020.

Other developments and progress as of 2020

Infrastructure implementation of 'Smart Cities' accelerated across the country in 2020.

Integrated command & control centres (ICCCs) to enable cities with evidence-based smart governance (operationalized in 53 cities and in-progress in 30 cities). An outlay of Rs. 15,000 crore (US$ 2.07 billion) investment has been earmarked for this. ICCCs are likely to be set up in all 100 Smart Cities by 2022.

Smart cities have completed >250 smart road projects to improve urban mobility and 415 projects are nearing completion with investments worth >Rs. 20,000 crore (US$ 2.76 billion).

5G trials to start in the country at various locations including Delhi, Mumbai, Kolkata, Bengal uru, Gujarat, Hyderabad, etc.

India's 4G user base is slated to grow to around 820 mn users in FY22 despite a COVID-19 spike.

Xiaomi to set up two new mobile manufacturing plants with 99 percent of its smartphones sold in India now manufactured In India.

Apple Inc has started the assembly of the iPhone in India by Apple's Taiwanese manufacturer in its Tamil Nadu plant.

Railway PSU RailTel formally launched its paid Wi-Fi service plans which will enable users to access high-speed internet at 4,000 railway stations across the country.

Pegatron Corporation has leased close to 5,00,000 sq ft at Casa Grande Industrial Park in Chennai, Tamil Nadu, for its mobile manufacturing facility.

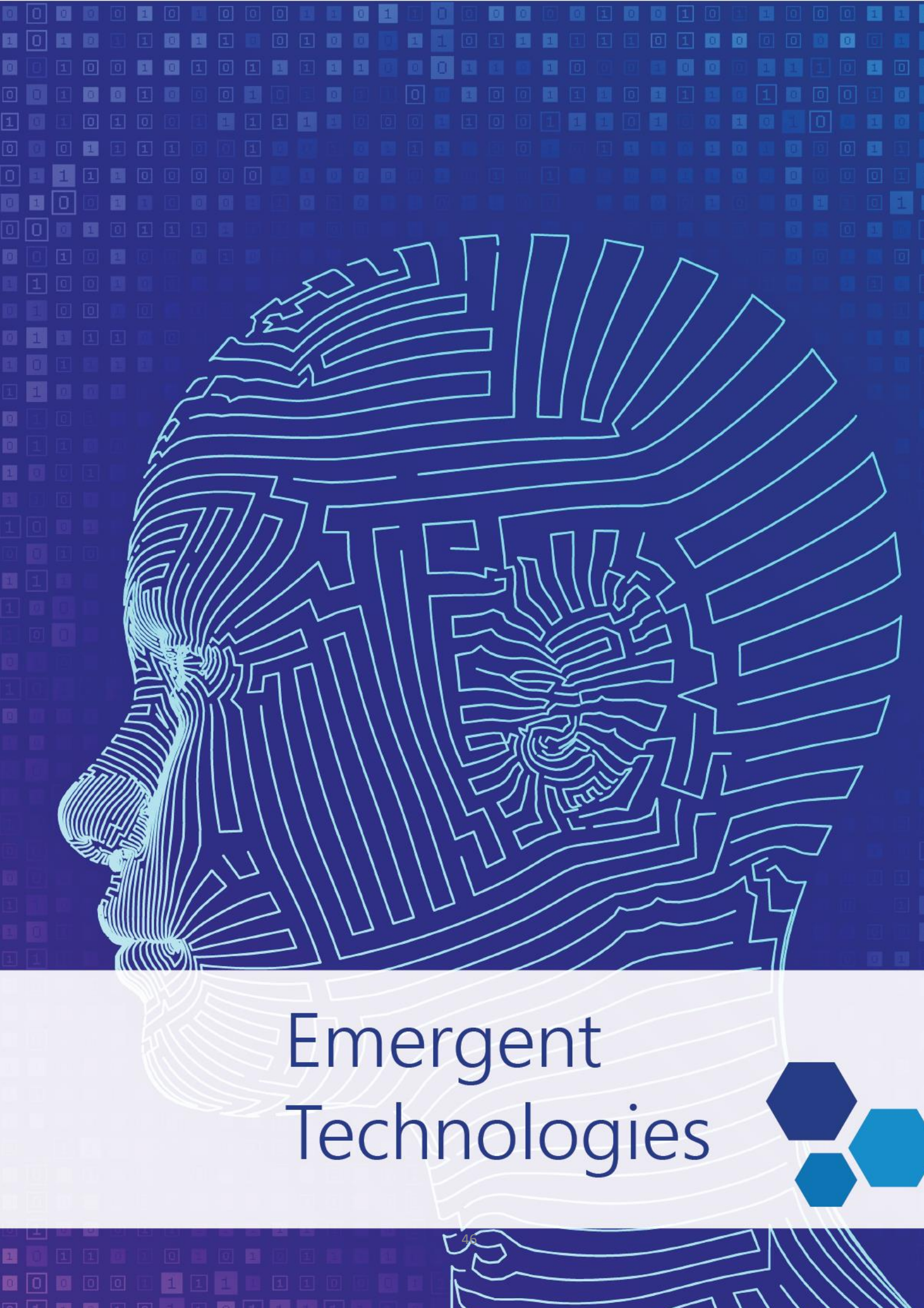
Bharti Airtel and Qualcomm Technologies have announced collaboration for accelerating 5G in India.

First year of PLI may be moved to FY22 instead of for mobile phone manufacturing to ease foreign and domestic mobile manufacturers.

The outlay for PLI scheme is INR 12,195 crore over a period of five years leading to enhanced production of more than ₹ 2.4 Lakh Crores.

“The government is working towards creating greater synergy between education and skills and mass scale digitization efforts are being made in creating new education, skilling, and entrepreneurial ecosystems in the country. The economy is growing at a rapid pace and the future of India is looking very promising. Building skill capacity is a key to enhance productivity and drive the economy ahead.

Shri Dharmendra Pradhan
Minister of Education of India



Emergent Technologies

Cloud

End-user spending on public cloud services in India is forecast to total $7.3 billion in 2022, an increase of 29.6% from 2021, according to a recent forecast by Gartner, Inc.

The overall Indian public cloud services market is expected to reach USD 10.8 billion by 2025, growing at a CAGR of 24.1 per cent for 2020-25, according to research firm IDC.

The demand for cloud technology professionals is likely to touch 2 million by 2025, a report by National Association of Software and Services Companies (NASSCOM), in association with Draup, Tata Consultancy Services and Accenture has found.

Titled "Cloud Skills: Powering India's Digital DNA," the report says as of FY21, India ranked third with 608,000 cloud professionals across all verticals, including technology.

The demand for cloud solutions is growing exponentially both in India and worldwide, leading to a higher demand for talent in this space. India had about 380,000 job openings in cloud in 2020, up 40 per cent over 2019. The demand for cloud skills far outweighs current supply and needs to focus across stakeholders on upskilling.

