Telecom Sector Skill Council

draup

TELECOM TALENT IN 5G ERA

DEMAND-SUPPLY SKILL GAP REPORT 2023-24

Rajeev Chandrasekhar
राजीव चंद्रशेखर

Minister of State for Skill Development & Entrepreneurship and Electronics & Information Technology Government of India
कौशल विकास और उद्यमशीलता एवं इलेक्ट्रॉनिकी और सूचना प्रौद्योगिकी राज्य मंत्री भारत सरकार

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FOREWORD

India is transforming rapidly, and the telecom sector is at the forefront of this change. With the fastest 5G rollout in the world and one of the strongest digital infrastructures, India is well-positioned to be a leader in 6G technologies.

This transformation presents a great opportunity for the young generation of Indians. By acquiring the digital skills needed for the new age of technology, students and entrepreneurs can bridge the digital divide and access global markets. This will enable them to compete, grow, expand, and succeed.

The Telecom Sector Skill Council plays a vital role in shaping the future of the telecom workforce in India. Their Skill Gap Demand Report 2023-24 provides valuable insights into the skills that will be in high demand in the coming years. This report is a valuable resource for policymakers, educators, and training providers.

I commend the Telecom SSC for their work on this important report. I urge all stakeholders to use this report to develop and implement programs that will help India's youth acquire the digital skills they need to succeed in the new economy.

Together, we can build a skilled and prosperous India for the future.

Rajeev Chandrasekhar

Shram Shakti Bhawan, New Delhi - 110001, Phone : +91-11-23465816, Fax : +91-11-23465829
E-mail : mos-msde@gov.in
Electronics Niketan, CGO Complex, Lodhi Road, New Delhi - 110003, Phone : +91-11-24368757
Fax : +91-11-24360958, E-mail : mos-eit@gov.in

It would be through skill development that we can enable our young population to reap the benefits unleashed by the new age telecom technologies.
The skill demand report put together by the TSSC, in the context of existing skill development efforts, skill gaps and futuristic skills required, would serve a good reference point for skill development in the telecom sector. TSSC's emphasis on skilling and upskilling resonates well with the vision of a skilled and future-ready workforce in this digital era for India.
It is our endeavor in MSDE to take this forward in the education and skill ecosystem with the concerted efforts of all the stakeholders."

Shri Atul Kumar Tiwari
Secretary
Ministry of Skill Development & Entrepreneurship,
Government of India

Telecommunication is a powerful enabler of economic and technological progress of a nation. Bharat has leapfrogged in telecommunication infrastructure and thereby significantly enhanced the quality of life of its citizens.
After witnessing the fastest rollout of 5G in a year, Bharat is getting ready to lead in next Generation technologies such as 6G, AI and Quantum Computing. This will require a significant upgrade to the capabilities of our human resource base. Telecom Sector Skill Council's role in bridging the skill gap and nurture the right talent is truly praiseworthy. This report offers valuable insights into industry relevant skills & training, and will go a long way in creating forward-looking competencies for the new Bharat."

Shri Neeraj Mittal
Secretary (T)
Department of Telecommunications
Government of India

In the modern era, the telecom sector's significance in shaping our digital landscape cannot be overstated. India is getting ready for 6G initiatives after dominating in 5G roll out. Internet is now reaching every house in every village and the country is speeding towards “Digital India”. Appropriate skills are crucial with the onset of high-end technologies like 6G, Edge and Quantum Computing. Potential of technologies among rural areas, such as Drone Technology in Agriculture is immense and empowering thousands of citizens with the skills will help the Indian youth to aim higher.

This report by Telecom Sector Skill Council is of paramount importance to understand our shared vision of fostering a skilled and future prepared workforce.”

Dr. Nirmaljeet Singh Kalsi IAS (retd)
Chairman
National Council for Vocational Education & Training (NCVET)
Ministry of Skill Development & Entrepreneurship,
Government of India

In today's fast-changing digital landscape, India has etched its name as one of the leaders within the telecom sector. After becoming the fastest country to roll out 5G services globally, India has not only achieved a technological milestone but has also emerged as a beacon of innovation. Therefore, the cultivation of a highly skilled workforce is imperative to embrace this technological prowess. And to forge ahead with confidence and competence, we must embark on a journey to equip our youth with the right skill set—tuned to the demands of today's digital age. With emerging technologies within the telecom sector acquiring the right skills would empower thousands of people and help them dream higher.

The Telecom Sector Skills Council (TSSC) has been playing an instrumental role to identify the skill gaps and train our workforce to become future-ready. In the current landscape we need to delve deeper to forge pathways to progress. And in this regard, The Skill Gap Demand Report for 2023-24 meticulously captures the challenges and the opportunities existing in the telecom sector and provides a comprehensive insight into the skills that will define the industry's trajectory.

I believe this report would serve as a good reference point for skill development in the sector and will lead to meticulous cultivation of skills needed to propel the industry. In our relentless pursuit of nation development, NSDC is making skills accessible to all, at any place, and at any time and inspiring our youth to embody the essence of excellence through skill development.

Shri Ved Mani Tiwari
CEO and MD, NSDC International
National Skill Development Corporation

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Foreword

India holds the top spot worldwide when it comes to talent in the technology sector, consistently maintaining a position of leadership in establishing global technology operations. With a substantial pool of both seasoned professionals and emerging talent, India possesses a resilient resource base capable of serving the needs of both traditional and cutting-edge digital technologies.

"Telecom Talent in 5G Era: Demand Supply Skill Gap Report 2023-24" is a demand-supply skill gap report by Telecom Sector Skill Council in association with Draup. The past decade has been a phenomenal time for technology and the telecom industry in India. With higher focus on digitization than before, this is the time for India to shine brighter in terms of not just our growth rate but also our roles in solving innovating solutions to global problems.

Skill Development in Information and Communication segment in India has observed a shift, driven by several factors such as increased investments in education & training, emergence of new industries and technologies that require advance or nuanced skills and expertise and growing focus on bespoke & blended training. The domain of work and employment opportunities is also increasingly decentralized, with new opportunities presenting in emerging cities.

Keeping these factors in mind, Telecom Sector Skill Council has been working extensively on multiple initiatives for skill empowerment in ICT.

The need for skilled manpower is paramount and the Telecom Sector Skill Council (TSSC) is playing a pivotal role in closing this workforce proficiency disparity. TSSC is an industry led apex body, a not-for-profit organization setup by Ministry of Skill Development & the telecom fraternity and are committed to develop and ensure adequate availability of world class skilled workforce to boost growth and productivity of the telecom sector.

This report delves into an understanding of the telecom sector in India, the increasing convergence of telecom with the technology sector, and the potential of talent in India across various job roles. The aim of this report by the Telecom Sector Skill Council, is to develop and strengthen this sector, enabling business and skill development organizations to make informed decisions and, in turn, contribute to the overall growth and success of the industry, as well as the empowerment of the youth in our nation

Executive Summary

The primary aim of this report is to study the Talent Demand and Supply Gap that is existing in the Telecom Industry in India. This report analyzes the talent inflow and the demand created for new talent in sub-sections such as Service, Infrastructure, Manufacturing, etc. in the Telecom Industry and aims at building a reskilling model to help transform it.

Key Takeaways-

- Blue-collar talent in India is nearly four times that of corporate talent. China has the highest number of overall telecom talent, closely followed by India across the globe
- According to the Telecom Talent analysis across 15 occupations, Network Operation & Maintenance and Project Engineering have the most corporate talent, while Network Operation & Maintenance and Sales & Distribution - Service Segment have the most Blue-Collar talent. The total number of employed talent in the Indian telecom industry is 11.59 million, with 2.95 million corporate talent and 8.24 million blue-collar talent
- 5G technology is expected to boost the Indian economy by $500 billion between 2023 and 2040. By 2025, India will require 22 million skilled workers in 5G-focused industries such as cloud computing, robots, and the Internet of Things (IoT). India is the only country expected to have a skilled labor surplus, with 1.3 million workers in the Technology, Media, and Telecommunications (TMT) sector by 2030
- As we move into the Web 3.0 era, the proportion of software in the telecom sector will triple. Trends indicate that, with the help of AI, an even more powerful 6th Gen will emerge in the coming years. By harnessing the value of IoT & RPA, AI/ML, Metaverse, and 6G, telecoms stand to gain the most
- Investing in skills such as Cloud Development & Management, Software Development, and Programming could help to improve the capabilities of available tech talent in the telecom sector, allowing them to capitalize on the potential of Cloud services, Distributed Systems, and Scripting Languages
- Technologies like Network Slicing, Autonomous Systems, etc., that fall under the 5G scope are expected to evolve into something greater with the advent of 6G, which boasts of being almost 1000x faster than 5G, short-term opportunities like Data Engineering and Analytics, and Cyber & Network Security would assure short-term gains
- The third-largest industry in India, the telecom sector accounts for roughly 6.5% of all FDI inflow. By 2027, India is anticipated to account for 11% of all 5G subscriptions worldwide. Currently, India has a tele density of just over 85%. With 1.17 billion subscribers, India has the second-largest telecom industry worldwide
- Leading telecom companies Jio, Airtel, and Vodafone have expanded their footprint in India with a disproportionately higher number of qualified individuals. The top hubs with more than 41% of the relevant talent are Mumbai, Delhi, and Kolkata
- India currently faces a 2.41M telecom demand-supply gap, which is expected to increase to 3.8 times by 2030. Only 40% of India's graduates in computer science, IT, and math are employable in the technology sector due to the mismatch between academic requirements and industry demands
- India has a good chance to close the growing Demand-Supply gap by 2030 with the proper reskilling and hiring strategies that target adjacent talent in Tier-II & III cities and university supply

Abstract

Telecom Sector Skill Council (TSSC) is interested in comprehending the Demand Supply Gap of talent employed in Telecom companies in India. Draup comprehensively analyzed the job role taxonomy and talent overview corresponding to TSSC for India Demand Supply Gap Study and proposed a reskilling framework to boost and reshape the telecom industry.

This document outlines the exhaustive analysis of the Overall Telecom talent in India employed in different industry sub-segments such as Service, Infrastructure, Manufacturing, etc. A detailed taxonomy covering all job functions and roles will be constructed at the start of the analysis. For this study, Draup analyzed about 1M+ relevant profiles and structured them into 200+ job roles across 15 Occupations.

Draup analyzed 40 nations worldwide for talent analysis. **China, India, The United States, and Indonesia has higher employment rates of talent** than other nations. The Overall telecom talent has been bifurcated into **Blue-Collar and Corporate talent.** Corporate talent represents the executive/leadership workforce, whereas Blue-Collar represents support-related functions.

There is a sharp increase in the total tech in the telecom industry with the **demand for tech professionals anticipated to increase 3x** in the coming few years in the industry.

Since the industry is moving toward automation, investing in 6G technologies and AI/ML will help businesses grow in the present and future markets.

Emerging Technologies are the main foundations and the engine of technological advancement, including Data Science, AI, IoT, and Blockchain, and Telecom is embracing them to empower the industry.

The top job positions in telecom include **Machine Learning Engineer, Deep Learning Engineer, and Data Scientist**. Digital assistants have undergone a revolution with the emergence of Deep Learning.

With the rise of patents in telecom R&D, the United States and China are at the top of the international rankings, and investment in the 5G infrastructure is expected to increase at a very rapid pace.

Currently, India is the world's second-largest telecommunications market with a **subscriber base of 1.17 billion and** has registered strong growth in the last decade. With a daily increasing subscriber base, there has been a lot of investment and development in the sector.

It is estimated that **5G technology will contribute approximately $500B to the Indian Economy in the period, 2023-2040**. With the global leaders focusing on 5G and 6G, Indian companies like Reliance Jio, InfoComm Ltd, Bharti Airtel, and Vodafone-Idea are actively investing millions of dollars into R&D initiatives towards developing 5G and 6G capabilities.

The government has accelerated changes in the telecom industry and is engaged in creating space for telecom businesses to grow. With a more significant percentage of relevant talent, companies like Jio, Airtel, and Vodafone have expanded their footprint in India. The top hubs with more than **41% of relevant talent are Mumbai, Delhi, Kolkata, and Bengaluru.**

Talent distribution across the Telecommunication industry is decentralized. **Delhi and Mumbai are the key cities with large-scale talent availability,** while Bangalore and Kolkata have a comparable and growing presence.

Across the analyzed Job roles, **Network Operation and Maintenance has the highly Employed Talent of about 2,498,450** professionals and **6,99,560 Open Job postings.** Talent in Customer Service – Service Segment and Sales and Distribution- Handset Segment job roles have a high proportion of Women's talent compared to other job roles.

The attrition rate for Project Engineer and Network Installation is relatively higher than for other job families (occupations). In contrast, the hiring difficulty for almost all the job roles is comparatively low except for specific roles like Communication Electronics and Terminal Equipment Application Developer.

Telecom demand-supply gap in India stands at 2.41M (lower than China) and is forecasted to grow to ~ 3.8x by 2030.

An increase in corporate-university collaborations can provide relevant skills to students in Computer Science, IT & Math related fields to enhance the employable graduates share.

Project Engineering holds the highest median base pay at 3.9L, followed by Network Operation and Maintenance at 3.7L among the occupation levels. Project Engineering and Communication Electronics also hold the highest pay for blue-collar talent at 2.8L and 2.7L respectively.

Draup proposes a 6-step reskilling framework to boost and reshape the telecom industry.

Bengaluru, Pune, and other various cities hold a high volume of university supply which can be reskilled to take up entry-level positions.

The government has taken several measures to keep the telecom industry in good shape, along with various private partnerships.

With the right reskilling and hiring techniques by targeting adjacent talent in Tier-II & III cities and University supply, India has a robust opportunity to subjugate the widening Demand-Supply gap by 2030.

Draup Overall Database & Boundary Conditions

Draup harvests from around 25 sources on the Draup platform to identify the total employed talent across various employers.

These sources include Paid Vendors, Resume Banks by partnering with staffing and resume agencies, open profiles from public sources, Resume aggregators, and manual monitoring of key executives. Draup has a database of over 750 Million professional profiles that are refreshed every quarter, and a Job Description Corpus of over 250 Million tracked daily.

However, these profiles are further mapped to specific job roles based on the relevant workloads and skill clusters and are further validated to eliminate the following shapes:

1. Inactive profiles (profiles that have not been updated in the last seven or more years)
2. Ghost profiles on various public portals consist of duplicate profiles or profiles with job titles such as Chef, Driver, Owner, Insurance Agent, Tour Grade, etc.

The Draup Profiles Database consists of the following attributes of each professional profile that the models track from various publicly available data.

- **Business unit attribute** – This attribute provides information about the type of business
- **Business function attribute** – It defines the function in which the business is operating
- **Workloads** – It provides information on responsibilities taken by the employed talent
- **Skills tagging** – Core & Soft Skills – The professional profiles tagging based on the skills possessed
- **Tools & Technologies** – The knowledge of tools & technologies taken by professional profiles
- **Honors and awards –** The honors & awards mentioned in the professional profile
- **Experience –** The amount of work experience mentioned in the professional profile
- **Education –** The education status & history of the professional profile
- **Organization attributes –** The attributes around the company or employer of professional profile
- **Projects –** List of projects mentioned in the professional profile
- **Publications & many more -** List of publications mentioned in the professional profile

Methodology

To provide a detailed analysis of the Telecom Talent Demand Supply Gap in India, Draup uses different methodologies to identify the job role taxonomy and talent overview corresponding to TSSC.

- **Job Roles Taxonomy:**

Draup leveraged its professional profiles and job description database to map the relevant roles and skill sets to identify responsibilities and skills associated with telecom talent.

- **Cost Modelling Methodology:**

Draup uses cost modeling methodology to devise costing models run on JDs, publicly reported salaries, and labor statistics.

For this study, Draup analyzed about 1M+ relevant profiles and structured them into 200+ job roles across 15 Occupations:

• Network Operation & Maintenance	• Network (Active Components) Installation	• Data Handling – Network Managed Services
• Project Engineering	• Customer Service – Service Segment	• Customer Service – Handset Segment
• Operation & Maintenance – Passive Infrastructure	• Network Security	• Communication Electronics
• Network Fault Management	• Sales & Distribution – Handset Segment	• Terminal Equipment Application Developer
• Sales and Distribution– Service Segment	• Network (Passive) Installation	• E-waste Management



- ## Methodology for Talent Analysis

Draup leverages a robust methodology to estimate the employed talent pool in occupations provided by TSSC.

Draup has comprehensively analyzed the proprietary dataset of ~100 Million+ profiles of professionals employed in India. Draup has around 2M telecom talent profiles database, which was identified after analyzing attributes such as skills overlap, and workload overlap is tracked across Job roles, skills, and tools in Telecom.

Draup mapped the job roles provided by TSSC to the list of 15 occupations in Telecom to identify the job role level share of corporate talent, out of the 2M Telecom talent pool in India.

According to BetterPlace, **2.8M people are employed in roles directly related to Telecom Sector, and 7M are employed in in-direct roles related to Telecom Sector**. Over the past decade, talent grew by 35%+, and by considering these numbers, Draup estimated that Overall telecom talent (as of Apr 2023) in India is ~11.59M (Blue Collar is 8.24M and Corporate is 2.95M).
Draup followed the systematic approach to identify the blue-collar and corporate talent:

Step 1: Draup utilized the database of 80-100 Mn+ professional profiles employed in India

Step 2: To identify the talent employed in the Telecom industry, Draup tagged the professional profiles with the industry in which the talent is employed

Step 3: Based on the list of 15 occupations provided by TSSC, Draup categorized the relevant talent across the 15 occupations, listed below:

- Customer Service - Service Segment
- Sales and Distribution - Service Segment
- Sales and Distribution - Handset Segment
- Customer Service - Handset Segment
- Terminal Equipment Application Developer
- E-waste Management
- Communication Electronics
- Operation & Maintenance - Passive Infrastructure
- Network (Passive) Installation
- Network Operation & Maintenance
- Project Engineering
- Network (Active Components) Installation
- Network Security
- Network Fault Management
- Data Handling - Network Managed Services

Step 4: Draup identified the total employed talent in the telecom sector of India

Step 5: Draup categorized the identified telecom talent into corporate & blue-collar talent counts. Draup referred to secondary data sources such as news, articles, and reports to identify blue-collar talent.

Draup utilizes the identified share of job role-level talent out of the 2M talent pool to scale the Corporate & Blue-Collar talent numbers to the estimated values from the secondary data sources.

Fig. 1: Talent Data Estimation in the occupations provided by TSSC

Draup Database Source: 1. Talent Analysis using Draup's database of 750M+ professional profiles globally, each professional profile is tagged with a job role, employer, and location, among other attributes.
Secondary Data Sources: 2. The list of secondary data sources has been shared separately (in spreadsheet format)
The reported talent numbers are based on estimation and validation through secondary data sources and Draup's profile database; these provided numbers in ranges come with a 90-95% accuracy rate.

Results

Draup examined more than 40 nations worldwide for talent analysis. China, India, the United States, and Indonesia had higher employment rates of talent than other nations. China has the highest number of Overall Telecom talent, including Blue-Collar and Corporate talent, followed by India. The **demand for Tech professionals is expected to increase 3x** in the next few years.

The top job positions in Telecom are **Machine Learning Engineer, Deep Learning Engineer, and Data Scientist**. Major participants in the Indian Telecom industry, including Reliance Jio, InfoComm Ltd, Bharti Airtel, and Vodafone-Idea, are actively investing high in R&D projects to create 5G and 6G capabilities.

The government has accelerated changes in the Telecom industry and is engaged in creating space for Telecom businesses to grow. Companies like Jio, Airtel, and Vodafone have expanded their footprint in India with a more significant percentage of relevant talent. **Mumbai, Delhi, Kolkata, and Bengaluru are the top hubs with more than 41% of relevant talent**.

Emerging Technologies are the main foundations and the engine of technological advancement, including Data Science, AI, IoT, and Blockchain, and Telecom is embracing them to empower the industry.

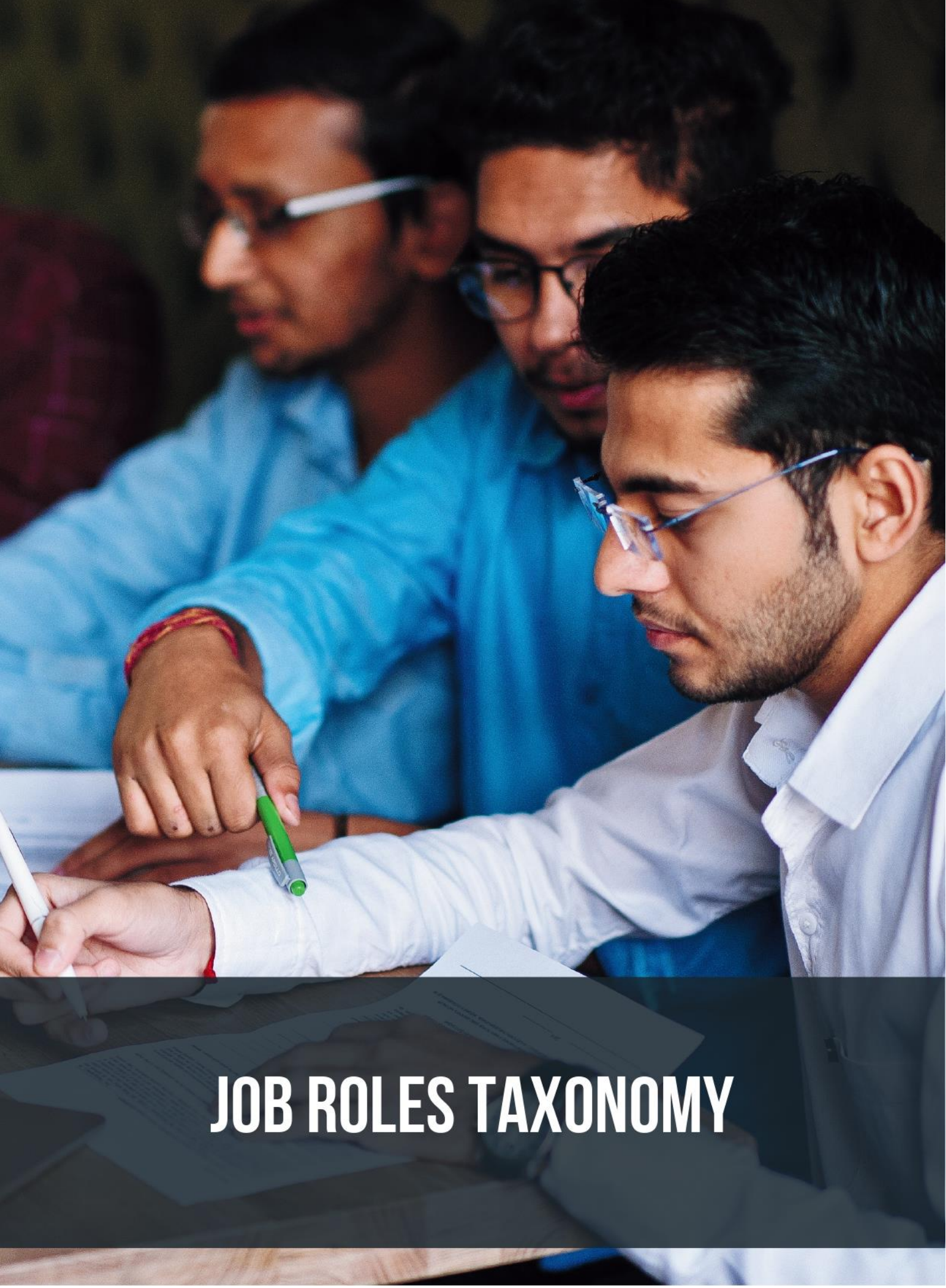
With the most patents in telecom R&D, the United States and China are at the top of the international rankings, and investment in the 5G infrastructure is expected to increase at a very rapid pace.

