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The Business of Communications

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# BUILDING INDIA'S TELECOM TALENT POOL

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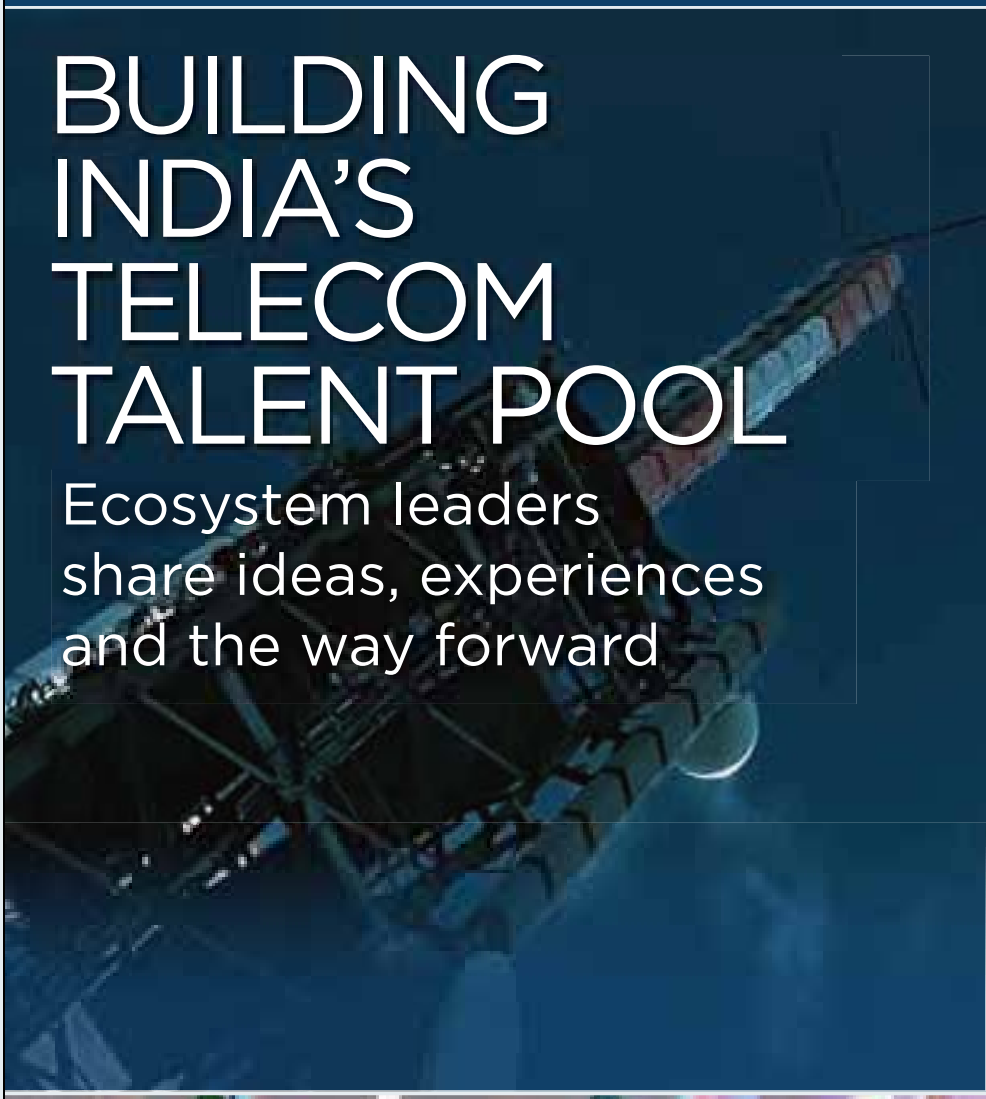

# BUILDING INDIA'S TELECOM TALENT POOL

## Ecosystem leaders share ideas, experiences and the way forward

62

# MAKE 5G DEPLOYMENT LOW-RISK AND GREEN

This solution simplifies the deployment of 5G networks. Built on open systems with pre-deployment integration, the solution minimises the need for the time-consuming and costly post-deployment integration that is a challenge for service providers


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# TELECOM MANTHAN

**Explore the new age technologies and the emerging business sectors related to them.**

**Know about the new talent requirements in the new age technological environment and the efforts by the IT industry to fulfil these requirements.**

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# The Road Ahead

Greetings, friends!

It has been an interesting month. Telecom Manthan was held on 28 June, 2019, where we looked at the emerging technologies that are creating demand for talent pool transformation.

Well, 5G, for instance, is definitely an area where India needs to look at!

There was an Ericsson report recently that talked about 5G. According to the report findings, all regions across the world, now have mobile broadband subscription penetration of 50% or higher. And, on a global level, mobile broadband subscriptions make up 76 percent of all mobile subscriptions.

Next, the mobile data traffic reportedly grew 82 percent between Q1 2018 and Q1 2019. The high growth rate was mainly impacted by the increased number of smartphone subscriptions in India, and increased data traffic per smartphone per month in China.

Now, India, as a region has the highest average monthly usage per smartphone, so far. Also, there are three main drivers for growth, globally:

- Improved device capabilities
- More affordable data plans
- Increase in data-intensive content.

The strong momentum for 5G continues, as we speak. Several markets have switched on 5G, following the introduction of new 5G-compatible smartphones. According to the report, there should be 1.9 billion 5G subscriptions in 2024.

However, the smartphone of today needs to evolve. One prime area is the battery power. At least 81% of the people expect at least one feature beyond battery life and extreme storage in their 5G-ready device.

In India, as far as the 5G use case is concerned, enhanced mobile broadband (eMBB), followed by TV over 5G FWA, should be the first service to go mainstream.

Where does rich communications services, or RCS, fit in? With RCS, consumers should be able to interact with brands in one place, such as airlines, railways, taxis, restaurants, banks, etc. However, it is reported that there has been a slow and painful rollout of RCS messages by the mobile operators.

We have a 5G event slated for September. We hope there are good discussions around the various topics planned.

*Pradeep Chakraborty*

**Pradeep Chakraborty**
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# BUILDING INDIA'S TELECOM TALENT POOL

**At a time when on one hand we see significant consolidation and job losses in telecom sector; on the other hand we also see operators, telecom technology players, equipment/handset vendors & manufacturers, and software & apps players gearing up for digital telecom and emerging technologies including 5G, IoT, AI, M2M, VR, Robotics, et al start to get centre stage.**

**To discuss threadbare the challenges before the sector and whether our talent pool is also geared up in terms of business and technology challenges this transformation will throw up, the JUNE 2019 issue of Voice&Data magazine is on Building India's telecom talent pool. This cover story explores the views of telecom industry leader about the emerging trends in the telecom technology and also about the prospects of industry-academic tie up to foster the state-of-the-art research in the field of telecom technology. In the following pages, Voice&Data has carried exclusive interaction with a number of telecom leaders to get a glimpse of these issues.**

**Ecosystem leaders share ideas, experiences and the way forward.**

—**Anjali Byce**
CHRO, Sterlite Tech

"WHILE REDUCING DEVELOPMENT TIMELINES REQUIRES TECHNICAL EXPERTISE; THE ABILITY TO UNDERSTAND CUSTOMER'S BUSINESS NEEDS AND SOLUTIONS THROUGH DEEP CUSTOMER ENGAGEMENTS IS ALSO EQUALLY BECOMING CENTRE-STAGE."

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

The Indian Telecom sector is fast transforming. Emergence of varied applications for 5G, Internet of Things (IoT), Blockchain, Artificial Intelligence, Machine Learning, among others,

need quick ramp up of skills matching global requirements. Coupled with this, aggressive policy-level targets for deeper broadband penetration and associated telecom services required to match urban as well as rural consumer demands are creating a major demand-supply gap at all levels of the talent hierarchy.

As per the Telecom Sector Skill Plan of DoT, additional telecom talent requirement by 2021-22 will be over 4.78 million. With the silos of telecom software, services, manufacturing disappearing, telecom professionals need to learn, adopt and develop new skills to fuel this transformation. As the sector shifts from 4G to 5G, telecom professionals need to satisfy customer requirements with newer solutions and services. The expectation is to have stronger techno-commercial capabilities to accelerate fulfilment of customer needs. While reducing development timelines requires technical expertise; the ability to understand customer's business needs and solutions through deep customer engagements is also equally becoming centre-stage.

**What role a company like yours is playing in building the right telecom talent pool for India?**

In India, less than 20% of mobile tower sites have a robust fibre backbone as compared to 70-80% in the developed countries. As telcos invest in fiberisation of backhaul networks, these deployments have to be standardised and implemented through highly skilled resources. Deployment quality, network reliability, lifetime and expenses all can be well-managed when smarter network professionals are employed to bring about this fiberisation.

Our STL Academy banks on our global expertise in optical fibre network designing, building and management, use of industry-best practices and state-of-the-art research to equip telecom professionals in boosting their efficiency, reducing error rates and achieve improved First Time Right (FTR) implementations.

STL Academy's goal is to build symbiotic relationships with all telecom stakeholders and create a conducive ecosystem matching global standards and practices. All of this while fulfilling our overriding purpose is service of the nation.

**What are the big challenges that you see today when you want to hire professionals that can build next-gen telecom networks, products and services?**

The requisite experience and exposure needed for the transition in the Indian telecom sector is not available in India. As a result, companies need to hire professionals from other parts of the globe on consulting assignments to build next-gen solutions while building competencies locally. This is especially a major challenge when niche skills are needed for high-tech product development.

Today's telecom sector need engineering graduates to be equipped with skills in fibre optic technology, IoT, cloud computing, carrier-grade Wi-Fi and 5G. In India, technical education is focused on theory-based learning where only 40% of students undergo internship and less than 36% take part in live projects as part of their course. Lacking industry exposure, students fail to apply technology concepts to industry requirements.

**What would be your advice to educational institutes which are the foundations of aspiring telecom professionals?**

Academia should join hands with equipment manufacturers, TSPs and network deployment experts to enable practical orientation, in addition to theoretical approach. To be in tune with the latest technology trends in the market, academia should partner with leading telecom network, product and services companies for knowledge exchange forums, internship programmes, industry visits, go-see-learn events and meet the leadership initiatives, to name a few. This will help the students and faculty in getting a realistic and contemporary perspective; further enabling them to select their specialisation. Creating technology labs and providing real-time environment for better adaptability will help build the right skills – and catch them young!

**What role and support from the Government do you think, will help the industry and academia to speed up quality and scalable telecom talent pool?**

From an industry point of view, the government should increase the number of institutions offering telecom education and add related technology courses in prestigious colleges to build a strong talent pool. As technology in the telecom sector continues to rapidly evolve, the government may explore the option of industry and academia co-creating specialised and cutting-edge training programme that helps in skill development that is forward looking.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

As technologies evolve, IoT specialists, artificial intelligence, data analysts, large-scale system integrators and its project managers, cloud application developers, carrier-grade Wi-Fi and 5G wireless technicians, FTTx network specialists would all be critical skills that the Indian telecom service providers would be looking for in the future.

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**—Arun Karna**
MD, AT&T Global Network Services India

# "THEY NEED TO THINK OF CAREER AS A JOURNEY AND THE VARIOUS STAGES THROUGH WHICH THEY MUST GO"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

Charles Darwin said that "It is NOT the strongest of the species that survive, nor the most intelligent, but the one most responsive to change". His description about the survival of species,is increasingly true in the telecom industry and applies equally well to the industry professionals.

The nature of telecom networks is changing at a rapid pace. The whole network architecture is changing from a hardware-centric build out to software-defined networking (SDN). SDN combined with Network Function Virtualisation (NFV) is shaping the networks of the future to be extremely flexible and agile to meet the needs of the business inthis rapidly changing environment. These developments call upon the industry professionals to learn and unlearn quickly; and to build the necessary skills and competencies to be successful in this software-defined world.