As of March 2022, or Telecom Sector, Cloud Industry has a digital talent demand of 36,400 and a supply of 23,400

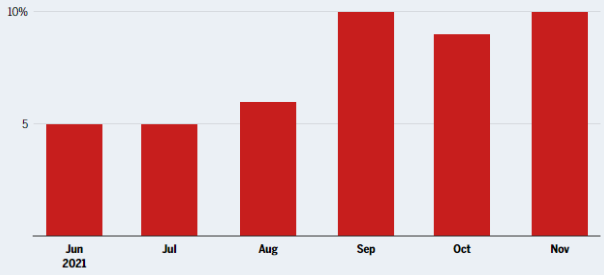
With 3 lakh active job searchers in November 2021, cloud-related roles accounted for 10% of total jobs. However, due to a lack of proper skilling, the industry is experiencing a talent shortage. India's cloud market is growing, with a projected 26 percent increase by the end of 2022. Machine Learning/AI, and security. With over 608,000 cloud experts across all verticals in India, demand for cloud-related jobs has increased by more than 40% since last year.

As of November 2021, intermediate level workers with 4-6 years of experience held the highest percentage of cloud positions, accounting for 44 percent of the cloud workforce. Entry-level talent with 0-3 years of experience came in second at 29%, demonstrating that the industry's freshers have a bright future.

By the end of 2022, India's cloud market is predicted to have grown by 26%. According to Monster, the top skills in demand for cloud experts include cloud computing, AWS/Azure, Cloud Migration, SAP, Cloud Security, and Machine Learning/AI. Furthermore, with over 608,000 cloud experts across all sectors in India, demand for cloud-related roles has surged rapidly since last year (40 percent).

Share of cloud jobs in % over last six months

The cloud market in India is expanding and expected to grow 26% by the end of 2022.



TOI Source: Monster.com

Total number of cloud jobs created each month

Month	Approx cloud jobs
Nov, 2021	85,000
Oct, 2021	130,000
Sep, 2021	140,000
Aug, 2021	130,000
Jul, 2021	160,000
Jun, 2021	150,000

TOI Source: Monster.com

Cloud Technologies Companies in India

aws Google Cloud ORACLE CLOUD IBM Cloud

Microsoft Azure TATA COMMUNICATIONS

IoT

Across the world, spending on software and hardware related to IoT is projected to grow rapidly, from US$726 billion in 2019 to US$1.1 trillion in 2023
the industrial IoT market is expected to grow at a CAGR of 16.7 percent from 2019 to reach US$263.4 billion by 2027.

High value drivers of IoT
Revenue Growth Using data from interconnected systems, a customized offering can be created for end consumers, leading to potential revenue boost.
Quality Control Assessing process historical data from sensors or edge devices helps operators manage the product's quality.
Cost Reduction Using data from IoT solutions, operators can proactively make better decisions, leading to increased efficiency and reducing operational costs.
security and Safety Remote monitoring and control of critical asset supports operators in determining trends and patterns and report any abnormality.

Sector themes driving IoT growth in India

The Indian market has the following three sectors: enterprise/industrial, consumer, and services/public. Each segment has distinct characteristics and market opportunities. COVID-19 is expected to further accelerate the investment pace in IoT.

Enterprise/industrial:

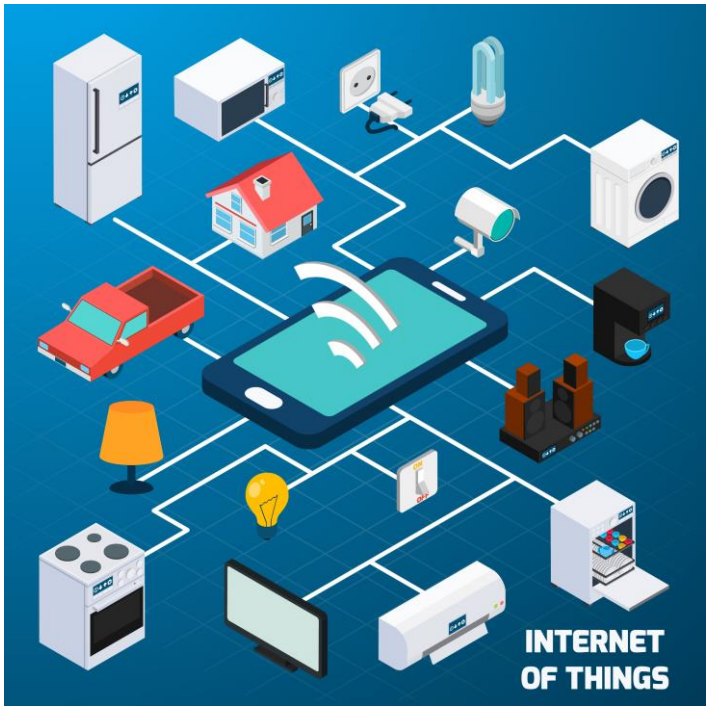
This segment is driven by manufacturing and product development. The life sciences, discrete manufacturing, and process manufacturing industries, along with utilities, will be spending most on IoT solutions in the coming years The trend is expected to continue with most of the use cases focusing around enhancing asset tracking and asset life with condition-based maintenance and equipment tracking and the ability to enforce physical distancing.

Consumer:

Focus on customer experience has driven investments in this sector. Smart home and connected vehicle are expected to drive investments in IoT. The consumer sector is expected to overtake process manufacturing to become the second-largest source of IoT spending by 2023.

As of March 2022, there is a talent demand of 20,900 by Industry and a ready talent supply of 14,800 in IoT segments under Telecom Sector.

Services/public sector: The Government of India (GoI) has taken several initiatives (discussed later in the report) that have encouraged most of the IoT spending. Considering the government's plans of launching 100 smart cities, 500 rejuvenated cities, and numerous projects to create industrial hubs, the segment has a substantial potential for IoT spending. With IoT software spending totaling US$39.3 billion in 20193 in APAC region and the fastest growth (a CAGR of 14.4 percent) expected over the five-year forecast period (2018-23), let us understand the industries that are making significant investments in IoT technology and promoting its growth in India.



IoT Development Companies in India

TCS TATA CONSULTANCY SERVICES
Infosys
LTI Let's Solve
Mindtree
HCL HCL TECHNOLOGIES
Tech Mahindra

ML/AI

The global AI In Telecommunication market size is projected to reach USD 13450 Million by 2026, from USD 773 Million in 2019, at a CAGR of 49.8% during 2021-2026.

Major factors driving the growth of AI in telecommunication market size are, increasing adoption of AI for various applications in the telecommunication industry and the utilization of AI-enabled smartphones.

With artificial intelligence and machine learning aid, the telecommunications network can operate independently and make a qualified decision to minimize the network.

Based on application, the virtual assistance segment is expected to witness the fastest growth. This rapid growth is attributed to the fact that customer service automation produces considerable savings for telecommunications companies. On the other hand, the consumer analytics segment is expected to hold the AI in telecommunication market share due to the increasing need for real-time behavioral insights.