Network Installation and Terminal Equipment Application Developer has the highest attrition rate among job families, whereas Communication Electronics and Terminal Equipment Application Developer have more incredibly higher difficulty.

The Demand Supply Gap in the Telecom industry in India stands at **2.41M**, which is relatively low compared to China (**2.97M**). To increase the talent numbers in the Telecom industry, relevant skills can be provided to students in Computer Science, IT, Math, and related fields through higher corporate-university collaboration. Project Engineering and Communication Electronics have higher median base pay than other occupations.

Draup proposed a 6-step reskilling framework to boost and reshape the Telecom industry. Bengaluru, Pune, and a few other cities hold a high volume of university supply which can be reskilled to take up entry-level positions. The government has taken several measures to keep the Telecom industry in good shape, along with various private partnerships.

India has an opportunity to subjugate the Telecom Demand Supply Gap by 2030 with appropriate reskilling and hiring techniques.



JOB ROLES TAXONOMY

Job Roles Taxonomy

Draup conducted a comprehensive analysis of ~1 M+ relevant profiles and structured them into 200+ job roles across 15 Occupations. The job roles were further segregated according to the NSQF (National Skills Qualification Framework) into levels of ranking based on knowledge, skills, and aptitude. The levels under consideration are as follows –

- ***Levels < 3:*** Works entirely under the supervision of a superior. Low responsibilities and basic familiarity with job process/knowledge
- ***Levels 4 & 5:*** Responsible for their work and learnings. Factual and practical knowledge of the field along with well-developed skill(s) is essential.
- ***Levels 6 - 8:*** Entirely responsible for their work; exercises management and supervision in the context of work. Factual, theoretical, and working knowledge of job role/field

Adjacent job roles have also been mapped within the occupations that can potentially be considered in the analysis further.

Customer Service - Service Segment

The primary role of Customer Service – Service Segment Job Family is to interact with customers to address their concerns, answer their questions and assist them with their needs. A customer service job role will often answer customer phone calls and emails, responding to customers' questions and concerns.

Sales and Distribution - Service Segment

The primary responsibilities of this job role include selling telecommunications products, market position by locating, developing, and defining business relationships, improving coverage, better penetration and enhancing competitive position, taking up responsibility for all customer communication in the circle for the enterprise group, etc.

Sales and Distribution - Handset Segment

The Primary responsibilities of this job role include creating awareness of products through demonstrations, distributing samples, making presentations, and creating public interest.

Customer Service - Handset Segment

The primary role of Customer Service – Handset Segment Job Family is to interact with customers to address their concerns, answer their questions and assist them with their needs. They help customers complete purchases, upgrades, and returns, and frequently provide advice and technical assistance as well.

Terminal Equipment Application Developer

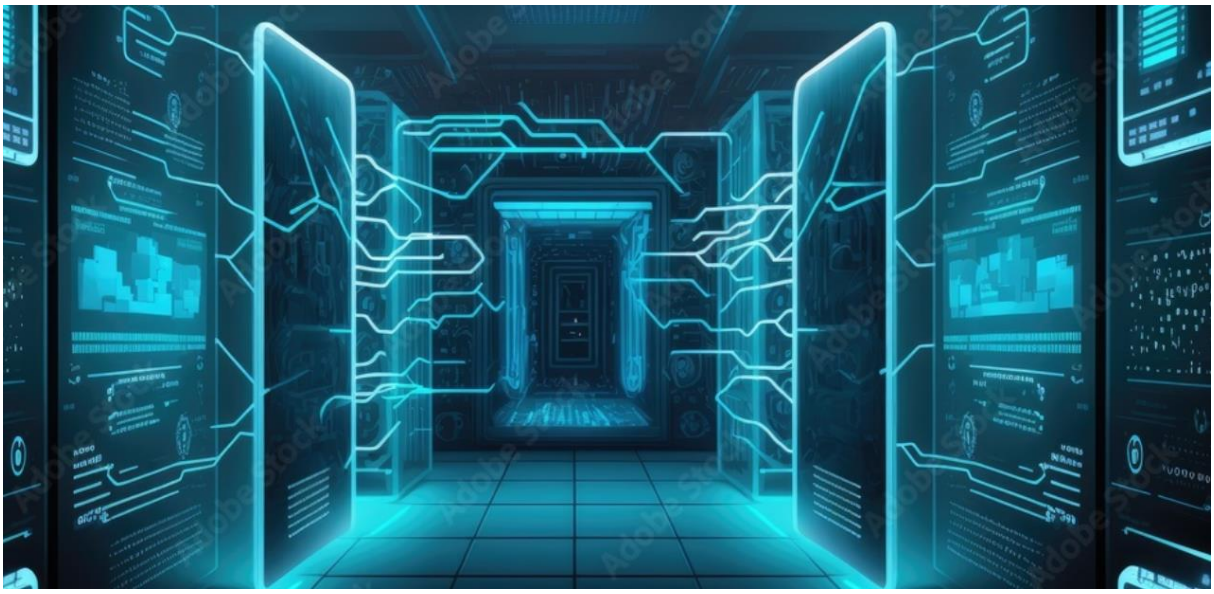
Telecom Terminal Equipment Application Developer is involved in the process of creating and developing applications for Android-based Smartphones/Tablets or iOS-based phones.

Occupation	Customer Service - Service Segment	Sales and Distribution - Service Segment		Sales and Distribution - Handset Segment	Customer Service - Handset Segment	Terminal Equipment Application Developer
Relevant Job Roles	Telecom Customer Care Executive - Call Center/Relationship Center	Territory Sales Manager - Prepaid/Broadband	Retail Store Manager	In-store Promoter	Telecom Customer Care Executive (Repair Centre)	Telecom Terminal Equipment Application Developer (Native)
	Jr. Supervisor	Distributor Sales Representative	Sales Supervisor	Sales & Marketing Executive	Handheld Devices (Handset & Tablet) Technician	Telecom Terminal Equipment Application Developer (Android)
	Billing Associate	Field Sales Executive	Retail Sales Specialist Cum Cashier		Mobile Handset (Smartphone & Tablet) Associate)	Telecom/Mobile Equipment Application Developer (Native) Executive
		Distributor Sales Executive	Distributor Salesman		Customer Service Desk Professional (Repair Centre)	Telecom/Mobile Equipment Application Developer (Android) Executive
		Retail Associate Cum Cashier	Retail Sales Associate			UI Developer (Native)
		Retail Trainee Associate	Retail Cashier			
		Home Sales Officer	Retail Store Ops Assistant			

NSQF Level

Levels 6-8 Levels 4,5 Levels =<3

Adjacent Job Roles



Source: DRAUP's proprietary talent module
Note: Roles listed are not exhaustive. The above taxonomy excludes seniority level prefixes (such as Senior, Lead, Principal, others) of the mentioned unique titles to showcase unique roles.

Job Roles Taxonomy

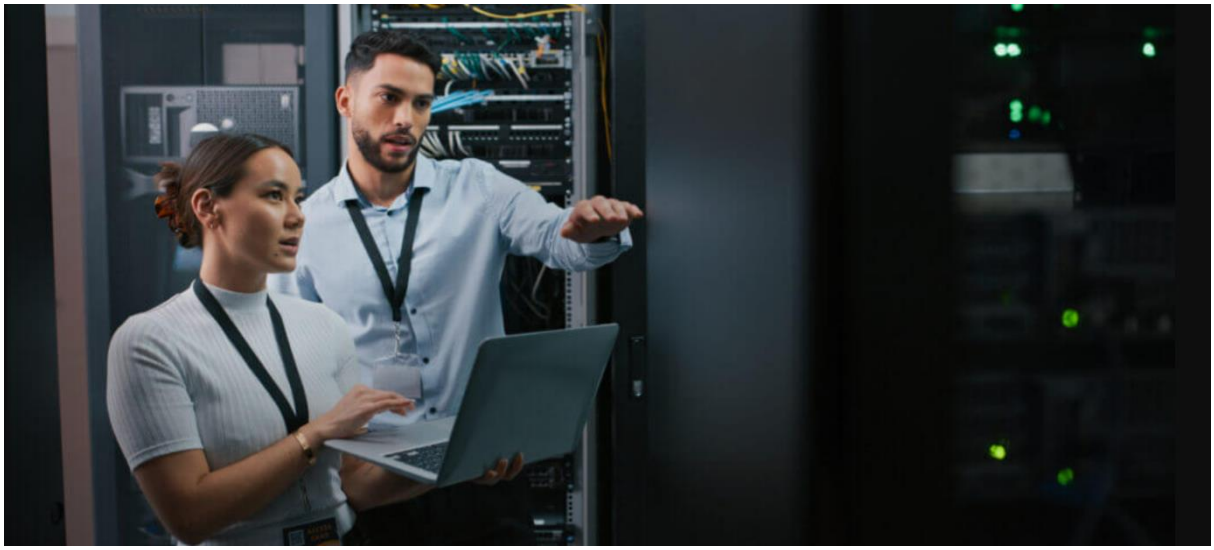
Draup conducted a comprehensive analysis of ~1 M+ relevant profiles and structured them into 200+ job roles across 15 Occupations. The job roles were further segregated according to the NSQF (National Skills Qualification Framework) into levels of ranking based on knowledge, skills, and aptitude.

E-waste Management – The E-Waste Job Family is responsible for collecting e-waste from retailers, repair shops, and other unorganized stakeholders. They are also responsible for promoting the importance of e-waste management and the ill effects of improper handling of e-waste. They lead, direct, and oversee all aspects of the e-waste management value chain.

Communication Electronics – This role is responsible for performing security and maintenance tasks, assisting with calibrations, completing the facility maintenance as per appropriate rules and regulations, monitoring site power and supervising, coordinating with supervisors for upgrades and modifications, etc. They are also responsible for maintaining the company's telecommunication networks, including communication systems and installation of internet lines and cables. Telecommunications technicians inspect the efficiency of the organization's communication networks, ensuring their optimal performance to support business operations.

Operation & Maintenance - Passive Infrastructure - This role is responsible for ensuring site uptime through preventive and corrective maintenance of passive infrastructure at sites, Energy Management, Site Management, Fault Reduction, and Preventive Maintenance. They also coordinate infrastructure upgradation activities and ensure timely payments of rent, diesel, and electricity charges after validating the vendor bills.

Network (Passive) Installation – This role provides passive infrastructure design expertise and support to the Passive Infrastructure Designers including all aspects of passive infrastructure design and coordination. They produce, review, and provide technical input into the documentation to ensure technical compliance with high-level requirements and respond as a first port-of-call to technical queries from many parts including Deployment, Property and Operations in a prompt and accurate fashion.



Occupation	E-waste Management	Communication Electronics		Operation & Maintenance - Passive Infrastructure		Network (Passive) Installation
Relevant Job Roles	Telecom E-waste Handler	Satellites Launch Chief Engineer	IoT Devices and AI Systems Integration Engineer	Cluster Manager	Base Station Sub-system (BSS) Support Engineer	AI Devices Installation Technician
	E-waste Collection Associate	Satellite Operator	IoT System Tester	Operations Engineer – OSS/BSS Testing	Cluster In-Charge	Passive Installation Technical Engineer
	E-waste Collector	Satellite Communication Technician	IoT Technical Service Executive	Instrumentation & Control Engineer	Telecom Testing Engineer	Operations and Management Coordinator (Passive Installation)
	E-waste Supervisor	Satellite Desk Coordinator	IoT Installation Solutions Planner	Quality Analyst	Automation Test Engineer	
		Satellite Controller	IoT – Telemedicine	Hand Soldering Technician - Telecom Board	Drone System Operations & Maintenance	
		SatCom Operations Engineer	IoT – Transport	Power supply Backup (EB/DG/BB) Technician	Outside Plant (OSP) Fiber Installation, Testing, and Commissioning Operator	
		Embedded/IoT Firmware Technician	IoT – Agriculture	Business Process Design Associate		
		Telecom Surface Mount Technology (SMT) Technician	IoT – Smart City	Designer – Control Systems	Engineer – Process Control	
		Drone Flight Control System (FCS) - Basic Hardware & Software	Satellite TV Technician	OSP Support Engineer	Testing Worker	
		Telecom Technician - IOT Devices/System		Testing & Laboratory Assistant	Testing Consultant	
		SatCom Systems Specialist	SatCom Engineer			
		Technical Support Engineer – Satellite Networking	Technical Project Coordinator - SatCom			
		Technology Specialist – SatCom	IoT Test Analyst			
		Technical Specialist	IoT DevOps Engineer			
		IoT System Integration Engineer	SatCom Electronics Technician			

Levels 6-8 Levels 4,5 Levels =<3

Adjacent Job Roles

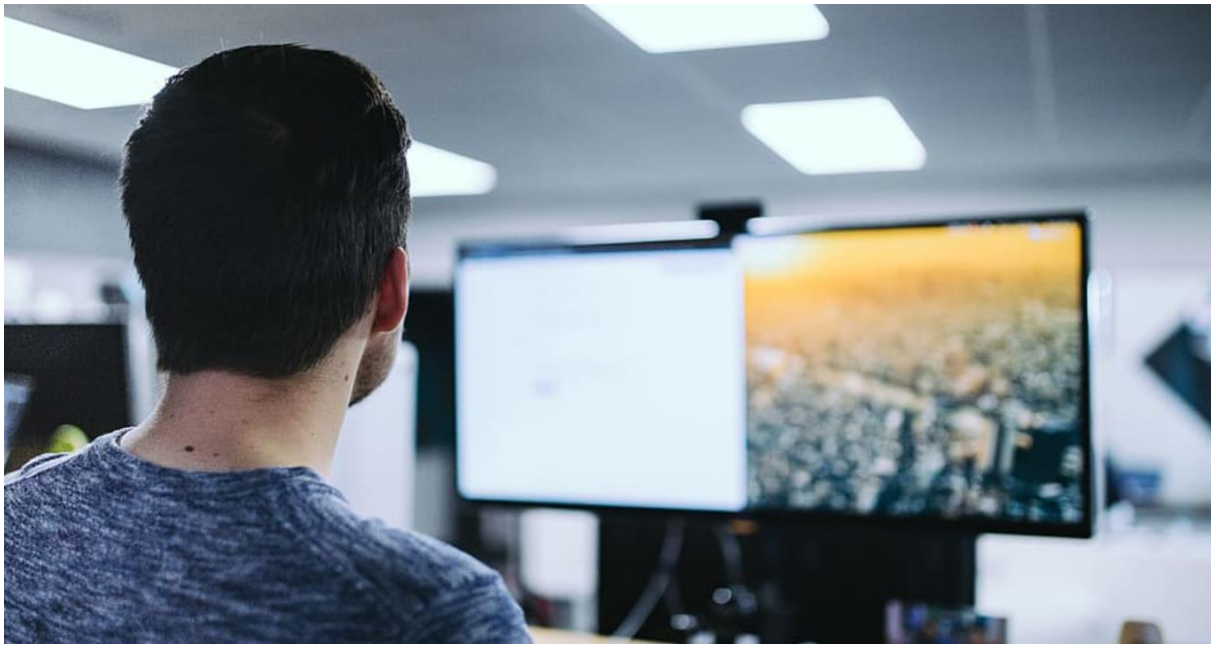
Job Roles Taxonomy

Draup conducted a comprehensive analysis of ~1 M+ relevant profiles and structured them into 200+ job roles across 15 Occupations. The job roles were further segregated according to the NSQF (National Skills Qualification Framework) into levels of ranking based on knowledge, skills, and aptitude.

Network Operation & Maintenance - This job family is responsible for creating and maintaining infrastructure necessary for the growth and upkeep of field and Network operations necessary by coordinating certification and field-level testing, as appropriate for the business segment. They ensure the reliability and robustness of the cable systems and set up configurations - number of fiber pairs in the cable, capacity, and landing stations.

Project Engineering - This job family is responsible for overseeing the execution of projects that involve the installation and maintenance of telecommunications systems such as phones, cables, internet, database network, or security systems. They work closely with other managers and engineers and may be tasked with developing and proposing project budgets.

Network (Active Components) Installation - Active Network Installation is responsible for carrying out rack-level installation to install 5G network equipment and then carrying out the 5G active network installation. They also identify and rectify faults or malfunctions during the installation process.



Occupation	Network Operation & Maintenance			Project Engineering			Network (Active Components) Installation
Relevant Job Roles	NGN Radio Planner	RF Planning & Optimization Engineer	Senior 6G Research Scientist	Embedded Product Designer - Technical Lead	6G Project Engineer	SoC Architect	Installation Engineer - SDH, DWDM, L2 & L3 Equipment
	6G Baseband Expert	System Architect – 5G Cloud RAN	5G NR (New Radio) Performance Test Engineer	Systems Designer	System Architect – 6G Cloud RAN	Principal Architect – Semiconductor Design	Line Assembler - Telecom Products
	Transmission Engineer	Core Engineer	Drive Test Engineer	5G Project Engineer	Simulation Specialist	Field Apps Engineer	Broadband Technician
	Wireless Technician	5G/O-RAN – Automation Testing Engineer	RF Site Surveyor	VLSI Verification Engineer	6G Standardization Architect	Safety Engineer	Optical Fiber Splicer
	Telecom Rigger – 5G and Legacy Networks	Grass Root Telecom Provider	Active Network Management Associate	Semiconductor Packaging Design Engineer	Wireless Research Systems Engineer	Process Integration Engineer	Fiber to-the Home (FTTH/X) Installer
	Tower Technician	Network System Associate		Semiconductor Manufacturing & Test Application Lead	Physical Layout Design Engineer	Silicon Validation Engineer	5G Technician – Active Network Installation
	QA Engineer	Service Engineer	Layer Engineer	Physical Design Engineer	6G System Engineer	Firmware Development Engineer	Infrastructure Technician - 5G Networks
	System Validation & Support Specialist – 5G RAN	5G RAN Integration Engineer	FM Specialist – RAN	Embedded Software Engineer	6G Implementation Engineer	RTL Design Engineer	Last Mile Active Network Installer
	Software Engineer – 5G RAN	Simulation Engineer – 5G RAN	Cloud Developer	Quality Engineer	Infrastructure Technician - 6G Networks	Scribe Design Engineer	BTS Engineer
	RAN NPO Engineer	RAN Support Engineer	RAN Tester	FPGA Design Engineer	ASIC Verification Engineer	Firmware Validation Engineer	Provisioning & Configuration Engineer
	5G RAN Developer	RAN Baseband Engineer	RF Validation Engineer	Warehousing Specialist	Analog Design Engineer		Rigger (Network Installation)
	Field Application Engineer	RF Systems Engineer	Compliance Engineer	Semiconductor Manufacturing & Test Technician			
	Signal Processing Engineer	RF Analog Layout Engineer	RF Analyst	Telecom Embedded Hardware Developer			
	LTE Developer	Field Technician	Telecom Operations Associate	Semiconductor Processor Associate			

NSQF Level

Levels 6-8 | Levels 4,5 | Levels =<3

Adiacent Job Roles

Job Roles Taxonomy

Draup conducted a comprehensive analysis of ~1 M+ relevant profiles and structured them into 200+ job roles across 15 Occupations. The job roles were further segregated according to the NSQF (National Skills Qualification Framework) into levels of ranking based on knowledge, skills, and aptitude.

Network Security – This job family is responsible for driving Network security, strategy, and implementation forward whilst protecting the business from internal and cyber security threats. They identify and analyze the organization's network requirements before overseeing the installation and parameterization of equipment and software. They implement the interconnections between the company's various networks, considering the user's needs in terms of performance, such as power, speed, and stability.

Network Fault Management – This job family is tasked with maintaining network uptime by ensuring that faults are effectively resolved within the shortest period. They also direct and coordinate with the field team to carry out corrective/change activities on-site in case field support is required.

Data Handling - Network Managed Services - This job family is responsible for successfully managing, creating, designing, implementing, and turning up services that include Data & Voice Services, Hosted/Cloud PBX/VoIP, IP enhancements, and procedures to support the Operations Department, etc.

Occupation	Network Security		Network Fault Management	Data Handling - Network Managed Services
Relevant Job Roles	Cyber Security Engineer	Cyber Threat Analyst	Information and Communication Technology (ICT) Engineer - 5G Networks	AI – Data Analyst
	Cloud Computing – Test Analyst	CCTV Surveillance Technician	Fault Management Engineer	Machine Learning (ML) Engineer
	Network Surveillance Optics Engineer	Cabling Technicians Access Control, CCTV	Field Management Engineer	Data Center – NOC Engineer
	Alarm Monitoring Executive		Information and Communication Technology (ICT) Technician	Drone – Data Handling and Analysis
	Surveillance Scale Engineer	Security Test Engineer	Optical Fiber Technician	Telecom Data Business Intelligence Analyst
	CCTV Technical Support Engineer	Routing & Switching Solution Test Engineer	Fault Troubleshooting Executive	MIS Executive
	CCTV Design Engineer	SDN & Netconf Developer	Optical Fiber Splicer	
	ELV Service Engineer	CCTV Installation Professional	ICT Network cabling Associate	
	Telecom Network Security Technician	Electrician Helper	Optical Fiber Executive	
	Field Executive		Optical Fiber Associate	
			System Test Engineer	
			Incident and Fault Management Associate	

NSQF Level

Levels 6-8 Levels 4,5 Levels =<3

Adjacent Job Roles

Source: DRAUP's proprietary talent module

Note: Roles listed are not exhaustive. The above taxonomy excludes seniority level prefixes (such as Senior, Lead, Principal, others) of the mentioned unique titles to showcase unique roles.

OVERVIEW: OCCUPATIONS IN INDIA

Telecom Talent Overview Across Occupations in India

Draup analyzed the Telecom Talent across the 15 occupations and identified that Network Operation & Maintenance and Project Engineering occupations have the highest corporate talent, whereas Network Operation & Maintenance and Sales & Distribution – Service Segment occupations have the highest Blue-Collar talent.

The overall employed talent in the Indian Telecom industry stands at 11.59M, with 2.95M Corporate talent and 8.24M Blue Collar talent (including talent directly employed in Telecom of 2.22M and talent employed in Telecom adjacent industries of 6.02 M).