This adaptability to new environments is essential in the VUCA world that we live in. Are the telecom professionals adaptable to change? This is where soft skills and the dimension of Emotional Quotient would come in. In addition,the telecom professionals should be willing to learn new things and unlearn the past.

Apart from telecom professionals acquiring the required technical skills and competencies that would help them with their regular day to day job (e.g. Telecom sales professional will need the required sales and account management skills plus the required Product knowledge, etc.), there are some areas that are extremely important for the Telecom professionals to focus on irrespective of which function they belong to.

Here are some points that I would like to raise:

1. While they understand the nuances of technology, i.e. SDN, NFV, IOT, AI, 5G etc., first and foremost, they must clearly understand how these technologies can be applied from a business perspective and the value that an enterprise, consumer and society at large can derive using these technologies. Hence, application areas of technology are something they should clearly focus on. Needless to stay business and industry knowledge of the customers they serve is equally important.
2. in a highly competitive world, where all things being equal, one factor that differentiates one telecom player from the other is superior customer experience. Hence, right from day 1 the telecom professionals should understand the importance of customer experience and how they should learn to build skills that will help them to empathize with their customer and add value to a customer through every interaction. In this context, I would advocate that Telecom professionals to understand and perhaps do a course on design thinking. In design thinking, the whole approach is to find new ways of solving problems and keeping the customer at the center.
3. Sense of purpose and meaning: through my profession, how can I contribute to society, to the nation? Is it all about myself?
   Telecom professionals should inculcate this idea at an early stage that there is a need to focus beyond compensation, career progression and their own jobs being fulfilled. There are various ways in which telecom professionals can contribute to the society. For example, volunteering for a social cause, teaching at a rural school, etc.
4. In a world where technology is fast changing and where one needs to keep themselves updated and relevant through acquiring the necessary skills, the importance of soft skills becomes very important. These skills include:
   1) Problem solving
   2) Critical thinking
   3) Communication and Interpersonal skills
   4) Creativity
   5) The art of storytelling
   6) Presentation skills
   7) Listening skills
   8) Strategic thinking
5. For those who want to be entrepreneurs in the future in the areas related to telecom/IT, they should clearly understand the problem they are trying to solve and reach out to successful entrepreneurs to guide them throughout their entrepreneurial journey. They need to understand this journey is a Marathon and not a sprint.

**What role can a company like yours play in building the right telecom talent pool for India?**

I believe that there should be a very strong industry-academia connection, which is somewhat lacking right now. The industry can help the educational institutions to keep their curricula up-to-date and relevant to the evolving nature of the industry. On the other hand, the fresh ideas and research output coming forth from the academia can help the industry spark off breakthrough innovation. Both can complement each other in a virtuous cycle.

I would urge my peers and colleagues in the industry to try and help in the following ways:

1. For freshers straight out of college, they should do a job at Internal apprentice programme for 6 months to a year after a thorough screening process and get themselves exposed

to world class processes and systems and get them to work on real projects.
2. Industry leaders can visit colleges and deliver lectures and share industry experiences and give them an exposure to latest technological developments.
3. They can act as mentors and counsellors to help the talent by guiding them as they progress through their career.

## What are the big challenges that you see today when you want to hire professionals that can build next generation telecom networks, products and services?

To begin with, there is a significant gap between the curriculum that is taught in our engineering colleges and what is relevant to the telecom industry today and the current state of technology. That means that the industry must spend training efforts to get the new hires to acquire the requisite level of skills and knowledge such that they become hands-on and effective.

The new wave technologies, for example, 5G, AI/AR, IOT, SDWAN,NFV, Edge Computing and the interplay between them is a recent phenomenon and that is ever accelerating. That means that even experienced telecom professionals need to make a quick pivot and then keep their knowledge and skills constantly refreshed. This requires constant effort and a continuous cycle of unlearning and learning.

A blend of good technical and business knowledge is extremely important, but such skills are hard to have today. They need to be able to communicate about the value that a product or service can offer effectively. They focus a lot on features, but they should ensure that they can relate the products and services to a customer's business problems and needs instead.

They need to develop patience and be willing to put in the hard work that is needed. As Thomas Edison said, "Genius is 99% perspiration and 1% inspiration". They need to think of career as a journey and the various stages through which they need to go through to get to where they want. It is a marathon, not a sprint.

## What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?

1. Have an active outreach program to the industry.
2. Focus equally on the application areas of technology rather than keeping the curriculum too technology focused.
3. Get students to attend industry forums and events to give them exposure to industry leaders and exhibitions where they can get the technology updates.
4. Arrange regular industry visits to see how technology is being used within an enterprise environment.
5. Get telecom industry leaders to give guest lectures on a regular basis.
6. Work on setting up IOT or telecom labs inside the college and get students to work on live projects. For example, conduct Hackathons regularly, set up start up incubators inside on campus so that students can get to engage with startups and work on projects (depending on the funds they have). Many progressive institutions or colleges have built start up incubators inside their campuses and these are ideal nurseries for nurturing talents.

## What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?

1. First and foremost, the Government should ensure that we have a stable and consistent telecom regulatory environment that will ensure that the telecom providers not just survive but also thrive. If the telecom sector is healthy, it will incentivise more telecom professionals to be drawn to the industry.
2. Ensure that the Educational institutes adopt a Skill and Industry oriented education framework. Hence, this may call for a revamped Technical Education Policy. The biggest challenge today is that those who come out of colleges are not hands-on and ready for the industry. The curriculum should be skill-based and industry-oriented to address the gap between students and industry-professionals.
3. Government-funded telecom sector post-graduate schools or telecom sector skill councils can be set up, or they can be set up through the PPP mode in many more cities and towns.
4. Our indigenous telecom hardware ecosystem is virtually non-existent. Hence the government should perhaps play a role in creating an ecosystem with the right policies, duty structures and incentives to ensure more manufacturing can be done in India. This will create a lot more jobs.

## What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?

AI/ ML, Block Chain, IOT, UI and UX design (user interface AND experience design), RF engineering, Data Sciences,Analytical skills, Embedded systems development, Design thinking, Cyber security, SDN, NFV, Edge Computing. Understanding how APIs work and how to apply them as we are in an API economy.

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**—Arvind Bali**
Former CEO Videocon Telecom

"CYBER SECURITY PROFESSIONALS ARE IN HIGH-DEMAND FOR ALL INDUSTRIES AND JOB OPENINGS ARE GROWING AT A RAPID PACE"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should posses?**

Modern technology is changing very fast; so are telecom professionals. We not only need to have a full understanding of new technologies, but also have to understand new trends which are going to emerge like 5G, Drones, IOT etc. 5G is the fifth generation cellular technology that not only increases the downloading and uploading speeds over the mobile network, but it also reduces the latency, which is the time taken by a network to respond, increases energy efficiency and offers more stable network connections. The core of the whole development is that telecom is trying to bring comfort, convenience & speed for all the activities which are happening around us. IOT is coming up as an advanced technology is also giving these drones as an edge by getting GPS tracker.

**What role can a company like yours play in building the right telecom talent pool for India?**

Fortunately, our group is into various telecom verticals & also has an IT company Infodart. We are all the time connected with telecom & IT world. As a policy, we hire lots of management trainees & train them into various fields so that it becomes telecom talent pool India.

**What are the big challenges that you see today, when you want to hire professionals who can build nextgen telecom networks, products and services?**

Skill Shortage is the biggest challenge. Students have got degrees, but skills are still missing and education is also of lower quality than desired. There is a disconnect between academia and industry in terms of training and industrial requirements.

**What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?**

Engineering institutes should focus on developing skills. It can be develop by having live labs in the campus & also extensive industrial exposure to the students. Working in the industry during their core studies should become the part of curricular.

**What role and support from the Government do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

Present government laid lots of focus on skills development and every sector have their skill sector council. In telecom, we have got TSSE, where I am an honourable member and treasurer. Government needs to have a long term consistence policy for skill development. Here again, complete linkage of education, skill training and work required in the industries have to be matched with each other.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

In my opinion, cyber security will be the biggest growth. India ranks 3rd in terms of the highest number of internet users in the world, after USA and China. The number has grown six - fold between 2012 - 2017 with a compound annual growth rate of 44%. India secures a spot amongst the top 10 spam - sending countries in the world alongside USA. India was ranked among the top five countries to be affected by cybercrime, according to a recent report by online security firm "Symantec Corp". Cyber security professionals are in high-demand for all industries and job openings are growing at a rapid pace. According to Forbes.com, the Cyber security industry will grow to an estimated $170 billion by 2020.

**How important is simulation software in telecom?**

Simulation is a powerful and important tool, because it provides a way in which alternative designs, plans and/or policies can be evaluated without having to experiment on a real system, which may be prohibitively costly, time-consuming, or simply impractical to do. In telecom it has a lot of relevance, because most of the time in telecom we have to work on live networks, which cannot be disturbed even for some minutes. Simulation methodology has become popular among telecommunication network researchers and developers worldwide for the reason it given almost real life results on a simulator.

This popularity is due to the availability of various sophisticated and powerful simulation packages and also because of the flexibility in model construction and validation offered by simulation. For selecting an appropriate network simulator for a simulation task, it is important to have good knowledge of the simulation tools available, along with their strengths and weaknesses. And that is the reason as lot of emphasis is being given to the right knowledge. The knowledge is required to ensure that the results generated by the simulators are valid and credible. It is being used on printed circuit boards, antennas, airwaves modelling and to study interferences. It is also being used for designing new CPEs.

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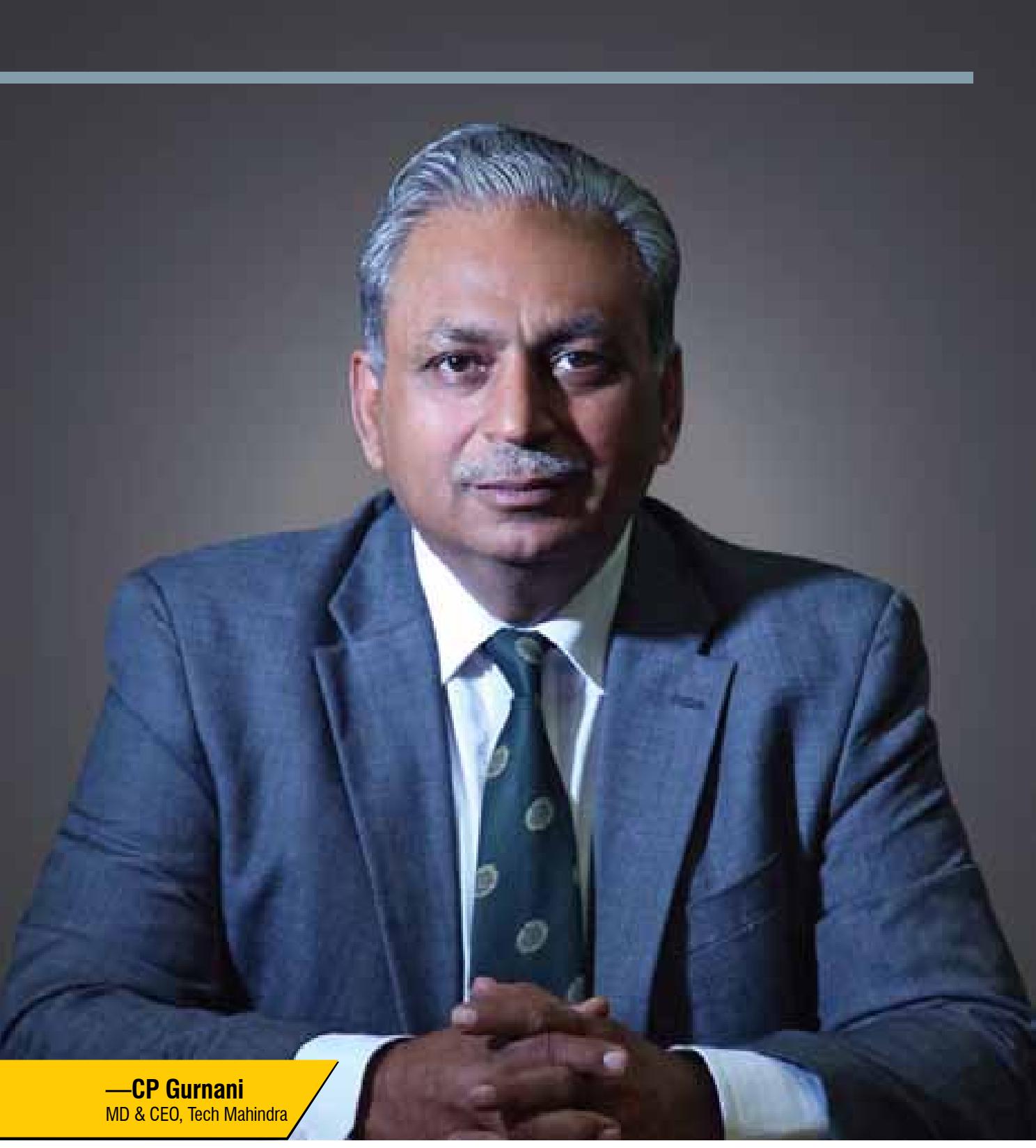

**—CP Gurnani**
MD & CEO, Tech Mahindra

"WE UNDERSTAND THAT TODAY'S DISRUPTIVE BUSINESS LANDSCAPE DEMANDS A FUTURE READY TALENT POOL; AND OUR PRIME RESPONSIBILITY THERE IS A GREAT DEAL OF FOCUS ON RESKILLING AND RE-TRAINING OUR EMPLOYEES."