Based on type, the Natural Language Processing (NLP) technology is expected to witness the highest CAGR in the Global AI in the Telecommunications Market. This is due to the use of NLP technology to read information stored in a digital format and used to understand human languages from different data sets in the telecommunications industry.

Market segment by Type

- Machine Learning and Deep Learning
- Natural Language Processing

Market segment by Application

- Customer Analytics
- Network Security
- Network Optimization
- Self-Diagnostics
- Virtual Assistance
- Others

As of March 2022, Industry has talent demand of 20,700 and a supply of 15,100 for Telecom Sector.

Key Players in AI

IBM Google cisco OpenAI intel AT&T Dixon NVIDIA

5G

A study by Ericsson ConsumerLab shows that at least 40 million smartphone customers in India could switch to the technology in the first year of implementation.

Indian Budget relayed that 5G spectrum auction will commence in 2022.
“India has the biggest rise in intention to upgrade, with 67% of users expressing their intent to take up 5G once it is available, an increase of 14 percentage points over 2019", Ericsson ConsumerLab said in a recent report.
The report also suggested that smartphone users in India are willing to pay 50% more for 5G plans bundled with digital services, versus just a 10% premium required for such connectivity.

According to the Ericsson Mobility Report, 5G will account for roughly 39% of mobile subscriptions in India by the end of 2027, with around 500 million subscriptions. By the end of 2027, 5G coverage is expected to have reached about 75% of the population. Several factors contribute to this higher uptake, one of which is that population-rich countries, such as India, will have attained significant population coverage. According to the report, "5G is still likely to be the fastest-deployed mobile technology in history."

As of March 2022, 5G industry has a demand of 23,800 talents and there is a ready supply of 15,800

In the India region, 4G subscriptions are forecast to rise from 680 million in 2020 to 830 million in 2026, increasing at a CAGR of 3 percent. 4G remained the dominant technology in 2020, accounting for 61 percent of mobile subscriptions. The technology will continue to be dominant, representing 66 percent of mobile subscriptions in 2026, with 3G being phased out by that time. 5G will represent around 26 percent of mobile subscriptions in India at the end of 2026, estimated.

Total mobile data traffic in India grew from 6.9EB per month to 9.5EB per month in 2020 and is projected to increase by more than 4 times to reach 41EB per month in 2026. This is driven by two factors: high growth in the number of smartphone users, including growth in rural areas, and an increase in average usage per smartphone. An additional 430 million smartphone subscriptions are expected in India during the forecast period, taking the total to over 1.2 billion in 2026.

On August 15, 2022, BSNL may offer 4G and 5G services. This is only the beginning. With BSNL's launch of domestic 4G, Indian telecom equipment makers would gain industry experience and opportunities for innovation. Companies like Tata Consultancy Services (TCS), who had no prior experience as a telecom vendor or delivering 4G radios, can now do so not only for BSNL but also for other telcos. Users won't have to worry about their data slipping into the wrong hands with domestic 4G and 5G networks. This would ensure India's future security and prevent any threats to the country's mobile networks

And 5G-related telecom employment are merely the tip of the iceberg. Driverless cars, virtual reality (VR), augmented reality (AR), cloud computing, and smart gadgets under the Internet-of-Things could all benefit from next-generation wireless technology. As 5G becomes more prevalent in India, more job openings will arise. With a slew of enterprises in India looking into various 5G use cases, recruiting could extend beyond traditional telecom end-users. Companies studying various components of the 5G value chain are anticipated to increase hiring in the coming months.

Satellite Broadband

No wires or towers: Satellite broadband promises to be the next big thing in India

Some of the biggest global names – including OneWeb, SpaceX and Hughes - are betting big on the opportunity to deliver satellite-based fast internet services - anywhere, anytime.

Currently, satellite broadband services in India are a primarily B2B play with a market size of roughly $100 million.

Nearly 75% of India's rural population do not have access to broadband since many locations go without cellular or fiber connectivity, according to the estimates of the Broadband India Forum (BIF), which represents OneWeb, Hughes, Amazon, Google, Facebook, Microsoft and Qualcomm.

"The future is probably shifting now. If you extrapolate this 10 years from now, will there be ground networks at all? Who knows?"

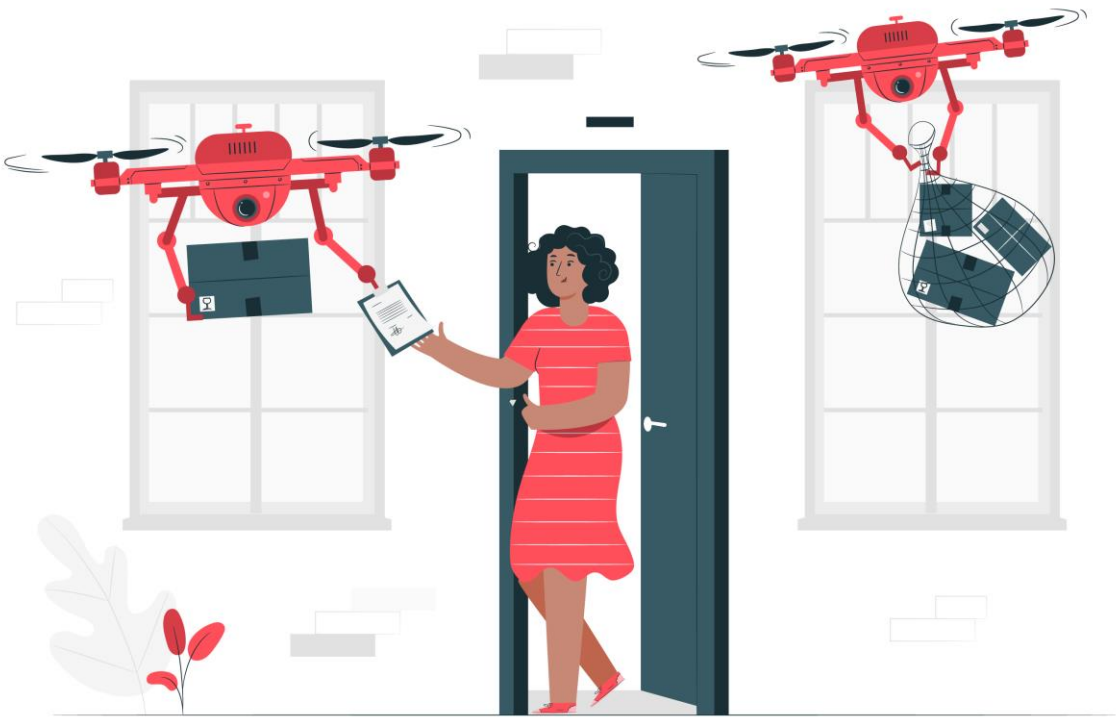
Sunil Mittal

Bharti Enterprises Chairman

Drone Technology

India's drone market expected to grow $885.7 Mn by 2021; Jobs look like a guarantee here! To become a drone pilot, training and assessment is required, as per guidelines released by the Directorate General of Civil Aviation (DGCA), Drone-related careers can open for pilots, UAV operators, engineers, and data processing and analysis experts. Potential positions range from full-time to contract-based work, even internships across many industries.