The **top 4 occupations** that have the **highest corporate talent - Network Operation & Maintenance, Project Engineering, Operation & Maintenance - Passive Infrastructure, and Network Fault Management** - make up for **66%** of the total corporate talent among the 15 analyzed occupations. The **top 4 occupations** that have the **highest blue-collar talent - Network Operation & Maintenance, Sales, and Distribution - Service Segment, Project Engineering, Operation & Maintenance - Passive Infrastructure** – make up for **50%** of the total blue-collar talent among the 15 analyzed occupations.

Communication Electronics	Corporate	34,629	Network Operation & Maintenance	Corporate	800,160
	Blue Collar	242,431		Blue Collar	1,698,290
Customer Service - Handset Segment	Corporate	33,382	Network Security	Corporate	32,769
	Blue Collar	300,398		Blue Collar	131,081
Customer Service - Service Segment	Corporate	68,319	Operation & Maintenance - Passive Infrastructure	Corporate	375,461
	Blue Collar	614,881		Blue Collar	796,899
Data Handling - Network Managed Services	Corporate	104,250	Project Engineering	Corporate	453,399
	Blue Collar	286,680		Blue Collar	845,751
E-waste Management	Corporate	16,496	Sales and Distribution - Handset Segment	Corporate	44,851
	Blue Collar	148,444		Blue Collar	403,669
Network (Active Components) Installation	Corporate	296,196	Sales and Distribution - Service Segment	Corporate	104,831
	Blue Collar	628,654		Blue Collar	943,449
Network (Passive) Installation	Corporate	143,645	Terminal Equipment Application Developer	Corporate	70,704
	Blue Collar	304,875		Blue Collar	150,076
Network Fault Management	Corporate	370,210			
	Blue Collar	740,430			

Talent Availability

High **Medium** **Low**

The above table has the following attributes:

Occupation: Job function/division within the telecom industry

Job Role Type: The type of role - administrative or 'on-ground'

Employed Talent: Total recognized and available Telecom talent in the country.

Telecom Role Transformation

With a constantly evolving skill blend due to automation, arising technologies, and new business models, familiar telecom roles are transubstantiating their own. Numerous roles and skills aren't presently addressing invention trends. When it comes to technician roles including switch engineers, network technicians, network administrators, and BSS engineers, 33% of the top network engineering and operations roles aren't yet equipped with future skills to address trending inventions, says a new report from AI-powered talent intelligence platform Eightfold AI.

> 33% of the top Network Engineering and Operations roles aren't yet equipped with future skills to address the trending inventions

While the industry is better positioned to make out capabilities for cloud and edge computing as well as big data, the analysis identified the industry's lowest talent readiness is in the areas like 5G and Open RAN.

Telecoms have a short window of one to two years to develop 5G capabilities as service providers, quicken 5G rollout, and even get ready for 6G capabilities that will enable the realization of emerging trends like the metaverse phenomena.

There are **three ways that the telecom sector may address its talent issues and benefit from new opportunities** -

- Close the skills gap between the current workforce's declining and rising skills, upskill and reskill them, and use the skillsets to guide participants' abilities. Beginning with alternate job routes like Network Technician to Cyber Security Engineer, assessing skillsets, and articulating the necessary skills for these upcoming occupations are the first steps in the approach.
- Create a career path based on developing skills in other high-growth, innovative firms, and calibrating jobs with future talents. For instance, telecommunications might benefit from aligning job descriptions with the quickly expanding skills existing in the workforces of companies like Amazon, Meta, IBM, Google, Microsoft, Apple, and Netflix.
- Take advantage of a far broader pool of qualified talent by hiring potential. As a result of using a "lead hire" strategy, telcos may almost increase the number of employees working in Python, cloud computing, and 5G. For specialized knowledge like agile techniques, this nearly quadruples.

The fact that many students are not aware that the 5G industry offers career prospects and attractive earnings is now one of the main hurdles facing businesses looking for 5G talent.

However, telcos have a special opportunity to recruit talent since they are the means through which workers learn about the potential in the sector. 5G is a good career path just waiting to be discovered.

Finding skilled engineers and other personnel ready to switch to 5G is challenging due to a lack of awareness of the career opportunities available with 5G and tough competition for talent in an era of low unemployment. Because of the pandemic's consequences, the unemployment rate is still high, and many people are starting to think about switching careers.

5G work offers the opportunity to complete vital infrastructure projects, often with social distancing, which can simplify on-site work. By emphasizing the advantages of 5G, telecom companies may find it simpler to hire candidates with the knowledge and aptitude to advance swiftly into 5G-related professions.

Employers in the telecom industry increasingly require 5G-savvy personnel. However, hiring in a 5G-enabled future needs to look beyond short-term talents. To succeed long-term as a 5G service provider and quickly create the infrastructure required to deliver 5G, telecom businesses must prioritize employing candidates with the potential to advance into multiple positions within the organization.

Source: Talent Analysis using Draup's database of 750M+ professional profiles globally, each professional profile is tagged with a job role, employer, and location, among other attributes.
Note: The talent data is reported as the end of Q1 2022 and rounded off to 10's. *Direct – talent directly employed in Telecom Industry; Indirect – talent employed in telecom adjacent industries

5G TALENT OVERVIEW IN INDIA

5G Talent Overview in India

Using the internal database of 750M+ professionals worldwide, Draup identified that **RF Planning & Optimization Engineer and AI – Data Analyst** job roles have the highest 5G-related employed talent in India.

The **overall employed talent** in the **Indian Telecom industry** stands at **11.59M, with 2.95M Corporate talent and 8.24M Blue Collar talent** (including talent directly employed in Telecom of 2.22 M and talent employed in Telecom adjacent industries of 6.02 M).

Segment	Job Role	Employed Talent	Segment	Job Role	Employed Talent
5G – AT	Last Mile Active Network Installer	8,190	5G – AT	IoT System Tester	1,100
5G – AT	IoT Technical Service Executive	18,940	5G – AT	Telecom Data Business Intelligence Analyst	10,520
5G – AT	AI Devices Installation Technician	2,190	5G – AT	Drone Flight Control System (FCS) - Basic Hardware & Software	1,450
5G – AT	IoT Installation Solutions Planner	1,100	5G – AT	AI – Data Analyst	65,560
5G – AT	Drone System Operations & Maintenance	1,950	5G – AT	Machine Learning (ML) Engineer	53,390
5G – AT	Drone – Data Handling and Analysis	2,970	5G – AT	Cloud Computing – Test Analyst	51,140
5G – AT	IoT – Agriculture	2,680	5G – AT	Data Center – NOC Engineer	45,380
5G – AT	IoT – Telemedicine	8,440	5G – AT	Cyber Security Engineer	16,010
5G – AT	IoT – Smart City	500	5G – AT	IoT Devices and AI Systems Integration Engineer	60,860
5G – AT	IoT – Transport	3,990	5G – RF	5G NR (New Radio) Performance Test Engineer	2,640
5G – AT	Alarm Monitoring Executive	2,490	5G – RF	RF Planning & Optimization Engineer	78,450
5G – AT	Fault Troubleshooting Executive	3,440	5G – RAN	NGN Radio Planner	13,750
5G – AT	Cyber Threat Analyst	990	5G – RAN	5G/O-RAN – Automation Testing Engineer	18,450
5G – AT	Embedded/IoT Firmware Technician	4,010			

Talent Availability

High **Medium** **Low**

The above table has the following attributes:

Segment: Network Generation Version

Job Role: The Job function/division

Employed Talent: Total recognized and available Telecom talent in the country

5G Evolution in India

It is predicted that 5G technology will boost the Indian economy by **$500 billion between 2023 and 2040.** To assure the spread of 5G technology throughout the nation, 5G Spectrum Trials are now being carried out in India. By December 2024, it aims to have 70 percent of towers fiberized, average broadband speeds of 50 Mbps, and a rollout of 50 lakh kilometers of fiber optic cable across all of India.

The blue-chip business, which has a large market share, has been working hard to launch 5G as soon as possible and has budgeted **Rs.1.17 lakh crore for spending on its subsidiaries**, Nxtra, Indus Towers, and Bharti Hexacom, over the next five years. This funding will mostly be used to get India's digital infrastructure ready, which would aid the telco in smoothly launching 5G services.

5G in Canada has an average speed of 169.46 Mbps, 205% faster than 4G. Experts assert that 5G may be 20 times quicker than 4G. As a result, download and upload speeds have been greatly boosted because of the reduced latency. Additionally, 5G offers a wider frequency band that is intended to serve a variety of gadgets and technologies in addition to mobile or cell phones. By connecting not only mobile phones but also enhancing the connection between devices, 5G will be especially beneficial for technologies like artificial intelligence (AI), the Internet of Things (IoT), and cloud computing.

India will require 22 million skilled people in 5G-focused industries by 2025, including cloud computing, robots, and the Internet of Things (IoT).

Experts assert that 5G may be 20 times quicker than 4G.

In addition to this, 5G intends to alter how things operate in day-to-day life. For instance, a robot that might monitor crops and harvest fields, or the role of a doctor where artificial intelligence can diagnose a patient. Of course, 5G alone cannot accomplish them, but it is a step in the right direction for upcoming network generations.

However, the concern of harmful emissions due to the rising strength of networks that come with artificial intelligence taking over the globe is constantly present.

Harmonization of the spectrum

In India, spectrum allocation is still in progress. The technology that should be used in a specific spectrum band is entirely up to the service providers. As a result, service providers are free to employ any spectrum band to offer 5G services. However, India must accomplish spectrum harmonization to improve economies of scale, lessen problems with cross-border interference, and facilitate roaming, which would ultimately increase usage.

Development of small cells

Plan to install small cells so that operators can provide much more capacity in crowded regions and better coverage in areas where signal strength is hindered by structures. Small cells will be installed every 200–250 meters on various types of infrastructure, such as power poles, street light poles, bus shelters, etc., as 5G capabilities depend on a hyper-dense network.

Wireless backhauling

It will be challenging to manage the current microwave backhauls due to the anticipated increase in traffic, which is mostly due to LTE (4G) and 5G networks after the launch of 5G. As a result, the backhaul portfolio needs to be set as a millimeter (mm) Wave spectrum to meet the demand for higher capacity.

Service-based architecture

The 5G network is planned to be based on a service-based architecture (SBA) to meet the various demands of consumers, enterprises, and industries.

Investment

A substantial investment is needed in a radio network, spectrum, backhaul, etc. for a 5G network. It won't just be based on government funding for this purpose; the anticipated new revenue streams following the rollout of 5G will also be important. Even after Indian service providers including Reliance Jio, Bharti Airtel and Vodafone Idea have conducted their 5G trials, the final launch of 5G in India is expected in late 2022.

Statistics for wireless mobile networks have been extremely active in India. India has the second-largest population in the world with a high level of poverty. Because of these issues, not everyone in India is able to use 3G networks. If 5G can live up to expectations, it will also be able to reach India's rural areas and assist people there in their daily lives, including in the fields of agriculture, health care, and other professions. This will be a major success for humanity as much as for technology.

If 5G can live up to expectations, it will also be able to reach India's rural areas and assist people in their daily lives, including in the fields of agriculture, health care, and other professions.

It is also true that it won't be affordable or accessible to everyone, at least not in the next years. However, every step counts, thus with the introduction of 5G networks, everyone will benefit from progress, not only the more affluent members of society.

Source: Talent Analysis using Draup's database of 750M+ professional profiles globally, each professional profile is tagged with a job role, employer, and location, among other attributes.
Note: The talent data is reported as the end of Q1 2022 and rounded off to 10's.

TELECOM IN INDIA

Telecom Sector Landscape in India

India has the second largest Telecom sector, with a subscriber base of 1.17B.

India has the **second largest Telecom sector, with a subscriber base of 1.17B**. With a daily increasing subscriber base, there has been a lot of investment and development in the sector.

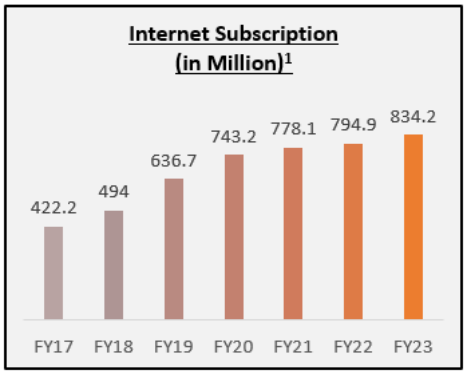


Fig. 7: Telecom Trends – Internet Subscriptions

Key players like Reliance Jio, Infocom Ltd, Bharti Airtel, and Vodafone-Idea in the Indian Telecom sector are actively investing millions of dollars into R&D initiatives towards developing 5G and 6G capabilities.

5G subscriptions in India are expected to reach **350M by 2026**, accounting for 27% of all mobile subscriptions.

FDI inflow in the Telecom sector stood at **US$ 39.04B** between April 2000 and March 2023.

The **PLI scheme** is expected to bring in investments of about **Rs. 4,000 crores** ($500M) and generate substantial direct and indirect employment.

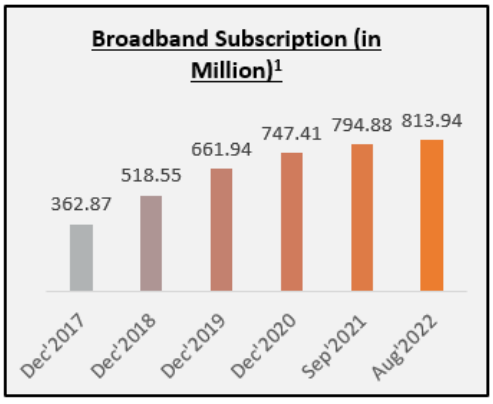


Fig. 8: Broadband Subscriptions

Source: 1. Insights derived from IBEF – Telecommunications report, November 2021, TRAI, and relevant articles.

Key Players

Jio

- Jio Platforms signed an MoU with the University of Oulu, Finland, for R&D-related activities in 6UG.
- **Jio invested Rs. 120 crores (US$ 15 Million) in tech firm** Two Platforms Inc. to enter Metaverse.
- Jio Platforms has invested $200 million in Glance, a platform that offers media content, news, and casual games on the lock screen of Android mobile devices.

Airtel

- **Airtel raised Rs. 22,000 crores (US$ 2.86B) in 2021**, and these funds are expected to develop a 5G network in India significantly.
- Airtel to **Invest Rs 5,000 Crores** to scale up data center business in India.
- Google and Airtel have partnered to expand India's digital environment. The deal involves a $700 million investment to purchase 1.28% of Airtel and up to $300 million for potential long-term business contracts.
- Airtel and Axis Bank will work together to sell a variety of cutting-edge financial services and digital products exclusively for Airtel's 340 million+ customers.

Vodafone

- Vodafone's Idea is to **invest Rs 16,656 crore (US$ 2B) per annum** to revamp the 4G network and to increase its tower footprint to 200,000 sites.
- In partnership with Bharti Airtel, Vodafone Idea to develop technologies to support 6G.
- The Research and Development Division of the Department of Telecommunications (DoT), Vodafone Idea, and the Center for Development of Telematics (C-DOT) have inked an agreement to use each other's domain-specific knowledge to develop and deploy IoT/M2M solutions in India.
- To establish the InViCT Telecom Center of Excellence, Vodafone Idea (VI) and the Indian Council for Research on International Economic Relations (ICRIER) inked a memorandum of understanding in New Delhi (ICRIER and Vodafone Idea Center for Telecom). The Center of Excellence is being created to serve the Digital India Mission by facilitating research consulting and policy support for the telecom industry.

BSNL

- In partnership with TCS, BSNL will deploy indigenously developed 4G and 5G NSA technologies by August 22. The project costs are **estimated to be around Rs. 249 crores (US$ 30M)**.
- The Odisha State Transport Authority (STA) and Bharat Sanchar Nigam Limited (BSNL) inked a memorandum of understanding to create, oversee, and run a vehicle location tracking (VLT) application.

Source: 1. Data sourced from Company websites, Economic Times, and relevant news articles

Government Initiatives to accelerate the growth in the Telecom Sector in India

The Government has fast-tracked reforms in the Telecom sector and continues to be proactive in providing room for the development of Telecom companies. Public Private Partnerships and Production Linked Incentive schemes encourage the private sector to participate in this growth.

China and the United States are leading 5G research. During the period 1996-2018, there were 6,828 publications related to 5G, with the most from China (981), the United States (618), and the United Kingdom (469). Investments in 5G infrastructure were estimated at 21.3% of total wireless infrastructure spending (Rs. 3.03 lakh crores or US$ 38.1B) in 2020.

Public Private Partnerships like **BSNL and Skylotech India** are developing **Satellite-based Narrowband-IoT networks** to support the Agriculture and Fishery industries and partnering with foreign countries like **Japan** to enhance ICT sector cooperation.

BSNL and Skylotech India are developing Satellite-based Narrowband-IoT networks to support the Agriculture and Fishery industries

Recent Government Initiatives

Policy Support:

The Department of Telecom has been given Rs 91,554 crores ($11.11 billion) in the Union Budget 2022–23, of which Rs. 30,436 crores ($3.99 billion) were allocated for revenue expenditures, accounting for 36% of total expenditures, and Rs. 58,291 crores ($7.11 billion) were allocated for capital expenditures, accounting for 64.01% of total expenditures.

Launched in May 2022, the **Prime Minister Wi-Fi Access Network Interface (PM-WANI) aims to hasten the expansion of broadband internet services**. Public Data Offices provide this free Wi-Fi service across the entire country (PDOs). 2,384 Wi-Fi hotspots at 100 train stations in 22 states provide access to it. The government also introduced a 5-P model of people-panchayat-public-private-partnership in August 2022, which will expand the PM-WANI Scheme to the nation's interior.

The Bharat Net fiber optic cable project was introduced in June 2022. It was put into place to give Indian gram panchayats broadband connectivity. 161,870 of the 178,247 Gram Panchayats where it was laid are currently operational. After 4,218 Gram Panchayats joined via satellite media, there were 166,088-gram panchayats that were ready to operate as a whole. The government wants to give broadband access to every gram panchayat by the year 2025.

A website portal - "Tarang Sanchar"- has been developed by the Ministry of Telecom to disseminate data on mobile tower compliance and Electromotive Force (EMF) emission standards. Consumers at home can learn more about the towers that are active in a particular location. Due to this, there are now 446 million users online instead of 251 million users in 2022.

Ministry of Telecom developed “Tarang Sanchar” website portal to disseminate data on mobile tower compliance and Electromotive Force (EMF) emission standards.

PLI Schemes in the Telecom Sector:

The PLI schemes for the telecom sector have been successful in attracting investments and boosting domestic manufacturing. To boast the vision of Atmanirbhar Bharat, the Ministry of Communications granted approval to 42 companies including 28 MSMEs, under the PLI Scheme for Telecom and Networking Products. Out of which, 17 companies have applied for an additional incentive of 1% under design-led manufacturing criteria. These 42 companies have committed investments of Rs. 4,115 crores. This is expected to generate additional sales of Rs. 2.45 Lakh crores and create additional employment of more than 44,000 over the scheme period.

Production Linked Incentive (PLI) Scheme for Telecom and Networking Products: This scheme was launched in February 2021 with an outlay of INR 12,195 crores. On December 2022, a total of 42 companies, including 28 MSMEs and 14 Non-MSMEs (eight domestic and seven global companies), were given the green light for an investment of $502.95 million as part of the PLI Scheme. The objective of the scheme is to promote domestic manufacturing of telecom and networking products, such as 4G, 5G and 6G telecom equipment, fiber optic cables, and microwave towers.

Union Cabinet approved Rs. 12,195 crores ($1.65B) under Production Linked Incentive (PLI) Scheme for Telecom & Networking

Design-led PLI Scheme for Telecom and Networking Products: The Union budget of FY2022-23 announced a design-led PLI Scheme for telecom and networking products. It was launched in June 2022 and applications were invited from Design-led manufacturers, as well as others, for availing incentives under the PLI Scheme for five years commencing from 1 April 2022. Additionally, if the products are both designed and made in India, the government offers an extra 1% incentive on top of existing benefits. The objective of the scheme is to promote design-led manufacturing of telecom and networking products. This includes products that are not covered under the PLI Scheme for Telecom and Networking Products, such as routers, switches, and cloud-based telecom solutions.

The PLI schemes are expected to play a major role in India's 5G/6G journey. By promoting domestic manufacturing, the PLI schemes will help to reduce India's dependence on imports and make it a global hub for telecom manufacturing.

FDI Cap

The FDI cap in the Telecom sector has been **increased to 100% from 74%.** In October 2021, the government notified 100% of foreign direct investment (FDI) via the automatic route from 49%.

Structural and Procedural Reforms

In 2021, large-scale structural and procedural reforms like the **Rationalization of Adjusted Gross Revenue and reduction in Bank Guarantee requirements** were brought to enhance liquidity and minimize financial stress within the Telecom sector.

Investment / Major Development

Increasing Investments

In 2021-22, the Department of Telecommunications allocated **Rs. 58,737,00 crores** ($ 8B), of which **56% allocation is towards revenue expenditure** and **44% towards capital expenditure.**

Development Measures

Under the Union Budget 2021-22, the **government allocated $ 1.9B for Telecom infrastructure** that entails the completion of an optical fiber cable-based network for Defense services to improve mobile services in the North-East.

Ease of Internet

The Department has approved a proposal to provide Public Wi-Fi Services by establishing **Public Wi-Fi networks** for Telecommunications.

Source: The data is sourced from IBEF Telecommunications Report, November 2021.

India Telecom Talent Overview

Talent distribution across the Telecommunication industry is decentralized. Delhi and Mumbai are the key cities with large-scale talent availability, while Bangalore and Kolkata have comparable and growing presence.

Organizations such as **Jio, Airtel, and Vodafone** have scaled presence in India with a relatively higher number of relevant talents. **Mumbai, Delhi, and Kolkata** are the top hubs with more than **41%** of relevant talent. These locations also house the top telecom giants.

Locations such as **Bangalore and Chennai** are medium-scale talent hubs, constituting **~18% of the total analyzed talent.**

Across the analyzed MSAs**, Hyderabad, Ahmedabad, and Pune** are emerging locations with substantial potential, accounting for approximately **~18% of total relevant talent. Pune** could be a **good investment** for telecom names **Jio and Airtel** owing to the enormous growth of **tech talent** observed in the past decade.