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

To say the least, it will have a massive economic spill-over. In the next few years, close to $582bn is on the table to be earned by the Telcos across the globe, incremental due to 5G. But at the same time, the media industry, healthcare industry will churn more than $100+bn each; a number upwards of $200bn is being projected for the manufacturing industry as well. And to realise these mammoth numbers, the various industries will undergo immense innovation. They will have to re-invent, re-design and repeat.

The healthcare industry will execute surgeries remotely like never before. The manufacturing industry with its superfast robots and analytics in operation will bank upon 5G networks to realise some of its most sophisticated use cases. The media industry, the E-sports industry (an industry that hardly shakes numbers today), will come into prominence with a variety of personalised, customised, AR-VR enabled, content consumption models.

In short, we are in for a whirlwind of innovation across tech, processes and business models. Yes, the consumer will be the ultimate winner. But the enterprises and the Telcos are both in the race for pole position! 5G will be significantly different in the impact it will create, unlike the previous generations of networks, humanity has seen yet.

**What role can a company like yours play in building the right telecom talent pool for India?**

The emergence of new age technologies like 5G, Blockchain, Robotic Process Automation (RPA), Cybersecurity, Artificial Intelligence, Augmented Reality and Virtual Reality, has led to the disruption of IT and digital sector globally and opened several new opportunities in the industry. Organisations are looking at aligning people, processes, systems, applications and tools to this new world, where connected products and services are at the epicenter of continuous digital transformation. At Tech Mahindra, disruption lies at the core of our business.

As part of the TechMNxt charter, we are betting big on the next generation technologies like 5G, Blockchain, Cybersecurity, Artificial Intelligence, Machine Learning, RPA, AR and VR. We are also heavily investing in reskilling our employees in these technologies. We have launched the biggest man machine collaboration in the history of Tech Mahindra viz., Botify. The objective of the campaign is to Educate, Empower, Enable all its associates on cutting-edge technologies like Artificial Intelligence, Machine Learning, Chatbots, Robotic Process Automation, Natural Language Processing, and related Platforms on Products.

**What are the big challenges that you see today when you want to hire professionals who can build nextgen telecom networks, products and services?**

The acute shortage of skills is a recurring theme in every sector, industry and profession in India and globally, including the IT industry. New age digital technologies are disrupting the business landscape and impacting structure of industries and economic activity. As a result, attracting and retaining talent with digital skillsets is a challenge for organisations.

We understand that today's disruptive business landscape demands a future ready talent pool; and our prime responsibility there is a great deal of focus on reskilling and re-training our employees. Following are some of the skill upgradation programmes offered by Tech Maindra –

### Talex

Tech Mahindra has unveiled an AI-driven programme called Talex, to create a 'Marketplace of Talent', by matching jobs with a candidate's profile and accordingly giving a 'percentage - match' score to the profiles. Additionally, the platform provides a unique 'job bidding' process to energize our internal pool movement. To address the skill gap in the industry, Tech Mahindra, is focused on reskilling and nurturing the talent internally, as well as hiring professionals in niche technologies.

### Tech Mahindra Foundation "SMART" Programme For Employability

Tech Mahindra Foundation is the corporate social responsibility arm of Tech Mahindra. Established in 2007, under Section 25 of the Companies Act (now Section 8), it is today active in 12 cities across India. The Foundation works in three key verticals, e.g., education, skill development and disability.

SMART (Skills for Market Training) is Tech Mahindra Foundation's flagship employability programme, which is built on the vision of an educated, enlightened and employed India and a belief that educated and skilled youth are the country's true strength.

- The programme started with 3 Centres in 2012 and is currently running 100 centres providing skill development in 11 cities across India.
- These include SMART Centres, SMART+ Centres (training for people with disabilities), SMART-T Centres (training in technical trades) and the SMART Academy.
- SMART has successfully trained over 40,000 young men and women, with a placement rate of over 70% thanks to its robust processes ensuring that quality is never compromised, and its industry-led approach to skilling.
- Youth from disadvantaged urban communities and in immediate need of jobs are the beneficiary group of SMART.
- The training starts with a Foundation

course comprising of Spoken English, Workplace Readiness and Basic IT/Computers. It offers a range of specialised courses, including Customer Relationships and Sales, Hospitality, IT Enabled Services and BPO, Lab Assistant, Multimedia, Nurse Aides, Office Administration, Pharmacy Assistant, Quick Service Restaurants and Tally.

- In addition, the SMART-T offers training in technical trades like Automobile Technician, Civil Works, Computer Numerically Controlled (CNC) Machine Technician, AC and Refrigeration, Electrician, Fitter and Maintenance Technician and Welding.

### Tech Mahindra SMART Academy for Healthcare, New Delhi & Mohali

Launched in May 2016, the Tech Mahindra SMART Academy for Healthcare, is a state-of-the-art paramedical training institute in New Delhi, established as a CSR initiative of Tech Mahindra Foundation.

- It aims at creating a cadre of well qualified, trained healthcare professionals by providing high quality innovative and interactive training to young men and women.
- The Academy trains professionals through a number of paramedical diploma courses and certificate courses. Well-equipped laboratories, highly qualified healthcare professionals, on-job trainings in leading hospitals along with an array of extra-curricular activities among verdant greenery have created a world class institution.
- Provide placements to its students at various reputed hospitals.

### Tech Mahindra SMART Academy for IT & Logistics, Vishakhapatnam

- Launched in July 2017, the Tech Mahindra SMART Academy for IT & Logistics at Vishakhapatnam is a state-of the- art IT and Logistics training Institute.
- The institute is set up by Tech Mahindra Foundation, the CSR wing of Tech Mahindra Ltd with a mission to create a cadre of well qualified trained professionals to meet the demand of the IT and Logistics sectors.
- The SMART Campus in Visakhapatnam has a complete training centre on par with corporate work environment. The Academy is fully equipped with the latest software and highly qualified industry experts from IT and Logistics sector.

An additional attention is paid to developing soft skills, spoken English and personality development training and on job training. We also assure placement assistance with a dedicated placement team, which ensures that each student graduating from the Academy receives support in finding a job.

### What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?

The primary objective is to create a digital skilling platform to reskill and upskill fresh as well as existing talent. Engineering students should be provided with hands-on training to better prepare them for real-world situations. States should institute quality benchmarks for engineering colleges.The government also, should drive more initiatives like Make in India and Startup India to boost employment avenues for engineers in the country.

### What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?

As we enter the fourth industrial revolution, it has become necessary to make India's youth ready for the jobs of the future.The need of the hour is for the government, academia and industry to align and work towards making India the digital skill hub of the world. India's education system at both the school and university levels is not in sync with the needs of modern businesses and industries. Many of the millions of Indian graduates stepping out of colleges every year lack the soft skills and aptitude to learn advanced technologies that are needed to succeed in the workplaces of tomorrow.

While the government's support is required for policy reform, reskilling initiatives, and embracing of technology and start-ups, the industry will have to extend its support with its own reskilling agenda. The government, with its campaigns and reskilling drives, has an important role to play in reskilling the workforce of the future.

It needs to give careful attention to the importance of teaching soft skills to IT students. At the same time, the government can instruct training institutions to take all possible measures to ensure the comprehensive skill development of candidates.

### What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?

To be at par with the digital revolution, there is an increased demand for skillsets in next generation technologies such as 5G, Cyber security, Blockchain, IoT, ML, AI, Robotics and Automation.

A FICCI-NASSCOM & EY report noted that by 2022, 9% of the country's 600 million estimated workforce (under the organized sector) would be deployed in new jobs that do not even exist today, while 37 per cent would be in jobs that have radically changed skill sets.

Tech Mahindra is focused on reskilling its associates to cultivate a future ready workforce. We have successfully reskilled and upskilled nearly 70% of our IT workforce through a four-tier internal training program and by leveraging our collaboration with online education partners like Pluralsight, edX.org and FutureSkills.

**Ibrahim Ahmad**
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— **Dr. Rishi Mohan Bhatnagar**
President, Aeris Communications

"WE AIM TO JOINTLY ADDRESS THE PRESSING NEED IN OUR COUNTRY FOR SKILL DEVELOPMENT, INNOVATION AND ENTREPRENEURSHIP IN THE FIELD OF NEW AND EMERGING TECHNOLOGIES"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

India is at the cusp of the second digital revolution post the internet era which single handedly created millions of jobs and the knowledge economy putting India on the world map. The advent of 5G here would similarly open plethora of opportunities not only for the telecom service provi ders, but also for technologist, innovators and enterprises. With a significant improvement in network performance characteristics, 5G will be brining to life many new service dimensions, business models and new set of companies acting as intermediaries across the value-chain to cater to the need for connectivity and differentiated services.

It is anticipated that 5G could support 22 million jobs globally in 2035, according to IHS Markit. There will be a huge demand for 5G ready engineers, who are experts in LTE Advanced Pro, SON, Small Cells, C-RAN, HetNet, Mobile Edge Computing, Massive MIMO, NFV, SDN, Network Slicing, Mesh Networks, cloud and IoT. However, those coming with multi-disciplinary skills will be able to demand a premium for their hybrid engineering skills. There will be a huge demand for 5G architects, orchestration engineers, 5G RF antenna researchers, and 5G algorithm experts as well as fibre skilled engineers such as network engineers, architects, planners, service delivery managers, project managers and programme manager too. Telecoms engineers with past experience of implementing 3G/4G technologies proactively developing the knowledge or new skills in 5G communications would gain advantage when 5G projects start to roll.

**What role can a company like yours play in building the right telecom talent pool for India?**

Aeris has been working in the field of

M2M since the 1990's. We are a global technology company with a proven history of helping companies unlock the value of IoT. With global headquarters in San Jose, California and India headquarters in Delhi NCR, Aeris strives to fundamentally improve businesses by dramatically reducing costs, accelerating time-to-market and enabling new revenue streams. And none of this would have been possible without the talent pool we have in India and abroad. IoT presents us the greatest opportunity to evolve the basic citizen services. But at the same time, the technology poses a challenge with respect to the skills needed by the next generation workforce.