While drones have captured the fascination of consumers for entertainment there has been considerable interest and growth in the commercial drone market in India and globally. The market is slated to grow at a 12 per cent CAGR. In India commercial drone applications have been mainly in Defense, Surveillance and monitoring. We are seeing an increasing interest for Drone usage in the Agriculture and Medical space. These are areas which can drive significant societal impact.



Services

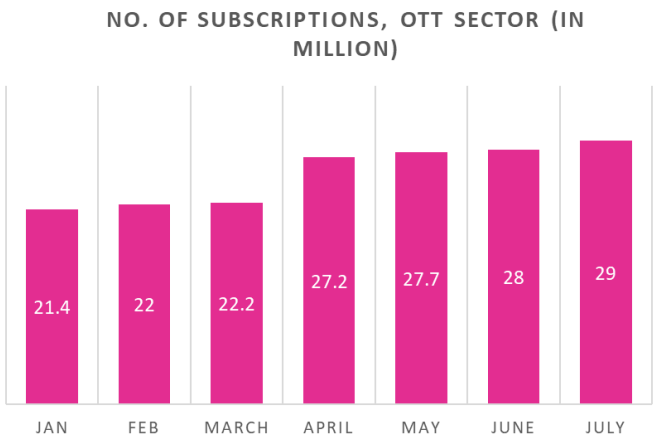
OTT, Podcasts and Online Gaming

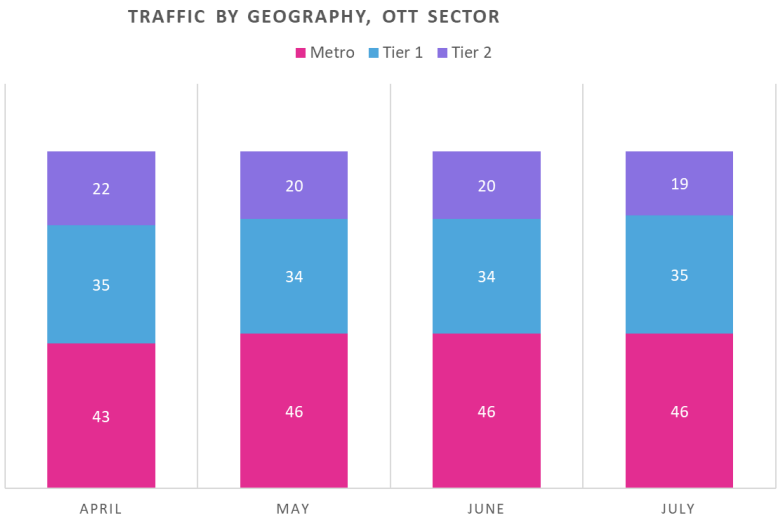
Over The Top streaming

India is currently the world's fastest growing OTT (over-the-top streaming) market and is all set to emerge as the world's sixth-largest by 2024. The market is expected to grow at a CAGR of 28.6% over the next four years to touch revenues of $2.9 billion.

According to findings from the Media and Entertainment Outlook 2020, a report by multinational professional services network of firms, PricewaterhouseCoopers or PwC, OTT video, along with Internet advertising, video games and e-sports and music, radio and podcasts are the top four segments expected to see revenue growth in the country over the next four years. The OTT sector in India witnessed a 30% rise in the number of paid subscribers, from 22.2 million to 29.0 million between March and July 2020.

Another study revealed that ~90% consumers prefer watching video content in regional languages, and that only 7% of the total time spent on OTT platforms in India is on English content. As the coronavirus-led lockdown affected the consumer theatre experience, moviemakers are adding new releases to the OTT platforms. According to a report, the Indian OTT market is set to reach Rs 237.86 billion (US$3.22 billion) by FY25, from Rs 42.50 billion (US$576.73 million) in FY19.





Podcast

According to the Media and Entertainment Outlook 2020 report by PricewaterhouseCoopers, India has emerged as the third-largest podcast listening market in the world after China and the US, with 57.6 million monthly listeners.

Why are podcasts popular in India?

- *Intimate and non-intrusive*
- *Plethora of genres*
- *Speaking many languages*

The PricewaterhouseCoopers report estimates that India will witness an increase of 30.4% compound annual growth rate in its monthly podcast listener base over the next five years.

Online Gaming

Online gaming industry to touch $2.8 billion by 2022 in India.

Largely driven by smartphones, affordable data and increasing disposable income, the rapid growth is expected to strengthen the sector's share of total media and entertainment industry by 4–5%.

The time spent on gaming apps, increased by 21% during the initial national lockdown, with the total customer base crossing 300 million users.

India is one of the top five mobile gaming markets in the world, with a 13% share of global game sessions, and is expected to add 40 million online gamers during 2020–22. E-sports revenue is expected to rise at a CAGR of 36% over the next three years. The findings of the report said that gamers spend more time watching other people play video games than they do watching traditional sports on TV.

Broadcast and Cable TV

Broadcast

Industry leaders opine that television will continue to grow irrespective of the economy and other hurdles since the medium promises reach and viewership like no other

According to ratings firm Crisil, the Indian media and entertainment (M&E) sector's revenue is projected to grow at 27% to reach ~Rs. 1.37 lakh crore (US$ 18.92 billion) in FY22, due to acceleration of digital adoption among users across geographies. In FY22, ad revenue is expected to increase by 31% YoY and subscription revenue by ~ 24% on the back of anticipated strong economic recovery. Ad revenue is expected to increase by 31% YoY and subscription revenue by ~ 24% in FY22.

FDI inflows in the information and broadcasting sector (including print media) stood at US$ 9.4 billion between April 2000 and December 2020.

BookMyShow, Vodafone Idea Ltd. (Vi) launched the pay-per-view streaming services. In March 2021, Telecommunications Standards Development Society, India (TSDSI) signed an agreement with the Advanced Television Systems Committee (ATSC) to adopt ATSC standards, a first-step towards initiating the development of next-generation broadcasting standards for India.

The Government of India has agreed to set up National Centre of Excellence for Animation, Gaming, Visual Effects and Comics industry in Mumbai. The Indian and Canadian Government have signed an audio-visual co-production deal to enable producers from both the countries exchange and explore their culture and creativity, respectively.

On February 25, 2021, the government outlined the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules 2021 to establish a progressive institutional mechanism and a three-tier grievance redressal framework for news publishers and OTT platforms on the digital media.

In February 2021, the digital entertainment committee of the Internet and Mobile Association of India (IAMAI) finalized a code of conduct to form the basis for self-regulation code for OTT content. The code has been endorsed by 17 OTT platforms including Netflix, Amazon Prime Video, Disney+ Hotstar, ZEE5 and Voot.

In February 2021, Prasar Bharati (India) and PSM (the official State Media of Maldives) inked an agreement to facilitate collaboration and capacity building in the field of broadcasting.