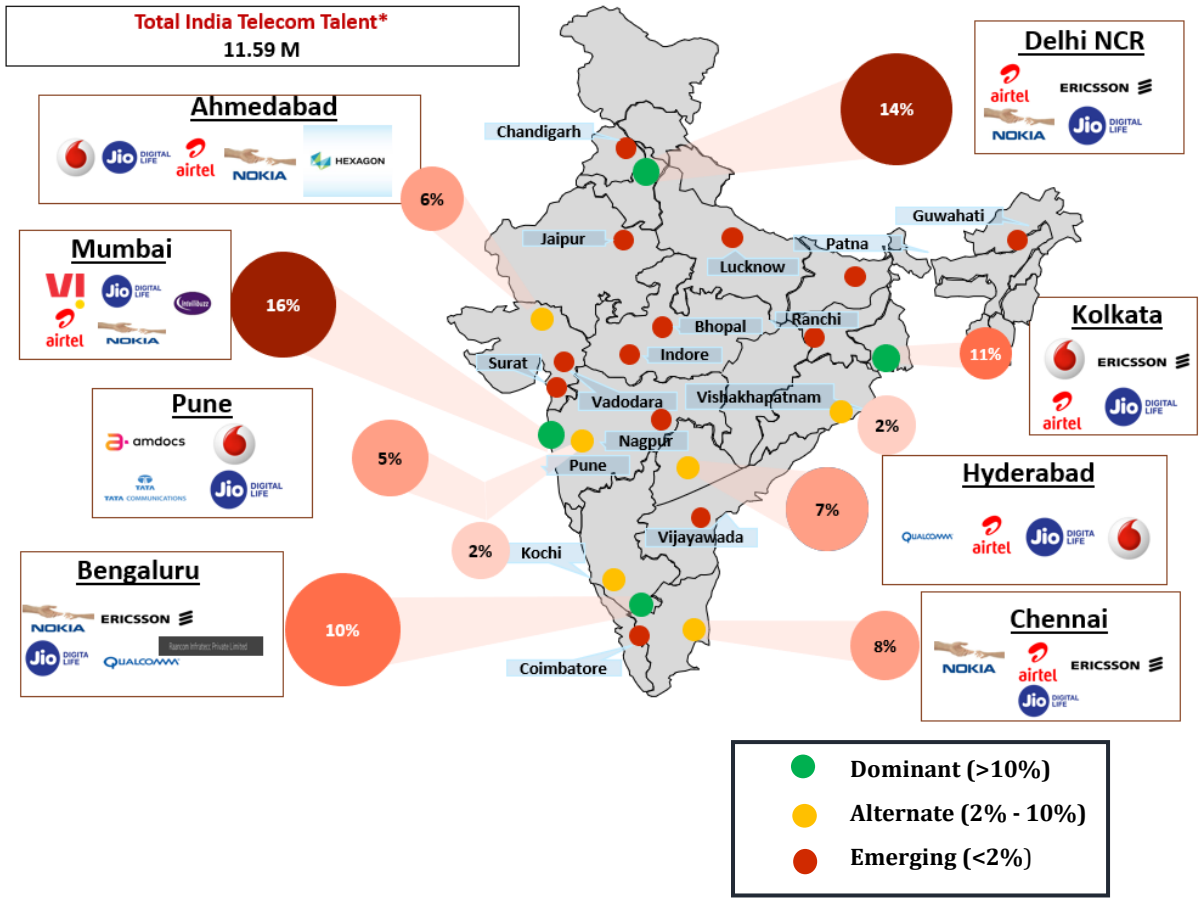


Fig. 9: India Telecom Talent Overview

Note: Locations with relatively low talent presence, i.e., less than 1,500 talented professionals, have not been included in the above map; the location analyzed is inclusive of the respective cities and not the overall region
Source: *Draup Talent Module that tracks 750M+ talent profiles for location and role level insights

Talent Analysis

The Talent Analysis table has the below attributes:

Analyzed Job Roles: Job Roles under consideration for the analysis

Total Employed Talent: Total addressable talent available in the region under analysis

Demand/Job Postings: Total Job openings in the telecom industry specific to the analyzed job roles in the previous year

Hiring Difficulty: The level of difficulty expected to fill the job vacancy for the analyzed roles

CAGR: Annual Growth rate observed in terms of supply and demand of relevant talent

Gender Diversity: The presence of female talent as compared to male talent

Attrition Rate: The rate at which employed talent exit from the current role

Experience Split: Total addressable talent split experience-wise

Across the analyzed Job roles, **Network Operation and Maintenance** have highly Employed Talent of **2,498,450 professionals and 699,560 job postings**.

Talent in Network operations and Maintenance and Project Engineering has a high proportion of Women's talent compared to other job roles. The composition of experience split is more in 0-2 years with 56%.

The experience split of candidates with 0-2 years of experience in Operation and maintenance of e-Passive Infrastructure and Network Fault Management is 62% and 61% respectively, which is the highest in the overall experience split.

The customer service segment shows the highest proportion of women's talent within a range of 33%-35% and with a low hiring difficulty. It also highlights the experience segment with more than 6-10 years of experience at 33% and 3-5 years of experience at 29%.

The Sales and Distribution-Service Segment shows the second highest proportion of women's talent within a range of 27%-29%. The experience segment highlights the 0-2 years of experience with 52%. It states that the job role welcomes fresh talents.

The attrition rate of the Project Engineering job role is 17.3%, which is the highest in the overall job role. The role also welcomes experienced talents with a weightage of 34% to 3-5 years, 28% to 6-10 years and 26% to 10+ years.

The highest CAGR can be observed with Network Operation & Maintenance role with a 9.67% increase.

Talent distribution In India							
Analyzed Job Roles	Total Employed Talent[1]	Demand/ Job postings[2]	Hiring Difficulty[3]	CAGR (20-23) [4]	Gender Diversity (%Female)[5]	Attrition Rate[6]	Experience Split (0-2Yrs. | 3-5Yrs. | 6-10Yrs. | 10+Yrs.)
Network Operation & Maintenance	2,498,450	699,560	HIGH	9.67%	11% - 13%	14.2%	56% 22% 15% 7%
Project Engineering	1,299,150	324,780	MODERATE	8.82%	7% - 9%	17.3%	12% 34% 28% 26%
Operation & Maintenance - Passive Infrastructure	1,172,360	222,750	MODERATE	8.10%	11% - 13%	12.1%	62% 22% 7% 9%
Network Fault Management	1,110,640	177,700	MODERATE	7.93%	4% - 6%	11.4%	61% 19% 11% 9%
Sales and Distribution - Service Segment	1,048,280	157,240	LOW	7.42%	27% - 29%	8.2%	52% 26% 14% 8%
Network (Active Components) Installation	924,850	157,230	MODERATE	6.71%	5% - 7%	14.4%	58% 19% 17% 6%
Customer Service - Service Segment	683,200	88,820	LOW	4.99%	33% - 35%	11.5%	27% 29% 33% 11%
Network Security	564,990	163,850	HIGH	4.47%	6% - 8%	13.6%	10% 36% 30% 24%

Score in Individual Parameter

Highly Favourable | Moderately Favourable | Unfavourable

Note: The analysis utilizes Draup's actively tracked database of 750M+ profiles across 5M+ organizations globally. Values have been rounded off. 1. The talent Availability/employed talent is the Overall talent captured in the MSA. 2. Demand/job postings have been extracted by considering job openings for the last year, April 2022 – May 2023. 3. Hiring Difficulty is derived from components such as talent headcount, growth rate, Notice Period, Base pay, Number of Enterprises, and Labor law complexity. The low value of hiring difficulty Is considered a favorable factor for the location. 4. Growth Rate is reported as CAGR for 2020-2023. 5. Gender has been calculated using LSTM Models with an F1 score >0.8. Drape's proprietary talent module analyzed the diversity metrics across the talent pool, the above number is showing only the female percentages. 6. Attrition rates have been reported for the last year. The coloring is relative, and the represented experience split might vary by +/- 1%

The attrition rate for **Network installation and Terminal Equipment Application Developers** is relatively higher. The hiring difficulty for almost all the job roles is comparatively low except for specific roles like Communication Electronics and Terminal Equipment Application Developer.

The female gender diversity is relatively higher in the Sales and Distribution-Handset Segment, Communication Electronics, and E-waste Management, whereas Data Handling-Network Managed Services and Network (Passive) Installation has the lowest.

The highest employed talent is with the Sales and Distribution- Handset Segment and Network (Passive) Installation with 448,520 professionals whereas the highest job posting is with Communication Electronics with 85,890 postings. E-waste Management has the lowest employed talent and job postings.

The availability of 0-2 years of experience is more with Network (Passive) Installation with a weightage of 58% and E-waste Management with a weightage of 59%.

Overall, the highest CAGR can be observed with Sales and Distribution- Handset Segment with a 3.82% increase.

Talent distribution In India

Analyzed Job Roles	Total Employed Talent[1]	Demand/ Job postings[2]	Hiring Difficulty[3]	CAGR (19-22)[4]	Gender Diversity (%Female)[5]	Attrition Rate[6]	Experience Split (0-2Yrs. | 3-5Yrs. | 6-10Yrs. | 10+Yrs.)
Sales and Distribution - Handset Segment	448,520	49,340	LOW	3.82%	31% - 33%	8.2%	10% 33% 33% 24%
Network (Passive) Installation	448,520	62,800	LOW	3.78%	6% - 8%	14.6%	58% 18% 13% 11%
Data Handling - Network Managed Services	390,930	54,730	LOW	3.20%	4% - 6%	8.9%	16% 32% 28% 24%
Customer Service - Handset Segment	333,780	50,060	LOW	2.93%	15% - 17%	10.1%	14% 37% 33% 16%
Communication Electronics	277,060	85,890	HIGH	2.43%	23% - 25%	12.9%	14% 32% 28% 26%
Terminal Equipment Application Developer	220,780	35,330	MODERATE	1.87%	16% - 18%	14.2%	18% 36% 32% 14%
E-waste Management	164,940	18,150	LOW	1.44%	20% - 22%	9.0%	59% 21% 15% 5%

Score in Individual Parameter

Note: The analysis utilizes Draup's actively tracked database of 750M+ profiles across 5M+ organizations globally. Values have been rounded off. 1. The talent Availability/employed talent is the Overall talent captured in the MSA. 2. Demand/job postings have been extracted by considering job openings for the last year, April 2021 – May 2022. 3. Hiring Difficulty is derived from components such as talent headcount, growth rate, Notice Period, Base pay, Number of Enterprises, and Labor law complexity. The low value of hiring difficulty Is considered a favorable factor for the location. 4. Growth Rate is reported as CAGR for 2019-2022. 5. Gender has been calculated using LSTM Models with an F1 score >0.8. Drape's proprietary talent module analyzed the diversity metrics across the talent pool. 6. Attrition rates have been reported for the last year. The coloring is relative, and the represented experience split might vary by +/- 1%

Demand Supply Gap Analysis

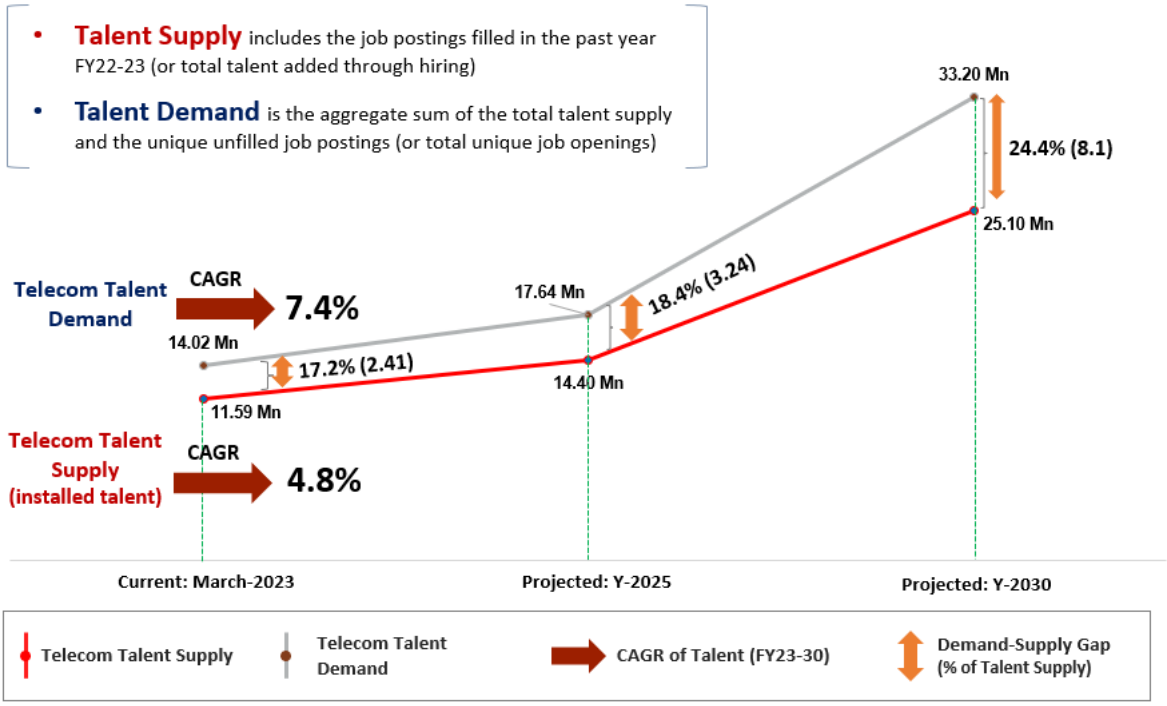


Fig. 10: Telecom Talent Demand and Supply - India

- **Telecom demand-supply gap** in **India** stands at **2.41M** and is forecasted to reach **3.8x by 2030**.
- The gap is, however, **relatively low compared to** global Telecom leader **China**, which also has a lower potential for talent growth (low CAGR for Talent Supply) than India.
- With the **telecom industry undergoing a digital transformation** due to areas like voice and text messaging being replaced with OTT services – they are **leveraging technologies such as Mobile Edge Computing (MEC), IoT, and 5G**.
- **Emerging and new-age technologies** require rapid reskilling of the existing tech and telecom talent which is **not entirely supported by the Indian academic curriculum**.

Countries	Demand-Supply Gap (FY23, in Mn.)
China	2.97
India	2.41
USA	0.78
Indonesia	0.46

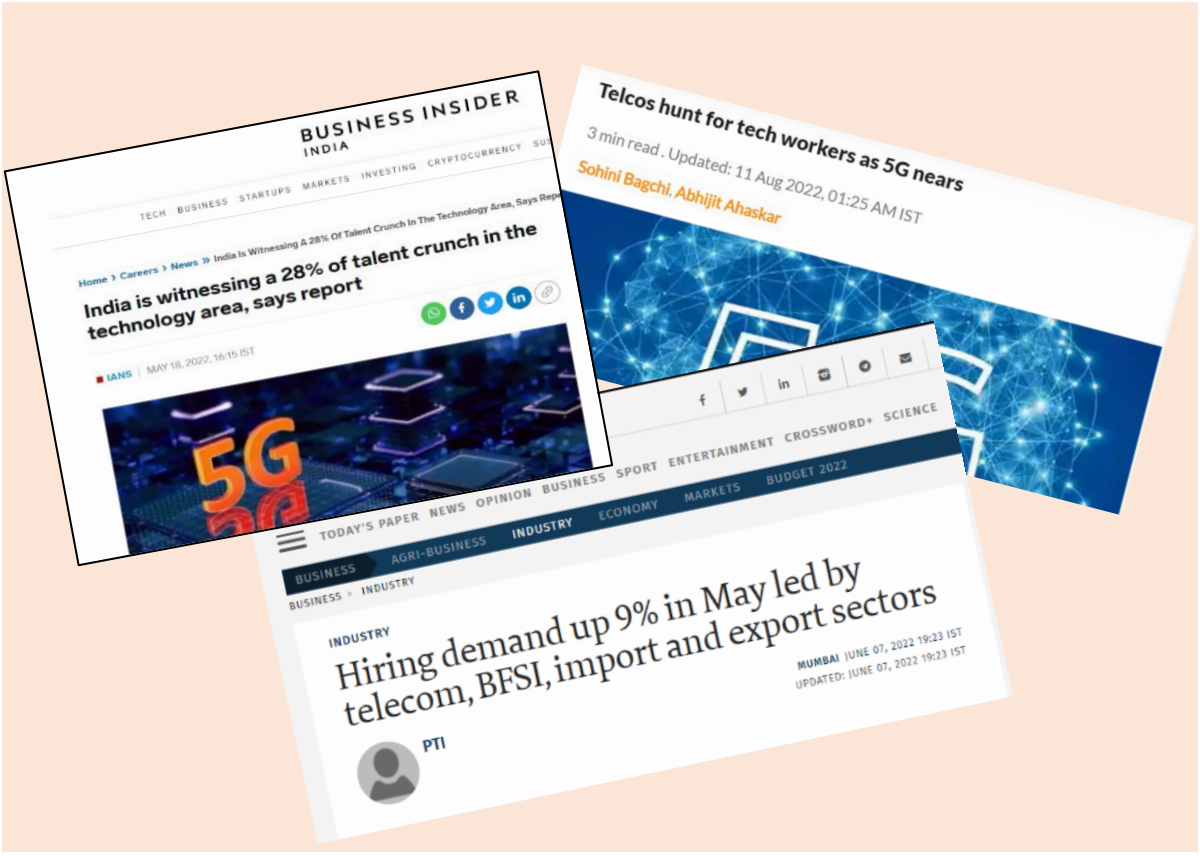
Fig. 11: Demand Supply Gap Analysis

- One of the major factors contributing to the demand-supply gap is the **skill crunch observed in the early and fresh talent**.
- The gap is further widened **with the surge in talent demand/job vacancies** to be filled which arises **due to constant shifts in the technological paradigm**.

Note:
CAGRs have been estimated by extrapolating talent growth rates observed from 2019 to 2022 and by validating them with Draup SMEs
Current Demand and Supply have been estimated using Draup's ML model that tracks the 65 M+ JDs across 2,000+ Job Roles

Demand Supply Gap view from the secondary data sources

India faced a talent **demand-supply gap of nearly 1.5 lakh jobs** in areas like 5G, Cloud computing, AI/Big Data analytics, IoT, mobile app development, and robotic process automation. Due to higher growth in job openings/postings, there is a widening gap in the demand and supply of these skilled professionals in the telecom sector. A solution to this supply crunch would be investing in already existing tech talent to upskill them accordingly.



EVOLUTION OF TECH IN TELECOM

Evolution of Tech in Telecom /Tech Adoption

With the rapid increase in tech talent in Telecom, the next-gen innovation and adoption cycle is shrinking. The Telecom industry will generate an estimated **$500B in economic growth** — including 5G-enabled innovation by startups and major companies that will add new economic value. The **Percentage of Software in Telecom** will increase **3X** as we enter the **Web 3.0 era.**

In the next few years, the Telecom industry will move towards automation with more companies leveraging **AI/ML and IoT**.

Telecom industry will generate an estimated $500B in economic growth.

The percentage of software in the Telecom sector will increase 3X as we enter the Web 3.0 era. The percentage of software in the Telecom

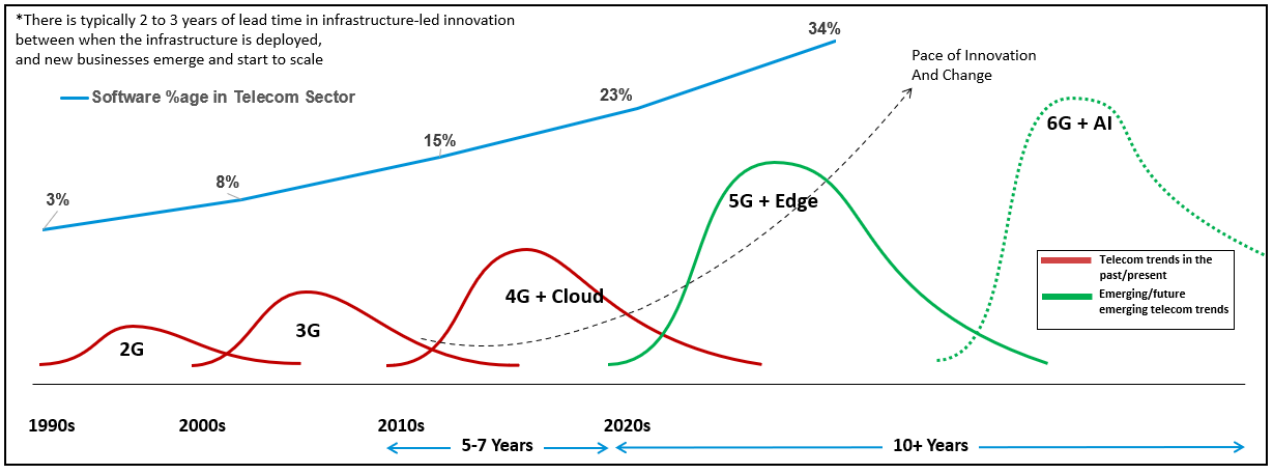


Fig. 3: Telecom Tech Talent Growth Analysis

The Telecom industry has expanded exponentially with the growing popularity of 3G in the mid-2000s, which paved the way for an even more powerful 4G to emerge – cloud technologies supporting its growth in the 2010s.

Trends suggest that in the upcoming years, an even more powerful 6th Gen will emerge with the help of AI.

The early 2020s saw the advent of 5G, promising new opportunities across manufacturing, transport, and other fields. Trends suggest that in the upcoming years, an even more powerful 6th Gen will emerge with the help of AI. The role of Software tech in telecom has only seen an unfaltering upward trend all these years.

Leading telecom carriers are taking several important steps to grow their market share and enhance the consumer experience, including:

NB-IoT (Narrowband IoT)

NB-IoT is a radio technology standard for Low Power Wide Area Networks (LPWAN). The Third Generation Partnership Project, a partnership between many telecoms standards organizations, has created several specifications, including the following:

NB-IoT LPWAN systems operate on a licensed spectrum, guaranteeing service quality and long-term interoperability. It is an LTE-related technology that provides two-way communication and is created specifically for LPWA applications.

NB-IoT was created to provide effective communication, increase battery life for many distributed devices, and reduce expenses for vast geographic areas. It is used in a vast urban infrastructure to connect a lot of devices with tiny, steady data streams at a low cost.

Wireless payment

Credit cards, debit cards, key fobs, smart cards, and other gadgets, such as smartphones and mobile devices that use technologies like RFID (radio frequency identification) or NFC (near-field communication) to enable secure payments, are all examples of wireless payment systems.

The mobile phone or payment card's wireless chips, which are embedded with the user's credit card information, are used to operate this technology. Customers can use a card or portable device at a point-of-sale terminal without swiping it or entering a pin, thanks to the embedded chip and antenna.

When NFC-enabled phones are near card readers or a sign at a store, the technology can also be utilized to send them educational messages.

5G technology

The 5G mobile network offers quicker and more dependable connectivity on smartphones and other devices by connecting and controlling machines, objects, and gadgets in addition to connecting and controlling people. New user experiences and industry connections will be made possible by its increased performance and efficiency.

Three categories broadly describe 5G:

1. Better mobile broadband: 5G's faster, more consistent data speeds, lower latency, and cheaper cost per bit enable new immersive experiences like VR and AR in addition to smarter phones.
2. Mission-critical communications: 5G offers applications like remote control of vital infrastructure, automobiles, and medical procedures that have the potential to alter entire sectors.
3. Massive IoT: With the potential to reduce data rates, performance, and mobility, 5G can seamlessly connect enormous numbers of embedded sensors in almost anything. This results in a very efficient and affordable solution.

Due to 5G's ability to connect to 4G and Wi-Fi, users of 5G can simultaneously connect to 5G New Radio (NR), LTE, or wireless technology without experiencing any issues. More organizations will be able to implement 5G and use 5G technology since it will be created for unlicensed spectrum without the need to access licensed frequency.