We understand the huge skill gap which needs to be bridged. Since our inception in India in 2016, we have been working relentlessly towards creation of a collaborative IoT platform and ecosystem in India which not only work towards IoT use cases in different sectors but also towards skill development. Establishing Aeris IoT Centre of Excellence (CoE) in universities is one of our initiative towards skill development and capacity building for IoT in India. We have partnered with IIT (BHU), Varanasi for establishing the state-of-art IoT CoE in the IIT BHU campus. With this path-breaking collaboration, we aim to jointly address the pressing need in our country for skill development, innovation and entrepreneurship in the field of new and emerging technologies.

This collaboration between Aeris as the IoT industry leader and IIT BHU as one of the top Engineering Institutes in India, will enable the creation of indigenous and innovative The Aeris IoT Platform will be used by IIT-BHU scholars for projects of academic interest as well as serve as an incubation platform for startups for the development of connected and integrated smart solutions. Aeris IoT experts from India and USA provide training and complete hands on experience in the technology.

Further, we invest heavily in training our own workforce. We have structured our training programs for skilling and reskilling our employees with hands on learning experience. Our engineers undergo rigorous IoT training and we host quarterly L&D workshops to help our employees learn and reskill on the emerging technologies at multiple offices across the globe. This not only helps in cross breeding of ideas and open learning culture, but also builds a progressive learning and knowledge sharing environment.

**What are the big challenges that you see today when you want to hire professionals that can build nextgen telecom networks, products and services?**

The next gen networks like 5G require hybrid engineers who are trained in multiple disciplines. There is a huge lacuna of such talent as our education system still fails to train the young with the skills which the industry demands. In addition, professionals with hands on experience required to manage the nextgen networks, products and services are very few and rarely found in the country. The concentration of trained workforce in this field is still found in countries where 5G are undergoing huge project trials.

**What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?**

5G promises to be such a huge technological leap forward for wireless networks. Academic institutions have to start working hard to make contributions to the 5G vision by conducting research and creating test beds in the campus. Appointment of dedicated teaching staff with industry experience and facilities as well as active engagement with industry would help the educational institutes train better. In addition, the scholars must be encouraged to publish their research works and build thought leadership.

**What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

India is aiming to rollout 5G services simultaneously with other countries, unlike 3G and 4G networks. 5G Research & standardisation is reaching its global peak and technology demonstrations have started gaining momentum, it is imperative to take early lead in 5G technology development and facilitate the development of vibrant 5G ecosystem in India as well.

As part of the effort, the Centre has already launched a three-year project 'Building an End-to-End 5G Test Bed' to advance innovation and research in 5G. With a budget of Rs 224 crore, the programme has been awarded to IIT Madras, IIT Hyderabad, IIT Delhi, IIT Kanpur, Centre of Excellence in Wireless Technology (CEWiT), Society for Applied Microwave Electronics Engineering and Research (SAMEER) and Indian Institute of Science IISc, Bangalore.

While this is a welcome move, it is certainly not enough. We need trained people not in hundreds but in thousands to meet the high speed connectivity and IoT needs of our nation. More academic institutions need to step up and proactively start collaboration with the industry for building 4G research and development centers inside their campus. An open platform for knowledge sharing mentored by global think tanks and achievers in this field must be created for facilitating learning. Exchange programs with foreign universities running 5G trials and test beds can also help in amalgamation of ideas and best practices.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

In addition to the high technology acumen both network and IT competence, the candidates must be well versed with the regulatory environment, market Intelligence and have sharp analytical skills and innovative thinking.

**Ibrahim Ahmad**
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**—Josh Foulger**
Country Head & MD, Foxconn International India

"ALTHOUGH A LOT HAS BEEN ACCOMPLISHED OVER THE LAST 5 YEARS IN TERMS OF CAPACITY BUILDING AND POLICY FORMULATIONS, THERE IS LACK OF INVESTMENTS IN DOMESTIC PRODUCTION AND R&D"

## Tell us something about your career graph

After completing my Masters in Industrial Engineering, with specialisation in Robotics, from the University of Texas in 1994, I worked at a Robotics & Automation startup. In 1998, I joined Nokia, USA where I managed global operations for more than 8 years. Eager to make a difference in India's industrial growth, I returned to my homeland to establish Nokia plant, which went on to become the world's largest facility having 12,000 workers, producing more than 100 million handsets a year and exporting to over 80 countries. I was then deputed to replicate my Indian success in Vietnam, where the facility today is counted among the top manufacturing sites in the world.

In April 2015, I was hired by Foxconn to head its India business and operations. Exercising my experience in mobile manufacturing, I have established Foxconn as number one Electronics Manufacturing Services (EMS) company in India. With over 30,000 workers who produce 3 phones a second in two sprawling campuses of Sriperumbudur (Tamil Nadu) and Sri City (Andhra Pradesh), Foxconn is ranked among top 45 companies in India in terms of size and scale, a feat which was achieved in a brief span of 3 years.

I was awarded "Electronics Man of The Year 2016" for my seminal contribution to electronics manufacturing in India. I have been deeply involved in policy formulation as Co-Chairman of Fast Track Task Force (FTTF) and have also been instrumental in developing Phased Manufacturing Programme (PMP) which inarguably helped increased the number of mobile manufacturing units from mere 2 in 2014 to 120 in 2018.

## How have you contributed to women's empowerment in your work?

I attribute Foxconn's success to my workforce, around 90% of whom are women coming from all the districts of Tamil Nadu, Andhra Pradesh and beyond. The company looks after their complete welfare, while also enrolling them in special skill development programmes and offering opportunities to pursue higher studies. Typically, in our society women are generally under-employed. However, the women in our workforce are rewarded and given apt opportunities to explore their full potential.

## What's next in mobile phones?

AI-enabled phones are already offering advanced functionalities of image recognition and voice assistance. With 5G, those same phones would become so immensely fast and powerful that they can even drive a vehicle autonomously. IoT market in India is expected to grow significantly, with the number of connected devices expected to grow 1.9 billion by 2020. Domestic manufacturing of these IoT devices by EMS companies would not only improve their capabilities but also significantly add to India's GDP.

## How do you build the right talent pool and what are the skills challenges involved?

Although a lot has been accomplished over the last 5 years in terms of capacity building and policy formulations, there is lack of investments in domestic production and R&D. It has done a huge disservice to the growth of the electronic manufacturing industry in India. Though India currently has 120 crore cellphones, yet there has been no focus on R&D or innovation.

## What is needed to go forward with digital revolution?

To ride the next wave of digital revolution, there is need to have strong multi-generational organisational skills. The fundamental need for human capital skill optimisation and importance of workforce strategy is as strong as ever, when 45% of employers around the world struggle to find the talent they need and 87% plan to increase or maintain their headcount as a result of automation. Foxconn continues to broaden and deepen the skills of its own people and integrates its learning programs with Sector Skilling Council, however it still perceives the immense need to design technical hubs to leverage expertise in core capabilities. An instance would be to give mobile repair technicians more attention in order to bring greater scale to the digital technology infusion at grass roots level.

Mobile phone is a sophisticated product with around 1200 micro components and features such as dual cameras, notch design and fast charging. The manufactured items are checked both for functionality and aesthetics as the company has to ensure zero defects. Therefore, mechanical reasoning, logical trouble shooting, and spatial visualization with personal flexibility becomes more vigorous to grow and to scale-up eventually by 2027.

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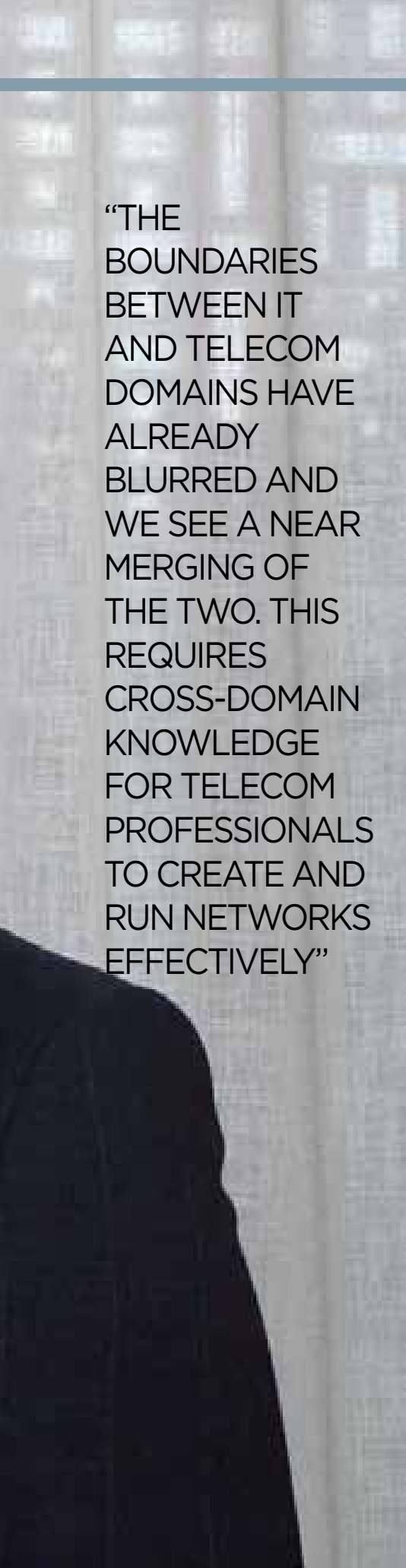
**—Karan Bajwa**
MD, IBM India



"THE BOUNDARIES BETWEEN IT AND TELECOM DOMAINS HAVE ALREADY BLURRED AND WE SEE A NEAR MERGING OF THE TWO. THIS REQUIRES CROSS-DOMAIN KNOWLEDGE FOR TELECOM PROFESSIONALS TO CREATE AND RUN NETWORKS EFFECTIVELY"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

The 5G and IoT era will create a completely new ecosystem of network, devices and applications. For businesses to prepare for the 5G era and ensure that processes and data run at lightning speed across their organisations, they need advanced levels of integration, automation and security across multiple cloud platforms and AI enhanced systems. The skills required will also have to be in sync with this requirement.

Telecom professionals will have to possess IP skill-sets since 5G will have bandwidth heavy services and managing a high capacity IP backbone will be a game-changer. With device to device communications, the number of "users" of the 5G network will explode. These huge numbers of devices would need to be managed with a lot of automation around, provisioning, security and service management. To support these operations, strong OSS skills will be required to be developed.

The boundaries between IT and Telecom domains have already blurred and we see a near merging of the two. This requires cross domain knowledge for telecom professionals to create and run networks effectively.

Networks will soon go on the cloud. The cloud domains will evolve in a hybrid manner with Telco leveraging the public as well as Private clouds driven by complexities and security requirements. Hybrid Clouds are here to stay. SDN/NFV / Hybrid Cloud skills will have a significant role to play. AI & Analytics will drive network operation and automation; hence we will also have to look at this extremely important domain from a telecom network point of view, for skill set readiness.

**What role can a company like yours play in building the right telecom talent pool for India?**

IBM is dedicated to building strong relations with leading universities, government agencies and professional organisations, world over. To help Academia keep pace with the rapid advancements in technology, relevant to the industry, IBM partners with academia on curriculum contents and education materials on specific Emerging Technologies that suits adoption by Academia. While these packages are available for academic institutions to download for free and use, IBM offers curriculum consulting by Industry experts and technologists, training and certification.

We are currently working with leading universities to co-create the right curriculum for professional degrees in IT & telecommunication space. IBM's approach is product and technology agnostic and we have a huge skill base across a large cross section of product and services portfolio. We have also set-up a large IBM Innovation Centre in Bangalore to explore new age solutions that our customers can build to address evolving business scenarios with the introduction of 5G. IBM research also has interests in various institutions supporting research. Internally, we are already conducting workshops and training modules to upskill our employees to get them ready for the 5G era.