Digital audio–visual content including films and web shows on over-the-top (OTT) streaming platforms, as well as news and current affairs on online platforms, have been brought under the Ministry of Information and Broadcasting in November 2020.

Cable TV

India's pay-tv industry is projected to grow at a compound annual growth rate (CAGR) of 7% between 2020-25 as total industry revenues, including subscription and advertising, reach $12.3 billion by 2025, according to a report by Media Partners Asia (MPA).

The report, titled India Pay-Tv Distribution 2021, predicts that more than 96% of India's pay-tv homes will be digitalized by 2025 with total pay-tv subscribers expanding from 127 million in 2020 to 134 million by 2025.

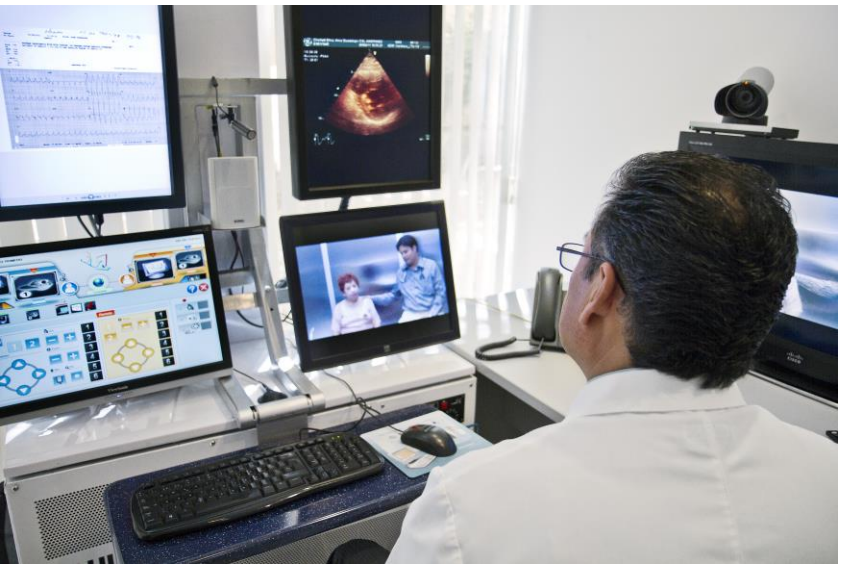
Call Centres

The IT and BPO services market in India and it is poised to grow by USD 83.6 bn during 2020-2024, progressing at a CAGR of almost 8% during the forecast period. Although call centre growth is expected, many job roles carried out in call centres traditionally will be shifted to IVR services, AI chatbots or a combination of the two. CRM roles are slowly but steadily shifting to automation solutions. Having said this, independent research carried out inn the UK showed 78% of people still prefer to interact with humans rather than machines. This means a hybrid model will come into effect with precision AI tools for effective CRM solutions.

Key changes which we will observe in the call centre space are:

- Hybrid working model (human and AI chatbots)
- Live Chat & Video Chat solutions
- Preemptive solutions using IoT
- Remote agents via cloud-based call centres
- Precision skill-based solution by highly trained agents (AI infusion)

Telemedicine



As the world continues to fight one of the biggest health crises, India's healthcare sector has become the prime focus of the government post the outbreak of Covid-19. To start with, INR 2.23 Lakh Cr has been allocated for healthcare and wellness initiatives in the Union Budget 2021-22, a 137% increase over the previous year.

Telemedicine market in India to reach USD 5.5 bn by 2025: EY-IPA study

"15-20% of the healthcare ecosystem is expected to shift to virtual care, across triaging, consults, remote monitoring, home health, etc., the study, 'healthcare goes mobile: Evolution of teleconsultation and e-pharmacy in new Normal

"The telemedicine market in India is expected to grow at a compound annual growth rate (CAGR) of 31% for the period 2020–25 and reach USD 5.5 billion". India's e-pharmacy market is projected to reach 10-12% of the overall pharmaceutical sales in the next five years driven by strong regulations, increased funding and creation of digital infrastructure,

Major Telemedicine Portals

1mg

practo

lybrate

myupchar

mfine

Wi-fi Access Points

PM Wani: Government targets 2 million Wi-Fi hotspots by end-2021

Telecom secretary Anshul Prakash said registrations for applying to offer these services under the recently launched Prime Minister Wi-Fi Access Network Interface (PM Wani) initiative will open by the first week of January, kick-starting the government's drive to make Wi-Fi ubiquitous across public spaces.

The PDOA ties-up with small businesses to install Wi-Fi access points and provides hotspots in public spaces and these entrepreneurs become public data operators (PDOs). A PDO could be the owner of a grocery store or kirana shop and even a pan vendor and doesn't need a license or registration. However, PDOs will have to buy bandwidth from telcos and internet service providers and resell them to consumers.

Telecom operators have promised the government to install 10 lakh Wi-Fi hotspots by December this year.

According to estimates shared by DigiAnalysys, after BBNL, BSNL tops the chart with 49,300 Wi-Fi hotspots. It is followed by Reliance Jio with 6,500 hotspots, QuadGen Wireless 6,000, Smart Cities 5,000, RailTel 1,618, Vodafone Idea and Bharti Airtel

NSE 0.95 % 1,000 each, L&T SW&C 800 and 15,000 other Wi-Fi hotspots.

In the next two years, India will witness additions of around 1.25 million public Wi-Fi hotspot in gram panchayats, 20,000 in colleges, 50,000 in smart cities, 4,791 in category B,C,D and E railway stations (of these, 800 stations are situated in 115 backward districts), retail outlets and others.

Business Enterprise Solutions

The past few years have seen India's telecom sector act as the stage for a high-intensity tussle for dominance one that has whittled down the number of competitors from nearly a dozen to less than a handful.

But this battle has been largely confined to the more consumer-focused segments starting off with Jio's entry into mobile services in 2016 and spreading over to the direct-to-home (DTH) and hi-speed home broadband segments over the next few years.

The enterprise segment for India's telecom sector has remained largely underserved and few telecom service providers have seen any significant revenue coming from it (industry sources say it contributes around 10% of revenue to TSPs, compared to around a quarter in developed nations).

Mobile Applications

The market for mobile apps is growing rapidly like never. Due to the pandemic, the number of apps downloaded has increased a lot. According to App Annie – leading global provider of app market data – in 2020 the app downloads have grown by 25% than the previous year. Generally, the Store and Google Play got about $112 billion for applications. But it's not only the number of uploads and money spent that is growing but also the average time of app use.

- Augmented and virtual reality
- Artificial intelligence
- Mobile wallets, banking and finance apps
- Retail shopping apps
- Restaurants and food delivery apps
- Video streaming apps
- Social and messaging apps
- Travel, transportation, and navigation apps
- Gaming apps
- Health and Fitness apps

India's app economy is maturing rapidly. While China remains the largest market in terms of usage and revenue, and American companies are perhaps the most innovative. The Indian app landscape is spearheaded by the telco giants Airtel and Jio.

There are more than 29,439 Indian publishers on Google Play out of all 872,704 app publishers. One of the biggest Indian publishers are Gametion, Moonton, Words Mobile, Moonfrog, Games2win.com, Rendered Ideas etc.