Location tracking

We can now develop personal security systems with location-tracking capabilities thanks to the development of IoT technology and location-based sensors like GPS. GPS is more accurate than any other tracking method at providing precise location data for moving objects and people.

Telecom providers may track and monitor the position of commodities, find employees, and improve corporate efficiency with the use of this tracking technology.

Additionally, it has the capability of transmitting the user's present position to a cloud platform for additional analysis. In this case, based on the information given by the remote system, the cloud platform assesses the location and converts it to a language that can be understood.

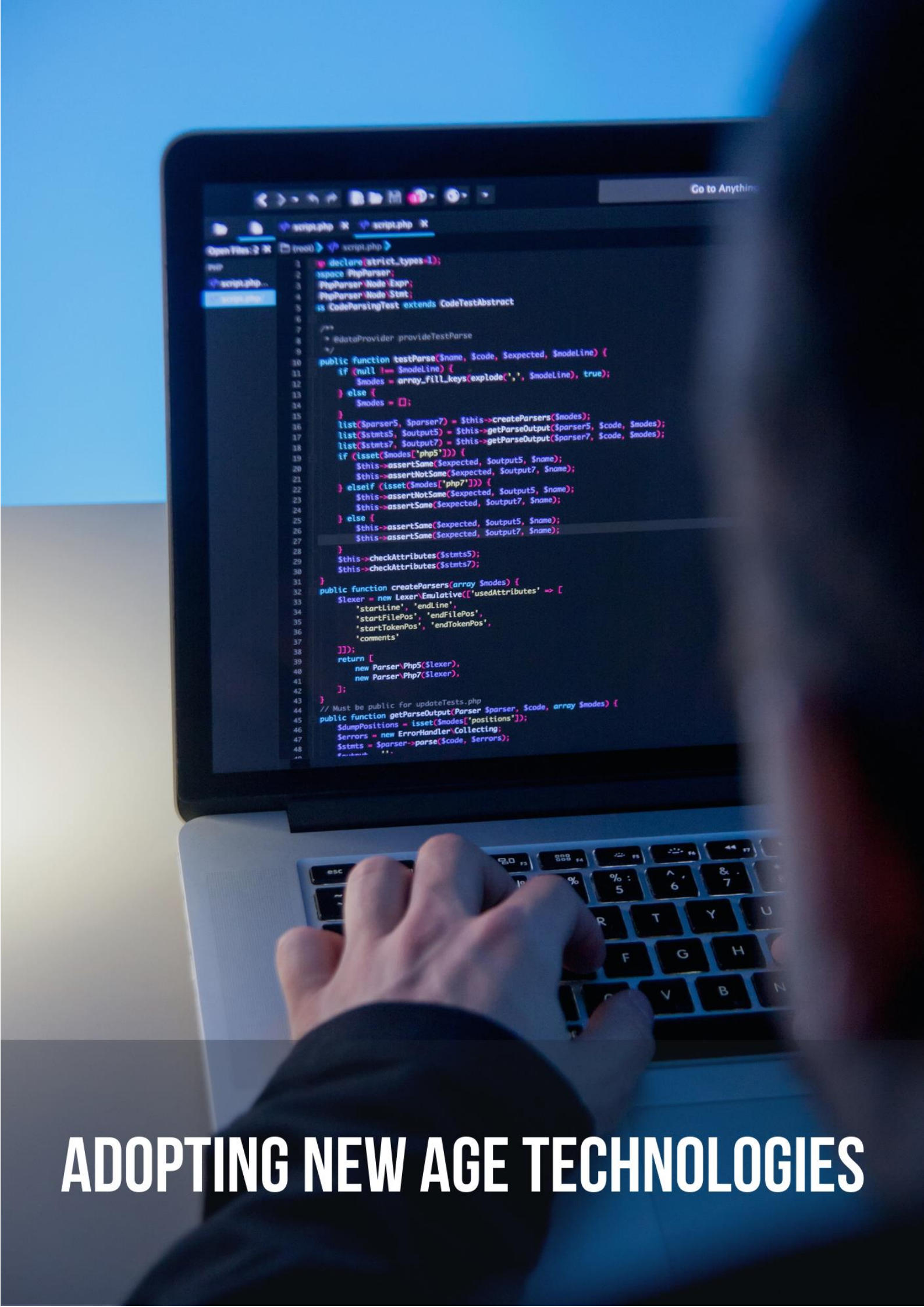
Integrated network management

Businesses today rely on a robust telecommunications infrastructure to keep daily contact between workers, clients, and employees efficient and successful.

Companies can more effectively monitor and manage costs associated with the current telecommunications network thanks to integrated network management. Creating a fault-free network and enhancing performance are the primary objectives of integrated network management.

Integration of BSS-OSS (IT-Network) fits within this strategy. It gives telecom companies a chance to expand and become more profitable. A competitive need, the integration of IT and network services enables telecom businesses to adapt to the shifting needs of their consumers. Additionally, it lowers expenses, enabling them to invest in special talents.

Source: 1. The 5G Economy in a Post-COVID-19 Era (2020) by IHS Markit. The above information is derived from publicly available articles, portals/websites, research papers and industry reports. Insights are curated through various strategic and tactical signals from news articles, journals, and similar sources.



ADOPTING NEW AGE TECHNOLOGIES

Technology Development in Telecom

The Telecom industry is no longer limited to providing internet service. Emerging Technologies such as **Data Science, AI, IoT, Blockchain**, **and 5G** are the key and heart of technological growth.

The following table has the below attributes:

Function/Focus Area: Functions/Areas of innovation in technology that can be leveraged to harness potential.

Use Cases: A situation where a product/technology/idea can be applied.

Job Roles: The most sought-out job roles at present.

Functions/Focus Areas	***Use Cases***	***Job Roles***
Data Science	• Product Optimization • Increased Network Security • Predictive Analytics • Preventing Customer Churn • Real-time Analytics • Price Optimization • Targeted Marketing • Location-based Promotions	• Data Science Engineer • Data Scientist • Knowledge Engineer • ML Engineer
Artificial Intelligence	• Network Management • Prevention Maintenance • Fraud Detection • Real-time Analytics • Recommendations • Network Planning	• AI Data Analyst • AI Engineer • Program Manager – AI Solutions
IoT	• Inventory Tracking • Device Management • Remote Monitoring • Fault Management • OTA Updates • A/B Testing	• IoT Cloud Engineer • IoT Developer • IoT Solutions Engineer • IoT Administrator
Blockchain	• Telecom Operations Advancement • Digital Asset Transactions • Digital Identity management and Verification • Cybersecurity	• Blockchain Developer • Blockchain Engineer • Blockchain Solution Architect
5G	• Broadband – like Mobile Service • Immersive Gaming and Virtual Reality • Harnessing the Power of IoT • Unleashing AI	• Project Manager • 5G Network Engineer • Software Developer
6G	• eMBB (Enhanced Mobile Broadband) • Edge AI • Transceivers with Integrated Frequency Bands • Integrated Terrestrial, Airborne, and Satellite Network • Intelligent Reflective Surfaces • Wireless Devices	• 6G Network Architect • Product Manager • Wireless Engineer 6G

The **functions/focus areas** that are currently **vital** to the growth and development of the **telecom industry** can be used in various real-world scenarios.

For example - **Real-time Analytics, Fault Management, Remote Monitoring**, and many more can be made possible in the telecom sector with the help of **Data Science, AI/ML, IoT, Blockchain,5G and 6G.**

Roles such as **Data Science Engineer, AI Data Analyst, IoT Cloud Engineer, Blockchain Developer, 5G Network Engineer, and 6G Network Architect** currently are and will be in **high demand** for the next few years.

Role of 5G & 6G in Telecom Sector in India –

India is actively involved in advancing both 5G and 6G technologies and has introduced several measures to encourage their adoption. One such initiative is the **Production-Linked Incentive (PLI) scheme** aimed at boosting the manufacturing of telecom equipment. **India** is also a **member** of the **International Telecommunication Union (ITU)**, which plays a crucial role in setting global standards for 5G and 6G.

6G is anticipated to push the boundaries of communication technology by delivering astonishing bandwidths of 1Tbps, which is a hundredfold increase over 5G.

5G technology offers several benefits, including faster speeds, reduced latency, and increased capacity. After 5G, the next big leap in telecom networks is 6G. **6G** will build upon the foundation of 5G, **offering even more reliable and ultra-low latency solutions** with speeds nearly **100 times faster than 5G**. This advancement will significantly impact user experiences, transform economies, and improve lives on a global scale. It will include intelligent network management and control, as well as integrated wireless sensing and communication capabilities. This has the potential to revolutionize how people interact with each other, machines, and data.

Recently, India has introduced the **Bharat 6G mission**, which aims to facilitate coordination and collaboration among various stakeholders, including the central and state governments, industry players, and academia. The mission focuses on fundamental and applied research for 6G technologies, fostering the creation of new IP, knowledge, and skilling. The pilot scale demonstration and validation of these technologies in field trials for various use cases, and participation and contribution to national and international standards are expected from 2025 onwards.

Semiconductor Industry Growth in Telecom-

Over 90% of the US$27 billion Indian semiconductor market in 2022 was imported, placing a heavy reliance on foreign sources on the part of Indian chip buyers. This is quite comparable to other important markets like the US and the EU, which rely heavily on imports, particularly from Taiwan and China, where there is a significant concentration of semiconductor manufacture.

Due to supply-side concentration, the semiconductor crisis during the previous two years seriously impacted the manufacturing of mobile devices, personal computers, cars, and consumer electronics—products and segments that have an influence on both the GDPs of countries and the economic well-being of individual citizens.

The GOI Semiconductor Program's goal is to draw investments in semiconductor manufacturing and design and position India as a major semiconductor hub. The **package incentivizes by offering financial support for 50% of project expenditures through a Pari-Passu structure**, allowing semiconductor businesses to operate under a model with much lower risk.

Indian government announced a US $10 billion programme for the growth of the semiconductor and display manufacturing ecosystem in India, which will cover both manufacturing and design.

On the demand side of things, the growth of the semiconductor industry in **India will be driven by rising semiconductor content in consumer electronics and vehicles, including electric vehicles (EVs), as well as rising demand for smartphones**, with the country's smartphone market expected to reach a billion units by 2026.

The deployment of smart devices would also increase with the launch of 5G and rising IoT device usage.

India will be able to meet the expanding local market with a very robust model and support global requirements by competing with the conventional supply sources on an equal footing thanks to the construction of a strong manufacturing and design foundation for semiconductors. However, India is not the only country that envisions and works toward this goal. Through various programs, the USA and the EU intend to speed both semiconductor design and manufacture.

While India's manufacturing ecosystem is still developing, **several major semiconductor companies have established sizable R&D facilities** there throughout the years to take advantage of the country's talented engineers and researchers. India is home to ~50,000 design engineers, most of whom work in engineering support roles. The government wants to promote the shift to value-added research in chip design in the nation via the Design Linked Incentive plan. This is anticipated to result in the creation of 250,000 job opportunities in R&D, production, and other enabling sectors.

There is a **critical need for the skill development** and **re-skilling of numerous technicians, engineers, and researchers in fields like material science, system-on-chip (SoC), system modeling, electromagnetics, plasma chemistry, lithography, microelectronics, silicon processing, smart factory automation specialists, and chip designing** in order to fill this talent pipeline and build a robust R&D ecosystem in India.

With both supply and demand side trends showing promise, **India has a unique potential to become a significant player in the semiconductor industry** and increase its involvement in the global value chain. In addition to strengthening India's position in the global manufacturing and value chain ecosystem, semiconductor production offers a significant opportunity to increase employment, stimulate economic growth, and position India as a major player in the world's technology market and a center for chip technology in the coming decades.

Note: The above information is derived from publicly available articles, portals/websites, research papers and industry reports. Insights are curated through various strategic and tactical signals from news articles, journals, and similar sources.

Deep Learning in Telecom

The telecom industry – being one of the most data-intensive industries - stands to benefit a lot from technological segments like Deep and Machine Learning. Use cases such as anomaly detection, system monitoring, and customer churn prediction lead to a projected **CAGR of 41.2% by 2030 and 17% by 2026** in deep learning professionals.

Deep Learning has had a consistent linear market growth in the Telecom Industry since the beginning of 2020 and has been forecasted to reach a whopping **$152B Globally** by the end of **2028**, growing steadily at a **rate of 38.6% CAGR since 2020**.

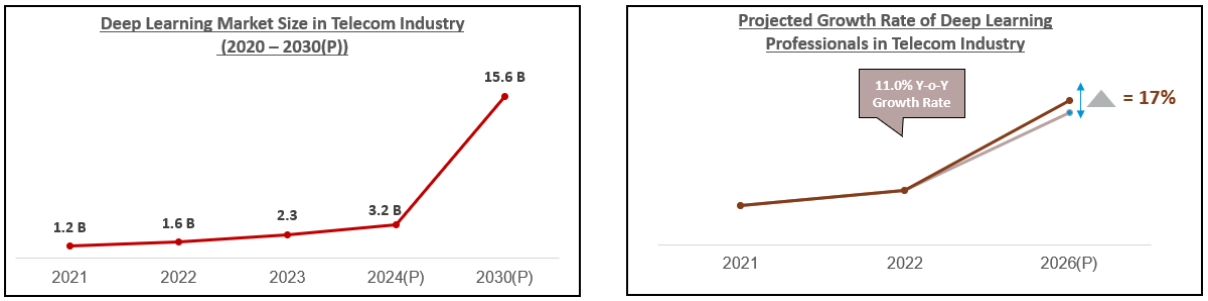


Fig. 4: Deep Learning Market Trends in Telcom Industry

Current Trends

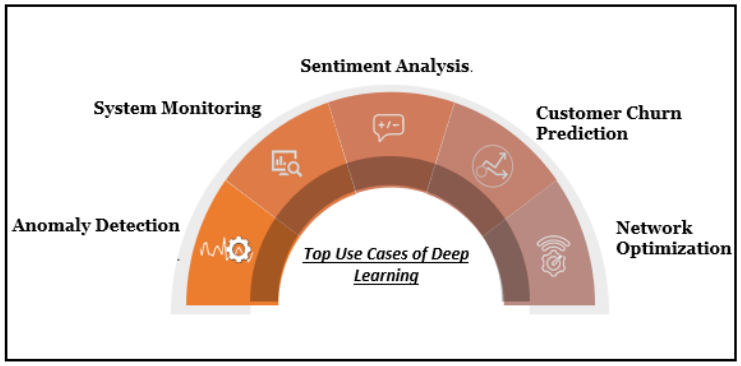


Fig. 5: Top Use Cases of Deep Learning

Deep learning has enabled a revolution in Digital assistance.

The several use cases in which Deep Learning is currently being used in the telecom industry globally to improve customer service and quality of service have attracted a lot of focus toward adopting emerging technologies for consistent long-term gains.

- **65%** of the technology firms plan to **increase** their **Machine learning-related investments by 2025**.
- **50%** of companies that allow **deep learning** over the next seven years have the **potential to double their cash flow** in the Telecom industry due to their heavy reliance on data.

Future Trends

Machine Learning Engineer, Deep Learning Engineer, and Data Scientist are the most demanding job roles in Telecom sector.

Machine Learning Engineer, Deep Learning Engineer, and Data Scientist are the most demanding job roles in Telecom, with Full-stack Deep Learning expected to gain popularity in the coming years.

Use cases like Deep Learning-driven **User Localization,** which applies different signals received from mobile devices or wireless channels to **identify users in indoor or outdoor environments,** and **Signal Processing** which relies on deep learning techniques to **monitor the physical layer** is expected to gain popularity soon.

The telecoms sector of today is evolving due to artificial intelligence and deep learning. This method of logical development eliminates the possibility of biased outcomes and is adaptable to various situations. Deep learning is ideal for predictive applications because it can handle large amounts of data.

Neural networks advance the prediction process by processing a large number of input variables and discovering relationships between them thanks to their various hidden layers. The important thing is that no interaction with humans is required. Traditional non-automated analyses would be useless with this much data.

Numerous neural network models, such as supervised models (Recurrent Neural Networks, Multilayer Perceptron's, or Deep Boltzmann Machines), unsupervised learning models (Autoencoders), and can be utilized for predictive analytics (Convolutional Neural Networks, Deep Belief Networks). Although deep learning models take longer to train and require larger datasets to get correct results, telcos often have a ton of data at their disposal, so this is not a problem.

Note: The insights are derived from Bureau of Labour Statistics, Industries Revolutionized by Deep Learning by IOT (2020), Capital Market Players Leveraging Emerging Technologies by Ortus Club (2022), Ways Machine Learning Is Revolutionizing Manufacturing by Forbes (2019), Machine Learning Use Cases by Ericsson (2021)

SKILL LEVEL TRENDS IN TELECOM

Skill-level Trends in Telecom

The Telecom industry is moving towards automation with the emergence of the Metaverse, leading to an increase in the proportion of tech skill stack in the future. Investing in 6G Technologies and AI/ML will help companies to gain an edge in the current and future markets.

The following table has the below attributes:

Immediate Opportunity*:* Top opportunities and skills the Telecom sector can invest in to gain immediate returns.

Short-Term Opportunity: Top opportunities and skills the Telecom sector can invest in to gain short-term immediate returns.

Big Bets*:* Top opportunities and skills the Telecom sector can invest in to gain a competitive advantage and, hence, increase profitability.

Future Potential Opportunity*:* Top opportunities and skills the Telecom sector can invest in to ensure long-term returns.

Skills roadmap for Telecom Sector

1 Immediate Opportunity	2 Short-term Opportunity	3 Big Bets	4 Future Potential Opportunity
Cloud Dev. & Management	**Data Engineering and Analytics**	**IOT and RPA**	**Metaverse**
AWS, CloudFormation, S3, EC2	Data Analysis, Big Data, Hadoop	IoT, Motion Control	AR/VR
Kubernetes	Data Visualization	UiPath, Blue Prism, Work Fusion	3D Reconstruction
Microservices	Spark, AWS Redshift, S3	MQTT, BACnet	Decentralized Applications
Terraform	Data Modelling, Warehousing	**AI/ML**	**6G**
Software Development	**5G**	Open RAN	High Performance Computing
Angular, Jenkins	Network Slicing	Security tools – CyberArk, Splunk, etc	Edge Computing
Version Control- Git SVN	Software defined networks	Network Optimization	Nano Core
SDLC, Distributed systems	Autonomous Systems	MLOps Monitoring	
Programming Skills	**Cyber and Network Security**		
Python, Java, Java Script	Internet Protocols, SSL, DNS		
Algorithm	Firewalls, VPN		
Shell Scripting, HTML, CSS	Encryption, Pen testing, Splunk		
	Cloud Security		

Note: Skills data is derived by leveraging text mining to identify skills required from JDs of the Telecom industry and selected organizations from Draup's database of 65M+ JDs; 1. Immediate opportunity refers to skill clusters easily within reach of Telecom 2. Short-term opportunity refers to skill clusters that present an opportunity to the telecom sector in the next 2-4 years 3. Big bets are those skill clusters that can help telecom companies to gain a significant market share 4. Future potential opportunity refers to the skill clusters that present an opportunity to the telecom sector in the long run

Priority-Based Use Cases for Telecom Sector

Priority	***Use Cases***	
Immediate Opportunity	▪ Network automation and management ▪ Targeted consumer experiences and solutions	▪ Enterprise Mobility ▪ Application Modernization ▪ Fault and anomaly detection
Short Term Opportunity	▪ Targeted Marketing ▪ Price Optimization ▪ Location-based Promotion ▪ Broadband – like Mobile Service ▪ Predictive Analytics ▪ Preventing Customer Churn	▪ Smart power distribution grid ▪ Early Threat Visibility and End-to-end Protection ▪ Immersive Gaming and Virtual Reality ▪ Product Optimization
Big Bets	▪ Invoice & Purchase Order Processing ▪ Customer Onboarding/Offboarding ▪ Customer churn prediction & cost estimation ▪ Recommendation engine for upselling and cross-selling	▪ Building customer 360 Intelligence ▪ Customer feedback insights from NPS (Net Promoter Score) and CSAT (Customer Satisfaction Score) survey feedback ▪ Sales Order Processing
Future Potential Opportunity	▪ Human Interface Hardware using AR/VR ▪ Metaverse Platforms ▪ Ecosystem Partnerships ▪ Connected Robotics and Autonomous Systems	▪ Real-Time Threat Detection ▪ ENI (Experiential Network Intelligence) ▪ Wireless Brain-Computer Interactions ▪ Blockchain and Distributed Ledger Technologies

The above table showcases the various tech skills that the telecom sector can invest in and capitalize on for both – Short-term and Long-term gains.

Investing in skills such as **Cloud Development and management, Software Development**, and Programming skills could **elevate the capabilities** of the available **tech talent** in the telecom sector, thereby harnessing the potential of **Cloud services, Distributed Systems, and Scripting Languages**.

Short Term opportunities like **Data Engineering and Analytics, 5G, and Cyber & Network Security** would assure short-term yet **assured gains,** considering that technologies such as **Network Slicing, Autonomous Systems, etc**., that fall under the spectrum of 5G are expected to evolve into something greater with the advent of 6G that boasts of being almost 1000x faster than 5G.

Investments in 'Big Bets' such as **IoT & RPA and AI/ML** would largely benefit the telecom industry by –

- **Automating Network Management** – With the network traffic growing almost 40-50% every 12-14 months, RPA can help ensure that the infrastructure can handle and optimize the network usage.
- **Optimize internal and external operations** – IoT aids complex software platforms to connect to various physical assets, thus combining their collective expertise to improve decision-making, increase efficiency, and maximize resource utilization, thereby saving cost.
- **Predictive maintenance and Fraud Detection** – AI-based predictive analysis can largely help telecoms monitor the state of equipment and anticipate equipment failure based on patterns. Similarly, ML algorithms can help provide real-time responses to any suspicious activities like behavioral fraud, theft, fake profiles, etc.

Telecoms stand to **benefit largely** by manipulating the value of **Metaverse and 6G**. Through the virtual environment of the metaverse, telecoms will be able to **increase operational efficiency, enhance customer experience and monetize their investments** through adjacent services.

The various opportunities that telecoms can monetize in the metaverse are –

1. Human Interface Hardware
2. Ecosystem Partnerships
3. Connectivity provider
4. Cloud Computing and Cybersecurity
5. Analytics

GLOBAL TALENT HOTSPOTS

Global Hotspots

Draup analyzed 40+ countries across the globe for talent analysis and identified **China, India, The United States, and Indonesia** have highly employed talent.