**What are the big challenges that you see today, when you want to hire professionals who can build nextgen telecom networks, products and services?**

While most software professionals have deep domain knowledge around existing technologies and services, there is a definite need to invest in them to bring them up to speed on next-gen technologies. Technology is moving so fast these days,that continuous

"While obtaining "hard" technology skills is the most visible challenge, the less obvious — but even more difficult — is finding technology workers with strong communication, collaboration and problem-solving skills along with empathy for customers and fellow workers."

learning is the only way out. If we look at freshers, they are relatively well informed these days, but their exposure to next-gen technologies such as AI, ML, Blockchain etc. is limited and they lack the experience of being effective in the corporate working environment.

While obtaining "hard" technology skills is the most visible challenge, the less obvious — but even more difficult — is finding technology workers with strong communication, collaboration and problem-solving skills along with empathy for customers and fellow workers. Soft skills have always been important. However, growing emphasis on engaging customer experiences created by collaborative product teams puts those skills at a premium.

### What role do you see for the simulation software in the Telco technologies?

5G technology will open up new possibilities to develop new business cases and innovative solutions to current and new problems. Like in any evolution, the success of an idea or applications has to go through its maturity cycle. Simulation software can reduce the test cycle drastically leading to "fail fast at lower cost" rather than waiting for the perfection.

### What would your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?

The uneven distribution of skills and education in a society is one of the key drivers for the uneven ratio of job opportunities versus the available resource pool with the right employable skills. Effective alignment is best achieved by engaging employers to map skills from classroom to job, and to partner on internships, apprenticeships and mentoring. Building these linkages will better alignment through regular updates of courseware and classes. Therefore, there is a greater emphasis on relevance of what students are taught compared to the hard and soft skills needed for employment.

An academia - industry interlock is critical for making the pre and post secondary education relevant to the industry needs. While on one hand the academia has to be open for accepting the industry intervention, it must insist on understanding the available or projected job opportunities for which the industry is seeking the change. The telecom industry too has to be mindful of the fact that a curriculum change must be backed by a detailed and serious hiring commitment.

### What role and support from the Government do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?

Government ratification and investments in worker training helps attract job-intensive investments and encourages new jobs by offsetting a key employment expense. With the rapid arrival of digital jobs in telecom sector, government support for training will grow. Governments play a very critical role in aligning learning with market needs. The pipeline of work-ready graduates can be improved by better aligning what is taught with the needs of telecom sector employers using improved mapping of the educational curriculum with those needs.

Governments also hold a position of influence to integrate secondary and higher education with course work sequencing and "stackable" industry-recognised credentials. The sector may also expect Government to incentivise educational institutions to collaborate with employers through programs such as internships, mentoring, apprenticeships, participation in curriculum design and other training support.

As a plus, to make the telecom sector more attractive for employment, Government must support Incumbent Workforce Training.

### What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?

New technologies and new ways of working, irrespective of the industry, demands that the workforce constantly re-skill and upskill to keep pace with the changes and stay relevant. In this context, hot skills for Telco industry continue to be Analytics, Cloud, AI and Security - these are required to monetise the rich data resource that they possess. At the same time, soft skills like critical thinking, creativity, emotional intelligence and complex problem solving will be equally essential.

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VOICE&DATA Telecom Manthan 2019

# EMERGING TECHNOLOGIES "CREATING DEMAND FOR TALENT POOL TRANSFORMATION"

28 June 2019, The Lalit, New Delhi

Telecom Manthan in its **second edition** will highlight the importance of emerging technologies and skill requirement for the next generation and will emphasize on the necessary changes to be made from the policy point of view along with industry to collaborate hand in hand for better future.

## HIGHLIGHTS

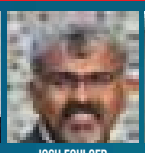
- 1 Day Forum & Recognitions
- 200+ Business Decision Makers
- Industry Keynote Sessions
- Power Packed Panel Sessions

## KEY SESSIONS

- Paradigm Shift
- The Next 5 Years
- The Win-Win Collaboration
- From Job Seekers to Job Creators
- Awards & Recognitions

## INVITED SPEAKERS

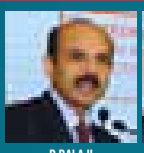
**MRS. ARUNA SUNDARARAJAN** (IAS), Secretary Department Of Telecommunications



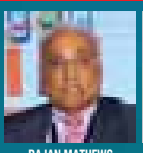
**JOSH FOULGER** MD, Foxconn Global

**RANDEEP SEKHON** Group CTO, Airtel

**HARSHVENDRA SOIN** Chief People Officer, Tech Mahendra

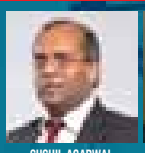


**P BALAJI** Chief Regulatory & Corporate Affairs, Vodafone Idea

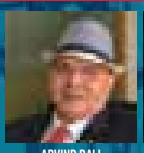


**RAJAN MATHEWS** Director General, COAI

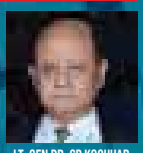
**SANJAY KAUL** President, APJ Service Provider Business, Cisco Systems Inc.



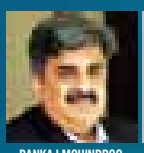
**SUSHIL AGARWAL** COO, Network Services Business, Sterlite Technologies Ltd (STL)



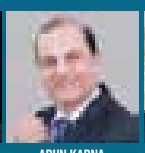
**ARVIND BALI** COO, TSSC, Group Advisor, Connect Broadband & Infodart



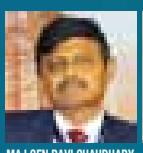
**LT. GEN DR. SP KOCHHAR (Retd.)** CEO, TSSC



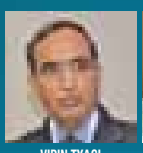
**PANKAJ MOHINDROO** National President, ICEA



**ARUN KARNA** MD, AT&T India



**MAJ GEN RAVI CHAUDHARY** Ex-Head, Digital Army Project, MoD



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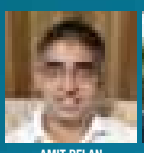

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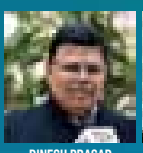

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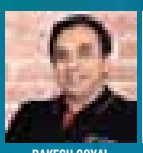

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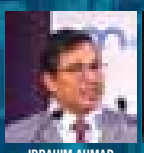
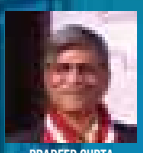
**SUNIL K GOYAL** MD,YourNest



**IBRAHIM AHMAD** Group Editor, Cybermedia



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**— Lt Gen (Retd) Dr. SP Kochhar**
CEO, TSSC

"INDIAN TELECOM INDUSTRY IS GOING THROUGH A SEA OF CHANGE DURING THESE DAYS WITH A MARKED SHIFT FROM THE TRADITIONAL SKILLS TO EMERGING SKILL REQUIREMENTS WITH A STRATEGIC FOCUS ON TECHNOLOGY-BASED SKILLS"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

The shape and contours of the Workforce of the future will be dictated to by the emerging environment. There will be a gradual merger of Blue and white collared jobs and the consequent emergence of no collar jobs. More and more focus will be on the knowledge of the workers, especially in the data sciences domain. Routine and repetitive jobs will be taken over by AI and robots. Employees will have to be multi-skilled for sure. Contextualized Attitude and Communication skills will be the deciding factor for selection. We will see a workforce emerging which will sell or provide services and may increasingly work from home utilizing electronic highways rather than physical highways.

**What are the main roles that TSSC is playing in building the right telecom talent pool for India?**

Indian telecom Industry is going through a sea of change during these days with a marked shift from the traditional skills to emerging skill requirements with a strategic focus on technology-based skills. These requirements are not being actively met by the existing education framework prevalent thus creating a demand/supply gap.

TSSC has already taken a step towards fulfilling the emerging requirements of the Industry by partnering with key stakeholders in order to bring the latest content to the forefront. In our pursuit for the absolute best we have certain offering which may bridge the aforementioned gap and garner higher employability and acceptability for our students. Some of the prime technologies being offered by TSSC are Cyber Security, IoT, AI, Big Data and so on and so forth.

**What are the big challenges that you see today when organisations want to hire professionals that can build NextGen telecom networks, products and services?**

Both the workforce and the way work gets done are changing, drastically. New collaborative and social innovations and applications are already reshaping business operations and just as significantly providing the resources for a new generation to work in ways that fit more naturally with its digital upbringing.

HR will have to prepare themselves to handle "hiring" of services rather than individuals, with consequent impact on processes and integration. Newer job roles manned by multitasked on or off-site workers will be created. Technology inserts like blockchain verification will impact their functioning. The reaction times will be lower, and the area of operations will expand manifold. Replacement of physical employees by technologies like AR, VR, AI and Robotics and entrusting critical jobs to virtual space workers will become commonplace. Upskilling, reskilling options will have to be personalised using new age technology and catering to the abilities of the person and requirements of the employer.

**What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?**

Piece of advice would be days of rote learning are passé. The institutions that will light up creativity and critical thinking in their students are the ones which will survive in the long run.

**What would be your advice to employers who give job opportunities to aspiring telecom professionals?**

The government is laying great stress in skill training of the youth. The employer industry needs to dovetail its requirements withthese initiatives to ensure that the skill training enhances employability. A premium needs to be paid in terms of better wages to such skilled manpower so that they are incentivised to obtain requisite skills.

**What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

The govt is already investing a lot in terms of resources and establishing of standards to improve the talent pool across all sectors. The Govt can probably move to the next level by concentrating on skilling manpower for the emerging technologies as also target specific sectors that are presently under stress due to market conditions.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

Aptitude and attitude will eternally be the most important skill that any employee needs. However, if you are talking in terms of technical knowhow then the emerging technologies that will have great impact in the telecom sector in the coming years would be in the field of Artificial intelligence, Big Data, Cyber Security etc.

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—Ravi Chaudhary

"THERE IS A DIFFERENCE BETWEEN TRAINING AND EDUCATION. WHILE TRADE WANTS TRAINED INDIVIDUALS, SPECIFIC TO THEIR PERCEIVED NEEDS, EDUCATIONAL INSTITUTIONS FOCUS MORE ON KNOWLEDGE. THIS GAP MUST BE BRIDGED"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

The key component has always been that of "understanding" and it shall always be so. Information is available today at the click of a mouse, but understanding is essential for innovations. Technological inventions, despite the increase in pace, are few and far between, while innovations are continuous and span areas from technology to management. Telecom today is a dumb pipe for data flow. The value comes from exploitation of such data flow for services that deliver efficiency. Hence, multi-spectral understanding of related technologies, ability to collaborate, learn, unlearn and re-learn will be key to higher level leadership. In technologies, organisations would have to redefine verticals based on depth of understanding required in related technologies while maintaining mesh like collaborations among them to ensure that every perspective is knowledgeably examined before arriving at a common perspective. The prominent fields of technology to train in would be optical transmission and processing, millimetric waves, transmission and data security, big data and analytics.

**What are the big challenges that you see today when you want to hire professionals that can build nextgen telecom networks, products, and services ?**

The major drawback is application. Any technology is only as good as its exploitation to find operational solutions. Technology is never an end in itself, but a means to improve the working and living environment. The professionals who can apply their learning to find solutions are rare. Most can follow a given path, should it be absolutely defined. However, in practice, every implementation plan, however well defined, needs modifications owing to changes in user requirements or policies or technologies themselves. It requires an alert, agile mind to grasp the changes and adapt, the pre-requisite for which a thorough understanding of underlying issues, a continuous and intense process.

**What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid ?**

There is a difference between training and education. While trade wants trained individuals, specific to their perceived needs, which may not be absolutely right in the first place, educational institutions, while professing to develop understanding of a bouquet of technologies, actually end up stuffing information, on which they are tested and graded, without reference to their practical exploitation to find solutions that may be monetised. This disconnect needs to be bridged through flexibility on the part of academicians and patience on the part of the industry. Steps have been taken for greater collaboration between academia and trade. I recall IIT Kharagpur had Russi Mody as its patron way back in 1990s before LM Thapar took over. So, institutional arrangements have existed even earlier. They have to be made more effective.