Overall, 3% of all app publishers on Google Play are from India.

Regional universities and the Indian Institute of Technology supply a wealth of app developers to the country's market every year. 24% of Android developers on the market have 0-2 years of experience, while 42% have between 2 and 5 years. Similar statistics in iOS development show not that the country is inexperienced, but rather that its developer population is very young.

Geographically, there are several hotspots in India, the top three being Bengaluru, the National Capital Region and Hyderabad, with 55% of all Indian Android app developers found in those three areas. iOS is more spread out, with just over 45% of iOS developers in the triad, according to a report by Belong.co.

Tele-enabled Services

E-government transactions

We use platforms everyday—to shop, hail cabs, book tickets, make payments and get and share information. By 2023, it is estimated that nearly two-thirds of Indians will have both a mobile device and internet access. Applying for a government-issued license online is likely to be easier and less expensive than travelling to a bricks-and-mortar office to meet an officer and fill out several forms. This growing digitally-able population is an opportunity to revolutionize legacy government processes. The platform approach has already been used with success in India. For example, according to the State of Aadhaar Report (2019), 95% of Indians currently have Aadhaar and on an average use it once a month. The NPCI's UPI has triggered a revolution in the digital payments ecosystem in India by providing a single platform for customers to access seamless fund routing, payments and banking features. UPI's success is attributable to its structure as a highly scalable platform bringing together different sets of users or stakeholders (customers, banks and merchants). The Prime Minister's call for all government procurement to be on the Government e-Marketplace (GeM) has led to Rs 1,16,000 crore of cumulative transaction value as on March 31, 2021.

Fundamentally, digital platforms create and provide the open participatory infrastructure to enable different sets of users or stakeholders (like buyers and sellers on Amazon or the GeM) to interact with each other in various contexts. Unified platforms enable robust interactions between these stakeholders who generate value for each other. Platforms also benefit from positive network effects, i.e., the additional value generated through robust interactions between different users and the freedom to innovate. In GeM, for example, the primary users are government buyer organizations and sellers/service providers.

Through an open, easy-to-use and accessible platform, GeM has transformed how public procurement is conducted by enabling a competitive and transparent marketplace which delivers more and more value as it scales. Government buyers benefit from a diverse ecosystem of sellers competing to provide higher quality and cost-effective goods and services. Sellers benefit from the ease of doing business with the government (such as by the incentivization of timely payments and more opportunities) on the platform.

Platforms replace ad hoc, case-by-case decision-making with policy-based, system-wide consistent decision-making.

Common service centres for e-services

As tech disruptions are set to rule the roost in the coming decades, India's much touted digital transformation can't wait any longer. Armed with the world's second largest internet market, digital e-governance no longer seems a distant reality despite India's somewhat late entry into this space. It is expected that India will witness an increase in the number of internet users to 800 million by 2023, driven by the increasing availability and decreasing cost of high-speed connectivity and smartphones. India's growth story is now intrinsically linked to the relative welfare of its people in the digital age. This calls for a greater impetus towards an e-governance infrastructure that focuses on public service delivery in order to achieve the goals of last mile connectivity. The good news is that recent developments are a step in the right direction: induction of ICT in government functioning and digital adoption of end-user platforms has brought about marked improvement in efficiency.

Considered a potential solution to the issue of 'big government', countries like Estonia have built a model known as 'government-as-a-service/platform' (henceforth, GaaP) that offers a more organized, digital-based service delivery system. With the singular aim of improved digital governance, the Estonian model places the citizen or the end-user at the centre of its design system to provide positive outcomes. By offering a single ID/card for multiple services, the focus has been on building an e-governance ecosystem that removes bureaucratic hurdles for citizens. According to a recent report by Omidyar Network India and BCG, the timing could not be better for India to roll out the carpet for Open Digital Ecosystems (ODEs) where the government 'creates the digital commons, enables interoperability between various stakeholders and leverages open-source software, data, standards, licenses and APIs in order to enhance citizen experience'.

The COVID-19 period also unlocked potential in other government service delivery mechanisms. For example, in order to enhance ease of doing business for MSMEs, the government launched the Udyam registration portal and integrated it with the government's e-commerce marketplace—GeM and the invoice-financing platform—TreDS. This portal allows MSMEs for paperless and free cost registration based on self-declaration, supports credit financing through the auction of trade receivables and offers competitive platform to showcase and sell their goods and services.

India is in the stage where digital & e-governance platforms are being integrated into government-run mediums such as various department websites, central welfare schemes, repositories, databases etc.. For instance, the Digital India initiative seeks to achieve the simplification of government processes through technology.

E-Commerce

Indian e-commerce market to touch $84 billion in 2021

The Indian online grocery market is estimated to reach US$ 18.2 billion in 2024 from US $1.9 billion in 2019, expanding at a CAGR of 57%. India's e-commerce orders volume increased by 36% in the last quarter of 2020, with the personal care, beauty and wellness (PCB&W) segment being the largest beneficiary.

Propelled by rising smartphone penetration, launch of 4G network and increasing consumer wealth, the Indian E-commerce market is expected to grow to US$ 200 billion by 2026 from US$ 38.5 billion in 2017. Online retail sales in India is expected to grow 31% to touch US$ 32.70 billion in 2018, led by Flipkart, Amazon India and Paytm Mall.

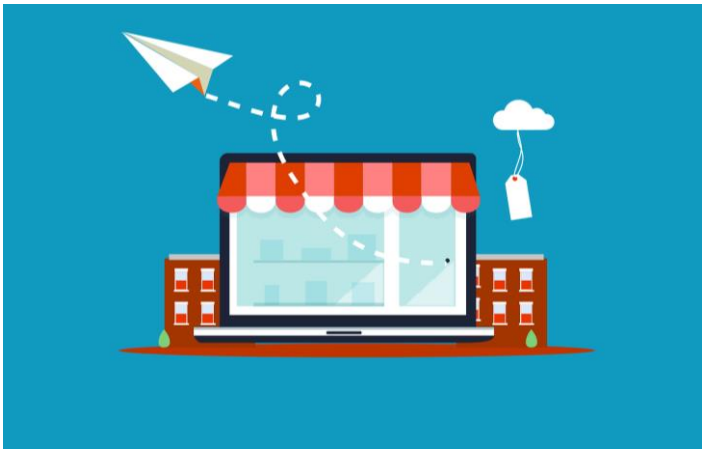
In India, smartphone shipments reached 150 million units and 5G smartphone shipments crossed 4 million in 2020, driven by high consumer demand post-lockdown.

In festive season CY20, the Indian e-commerce GMV was recorded at US$ 8.3 billion, a significant jump of 66% over the previous festive season. Similarly, the Indian e-commerce market recorded ~88 million users in festive season CY20, a significant jump of 87% over the previous festive season.