The following picture has the below attributes:

Analyzed Countries: Top dominant, alternate, and emerging countries with a strong Telecom Talent Landscape

Talent Size: Total recognized and available Telecom talent in the country

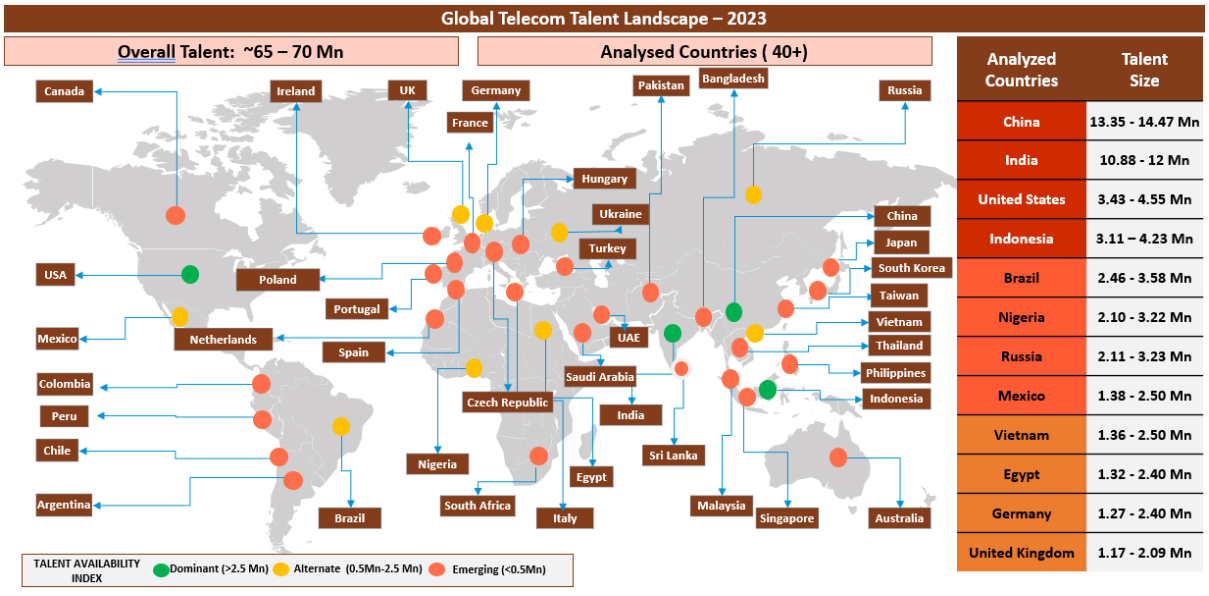
China has the highest talent availability among the analyzed countries in terms of the Telecom Talent Landscape, followed by India and The United States.

Countries like **Egypt, Germany, and The United Kingdom** comparatively have a lower talent count ranging between **0.17M to 2.40M**.

Several countries such as **Australia, Ireland, Argentina, South Korea**, etc. have been identified as emerging locations for Telecom Talent with a talent count of **less than 0.5M.**

- APAC grew 0.5%[1] faster than the initial forecast of Oct 2021
- The Americas grew 1.0%[1] faster
- EMEA grew 0.2%[1] faster

Most of the dominant telecom talent is concentrated in the APAC region. Additionally, the spending growth on Telecom was slightly faster than what was initially forecasted for the year 2021, thus directly impacting the telecom talent



Analyzed Countries	Talent Size
China	13.35 - 14.47 Mn
India	10.88 - 12 Mn
United States	3.43 - 4.55 Mn
Indonesia	3.11 – 4.23 Mn
Brazil	2.46 - 3.58 Mn
Nigeria	2.10 - 3.22 Mn
Russia	2.11 - 3.23 Mn
Mexico	1.38 - 2.50 Mn
Vietnam	1.36 - 2.50 Mn
Egypt	1.32 - 2.40 Mn
Germany	1.27 - 2.40 Mn
United Kingdom	1.17 - 2.09 Mn

Fig. 2: Global Telecom Overall Talent Size across Various Countries

1Source: Insights are curated through various strategic and tactical signals from news articles from telconews.asia, investindia.gov, ibef.org, Journals and other similar sources

Note: The talent data reported is triangulated from secondary data sources. The emerging locations have been identified based on the talent count i.e. (<0.5Mn).

Telcom Talent Split

The overall Telecom talent has been bifurcated into Blue-Collar, and corporate talent, where the corporate talent represents the executive/leadership workforce and Blue Collar represents support-related functions.

The following table has the below attributes:

Analyzed Countries: Top dominant and alternate countries with a strong Telecom Talent Landscape

Talent Size: Total recognized and available Telecom talent in the country

Corporate Talent: Telecom talent currently employed in the Corporate Sector in an administrative/ clerical or managerial role.

Blue Collar Talent: Telecom talent currently employed 'on-ground' in roles like operators, technicians, etc.

Global Telecom Talent Split (Blue Collar & Corporate)

Analyzed Countries	Talent Size	Corporate Talent	Blue Collar Talent
China	13.35 - 14.47 Mn	1.7 – 2.75 Mn	9.87 - 10.99 Mn
India	10.88 - 12 Mn	1.97 – 3.1 Mn	8.20 - 9.03 Mn
United States	3.43 - 4.55 Mn	0.59 – 0.93 Mn	2.2 - 3.15 Mn
Indonesia	3.11 – 4.23 Mn	0.43 – 0.66 Mn	3.55 - 3.45 Mn
Brazil	2.46 - 3.58 Mn	0.42 – 1.06 Mn	1.98 - 2.39 Mn
Nigeria	2.10 - 3.22 Mn	0.38 - 0.84 Mn	1.52 - 2.16 Mn
Russia	2.11 - 3.23 Mn	0.16 - 0.60 Mn	1.90 - 2.40 Mn
Mexico	1.38 - 2.50 Mn	0.12 - 0.44 Mn	1.18 - 1.91 Mn
Vietnam	1.36 - 2.50 Mn	0.17 - 0.44 Mn	1.19 - 1.91 Mn
Egypt	1.32 - 2.40 Mn	0.17 - 0.87 Mn	1.03 - 1.31 Mn
Germany	1.27 - 2.40 Mn	0.18 - 0.50 Mn	1.09 - 1.82 Mn
United Kingdom	1.17 - 2.09 Mn	0.21 - 0.50 Mn	0.64 - 1.00 Mn

- **China has the highest no of employed talent in the Telecom industry**, followed by India and the United States.

Note: The talent data reported is triangulated from the secondary data sources.

- The Blue-Collar talent is nearly **four times higher** than the corporate talent in India.
- Despite having vast potential, **Egypt, the United Kingdom, and Germany** have recorded relatively **low Employed Talent count**.
- It is anticipated that **Blue-Collar jobs in the Telecom space will drop with evolving technologies such as AI/ML, 5G, and Web 3.0**.

Future of the TMT Sector

According to the Korn Ferry Future of Work report:

The United States, currently the world's leading technology market, can expect to **lose out on $162.25 billion by 2030**[1] due to **Technology, Media, and Telecommunications (TMT)** sector **skills shortages**. These talent deficits may imperil America's status as the global tech center.

China, which has labored to transform itself into a world-leading tech center, could fail to generate $44.45 billion of revenue by 2030 due to skills shortages.

By 2030, the UK will fail to realize almost 9% of the TMT sector's potential revenue due to skills shortages.

India is the only country expected to have a skilled-labor surplus, expected to reach 1.3 million workers by 2030 in the TMT sector.

India is the only country expected to have a skilled-labor surplus, expected to reach 1.3 million workers by 2030[1] in the TMT sector, creating opportunities for India to further develop its importance as a technology center.

Companies must alter their business models and create substantial - not incremental - new sources of revenue to prolong the pandemic's unforeseen but welcome boost to the TMT sector. Organizations must make significant investments in infrastructure and technical improvements, supported by sufficient government funding. To increase market trust, the government must also swiftly implement the newest programs and ensure greater openness.

Globally, businesses need a new set of technological solutions to streamline operations, increase supply chain visibility, and foresee bottlenecks. In response, the TMT sector must change its business models and engage in active collaboration to provide clients with convergent technology and communication solutions.

To improve customer experience and boost value, TMT firms must adapt to changing "digital first" customer behavior as they refocus on managing digital transformation themselves.

Cybersecurity, supply chain, legislation, financial stress, and new technology are the main risk factors impeding the expansion of the TMT business.

Companies all over the world have been impacted by supply chain unpredictability, which has forced them to reconsider the design of their global manufacturing networks. The current

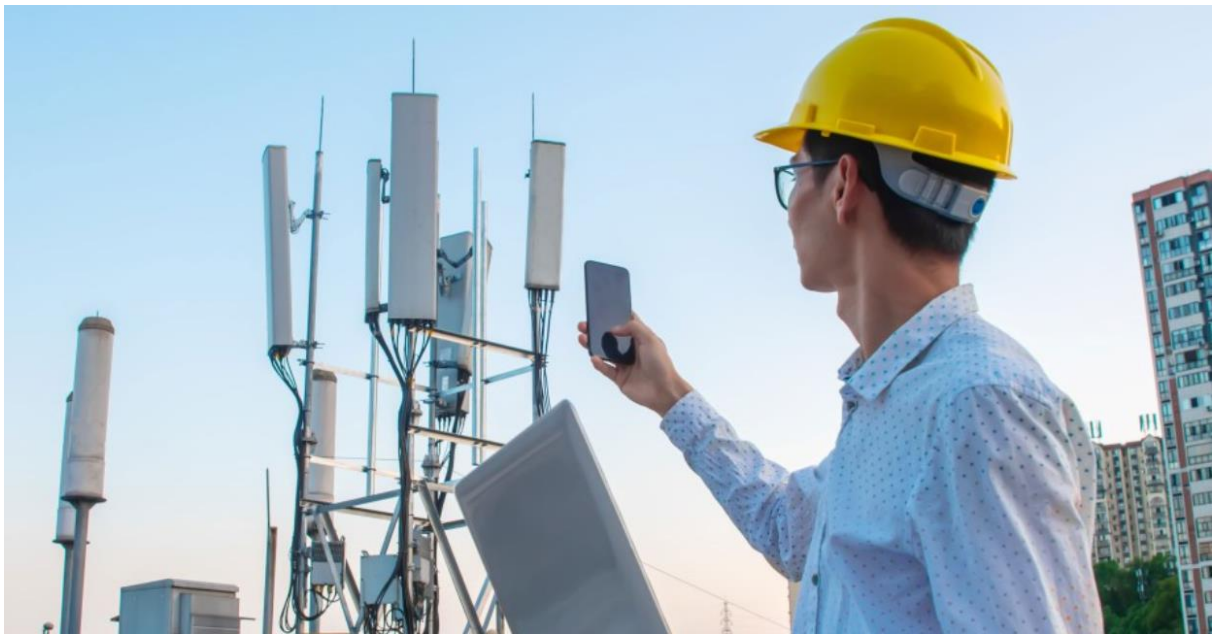
situation offers India the chance to position itself as a prospective alternative manufacturing base for international firms.

Maintaining the status quo and not implementing these technologies is no longer an option due to the risk posed by the velocity of disruption brought on by developing technologies.

Robust risk management rules are required to address the cybersecurity hazards from remote work that are present around the clock. To satisfy regulatory standards and increase customer confidence, this would be crucial. Long-standing financial and regulatory obstacles must also be removed through a cooperative public-private strategy.

Telecom operators must find strategies to use infrastructure sharing and leasing to lower their high capital expenditures given the current financial instability of the Indian telecom sector. Telcos would need to work closely with IT firms to establish the necessary technical infrastructure due to the growing adoption of smart gadgets, wireless technologies, and sophisticated computing technologies across industries.

While telecom companies continue to prioritize network virtualization and cloudification, additional funding will be required to advance their capacities for data center management and edge computing. They would be able to support use cases and applications that need high bandwidth and low latency thanks to these changes. Diverse solutions are being offered by emerging technology to transform business and operational paradigms across industries. To prioritize future expenditures, firms will need to evaluate the relevance of developing technology projects against performance indicators.



Source: 1. Future of Work – The Global Talent Crunch by Korn Ferry

GLOBAL HUBS: COMPARISIONS

Comparative View of India with Respect to Global Hubs

India is expected to have 11% of the world's 5G subscription base by 2027. The United States and China lead the world in Telecom R&D with the maximum number of patents. China and the US are leading in 5G research.

During the period (1996-2018), there were 6,828 publications related to 5G, with higher publications from **China (981)**, followed by the **United States (618)** and the **United Kingdom (469). Investments in 5G infrastructure are estimated to reach 21.3%** of total wireless infrastructure spending (**$38.1B)** in 2020.

The introduction of 5G fixed wireless access (FWA) having faster broadband speeds is expected to accelerate broadband adoption and derive the potential for more competitive broadband markets.

A shift to more decentralized government broadband infrastructure funding policies is happening globally, with rising interest in **multi-access edge computing and private cellular networks** aligned for enterprise solutions. With the progression toward 5G infrastructure, there is an immediate need to reassess **cybersecurity and risk management policies**.

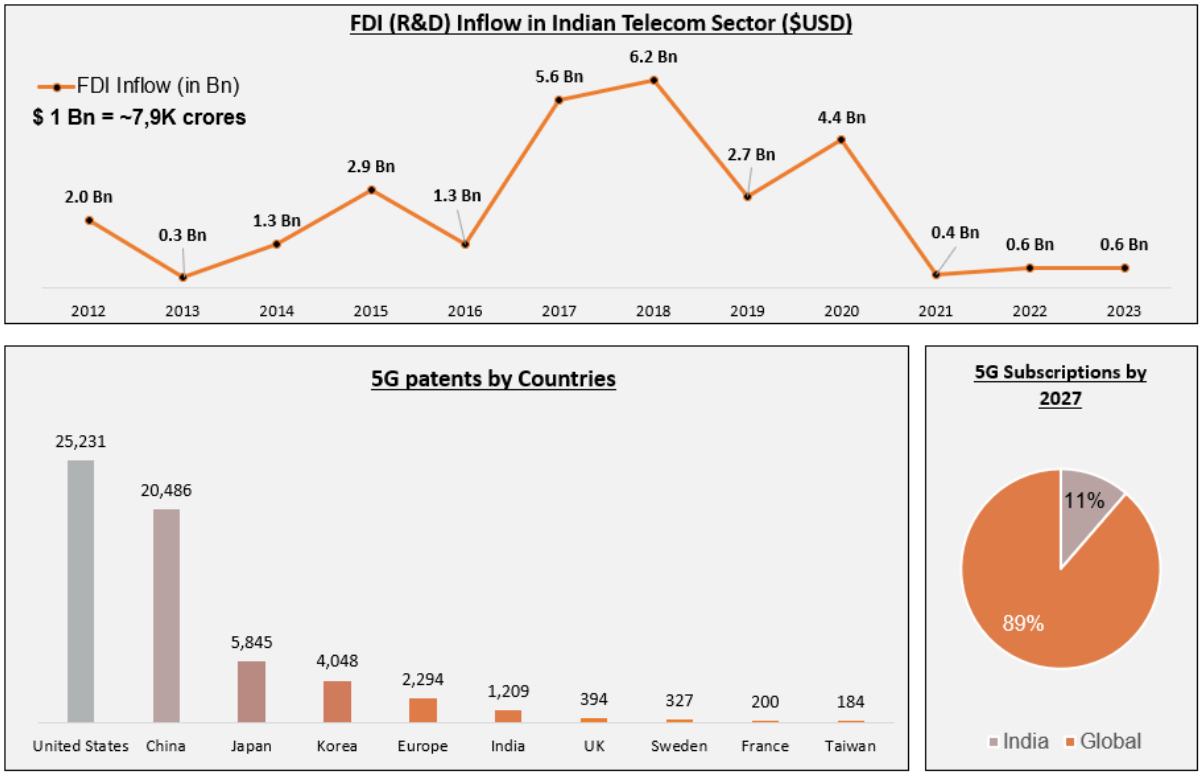


Fig. 6: Comparative View of India with respect to Global Hubs

The **Telecom sector** is the **3rd Largest Sector** in India, contributing to approximately **6.5% of the total FDI inflow**. India's current **tele density** is just over **85%.** As of May 2022, the number of **active wireless subscribers** in India was **1,017.7M.** It directly supports 2.2 million employees and indirectly supports 1.8 million jobs.

The Telecom sector is the 3rd Largest Sector in India contributing to approximately 6.5% of the total FDI inflow.

India's top **2 telecom giants, Reliance and Airtel** are now working toward undertaking one of the **fastest global rollouts of 5G services** in India.

Reliance Industries announced that they will execute their plan to roll out the **fastest 5G network** in the world in **October 2022,** which will cover approximately **5,600 talukas and tehsils** in **18 months**.

Airtel has also unveiled its plans to launch a **pan-India 5G service** for as many as **5,000 towns** by **March 2024.**

Between 2014 and 2021, the amount of foreign direct investment in the telecom industry increased by 150%, from US$8.32 billion to US$20.72 billion

Between 2014 and 2021, the amount of foreign direct investment in the telecommunications industry increased by 150%, from US$8.32 billion to US$20.72 billion.

Many telecom services and telecoms infrastructure providers, including Basic Cellular, United Access Services, and Commercial V-Sat, have made investments in the telecommunications sector.

Source: Data sourced from Ericsson Mobility Report 2019, Insights from "Connected World," February 2020 by Mckinsey Global Institute, Data sourced from GreyB Consulting and relevant websites (2019). Insights from "Technology and Innovation Report 2021" by UNCTAD, investindia.gov, Data from Gartner and relevant websites

UNIVERSITY TALENT - CORPORATE

University/Fresh Talent Supply Analysis

Increased corporate-university collaborations can provide relevant skills to students in **Computer Science, IT & Math** related fields, increasing the share of employable graduates.

- India has many **graduates in Computer Science, IT, and Math**, but only **40% are employable in the Tech sector**, owing to the disconnect between university curriculum and market demand.
- **Indian universities lack in terms of Industry-Academia Tie-Ups** required market-ready training and internships for graduates.

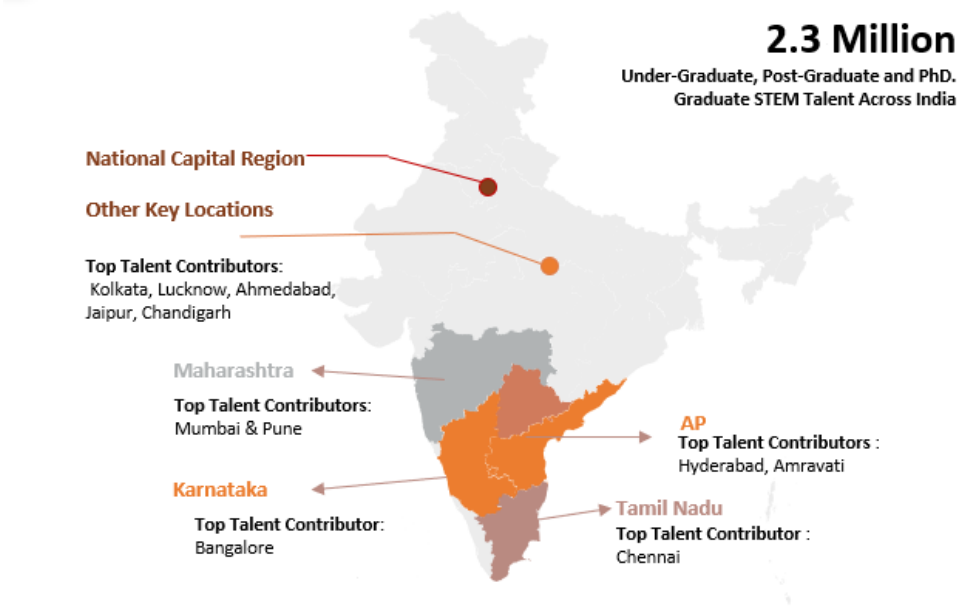


Fig. 12: STEM Talent Distribution across India

Source: Data has been triangulated from multiple sources, including AICTE (All India Council for Technical Education), talent profiles from Draup's database, Ministry of Education statistics
Note: Number of University graduates includes tertiary education (Bachelors, Masters, and PhD.) and other relevant diploma and vocational courses

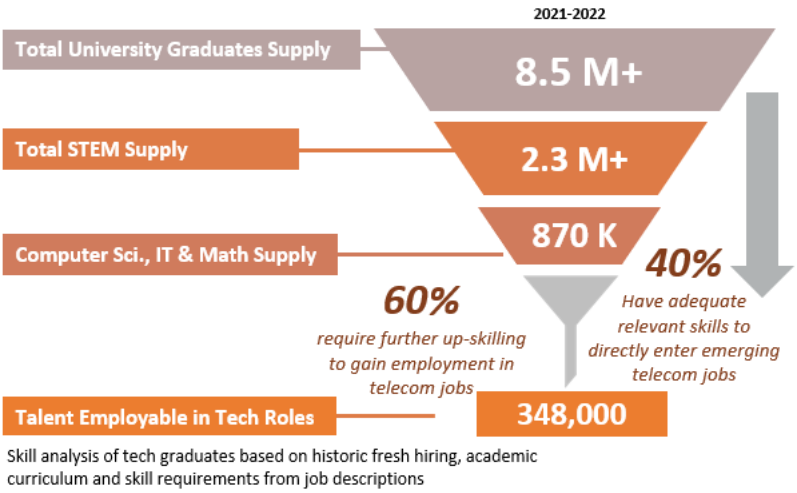


Fig. 13: University/Fresh Talent Supply Analysis

- **60% of the available fresh talent** requires to be **reskilled/upskilled** to enter the telecom-tech sector – this is due to the use of new emerging technologies in the industry, whereas the **outdated focus of academic education and lack of Industry-Academia Tie-Ups** further **boosts the skill crunch** that already exists
- **Academic institutions should focus more on practice-based learning** rather than theory-based education especially when technology is concerned
- **Increase corporate collaborations in Tier-II & III universities** to overhaul course curriculum by including introductory to medium-level complexity courses in the Telecom-related tech domain such as 5G, AI, and Network Security

Source: Data has been triangulated from multiple sources, including AICTE (All India Council for Technical Education), talent profiles from Draup's database, Ministry of Education statistics
Note: Number of University graduates includes tertiary education (Bachelors, Masters, and PhD.) and other relevant diploma and vocational courses

Corporate Talent: Median Base Pay Analysis – India

Median Base pay for the **Communication Electronic** occupation level is comparatively higher than the Operation and Maintenance – Passive Infrastructure and other occupation levels. Jio Digital, Bharti Airtel, and Vodafone India are some of the top employers hiring talent across occupation levels.