**What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

My view is that the IITs and IIMs are what they are more because of the quality of students than faculty. Hence, my inference is that government has to concentrate more on the quality to education at primary and secondary level, where the basic understanding of scientific principles are grooved.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

A look at the successful start-ups tells us that monetisation is dependent on innovative exploitation of technologies. In my view, telecom companies have to get out of the dumb pipe mode. There was a time when voice communications were a service, then came data communications. Now, both these are a given and become part of the infrastructure taken for granted. IoT and 5G present an excellent opportunity to collaborate with data science experts to provide services beyond voice and data. Today handset is not a device for voice and data communications alone, since every other device, from AC to fridge can communicate. End to end integration, from cloud to end device, can only be achieved through collaborations. In my humble view, any telecom company that only deploys switches and not a cloud has a bleak future. It is already being said that fibre-laying cannot be monetized, but 5G needs fibre. So monetisation must come from services. It is an age of confederation, not just of companies dealing in similar technologies, e.g. COAI, but broader across the spectrum service providers, leveraging specialist skill sets in core competencies.

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—**Manoranjan Mohapatra**
Executive Director & CEO, Comviva Technologies

# "WE START COMPETING TOO SOON AS OPPOSED TO COLLABORATING. WE HAVE TO COLLABORATE TO MEET OUR CHALLENGES"

**With th the coming of new age technologies in the telecom sector, what changes do you foresee?**

Now the revolution is happening at the bottom i.e., at the consumer level. The DTH industry is completely revolutionalised with service providers. The content is available, through internet, through Skype, Youtube, Facebook, you have a choice of the service provider content. What really happens is, it's more design thinking. It's more in terms of who the user is and what solutions you are using. People have a time shortage. The day has fixed 24 hrs and can't be extended. Within this time frame, the person who makes the people's life easy is the one who will win. This has to be practised for people to experience. It's no more a B2B; now it's a B2B2C system in the businesses.

There were 12-13 mobile service providers and in the last 3-4 years, half a dozen of them disappeared. Look at the airline services. There was a time when there were several airline services in India. Very soon all airless may get merged in one or two entities.

From a skills and competency point of view, our method of teaching and our method of evaluation etc is still a fair amount of legacy. The thought process has to change.

**What are the challenges in meeting these expectations?**

As the industries go through automation they have to think about how to do more for less. But if the business model is how to make 500 people work in Europe then it's basically a wrong construct. Now the IT industry is not going to die because of this. Let's go back and look at the industrial revolution. The bullock cart owners with well-maintained bulls were the most advanced. The moment the automobiles came in, the animal-driven carts died. It is the inability to see the change and hold on to your values for long is what was wrong. The industry didn't die. The industry grew. Some adapted quickly, some took time and that made the difference in who reached where in life. Same is happening

in regards to AI, ML etc. We are reacting to a situation than forecasting about when AI happens, how we are going to position in the right opportunity.

We're holding on to our old values for long, even in education. We're judging people on how much they learn rather than how quickly they learn new things. I personally think adaptability has to be taught. Your mindset has to be tuned to how to adapt to the change. The change has to come at the cost of time, money and infrastructure. It has to be leading the revolution. The government sector funding the education has come down rapidly. Someone has to fund the education. The private sector institutions are not going to wait for 5-7 years to get the benefit of investment.

## Do you have some thoughts about how this change can be brought about?

We can't go to the grass roots and change the system at the lowest level. But the industry people can collaborate and train skilled people at the graduate level. If the skill training is done by the industry people, then it's easier because the industry would have a stake in it and they would take the success of the training programmes more seriously. Industries know better than the academics the needs of the industry.

## Is there some such initiative in the pipeline in the industry?

Not really. There may be something in the initial stages, but we are fragmented as industry bodies too. We're too worried about who steals the thunder. And we start competing too soon as opposed to collaborating. When cross-service provider companies collaborated in the early generation mobile technology, sms traffic was allowed, sms traffic multiplied and the revenue generated was much larger in volume. So, we have to collaborate to meet our challenges.

## Is there some such initiative at your organisation?

At the larger Mahindra level there is talk of Mahindra university etc., but it's too early to talk about it in detail.

## What would be the important areas in the industries as far as employment generation is concerned?

As much the operators would like the 5G to come a little slowly, they can't control it. It will come soon. Telecom industry is evolving fast. Investment cycles are shrinking too soon. But we are part of an environment which is becoming weaker and weaker financially. Opportunities will be there. The OTT phenomenon will perpetuate further. A lot of information would be shared and would be available. There will be new consumption of video, audio etc. What appears t be an attractive technology 3-5 years from today, suddenly becomes redundant. What will bring down cost is speed, IoT, Cloud, AI and ML. Earlier, consumer behaviour is studied by the groups of women, children, professional men etc. Now the consumer behaviour is studied by the individual choices. This can only happen with speed, Big Data Analytics and AI and ML. If the network knows a consumer's preferences, it will give him or her only those preferences. People will pay more only if it helps them in making their sipler effort or making their life easy or if it's an SME, if it helps it earn more. Cloud mode of delivery is significantly cheaper than the on-premise sytem. If some other technology comes to unsettle cloud, then cloud will die.

## When you're hiring people, what are some of the observations?

There are 2 kinds of recruiters. One set wants the people ready who will run the challenge today. They look for people who have the skill competency rather than the ability to learn new things. I belong to a school where I was taught to hire for attitude. Teaching attitude is not easy. The pressure to deliver makes us go for the readymade resource here and now. If an employee has potential but if the industry has to invest in him/her for 6 months, it's not a good thing for the industry. So people who have expertise in an area become more attractive than someone who really has a potential. The talent definition in my HR content has performance and potential. We're hiring for performance not for potential.

## Are there specific challenges that you can discuss?

Lateral hires are becoming increasingly difficult to get the right people. The challenge is the quality of resources that are available. The old-fashioned IT system where people go on-site and learn on hand is still very relevant.

## What's your message to the engineering colleges?

Education in general is going to become expensive; students have to contribute a lot more because faculty with industry experience will demand a lot of money as salary. There should be more industry-affiliated collaborative programmes. More importantly, focus should be on what would be important 3 years from now rather than on what is important now.

## Is there any role you see for the govt in all this?

Industry and vision that are required have to be long term say, 5-7 years. No private investor is going to take risks for a 7 years horizon. Investors in infrastructure and skill competencies want to have return in 3-4 years. Hence, some support is required if you want to improve the quality of institution.

## Do you think that there are areas of concern in the telecom sector?

For sure the system will correct itself and get there. Why should you let someone else get there if you have a leadership position? How do you keep your leadership position? Do we want to give away part of the market because we did not change in time adequately, or do we go for that change and make it happen proactively and accelerate our growth further? These are the areas which require careful thinking and planning.

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—Pramod Chandrasekhar
Head, HR, Nokia India

**As India gears up for 5G, broadband for all, IoT, and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

The average life of a technology is shrinking rapidly, and it is even more important to remain relevant in this dynamic market space. With 5G technology expected by 2020, it will transform how we live and work. It is estimated that over 20 billion connected devices will be in use globally that will rely on 5G networks to function properly. In the continuously changing technological environment and evolving user needs, it is critical for businesses to build competencies, so that they can match the speed of technological changes.

Some of the key competencies that telecom professionals should possess are understanding of technologies such as Advanced LTE, Self-Organizing Networks (SON), Cloud-RAN, Heterogenous Networks, Mobile Edge Computing, Massive MIMO, Network Functions Virtualization (NFV), Software-Defined Networking (SDN), Network Slicing, Mesh Networks, and IoT. Globally, we actively engage with the ecosystem to accelerate acquisitions of industry knowledge and skills for 5G world.

"IN THE CONTINUOUSLY CHANGING TECHNOLOGICAL ENVIRONMENT AND EVOLVING USER NEEDS, IT IS CRITICAL FOR BUSINESSES TO BUILD COMPETENCIES, SO THAT THEY CAN MATCH THE SPEED OF TECHNOLOGICAL CHANGES"

**What role can a company like yours play in building the right telecom talent pool for India?**

We at Nokia look at this as an opportunity and have established ecosystems keeping in mind the evolving telecom talent pool. We have initiated focused solutions to meet the challenges and opportunities of building a truly global workforce which ranges from attracting high-performing talent at graduate-level to offering professional development opportunities to our employees. Our people strategy is focused on broadly three levers. Firstly, our People Development is a dedicated, progressive approach to both short-term developments that improves one's performance, as well as long-term development in preparation for future roles, optimising the interests of employees and the organisation. Next, our Focused Graduate programme, where we engage with college students is into their competency building for the industry.

Our university collaboration is a great chance for young graduates to gain expertise through challenging new assignments during a one-year engagement. Programmes like "Learn at Nokia" offer training and online resources to graduate students through Nokia Lecture Series, technical projects as well as coaching from some of the brightest minds in the Organisation. We also engage with academia in activities like customisation of course curriculum to make it more industry relevant. And most importantly we strive for gender balance, within our organisation and the industry, to reflect the world around us, where both men and women have an equal opportunity to succeed in every function and at every level. We are successfully running high touch corporate programmes that focus on leveraging female capital into leadership. We are also committed to empowering girls on science, technology, engineering and mathematics (STEM) with a view to contributing to the larger and long-term talent pool creation.

**What are the big challenges that you see today when you want to hire professionals that can build nextgen telecom networks, products and services?**

Versatile competencies and the capabilities are critical for managing complexity of technology. Multi-competency capability in professionals would be differentiator for delivering nextgen services/products. Certain competencies are must for professionals - strong expertise in SDN, SDWAN, Telco Cloud, Security etc. These are niche skills considering the entry of telecom industry in cloud applications. By fostering a strong culture around learning new tools and programs, the organisations can remain agile and respond to challenges as they emerge.

**What would be your advice to educational institutes where the foundations of aspiring telecom professionals are laid?**

Academia and industry share a symbiotic relationship. Academia produces graduates who are absorbed by industry. We see a great potential to relook at the educational courses design and its curriculum that can fit the industry needs. Educational institutions revise the curriculum, but it is not at par with the industry speed. At the end of the day they both co-exist nicely if they can match the speed, which is aligned as per the technology trends. The industry – academia partnership will enable an employment-ready workforce and foster innovation.

**What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

Academic institutions and industry confluence play a very critical role in scaling up the talent pool in India. There are many challenges businesses face to bring in a new service - from conceptualising an idea to user centric service. Lot of research is required to devise applications in the new technologies like 5G in India. To bring in more research orientation, the Government can provide support to strengthen the infrastructure of research firms and propagating entrepreneurial culture. The academic courses design should move from the traditional way to industry-centric way.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

As India keeps pace with global technology evolution and prepares for the 5G era, certain competencies that are high value for service providers as well as equipment companies are Cloud Computing, Artificial Intelligence, Machine Learning, Automation, Predictive Analytics, Network visualization, IOT, Big Data and IP.