The E-commerce industry has been directly impacting micro, small & medium enterprises (MSME) in India by providing means of financing, technology and training and has a favourable cascading effect on other industries as well. Indian E-commerce industry has been on an upward growth trajectory and is expected to surpass the US to become the second largest E-commerce market in the world by 2034. Technology enabled innovations like digital payments, hyper-local logistics, analytics driven customer engagement and digital advertisements will likely support the growth in the sector. The growth in E-commerce sector will also boost employment, increase revenues from export, increase tax collection by exchequers, and provide better products and services to customers in the long-term. Rise in smartphone usage is expected to rise 84% to reach 859 million by 2022.

E-retail market is expected to continue its strong growth - it registered a CAGR of over 35% to reach Rs. 1.8 trillion (US$ 25.75 billion) in FY20. Over the next five years, the Indian e-retail industry is projected to exceed ~300-350 million shoppers, propelling the online Gross Merchandise Value (GMV) to US$ 100-120 billion by 2025.

According to Bain & Company report, India’s social commerce gross merchandise value (GMV) stood at ~US$ 2 billion in 2020. By 2025, it is expected to reach US$ 20 billion, with a potentially monumental jump to US$ 70 billion by 2030, owing to high mobile usage.



Social Media And Communication

Among ad formats on digital, currently, the highest proportion (29%) of overall spends on digital is contributed by social media.

Advertising on social media platforms is expected to drive the growth of the country's digital advertising industry. The segment is expected to grow at 20% to reach a market size of ₹18,938 crore by 2021, said a report by Dentsu India.
With India expected to have over 760 million smartphone users in 2021, social media platforms will be an immediate beneficiary of the increased data adoption.
As more users log onto Instagram, Facebook, Twitter, YouTube and Google, brands will find ways to target them through various formats of digital ads. This could include photos, videos, promoted posts and short format unskippable video ads that appear on digital video content.
Among ad formats on digital, currently, the highest proportion (29%) of overall spends on digital is contributed by social media which stands at Rs. 4,596 crore, registering a growth of 20% over 2019. It is expected to grow steadily in the next two years, said Dentsu in its Digital Advertising forecast report. The other key formats include online video, paid search and display banners.

E-commerce platforms have also emerged as a serious avenue for advertising during the pandemic as most consumers have opened to digital buying. E-commerce giants have been focusing on these consumers with initiatives like the use of local language and localized content and offers. In addition to that, higher focus on product search during the pandemic period has driven the evolution of e-commerce advertising in India.
By the end of 2020, the advertising spends on e-commerce platforms were Rs. 4,700 crore which is expected to grow at a compound annual growth rate (CAGR) of 40%. E-commerce advertising also results in greater sales conversions and personalized ads also helps in effective targeting of consumers.
"With increased digital consumption which accelerated last year, social media has picked up in a big way and it is driving the growth of digital advertising in India. The growth across key platforms is much sharper and faster than before.

Digital Payments & Payment Gateways

Digital Payments

In financial year 2021, as of December 2020, digital payments in India reached a total of 35.6 billion Indian rupees. This marks a significant increase from 20.7 billion Indian rupees in financial year 2018. Among the cashless payment options the mobile payment app BHIM (Bharat Interface For Money) overtook debit card payments since 2018. The value of BHIM transactions increased significantly between 2018 and 2021, whereas debit card payments remain on a stable level since 2019.

Digital payments will grow to 71.7% of all transactions by 2025

Of the overall payments in 2020, instant payments accounted for a 15.6 per cent share, 22.9 per cent was other electronic payments and paper-based payments commanded a 61.4 per cent share.

By 2025, the same will change to instant payments becoming 37.1 per cent, electronic payments becoming 34.6 per cent, and cash and other paper-based payments' share reducing to 28.3 per cent, it said. The share of real-time payments volume in overall electronic transactions will exceed 50 per cent in 2024. As the pandemic continues to drive changes in consumer and business behaviours, banks, merchants and intermediaries across the payment ecosystem are responding rapidly, prioritizing the shift to digital, the report said.

The global report said India, China, South Korea, Thailand and the UK rank in order as top-5 countries generating real-time transactions in 2020. Mobile wallet adoption rose to a historic high of 46 per cent in 2020, up from 40.6 per cent in 2019 and 18.9 per cent in 2018. Countries like Brazil, Mexico and Malaysia where many people historically relied on cash are now some of the fastest adopters of mobile wallets.

Payment Gateways

Budget 2021: Rs1,500 crore for digital payments industry to offset MDR losses.

The move also comes months after the Reserve Bank of India announced an Infrastructure Development Fund with an initial corpus of Rs 345 crore to promote digital payments in rural India. Patel said that both the funds can work in tandem to boost payments growth in India.

To be sure, the government had first waived off MDR — or the fees accrued by the banks and payment operators from merchants — for processing digital payments from the UPI and RuPay modes of payments in 2019.

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Electricity And Powering Telecom Infrastructure

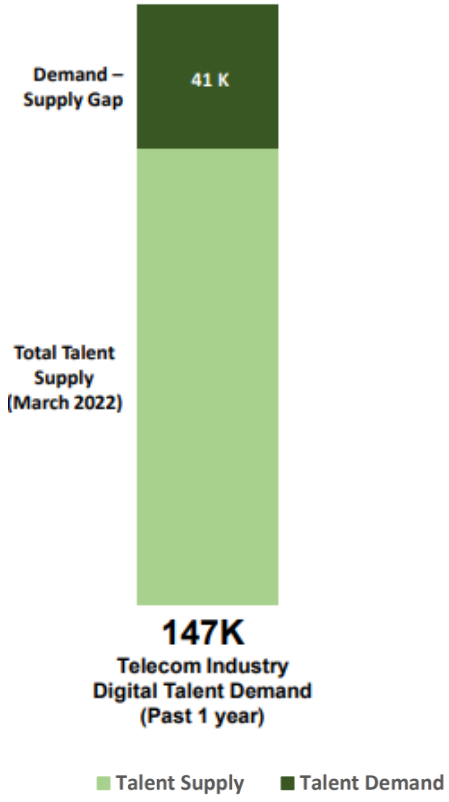
India has approximately 109 lakh of transmission/distribution ckt km and this network covers every nook and corner of the country. Also, with over 12 lakh transmission towers as against 5 lakh telecom towers, utility networks can ensure that there is no need to build new telecom tower sites. Transmission towers can easily host telecom equipment to act as telecom sites, of course, with the already fiberized facilities. This omnipresent utility network can ensure next-generation last-mile connectivity to the deepest corner of rural India.

To further strengthen the existing telecom infrastructure, collaborations between the Government and private players should be encouraged as it can help in creating the requisite fiber infrastructure. It will help telecom services to address our data demands from any part of the geography and provide reliable services round-the-clock, to ensure we stay connected for our business continuity.

Digital Demand Supply Gap

The total installed digital talent in the Telecom sector is 1.06 lac with a demand of 1.47 lac. The demand supply gap is highest across Cloud computing (56%) and lowest across Web and Mobile Development (36%)

India – Talent Attributes (Telecom Sector): Talent Supply and Demand is highest for Web & Mobile Development and lowest for AR/VR; Talent CAGR for the sector lies between 18.2% for Cloud Computing and 22.38% for Blockchain.