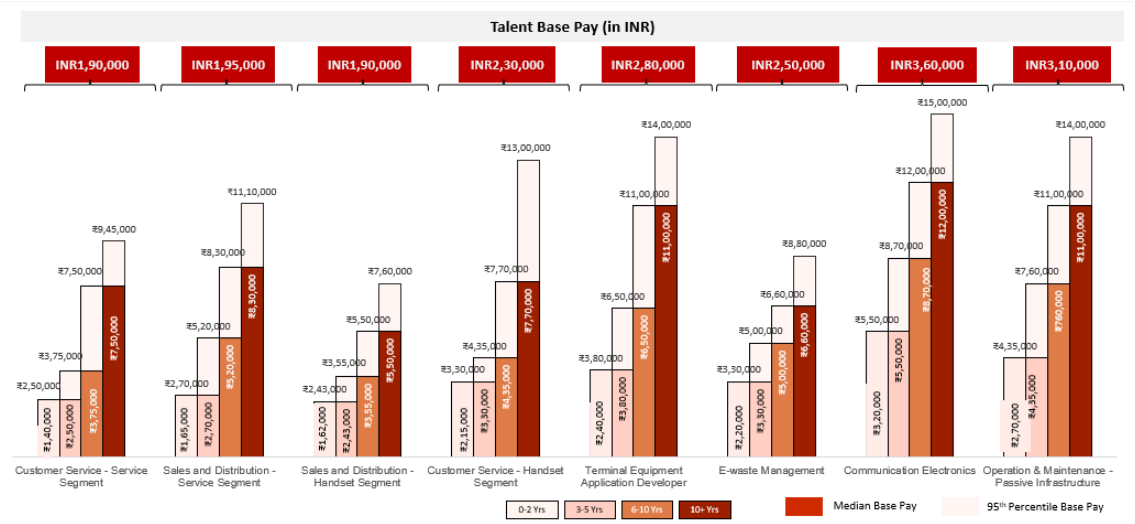


Fig. 14: Median Talent Base Pay Analysis

The median base pay for Communication Electronics being the highest among other occupations mentioned above is 89% higher than the lowest paid Sales and Distribution – Service Handset Segment and Customer Service – Service Segment and 16% higher than the second highest paying Operation & Maintenance-Passive Infrastructure

The Customer Service – Handset Segment displays a huge gap in the median pay range for employees with 6-10 years and 10+ years of experience with an average difference of almost 42%

The Sales and Distribution – Handset Segment has the lowest pay scale ranging from 2.4L to 7.6L throughout the experience groups, whereas Communication Electronics displays the highest pay scale ranging from 5.5L to 15L

Note: All salaries are base salaries and do not include additional compensation & benefits offered by individual companies; *95th percentile salary is analyzed by considering salaries across all highest paying firms

Source: Draup's Cost Simulation Module. The analyzed data points are harvested from global salary social media platforms, company job postings, and official boards. The cost datasets are then normalized and mapped to specific job clusters and job roles. The entire job family and associated job roles have been considered to calculate cost data for each job family.

Median Base pay for the **Project Engineering** occupation level is comparatively higher than the Network Operations & Maintenance and other occupation levels. Jio Digital, Bharti Airtel, Vodafone India, Nokia, and Ericsson are some of the top employers hiring talent across occupation levels.

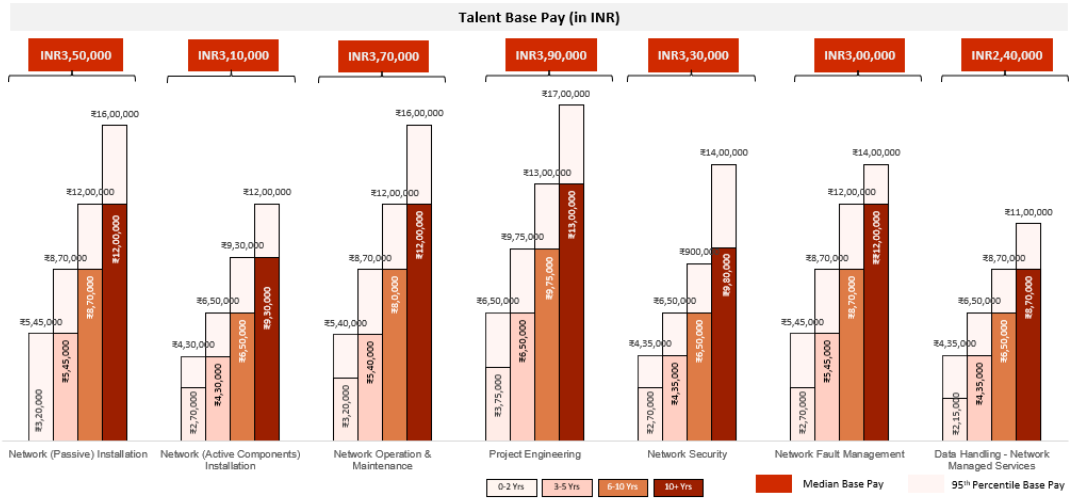
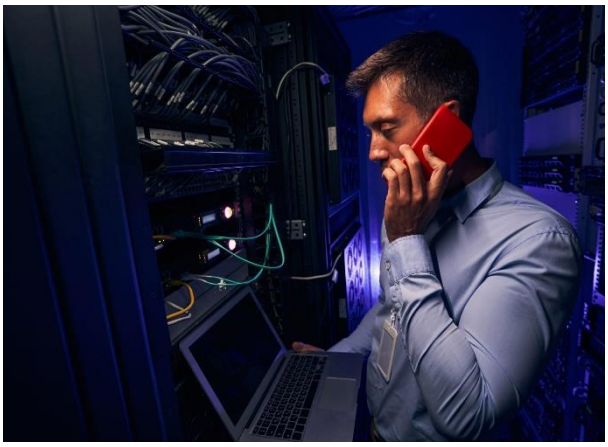


Fig. 15: Median Talent Base Pay Analysis

The median base pay for Project Engineering, being the highest among other occupations mentioned above is 63% higher than the lowest Data Handling -Network Managed Service and 5% higher than the second highest paying Network Operation and Maintenance Job roles

White Collar hiring across all sectors – especially telecom – are showing signs of stability with telecom and retail registering a double-digit uptick in hiring

The Data Handling – Network managed Services has the lowest pay scale ranging from 4L to 11L throughout the experience groups, whereas Project Engineering displays the highest pay scale ranging from 6L to 17L



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Source: Draup's Cost Simulation Module. The analyzed data points are harvested from global salary social media platforms, company job postings, and official boards. The cost datasets are then normalized and mapped to specific job clusters and job roles. The entire job family and associated job roles have been considered to calculate cost data for each job family.

UNIVERSITY TALENT - BLUE COLLAR

Blue Collar Talent: Median Base Pay Analysis – India

Median Base Pay for **Project Engineering, and Communication Electronics** is comparatively higher than other occupations levels. Sales and Distribution- Service Segment, Operations, and Maintenance-Passive Infrastructure and Project Engineering are among the top Employers at the occupation's levels.

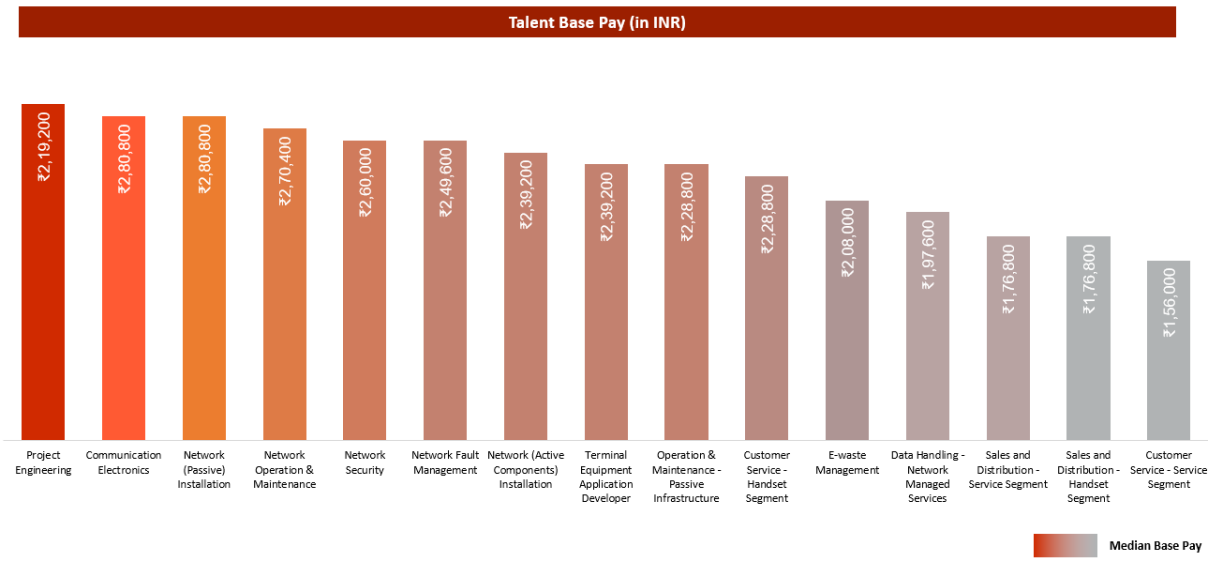
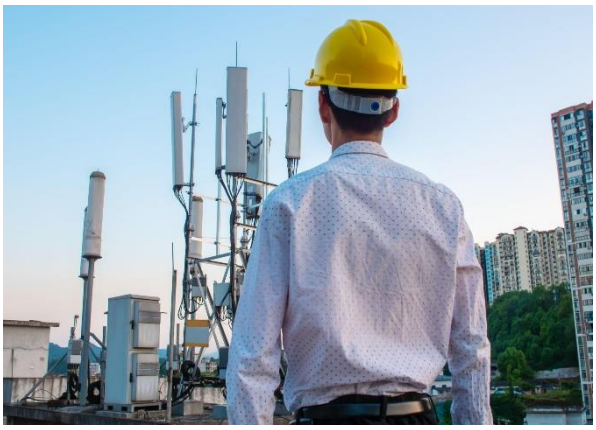


Fig. 16: Median Talent Base Pay Analysis

The job families – E-waste Management, Data Handling – Network managed Services, Sales, and Distribution – Service Segment, Sales and Distribution – Handset Segment and Customer Service – Service segment have the lowest Median Base Salary in India

Almost all Median base salaries for blue collared workers in respective the segments are lesser than the salaries paid to the early white-collar talent displaying a stark difference in the average minimum salary offered to blue collared workers



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Source: Draup's Cost Simulation Module. The analyzed data points are harvested from global salary social media platforms, company job postings, and official boards. The cost datasets are then normalized and mapped to specific job clusters and job roles. The entire job family and associated job roles have been considered to calculate cost data for each job family.

Draup Recommendations

Draup proposed a 6-step reskilling framework to build and harness a robust capability to boost and reshape the Telecom industry.

1. Identify Telecom Use-Cases

- *Horizonal vs. Vertical specific requirement*
- *Requirement of Emerging Technology such as AI/ML, 5G, Etc.*
- *Maturity level in the Telecom*

2. Identify Roles to Execute Use-Cases

- *Core roles vs. adjacent roles, skills, and capability assessment*
- *Leadership and program managers for execution*
- *In-house skills vs. Outsourced partner*

3. Build a Location Strategy (Hub-and-Spoke Model)

- *Tier-1 hubs for embracing Data & Analytics to navigate the digital transformation*
- *Tier2/3 satellite centers and focus on reskilling and upskilling to grow further in the Telecom sector*

4. Leverage Govt. Affiliated Programs

- *Learn from Govt programs and training courses to upskill the career opportunities in the sector*
- *Assess skill levels, and skill gaps of employees and develop Upskill/reskill paths*

5. Build Learning Provider partnerships

- *Provide access to leading global curriculums*
- *Certify employees*

6. Identify alternative rising career paths for the employees

- *Evaluate skill adjacencies.*
- *Outline the skill requirements into future roles identified.*

Fig. 17: Reskilling Framework Developed by Draup

The reskilling framework proposed by Draup helps Telecom industry to equip employees with in-demand skills and future-proof workforce while improving employee retention, optimizing talent costs, and promoting employee career growth.

Identify Telecom Use-Cases:

Draup recommends a detailed analysis of the company's Horizontal and Vertical business requirements and their alignment with the emerging technology solutions such as AI/ML, 5G etc. Research on the current trends in the overall industry and an overview of what technologies major players are implementing to meet their business requirements would provide appropriate use cases to aid with decision-making.

Identify Roles to Execute Use-Cases

An internal assessment of employee skillsets and capabilities would help formulate the plan of action toward reaching the solution to the business problem statement – it would highlight the dominant as well as dormant skillsets of the existing employees and accordingly, the business leaders or stakeholders would be able to make an informed decision of whether to reskill/upskill the existing employees or to invest or outsource new talent with the required skillsets.

Build a Location Strategy (Hub-and-Spoke Model)

Instead of centralizing all operations to a headquarter location, Draup recommends a decentralized organization where the central and/or headquarters location can be leveraged for overseeing major transformational activities whereas decentralized "hubs" or satellite centres can focus on activities like reskilling.

Leverage Govt. Affiliated Programs

Various organizations and institutes in affiliation with the Government of India provide a varied range of tech-based training courses that provide low-cost sector-specific certifications that can be leveraged to boost employee reskilling/upskilling operations.

Build Learning Provider partnerships

Draup recommends establishing a partnership with learning platforms and certification providers o get employees easy access to global learning and certification programs.

Identify alternative rising career paths for the employees

A thorough study of the global market will provide a clear insight into the trends of emerging/in-demand skills and job roles. This would prove to be helpful while planning for reskilling activities of existing employees in alignment with their skillset.

Source: Draup Methodology

Reskilling efforts should be focused on Tier-2,3 cities

Mysuru, Coimbatore, and other Tier-2 cities in India have a high volume of university supply which can be reskilled to take up entry-level positions in the telecom industry.

Cities like **Pune and Kolkata** have established **Telecom Service Hubs** among which **Pune** has **one of the largest** supplies of **Fresh STEM Graduates**.

Fig. 18: Telecom Industry Hubs Heat Map of India

Total STEM University supply in India as of FY2021-2022 was 2.3M, with Fresh supply distribution of 47% in Tier-I cities and 53% in Tier-II & Tier-III cities.

Reskilling Existing Workforce

Over the past ten years, the thriving telecom industry has suffered because of an unsteady regulatory environment. Major occurrences in the sector include the spectrum debate and the Vodafone Idea case, which resulted in the layoffs of approximately 1,500 workers.

Contrary to 2021, the telecom sector has seen an increase in recruiting intentions. Data from Naukri.com shows that the telecom industry experienced a 48 percent rise in hiring activity from January of the previous year.

The Indian government has already made hints at its intention to recommence operations in the telecom sector with the announcement of 5G spectrum auctions this year and the launch of a PLI scheme for 13 important sectors, including the manufacturing of electronic components. As a result, consumer consumption will climb across a range of indicators,

including data usage, the adoption of 5G intelligent devices, and the expansion of the IoT market.

Almost four million people are currently employed in the Indian telecom industry. This sector is anticipated to continue to have a significant skill gap in the Indian economy notwithstanding the launch of the government's Telecom PLI scheme and emphasis on the 5G network.

There are several government programs in the skill ecosystem that have been created to improve candidates' employability within six months. The correct skills programs across the industry might reduce the expected demand in this sector. The existing workforce needs to be retrained or upgraded, and multiskilled candidates need to be produced to meet the fluctuating need for labour.

Additionally, it is possible to pinpoint freshly qualified workers and workers in particular clusters based on local or regional demand.

Companies in this sector believe that the Indian workforce is well-positioned to close the skills gap and make significant contributions to the global telecom environment, even though the constant inflow of new technologies necessitates consistent reskilling and upskilling. Major firms in the industry have already partnered with schools and training facilities to increase employability and provide continued on-the-job training opportunities.

For instance, MediaTek is creating internal training modules while also working with external teams to prepare the future workforce through a two-pronged initiative. Given the sizeable core workforce in India, MediaTek's campus to corporate programs are designed to aid entrepreneurs in adjusting to workplace culture.

Nokia has also launched a 5G certification program in association with NIIT and COAI (Cellular Operators Association of India) for individuals and companies throughout India to implement the new technology, as credentials are required hourly.

To educate and equip young people for the digital age, the telecoms giant also conducts a university bridging program.

Source: Publicly available articles, Government portals/websites, press news, etc

	TELECOM INFRA DEVELOPMENT	TELECOM SERVICES	TELECOM MANUFACTURING
PRIMARY HUBS	**Mumbai**	**Mumbai**	**Chennai**
	Delhi-NCR	**Kolkata**	**Hyderabad**
	Bengaluru	**Pune**	**Bengaluru**
LOCATION SPOTLIGHT	**Bengaluru** ▪ Maiden Private 5G Network deployed at Bosch ▪ DOT ready to deploy 5G services from 2022 **Delhi-NCR** ➢ IT infrastructure developed ahead of DOT commercial network deployment	**Mumbai** ▪ Largest Financial Hub in India ▪ Telecom Hub of India with headquarter of companies like Jio **Pune** ➢ One of the largest business & technology service sector providers in the country	**Chennai** ▪ Largest Industrial and commercial center in South India ▪ Anchored around Automotive, Electronics & Aerospace sectors **Bengaluru** ➢ The largest hub for telecom tower manufacturing companies in the country
EMERGING REGIONS (Future Talent Growth >30%)	• Emerging cities include **Hyderabad, Chennai, and Ahmedabad** • DOT strengthening infrastructure by customized telecom towers with cost-effective ground and rooftop-based solutions	• Emerging cities include **Chennai, Hyderabad,** and **Pune** • These cities are leading secondary hubs for the major telecom industry • Favorable govt. policies and initiatives to establish service hubs across the locations	• Emerging cities are **Pune, Ahmedabad** • Growing logistical performance indices • Maharashtra and Gujarat also have high STEM university talent

Source: Publicly available articles, Government portals/websites, press news, etc

Government and Private Partnerships

The government has taken several measures to keep the Telecom industry in shape and strengthen this industry in the country. Also, many private partnerships revamp the sector and explore the business development prospects across the industry.

Government Partnerships

FTTH Partner with BSNL

BSNL offers a unique opportunity to individuals/ firms interested in partnering with BSNL to provide FTTH (Fiber To The Home) and other services in the existing and upcoming residential/commercial complexes and all other parts of rural and urban areas revenue sharing basis.

C - DOT – Vodafone Idea

Centre for Development of Telematics (C-DOT), the R&D arm of the Department of Telecommunications (DoT), and Vodafone Idea have signed a pact to leverage each other's expertise in their respective domains to develop and deploy IoT/M2M solutions in India.

TEC (Skill Development Training Program)

In collaboration with the industry, Telecommunication Engineering Center (TEC) has organized a skill development training program for girl students from rural backgrounds. This training will help provide aspiring candidates with good career opportunities in the telecom testing domain.

Pelecon-BSNL

Pelecon, a subsidiary of Pondicherry Industrial Promotion Development and Investment Corporation Limited (PIPDIC), has entered a Memorandum of Understanding (MoU) with Bharat Sanchar Nigam Limited to provide 'triple play service' to households and industries.

Inmarsat-BSNL

Bharat Sanchar Nigam Limited (BSNL) has entered a strategic partnership with UK-based satellite communications provider Inmarsat to offer its Internet of Things (IoT) services in India.

BSNL-Nokia

BSNL and Nokia are collaborating to implement the next level of industrial automation to leverage 4G LTE technology to ensure greater operational efficiency at Nokia's Chennai factory.

TCS-BSNL

Tata Consultancy Services (TCS) has pioneered a partnership with BSNL to roll out the country's first genius 4G network.

Private Partnerships

Jio – Google

Jio has entered a partnership with internet major Google to use the latter's Google Cloud to provide Jio 5G Solutions and the internal needs of other businesses.

Tech Mahindra – IOH

Tech Mahindra has announced a strategic partnership with the telecom service provider Indosat Ooredo Hutchison (IOH) to jointly explore business development prospects across industry 4.0, cloud, data, and 5G networks.

Reliance Jio – Zupee

Reliance Jio has announced that it has entered a strategic partnership with Zupee, a skill-based gaming company, to integrate the latter's apps into Jio Platforms. This will entail the integration of products and strong synergies in user engagement and distribution in a future-ready ecosystem that will benefit over 450 million users.

Vodafone Idea – Ciena

Vodafone Idea Limited (Vi) announced that it partnered with US-based Ciena for 5G solutions. The telco said it is revamping its backbone scalability and service resiliency with help from American telecommunications networking equipment company Ciena to prepare for the 5G rollout.

The Telecom players are developing **strategic partnerships with learning platforms to reskill and upskill their employees** to adapt to the new technological and cultural changes.

Airtel-Tech Mahindra

Bharti Airtel ("Airtel"), India's leading communications solutions provider, and Tech Mahindra, a leading provider of digital transformation services and solutions, consulting, and business reengineering, today announced a strategic partnership to build and market innovative solutions for India's digital economy. by combining their main strengths.

Airtel-IBM

IBM and Bharti Airtel, India's leading communications solutions provider with more than 358 million subscribers, today announced their intention to collaborate to deploy an Edge Computing platform in India that will include 120 network data centers in 20 cities.

Once deployed, the platform is designed to enable large enterprises across multiple industries, including manufacturing and automotive, to accelerate innovative solutions that deliver new value to their clients and operations – securely at the edge.

Source: Publicly available articles, Government portals/websites (smartcities.gov.in; indiaai.gov.in; Cloud.gov.in; niti.gov.in)
Note: MSDE is the Ministry of Skill Development and Entrepreneurship; NSDC is National Skill Development Corporation

Airtel-Hughes

Hughes Communications India Pvt Ltd, (HCIPL), a majority-owned subsidiary of Hughes Network Systems, LLC (HUGHES), an innovator in satellite and multi-carrier technology and networks for 50 years, and Bharti Airtel Limited (“Airtel”), India's leading the communications solutions provider today announced the formation of a joint venture to provide satellite broadband services in India.

Airtel-Axis Bank

Bharti Airtel ("Airtel"), India's leading communications solutions provider, and Axis Bank, India's third largest private sector bank, today announced a strategic partnership to boost the growth of India's digital ecosystem through a range of financial solutions.

Jio-Ericsson

Telecom equipment maker Ericsson has announced a long-term strategic 5G agreement with Reliance Jio to roll out a standalone 5G (SA) network in the country. The announcement follows the allocation of 5G spectrum in the recently concluded auctions in India.

JIO-ICAI

The Institute of Cost Accountants of India and Jio Platforms have entered into a partnership that will use audio-visual content created by ICAI to upskill the telecom service provider's customers.

Source: Publicly available articles, Government portals/websites (smartcities.gov.in; indiaai.gov.in; Cloud.gov.in; niti.gov.in)
Note: MSDE is the Ministry of Skill Development and Entrepreneurship; NSDC is National Skill Development Corporation

Strategic Partnerships

Google – Vodafone

Google Workspace will equip Vi Business Plus customers with productivity applications such as Google Meet, Gmail, Google Drive, Google Sheets, Google Slides, Google Docs, and Google Calendar at no extra cost

Coursera – Airtel

Airtel partners with Coursera to upskill its workforce for the future

Jio - IETE

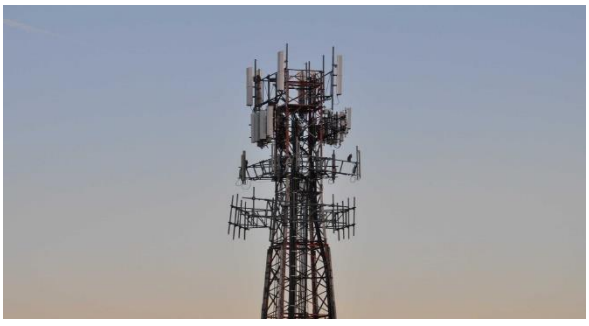
IETE has signed an MoU with Reliance Jio Infocomm Ltd for imparting training and skill development to selected candidates who may be recruited for Reliance Jio as per their requirement to support their 4G network installation at various locations.