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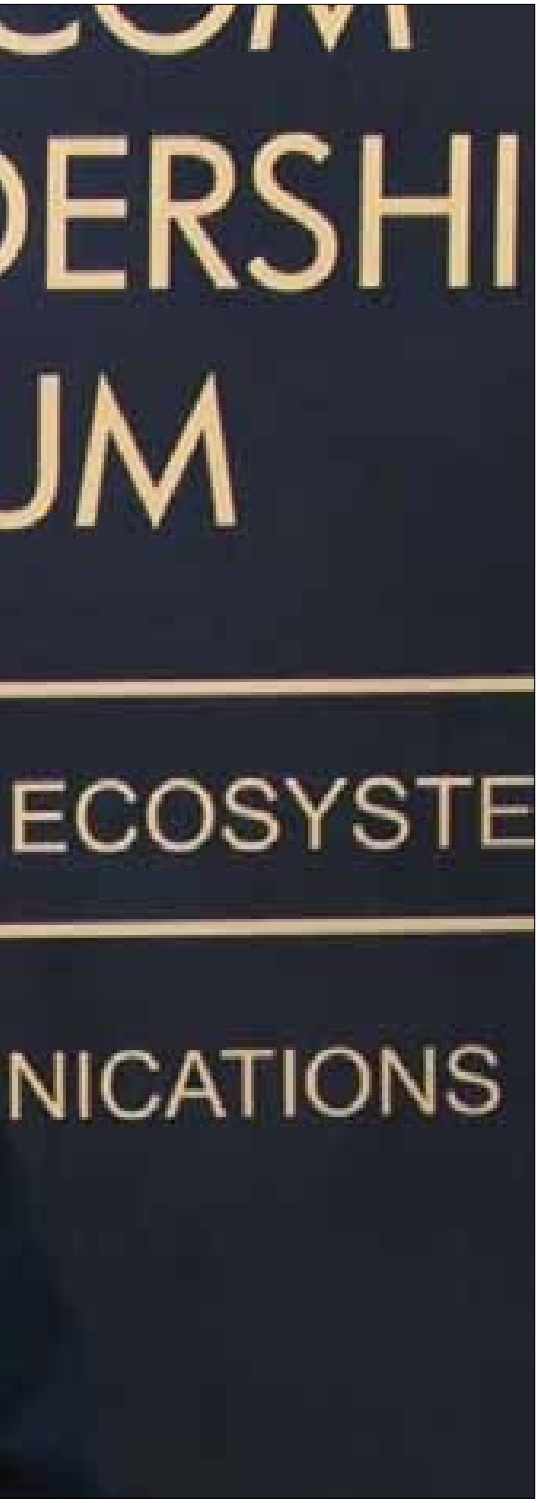
**—Puneet Chawla**
CMD, RailTel

"SINCE TECHNOLOGY IS CHANGING FAST THERE IS A PREMIUM ON ATTITUDE TO LEARN INSTEAD OF THE EXPERIENCE OF HAVING DONE THE WORK"




**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

Telecom Industry is such a dynamic area that telecom professionals should learn to unlearn and relearn. The fundamentals remain the same and it is important that professionals ensure that they stay relevant in a rapidly changing world. In today's world the choices to learn on various niche subjects are plenty and one must make use of the various options available like online courses etc.

**What role can a company like yours play in building the right telecom talent pool for India?**

RailTel is a relatively a lean & thin company in terms of manpower, yet we are trying to make a difference through program mes like RailWire (our retail broadband service), station Wi-Fi (public Wi-fi at Indian Railway stations), RailWire saathi etc, where we use the entrepreneurial talent available in the unstructured market and help them learn practical aspects of technology and run their businesses. Apart from that we train apprentices and run other short-term programmes for students and senior Railway officers.

**What are the big challenges that you see today when you want to hire professionals who can build nextgen telecom networks, products and services?**

Since technology is changing fast there is a premium on attitude to learn instead of the experience of having done the work. We find it difficult to acquire experienced professionals since we have to adhere to PSU pay structure but we are focusing on training and building in house capability and thus retaining the talent by looking after them.

**What is your advice to educational institutes where the foundations of aspiring telecom professionals are laid?**

My suggestions would be to focus on the fundamentals and create an enabling environment to learn. Also they need to focus on providing opportunities for hands on trainings as well in emerging and relevant areas.

**What role and support from the Government do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

In my opinion there are broadly three kinds of telecom talent pool - first is the group which serves the Telecom operators, second which produces and supports telecom equipment manufacturing and lastly the telecom talent pool which supports back office services of global telecom giants. With the consolidation of telecom industry, people are surplus in the first group. The Indian domestic telecom products have had few success stories but have not been able to absorb the workforce as such. The government can facilitate and take necessary steps to support this group to thrive. With the advent of automation and Artificial Intelligence, the skill set to serve the global market has changed considerably. Policies to support this vertical can also be laid down by the Government.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

Technologies like SDN (Software Defined Network) and NFV (Network Function Virtualization) are poised to become mainstream. On the mobility front 5G, Internet of things (IoT) and creating solutions for various industry verticals will become valuable for next few years. So specialized skill set for these will be of high demand.

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—Rajan S Mathews
DG, COAI

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

The telecom industry has witnessed sweeping transformations, especially in the last 5 years owing to the declining demands for traditional services and rising demands of digital services. Moreover, the competitors have eroded the consumer base by creating downward pressure on tariffs and rates.

The current situation demands telecom professionals to be well-equipped with a diverse set of qualities and competencies to face the challenges, cope up with emerging technologies and build a solid track record of performance. To start with, a telecom professional needs to be an innovative thinker especially in the times of crisis, they should have market intelligence, superior customer-handling skills, excellent financial management skills, technology-friendly, great analytical skills to name a few. Area of competency will be AI, Robotics, Deep Neutral Networks, Security Block Chain, RF Engineering Cloud Computing, Chip design, Software engineering etc.

The changing landscape of the telecom sector poses many challenges for all the players but if addressed properly and with the right competencies, these challenges can be converted into growth opportunities.

"THE CURRENT SITUATION DEMANDS TELECOM PROFESSIONALS TO BE WELL-EQUIPPED WITH A DIVERSE SET OF QUALITIES AND COMPETENCIES TO FACE THE CHALLENGES, COPE UP WITH EMERGING TECHNOLOGIES AND BUILD A SOLID TRACK RECORD OF PERFORMANCE."

**What role can a company like yours play in building the right telecom talent pool for India?**

COAI, as an industry body, is always encouraging telcos to impart proper training to their employees. We are committed to bridge the skills gap and to build a base, comprising of efficient industry ready resource pool. It is very important to train people on the job and provide hands-on practical experience so that they are efficient and competent to survive and grow in today's time. COAI was one of the founding members of the Telecom Sector Skill Council (TSSC). The TSSC is responsible for formulating the right training courses, content, training, evaluation and certification of candidates. The members of COAI attempt to hire from this pool of certified candidates. TSSC offers 49 qualification packs and 7 various courses in Smart City roles. Till date they have trained more than 7,51,647 students whereas more than 4,20,809 are certified.

**What are the big challenges that you see today when you want to hire professionals that can build nextgen telecom networks, products and services?**

The most common challenge that is being faced while hiring professionals is the wide skill gap. Graduates from engineering colleges are often found thorough in theory, but lack practical knowledge and are not equipped to start working instantly. Most of the professionals are not very tech-savvy, which is the very need of the hour. They lack hands-on experience in working with the latest tools and technologies. It is seen that the aspiring telecom professionals are not 'industry-ready' to take on bigger roles in an organisation.

Lack of practical knowledge, no proper training while working and the inadvertent skill gaps are some of the challenges that need immediate solutions so that the hiring process can be made simple and less time-consuming.

**What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?**

The fresh-out-of-college engineers are often found thorough in theory, but lack practical knowledge and therefore don't seem ready for the industry. The problem usually lies not in them but in the pattern of syllabus or courses, they have followed. In the job market of India, Artificial Intelligence, Internet of Things, Machine to Machine Learning etc. are completely new digital spheres and hence, need professionals who know their subject matter well. So, to make the aspiring telecom professionals 'industry-ready', the educational institutions should try to re-design the pattern of courses and syllabus, so that students master the knowledge well, both in theory and in practice. Students should be taught to be creative, analytical and be able to apply new knowledge and come up with workable solutions. That can be earned through practical future forward learning.

**What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

Digital innovations being the future of telecom, it's immensely important to speed up the quality and scale of the telecom talent pool. A recurring problem for employers in India has not been finding the right employee or the skill-gap in the talent pool. Here, the government can play an important role and work in tandem with the industry to bridge the skill gap. To speed up the quality of knowledge and scale the size of talent pool, proper training is needed. Government can collaborate with the institutions or industry to fund or organise such relevant trainings modules, programs and workshops. Government through the Skill Councils has attempted to provide needed skilling to students. However, these programs are largely focused at the 10 to 12 standard students. Government should focus on designing the proper syllabus, courses, teacher training and apprenticeship programs for students at the college level and ensure there is proper evaluation and testing of skills before students graduate.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

For service providers, Artificial Intelligence, Machine Learning, Robotic Automation and analytics will be the high-value skills of the future. This would help to reduce manual mistakes, ease out managing volume, ensure flexibility and quick responses.

In addition, Internet of Things, Big Data Analytics, Cyber Security are of foremost importance and therefore, hot selling skills for the future.

**What is the relevance of simulation software in the telecom industry**

With upcoming technologies like Artificial intelligence, Internet of Things, Machine to Machine Learning etc., simulation software will particularly be relevant. There will be interdependence as some of the components can either be used in simulation models to reflect the real system, or simulation models can be used to train the AI components. We can also use machine learning to build better simulations.

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—**Rajen Vagadia**
VP & President, Qualcomm India & SAARC

"R&D ENABLES US TO FOSTER NEW IDEAS WHICH ULTIMATELY LEAD TO FUTURE TECHNOLOGY ADVANCEMENTS AND GROWTH. THAT FOCUS IS ALSO WHAT LED US TO WANT TO PARTNER WITH THE RESEARCH SCHOLARS IN THE UNIVERSITY"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

India's foray into the latest and most advanced technology has opened tremendous opportunities for telecom professionals. As a result of the potential benefits offered by these new technologies, consumers have high expectations from companies delivering products or services. India has a huge talent pool when it comes to the tech ecosystem. The factor that adds an edge is the determination to develop a deep understanding of

problems through thoughtful data-driven analysis and then shepherd relevant solutions through the lab and into real world deployment.

### What role can a company like yours play in building the right telecom talent pool for India?

At Qualcomm, research and development is a key focus. It enables us to foster new ideas which ultimately lead to future technology advancements and growth. That focus is also what led us to want to partner with the research scholars in the university, in order to cultivate new and forward-thinking ideas and continue to further research and development overall. To establish a forum for Qualcomm and students to engage routinely, we created the Qualcomm Innovation Fellowship (QIF) programme in 2009. The India programme was launched in 2016 with an aim to engage with the academic community to encourage and support advanced engineering research; this included predominantly Graduate, Post Graduate and PhD students from top institutes across the country. This annual program works to amplify student knowledge and foster a culture of innovation and invention amongst the academic community. QIF invests in University research students, engineering schools, professors and students to advance their research and accelerate the development of key technologies.

We also have STEM Community partnerships which focus on skill gaps, demographic gaps, belief gaps, and in making STEM accessible for all by collaboration with organisations, governments, academic organisations and industry partners. One of our sustainability goals is to enhance and expand the talent pipeline in the technology industry by engaging students and other key stakeholders in our scalable STEM education initiatives by 2020.

### What are the big challenges that you see today, when you want to hire professionals who can build nextgen telecom networks, products and services?

One of the challenges we face while hiring professionals is the significant gap between the industry requirements and academic preparation. A high emphasis on theoretical knowledge is placed in Indian institutes but applied approach to this knowledge in real world industry is usually inadequate. Corporate involvement in the students' academia and internships in such cases is important to train students in the required skills and corporate culture to make them better prepared and to succeed in the industry.

### What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?

The advice would be to step up the engagement and collaboration between industry and academia. Educational institutes should focus on science, technology, engineering and math from the school level among all social classes especially within the backward socio-economic community, to encourage healthy talent with an innovation centric mindset in the industry. Institutes should also allow a part of their curricula to be advised by corporates through specialised courses, additional training and ongoing guest lectures and assessments. This way we can provide a holistic foundation for the upcoming telecom professionals.

### What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?

India is the fifth largest economy with a massive youth base. Research as we know, is the key focus for corporates around the globe and academic institutions, too, play an important role in involving students in research and development. For the upcoming talent pool, these two worlds need to be amalgamated. For example, to aid the talent in the country, corporate research fellowships can be granted to students to understand and test their theories in state-of-the-art labs in real world business settings. Government can offer support through sponsored research programs, fellowships, innovation labs and infrastructure at universities for encouraging research collaboration.