Job Function	Talent Supply	Talent Demand	Talent CAGR (Apr'17-Mar'22)	Attrition Rate (%)	Gender Diversity		Designation Split
					Male	Female	C-Suite %
Web & Mobile Development	44,300	60,400	19.58%	13.9%	78%	22%	4.05%
Cloud Computing	23,400	36,400	18.58%	15.7%	75%	25%	7.14%
5G	15,800	23,800	19.01%	16.6%	73%	27%	3.46%
AI & Big Data Analytics	15,100	20,700	19.33%	14.8%	77%	23%	4.59%
Internet of Things	14,800	20,900	22.45%	17.8%	74%	26%	9.85%
Embedded Systems	14,000	21,500	18.87%	10.1%	78%	22%	6.80%
Cyber Security	10,100	14,200	20.95%	13.7%	75%	25%	6.21%
RPA	1,600	2,200	20.70%	21.3%	76%	24%	9.20%
Blockchain	900	1,300	22.38%	20.3%	77%	23%	9.14%
AR/VR	800	1,100	19.80%	15.7%	80%	20%	6.13%

Telecom Sector Skill Council

TSSC

Telecom is driving India's next phase of growth with development of new technologies like 5G, IoT, ML/AI, Data, Blockchain, Cybersecurity and M2M communication. The need for skilled manpower is paramount and Telecom Sector Skill Council (TSSC) is helping bridge this gap. TSSC is an industry led apex body, a not-for-profit organization setup by NSDC & the telecom industry. We are committed to develop and ensure adequate availability of world class skilled workforce to boost growth and productivity of the telecom sector.

TSSC has a strong presence in the community with multiple projects through various channels. Our vision is to develop a world class skilled workforce for the Telecom industry. Skill development has the potential to become a tool for change, and TSSC provides skill development to the served and the underserved. TSSC offers multiple programs to conduct skill training. We have strong ties with the Ministry of Skill Development and Entrepreneurship (MSDE), Ministry for Electronics & Information Technology (MeitY), various state skill development missions and district skill committees.

दूरसंचार विभाग
DEPARTMENT OF
TELECOMMUNICATIONS

N·S·D·C
National
Skill Development
Corporation

COAI

ICEA
INDIA CELLULAR
& ELECTRONICS
ASSOCIATION

TSSC has several projects like Center of Excellence, TelcoJobs Job portal, TSSC Learning eLearning platforms, CSR and international projects to empower skill development in India.
With these projects we aim to take Skilling in India for the Telecom Sector to the next orbit.

10 Lac+
Trained Manpower
6.85 Lacs people are certified and ready for job

51
Qualification Packs
Industry Specific QP covers all 4 verticals - Service, Handset, Passive Infra and Network

1000+
Training Centers
Available from Ladakh to Kanyakumari ; Rajasthan to Arunachal Pradesh

26
Assessment Partners
3rd party assessment agencies conducting transparent and fair assessment

40+
Industry Partners
Major industry players across the telecom sector

TSSC has trained 10+ lac youth since inception and has 1000+ training centres across India with presence in all 36 states and UTs. TSSC has a strong industry and academic presence with 40+ industry partners and 600+ training partners. We cover 51 key job roles in the telecom sector and provide training through Govt. schemes, CSR projects and NAPS program.

TSSC: Qualification Packs

NSQC approved Qualifications:

	QP Code	Qualification
1	TEL/Q2101	In-Store Promoter
2	TEL/Q2100	Distributor Sales Representative
3	TEL/Q2400	Telecom E-waste Handler
4	TEL/Q6400	Optical Fiber Splicer
5	TEL/Q0102	Broadband Technician
6	TEL/Q2200	Telecom Customer Care Executive - Repair Center
7	TEL/Q2201	Handheld Devices (Handset & Tablet) Technician
8	TEL/Q6401	Optical Fiber Technician
9	TEL/Q2300	Telecom Terminal Equipment Application Developer (Android)
10	TEL/Q2301	Telecom Terminal Equipment Application Developer (Native)
11	TEL/Q4100	Tower Technician
12	TEL/Q6302	Active Network Management Associate
13	TEL/Q6100	Telecom Infrastructure Engineer
14	TEL/Q6205	Information and Communication Technology (ICT) Engineer - 5G Networks
15	TEL/Q6200	Base Station Sub-system (BSS) Support Engineer
16	TEL/Q4102	Cluster Manager
17	TEL/Q0200	Field Sales Executive
18	TEL/Q0100	Telecom Customer Care Executive - Call Center/Relationship Center
19	TEL/Q6206	Information and Communication Technology (ICT) Technician
20	TEL/Q6210	Telecom Technician - IOT Devices/System
21	TEL/Q6207	Grass Root Telecom Provider
22	TEL/Q6208	Network System Associate
23	TEL/Q2303	Telecom Embedded Hardware Developer
24	TEL/Q4101	Cluster In-Charge
25	TEL/Q6300	Installation Engineer - SDH, DWDM, L2 & L3 Equipment
26	TEL/Q0203	Territory Sales Manager - Prepaid/Broadband
27	TEL/Q4200	Fiber to-the Home (FTTH/X) Installer
28	TEL/Q2500	Hand Soldering Technician - Telecom Board
29	TEL/Q4107	Outside Plant (OSP) Fiber Installation, Testing and Commissioning Operator
30	TEL/Q2501	Telecom Surface Mount Technology (SMT) Technician

	QP Code	Qualification
31	TEL/Q2502	Line Assembler - Telecom Products
32	TEL/Q6211	Drive Test Engineer
33	TEL/Q4105	Wireless Technician
34	TEL/Q6202	Field Management Engineer
35	TEL/Q6212	Telecom Rigger – 5G and Legacy Networks
36	TEL/Q4201	Infrastructure Technician - 5G Networks
37	TEL/Q6213	Technician 5G – Active Network Installation
38	TEL/Q6306	Project Engineer - 5G Networks
39	TEL/Q6305	System Architect – 5G Cloud RAN

Upcoming Qualifications:

	QP Code	Qualification
40	TEL/Q6101	Last Mile Active Network Installer
41	TEL/Q6214	IoT Technical Service Executive
42	TEL/Q6102	AI Devices Installation Executive
43	TEL/Q6602	AI – Data Analyst
44	TEL/Q6215	Cloud Computing – Test Analyst
45	TEL/Q6603	Machine Learning (ML) Engineer
46	TEL/Q6216	IoT Installation Solutions Planner
47	TEL/Q6217	Drone Monitoring and Maintenance Associate
48	TEL/Q6218	Alarm Monitoring Executive – Network Operation Center (NOC)
49	TEL/Q6219	Fault Troubleshooting Technician – Network Operation Center (NOC)
50	TEL/Q6304	Technician – Automatic Train Protection System (ATPS)
51	TEL/Q6303	Technical Supervisor – Automatic Train Protection System (ATPS)

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