Verizon – Airtel

Verizon and Airtel bring secure enterprise-grade BlueJeans video conferencing to India

Vodafone – NASSCOM

Vodafone India Foundation has collaborated with CGI and NASSCOM Foundation to launch 'DigiSakshar.org', to help India's citizens become self-reliant through digital literacy. The online digital skills portal has been developed to aid communities by using this knowledge to build and enhance their livelihood.



Source: Publicly available articles, Government portals/websites, press news, etc.

Addressable Telecom Talent Gap

With the right **reskilling and hiring techniques** and targeting adjacent talent in Tier-II & III cities and University supply, India has a robust opportunity to subjugate the widening Demand-Supply gap by 2030.

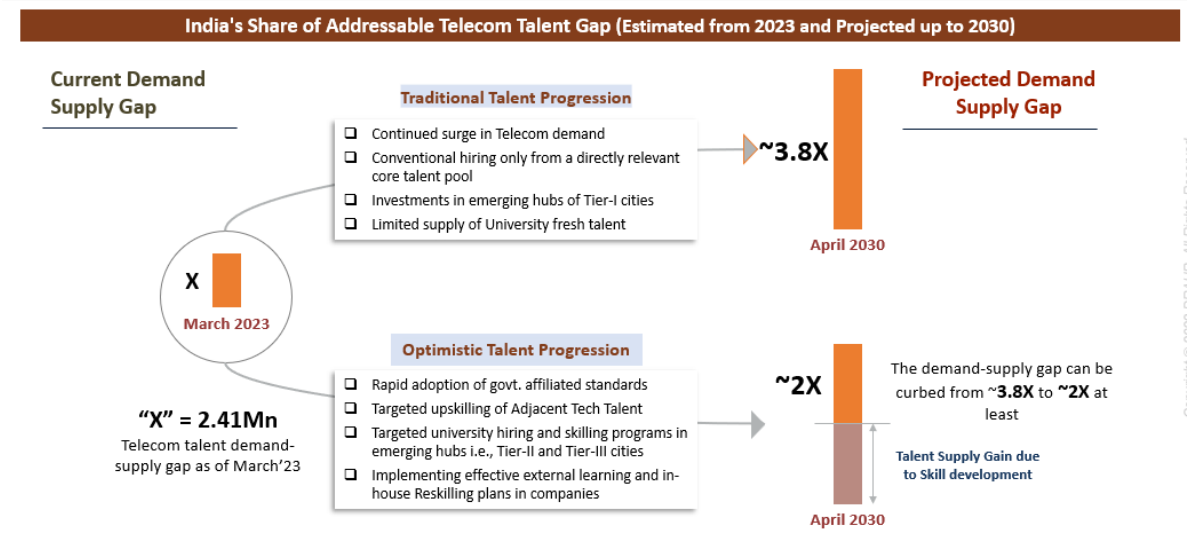


Fig. 19: Share of Addressable Telecom Talent Gap in India

Traditional Talent Progression

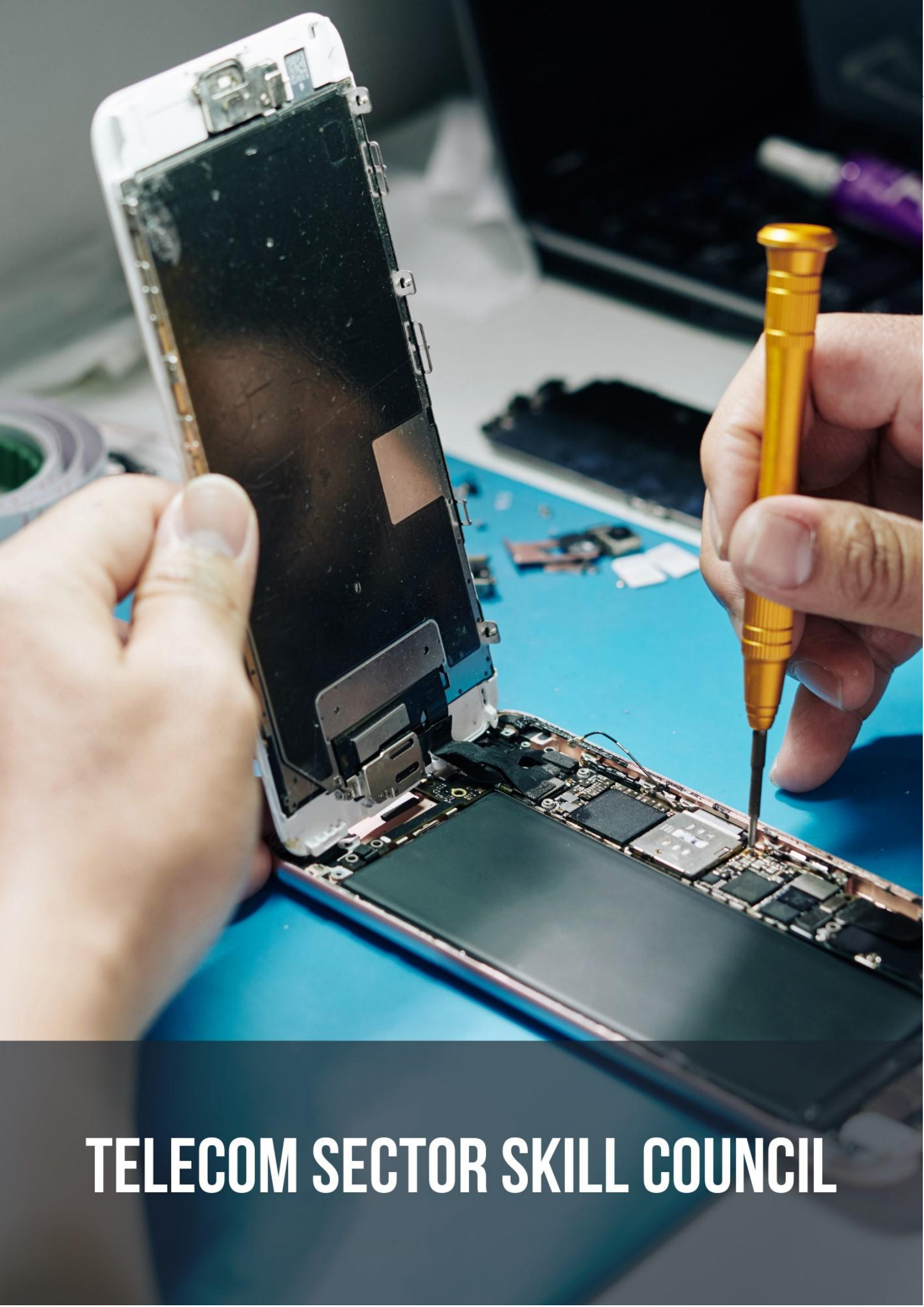
- Current **demand-supply gap** in India stands roughly at **2.41M** which is estimated to rise to **9.1M by April 2030** if **Traditional Talent Progression** methods were to be adopted
- **Conventional and competitive hiring** from an already available core talent pool would simply **increase the hiring/talent cost** with little to no increase in the skillset of the acquired talent
- Investing in **Tier I cities** would imply ignoring all the **potential growth in Tier II and Tier III cities** which usually house the **largest untapped potential talent sources** probably at an **even lower cost**
- **Technological paradigm** is on the rise globally while the **demand** for the **latest technologies would surge. Limited upskilling and reskilling activities** would mean a severe talent supply shortage which in turn will **contribute largely** to the **demand-supply gap in India**

Optimistic Talent Progression

- The **demand-supply gap** is estimated to be **reduced by 1.8x** than the projected 3.8x if an **Optimistic Talent Progression** approach is adopted
- Conducting a **skill-gap analysis** would help with a view of what the existing talent is lacking. This would help in setting up **appropriate training plans** for the incoming fresh talent to **reduce the skill gap** and provide **reskilling opportunities** to the existing talent
- **Industry-Academic tie-ups** and **re-skilling programs in Tier II and III cities** would help incoming talent gain an industry perspective during their academic years which would prove to be beneficial in the long run. This would also help **boost the talent inflow** from emerging hubs thereby **reducing the talent and skill crunch**
- **Adjacent tech and non-tech talent areas** can be leveraged and **upskilled** with the emerging trends **thus reducing the talent supply crunch** by considerable amounts

Leveraging the existing government skilling infrastructure is an optimal way to achieve the objectives at the most minimal time and cost factor. Setting up centers of excellence using the hub and spoke model in installed educational infrastructures such as existing ITI/Polytechnic institutes and utilizing their reach to penetrate training for entry-level and specialized job roles will expedite the training initiatives to bridge the gap between demand and supply.

Source: Draup's proprietary ML-model and Talent base of 65M+ unique JDs has been leveraged to forecast the demand-supply gap.



TELECOM SECTOR SKILL COUNCIL

Telecom Sector Skill Council

India holds the top spot worldwide when it comes to talent in the technology sector, consistently maintaining a position of leadership in establishing global technology operations. With a substantial pool of both seasoned professionals and emerging talent, India possesses a resilient resource base capable of serving the needs of both traditional and cutting-edge digital technologies.

The need for skilled manpower is paramount and the Telecom Sector Skill Council (TSSC) is playing a pivotal role in closing this workforce proficiency disparity. TSSC is an industry led apex body, a not-for-profit organization setup by NSDC & the telecom fraternity and we are committed to develop and ensure adequate availability of world class skilled workforce to boost growth and productivity of the telecom sector.

Telecom Sector Skill Council (TSSC) works under the Skill India Mission of the Ministry of Skill Development and Entrepreneurship (MSDE), and governance of Department of Telecommunications (DoT), Ministry for Electronics & Information Technology (MeitY), various state skill development missions and district skill committees. TSSC has a strong presence in the community with multiple skill development projects through various channels. Our vision is to develop a world class skilled workforce for the Telecom industry as we believe that skill development has the potential to become a tool for change, and TSSC strived to leverage this to empower the youth of our nation.

Skill Development in Information and Communication segment in India has observed a shift, driven by several factors such as increased investments in education & training, emergence of new industries and technologies that require advance or nuanced skills and expertise and growing focus on bespoke & blended training. The domain of work and employment opportunities is also increasingly decentralized, with new opportunities presenting in emerging cities.

Keeping these factors in mind, Telecom Sector Skill Council has been working extensively on multiple initiatives for skill empowerment in ICT.

1. Skill India Mission

Under the Ministry of Skill Development and Entrepreneurship's (MSDE) Skill India Mission, Telecom SSC has been training and empowering the youth of the nation for 10 years now. Over the years we have trained more than 10 lakh young Indians with core telecom and digital skills.

Post 5G Launch in India, Telecom Sector Skill Council is empowering the youth with skills pertaining to Industry 4.0 with core technologies such as 5G RF, RAN, Infrastructure and augmenting technologies such as Internet of Things, AI, Cybersecurity and more.

As per this moment, Telecom SSC has developed 20+ new qualification packs or courses which are engineered to cater to the in-demand skills in the industry.

Workforce with skills in 5G, Optical Fiber, Managed Services etc are increasingly in demand in the industry, and Telecom Sector Skill Council has achieved multiple special projects by the government to upskilling individuals in 5G based skills under Government schemes such as Pradhan Mantri Kaushal Vikas Yojana (PMKVY 4.0), ESDM Skill Development Schemes and multiple schemes by State Governments to empower emerging states and cities.

2. List of Qualification Packs (QPs) under Telecom Sector Skill Council:

S.No.	New Qualification Name	NSQF Level
1	Telecom Grameen Udhyami	4
2	5G System Integrator	
3	In-Store Promoter	3
4	Distributor Sales Representative	3
5	Telecom E-waste Handler	3
6	Optical Fiber Splicer	3
7	Broadband Technician	4
8	Telecom Customer Care Executive - Repair Centre	4
9	Handheld Devices (Handset & Tablet) Technician	4
10	Optical Fiber Technician	4
11	Telecom Terminal Equipment Application Developer (Android)	4
12	Telecom Terminal Equipment Application Developer (Native)	4
13	Tower Technician	4
14	Active Network Management Associate	4
15	Telecom Infrastructure Engineer	5
16	Information and Communication Technology (ICT) Engineer - 5G Networks	6
17	Base Station Sub-system (BSS) Support Engineer	6
18	Cluster Manager	6
19	Field Sales Executive	3
20	Telecom Customer Care Executive - Call Center/Relationship Center	3
21	Information and Communication Technology (ICT) Technician	4
22	Telecom Technician - IoT Devices/System	4
23	Grass Root Telecom Provider	4
24	Network System Associate	4
25	Telecom Embedded Hardware Developer	4
26	Cluster In-Charge	5
27	Installation Engineer - SDH, DWDM, L2 & L3 Equipment	5
28	Territory Sales Manager - Prepaid/Broadband	5
29	Fiber to-the Home (FTTH/X) Installer	3
30	Hand Soldering Technician - Telecom Board	3
31	Outside Plant (OSP) Fiber Installation, Testing and Commissioning Supervisor	4
32	Telecom Surface Mount Technology (SMT) Technician	4
33	Line Assembler - Telecom Products	4
34	Drive Test Engineer	5
35	Wireless Technician	4
36	Field Management Engineer	5
37	Telecom Rigger – 5G and Legacy Networks	3
38	Infrastructure Technician - 5G Networks	4
39	Technician 5G – Active Network Installation	4
40	Project Engineer - 5G Networks	5
41	System Architect – 5G Cloud RAN	6
42	Technician - Automatic Train Protection System (ATPS)	4
43	Technical Supervisor - Automatic Train Protection System (ATPS)	5
44	AI Devices Installation Operator	3
45	Jr. Technician - Last Mile Active Network	3
46	IoT Technical Service Operator Electives: IoT – Smart City, IoT – Agriculture, IoT – Telemedicine, IoT – Transport	3
47	Drone Monitoring and Maintenance Associate	3
48	AI & ML - Jr. Telecom Data Analyst	4
49	Cloud Computing - Jr. Analyst	4
50	Machine Learning (ML) Engineer	5
51	IoT Installation Solution Architect	5
52	Retail Store Ops Assistant	1
53	Retail Cashier	2
54	Retail Trainee Associate	3
55	Retail Associate cum Cashier	3

56	Retail Sales Associate	3
57	Distributor Salesman	3
58	Retail Sales Specialist cum Cashier	4
59	Sales Supervisor	5
60	Retail Store Manager	7
61	CCTV & Access Control - Cabling Executive	
62	Alarm Monitoring Executive - Network Operation Center (NOC)	
63	Network Surveillance Optical Engineer	
64	Fault Troubleshooting Technician -Network Operation Center (NOC)	

3. Corporate Social Responsibility & Centres of Excellence

As Government of India recognizes the value of skill development in India for the underserved sections of the society, many of the corporates are partaking in skill development with Corporate Social Responsibility (CSR) efforts. Firms are significantly contributing to this endeavor by making substantial investments in skill development initiatives with a long-term outlook. The Telecom Sector Skill Council has been executing these initiatives through a variety of programs, the most key endeavor being “Centres of Excellence”.

In FY 2023-24, as CSR projects, Telecom Sector Skill Council has associated with technology firms such as Nokia, Ericsson and Vodafone Idea to setup Centres of Excellence in Gujarat and Delhi, to accelerate high level training in 5G Technology, Internet of Things, Advance Surveillance and more. These Centres of Excellence are high end laboratories with practical infrastructure for more of a hands-on approach towards skilling. Telecom SSC also partnered with Rotary District 3011 to execute blended learning for underserved sections of youth.

Apart from these CSR partnerships this year, TSSC has carried out a project with SBI Card.

The blend of corporate investment in skill development and Government Skilling programs under Skill India Initiative has the potential to significantly improve the quality of training and expertise of the workforce in all tiers of cities.

4. Academia

Educational Institutions are increasingly cognizant of the need of integrating supplementary skilling courses and programs into school, undergrad or diploma curricula to ensure the students are fully conversed with the industry benchmarks and standards. Furthermore, the primary emphasis is on introducing sector-specific curricula in diverse sectors to ensure that students are adequately prepared for success in their aspired fields.

Telecom Sector Skill Council is focused on introducing learning programs for students, especially in emergent cities. TSSC is currently working with DGT to ready the graduates of all Indian ITIs to upskill in new age technologies and boost the technology sector. TSSC is also focused to integrate our courses in core skills and digital skills in school/graduation curriculum.

5. Apprenticeship

Internet penetration in India has advanced faster than in other countries in the past and is poised to grow significantly higher in future. Industries are developing rapidly and there is a significant skill gap amongst the jobseekers. The concept of "Apprenticeship" where an individual learns while they earn is a brilliant model for India. Under MSDE, "National Apprenticeship Promotional Scheme" (NAPS) is one of government's scheme which leverages "DBT or Direct benefit Transfer" by the government to the trainees who get the opportunity to learn on-the-job.

6. Placements

As we focus on Apprenticeships, we do consider employment of young Indians to be the ultimate goal of Telecom Sector Skill Council. Indian youth has been proven to be a powerhouse of technology talent due to large pool of resources and diversity of skills available across the industry. TSSC started with "TelcoJobs.in", an online portal to create a seamless ecosystem for employers and jobseekers to come together and bridge the significant gap in the industry. There is also a significant gap in tapping the talent in emergent cities and underserved sections of India.

In addition to TelcoJobs.in, TSSC is actively engaged in establishing various channels to offer opportunities to individuals who have received training through TSSC projects. This is accomplished through collaborations with corporate entities, job fairs across India, inclusion of supplementary training programs, the initiation of on-the-job projects, apprenticeship programs, and the adoption of place-and-train models.

Telecom Sector Skill Council has undertaken the goal of facilitating employment for 1.25 Lakh trained young Indians in FY 2023-24

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7. Placements

Telecom has always been one of the fastest growing industries in India, but the pandemic came as a tip-off point, not only on how the demand of skilled workforce shifted, but also on how the skilling and learning distribution model changed. The possibility to leverage digital learning, online programs and internet in general grew and the possibility to develop talent hubs in cities of all tiers became real and essential. Telecom Sector Skill Council launched "TelcoLearning.com", an online eLearning platform which replicated all major skill development qualification packs of TSSC and other important core telecom skills and digital skills.

This initiative not only allowed TSSC to expand its footprint in multiple projects and cities, but also allowed us to explore "blended" learning programs through corporate investments.

TSSC aims to create value through TelcoLearn by collaborative projects in training and build highest quality of skills in tier-2 and even tier-3 economy.

8. Telecom Grameen Udhyami

India's rural landscape has witnessed a remarkable transformation in recent years, primarily driven by the rapid expansion of technology. This transformation has empowered rural communities, creating new opportunities for growth and development. The increased penetration of the internet and the availability of affordable smartphones have revolutionized the lives of rural residents, granting them access to online services and significantly improving their quality of life. The Telecom Sector has been a catalyst for change in India, especially rural and tier-2 and 3 cities. Digital literacy is on the rise in rural India, equipping more individuals with technological awareness and skills. This growth of awareness and accessibility of digital technologies, internet and other solutions are leading to businesses to grow in these geographies, and emergence of innovative business models which are revolutionizing the Indian market.

The growth of IT and Telecom companies in rural India has necessitated a demand for a proficient workforce to fulfil the operational requirements. The industry expects a proficient local workforce to cater to their demands, and supersede the migrating workforce from cities. This empowers Indian population to earn their livelihood from diversified avenues. The growth of telecom in rural India also promotes entrepreneurship for allied services to the industry. As 5G, Fiber, Smartphones, Passive infrastructure, digital solutions and other sub domains and technologies flourish, rural enterprises by local resources are led to grow. This in turn spurs for more employment avenues, affecting directly to the levels of migration. To ensure the development of viable businesses, support in terms of investments, materials, machinery and skill development is fundamental.

Telecom Sector Skill Council observed this drastic transformation and has introduced "Telecom Grameen Udhyami", which is a Skill Development project, aimed to empower local resources as workforce for the telecom sector. The aim of this project is to promote the telecom industry's confidence in expanding to rural and remote areas, with the assurance that a local skilled workforce will be available either as employees or entrepreneurs. This workforce is envisioned to address a diverse range of requirements essential for the successful implementation of their services.

The project will skill, upskill and reskill the youth of Rural India in electrical functions, wiring, Wi-Fi and broadband backhaul, optical fiber, in-building systems, FTTH/X Cabling, configuration for wired connectivity, troubleshooting, handset/device repair and servicing. The project also provides comprehensive skills for employability and entrepreneurship. The project encompasses two parts –an NSQF aligned Qualification Pack from classroom and hands-on training under paid projects and Government funded projects and a cluster of ten Digital eLearning courses on telcolearning.com, including all necessary skills required to augment the upskilling process.

The project is centered on the fundamental idea of "Digital India". TSSC is bringing prominent industry players in telecom sector, government departments, skill development institutes and academic institutions together to forge a robust integration and foster high-end industry aligned workforce, standardize qualifications for the telecom professionals and also create employment opportunities in the domain.

"Telecom Skilling on Wheels" is another project in our dossier which aims at sensitization in remote locations in India with telecom skills and improve inclusive employability through capsule courses/Short term training and soft skills, leveraging mobile modular skill labs with integrated skill development infrastructure.

APPENDIX

Term	Definition
Overall Telecom Talent	The total addressable talent available in the region under analysis
Blue-collar Talent	Telecom talent is currently employed 'on-ground' in roles like operators, technicians, etc.
Corporate Talent	Telecom talent currently employed in the Corporate Sector in an administrative/ clerical or managerial role
Employed Talent	Total recognized and available Telecom talent in the country
Adjacent Talent	Talent employed in adjacent job roles in the Telecom industry
Direct Roles	Job roles directly relevant to the Telecom industry
In-direct Roles	Job roles where adjacent talent is employed in the telecom industry
Occupation	Job function/division within the telecom industry
Segment	Division
Job Role Type	The type of role - administrative or 'on-ground'
Use Cases	A situation where a product/technology/idea can be applied/used
Median Base Pay	Salary set at the 50th percentile of the comparison group
STEM Graduates	The college graduates with an educational degree in the STEM area
Analyzed Job Roles	Job Roles under consideration for the analysis
Demand/Job Postings	Total Job openings in the telecom industry specific to the analyzed job roles in the previous year
Hiring Difficulty	The level of difficulty expected to fill the job vacancy for the analyzed roles
CAGR	Annual Growth rate observed in terms of supply and demand of relevant talent
Gender Diversity	The presence of female talent compared to the male talent
Attrition Rate	The share of employees who left the organization in the past 12 months
Experience Split	Total addressable talent split experience-wise
Tele density	Number of telephone connections for every hundred individuals living within an area

Telecom Sector Skill Council
www.tsscindia.com

Draup Business Solutions
www.draup.com