India is capable of grooming talent and creating a workforce that focuses on automation-proof innovation for the telecom industry. So, right investments in focused and collaborative training and skilling initiatives are important to close the gap between the industry and the academia.

### What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?

Engineering work has moved up the value chain in India. Today more and more R&D is being driven from India. Whether in the software, hardware or the services space, having a focus on innovation will be a key trait that companies within the telecom sector will be looking for. As well as a deeper understanding of customer needs and knowledge on what are the gaps in the industry that need to be filled.

Apart from the right technical skills in their respective domains, at the end of the day, it is having the right attitude and aspiration to expand and hone their skills & be industry ready on which companies place a high value.

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—Sanjay Kaul
President, APJ Service Provider Business, Cisco

"THE TELECOM/ ICT SECTOR NEEDS TO BE PREPARED AND APPLY MORE FOCUS ON TRAINING IN CYBER SECURITY, IOT, MACHINE TO MACHINE NETWORKING AND CLOUD SERVICES, AMONG OTHER SKILL SETS"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

The telecom network has become a critical infrastructure in itself, enabling many essential features of today's society such as digital payment/financial networks, smart cities etc., in fact, today telecom network will evolve to network platforms that are well equipped to create digital value plays for industry

verticles and as a result drive need monetisation for 5G investment and in turn to bring digitisation and value connected to it to enterprises. To execute on this enormous opportunity industry require a diverse set of skills in cloud, AI/Machine learning, analytics/ data scientists, security experts etc. are required for the upkeep of the deployment, management and maintenance.

Today, AI and Machine Learning are being used to predict faults in the network. Also, the market is disrupted by emerging technologies (sensors, IoT, crypto-currency, blockchain and robotics) and professionals in the telecom sector should be equipped with skills to survive in a world of automation. The telecom/ICT sector needs to be prepared and apply more focus on training in Cyber Security, IoT, Machine to Machine networking and cloud services, among other skill sets.

Such competencies were earlier confined only to the IT sector, but now since telecom operators are reengineering networks to be smarter and more efficient, proficiencies in the areas of IoT, AI, ML and blockchain are in high demand in the telecom sector.

## What role can a company like yours play in building the right telecom talent pool for India?

The digital skills gap is widening and the cost to our economy is escalating. The education system alone cannot be expected to keep up with the increasing skills gap. We, as technology industry leaders and future employers, must partner with the government, SPs and education institutions to address the opportunity now so that we can ensure India cements its place as a digital leader.

That is why we run, support and fund several initiatives to help train people in Digital Skills. Through our networking academy, we have trained over 100,000 students so far in digital skills this year alone. Most of the people who complete our courses have a better job prospect or education opportunity as a direct result and we are incredibly proud of that. However, the ambition of our programs goes further. By 2020, we are committing to help improve the digital skills of over 250,000 students in India. On top, we are skilling up our massive partner network with certification in IP, Automation, DC/cloud and security.

## What are the significant challenges that you see today when you want to hire professionals that can build nextgen telecom networks, products and services?

The critical challenge for hiring in the telecom sector is the volatility within the industry itself. Due to the recent upheaval in the industry, new entrants are hesitant to take up roles in what they assume is an unpredictable industry. However, since the business model of the sector has changed from simple telephony to a data-driven mobile usage model, this presents vast opportunities for current as well as future employees of the sector. The telecom sector is driving India's digital transformation and offers a coveted opportunity to help this transition. I believe that technologies like 5G and WiFi 6 will be the true enablers fourth industrial revolution

## What would be your advice to educational institutes who lay the foundation for aspiring telecom professionals?

India now has the second largest telecom network in the world and the needs of the telecom industry continue to evolve with the onslaught of emerging mobile technologies rapidly. As the telecom industry continues to grow, new job roles are being created to cater to new goals. It is imperative that educational institutions offer courses that integrate emerging technologies, which are relevant and in sync with these industry needs. The academia and the industry should join hands for skill development. A partnership between them would create a smooth path to bridge the skill gap. Institutions should prepare students on skills such as building and maintaining a robust IT infrastructure, project management, AI/ Machine Learning, cyber security, Data science and analytics.

## What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?

As the telecom industry continues to stabilise, there will be a need to re-strategise talent acquisition efforts to focus on creating new roles, generating more jobs and getting more investment into the sector in the process, as is the aim of the government projects as well. The recognition of telecom services and infrastructure as "an essential public utility," will aid the proliferation of such services, facilitate low-cost financing, increased hiring and ultimately lead to a digitally empowered India. Lastly, I believe every player in the industry must devote a certain portion of the investment to skill development to ensure we create a sustainable advantage for India and live up to the dream of true digital India.

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**—Sridhar Krish**
Chief Operating Officer, Tikona Infinet

"WITH A HUGE INCREASE IN THE NUMBER OF DEVICES, ENGINEERS WITH A GOOD UNDERSTANDING OF DATA NETWORKING WOULD ALWAYS BE REQUIRED"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should posses?**

Telecom Professionals need to get deeper understanding of data oriented technologies and businesses. Professionals who can create products and services that can help telecom companies acquire more customers and retain them over longer period of time will be of more value to the Industry. The conventional modes of customer acquisition are very expensive and Industry will look for more and more digitally savvy marketing professionals who can work with Internet and social media based technologies to help improve customer acquisition and reduce the costs.

Professionals who can provide deeper insights into customer behaviour and decision making thorough Data Analytics and Data Science would be required. With a huge increase in the number of devices, engineers with a good understanding of data networking would always be required. Skilled Manpower who can install and trouble shoot networking home and enterprise gateways/routers/Wifi/Smart TV/CCTV/IOT integration etc. will be required. RF Engineers with a good orientation of small cell technologies like MIMO and smart antenna technologies will help.

**What role can a company like yours play in building the right telecom talent pool for India?**

We are an ideal training ground for a large number of young talent who want to make a career in the industry. We have a large force of data engineers who gain thorough understanding of building & maintaining data networks on a Pan India basis. We are continuously on the lookout for skilled/semiskilled manpower who can do field installation work for home and enterprise broadband. We have created extremely good quality courses to skill anybody without any formal educational qualifications. We have one of the largest Direct Sales teams for home broadband and enterprise sales. These are a mix of young and experienced sales professionals, with or without any formal University degree, most of them coming from tier 2 and tier 3 towns and getting trained to make a career in sales. Further we have programs to enrol entrepreneurs who can become franchisees for our business and we can help set up their business in their geography of interest.

**What are the big challenges that you see today when you want to hire professionals that can build nextgen telecom networks, products, and services?**

The biggest challenge is the poor quality of manpower, coming out of our universities and the huge gap between industry expectation and delivery.

**What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?**

Industry and educational institutes should offer co-op programs where students are required to spend minimum 12 to 16 weeks in a year with the industry. There need to be more forums of engagement between industry and academia to better understand each other's requirements.

**What role and support from the Government do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

a. Government should work on setting performance standards for the educational institutes to improve overall quality of graduates and post graduates in line with the best practices globally.
b. Government should focus on setting more centres for vocational course/skill development in the areas of networking/smart home technologies like WiFi/CCTV integration/IOT device integration etc.
c. Government should work on creating inter-industry work groups to brain storm and arrive at solutions/white papers that can help various industries come up with use cases for 5G and IOT, fund trial implementation of some of these technologies.
d. Government should work on ensuring Industry participation in entrepreneur development to skill, local entrepreneurs set up Businesses around these new technologies.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

a. Marketing professionals with a good mix of skills in using Digital/Internet based technologies.
b. Data scientists and analysts who can help understand customer behaviour and guide decision making.
C. Product Managers who have a good understanding of telecom, OTT/content, cloud technologies and can help create products that can enhance overall life cycle value of products and services.
d. Networking professionals capabilities to use AI and Machine Learning concepts to implement, manage and trouble shoot large scale data network implementations.
e. Radio Engineers with a good understanding of implementing small cell technologies like MIMO and smart antenna technologies.

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—Suvamoy Roy Choudhury
CHRO, Vodafone Idea

"THOSE WHO HAVE THE ABILITY TO CONTINUOUSLY RE-INVENT THEMSELVES, APPLY INSIGHTS FROM DIVERSE EXPERIENCES TO COMPLETELY UNRELATED FIELDS WILL BE THE BOLD NEW CITIZENS OF THIS DIGITAL AND HYPER -CONNECTED WORLD."

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

The advent of new age technologies is transforming the way businesses are being run across industries. In the telecom sector too, new business models are evolving as customers are rapidly embracing smarter devices with broadband connectivity. They are preferring to use state-of-the-art digital platforms to access products and services. The do it yourself comfort of the digital platform

empowers them to transact from any location and at their convenience in a seamless manner.

Most changes that we see around us are unprecedented and without any playbook or reference from the past. Accordingly, a new set of competencies is expected from telecom professionals to cater to the evolving business needs. It is vital to have a bold outlook, act with speed and not be afraid of failure in the dynamic, fast changing environment in which we are operating. Hence, Learning Agility and ability to Lead Change to deliversuccess in first time situations is vital.

Digitally savvy customers expect a personalised and seamless experience. To deliver this, highest levels of customer centricity, data analytics and ability to create unique value proposition through cross industry alliances and partnerships is critical.

With the explosion of offerings, managing multitude of devices on IoT will lead to be a new way of living. To enhance customer experience, it is important that solutions offered to manage this complexity are simple and easy to use. This will need competencies of design thinking and digital mindset.

Cognizant of these changes, at Vodafone Idea, we are building an agile and future fit company. Digital is one of the core values that drives the organisation. We choose Digital First to make things simple for customers, our vendor/partners and ourselves.

What role can a company like yours play in building the right telecom talent pool for India?

Telecom companies are enabling a new kind of organisational DNA. One that thrives on disruption, is innovative and collaborates well with the ecosystem players. This is a shift from the average workforce we have seen in the past. Significant investment is being done and more is required to upskill our talent and develop a new breed of leaders. With the influx of talent, especially at the leadership layer from non-traditional sources we are seeing a hybrid workforce that is spurring creative conflicts and hastening the process of the change.

What are the big challenges that you see today when you want to hire professionals that can build nextgen telecom networks, products and services?

The telecom industry offers enormous scale and potential of creating blockbuster products that can potentially transform the lives and experiences of millions. As the way business is done is itself rapidly transforming, we are seeking skills that can enable and facilitate this transformation.

Our challenges are in hiring the right talent from the cutting edge technology space– AI, Machine Learning, Big Data, IOT, AR/VR, Digital etc. It however, takes some time for talent with some of the new age skills to understand the business dynamics of telecom and adapt solution development to this space.

**What role and support from the Government, do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

In the not too distant future, niche skills like Analytics & Data Sciences, AI, Machine Learning, E-commerce etc. will drive large scale employment across multiple industries including telecom. Hence, we need to produce these skills at scale to meet industry needs.

The government has a role to play in coordinating private and public initiatives in building capacity for producing the new age skills that deliver thresh-hold quality. Similarly academia has to recognize the future skills needs landscape and divert resources and effort accordingly.

Our vocational architecture has often lacked quality and therefore credibility. Here is an opportunity to think afresh and correct this historical lacuna.

**What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?**

Education must prepare aspiring young professionals with the requisite skills and orientation to meet the dynamism and quality standard expected by Industry. Ensuring that each one acquires a specific skill in addition to learning the fundamentals subjects at the school /college level will be a good starting step.

We must ensure that there is appropriate filtering while enrolling students. It is important that the aptitude required for the job matches the individual's preference and abilities. Students must be appropriately counselled on their choice of streams, education institutes can partner with Industry to hold career talks.

The second vital step is to have Industry specific courseware. To make it practical, I would advise them to look at Industry clusters which require similar skill sets and build relevant and realistic content jointly with them. We can create apprenticeship as part of the course design so that new skills can be nurtured via on-the-job training. The latent potential to build a win-win partnership between academia and industry is huge at this point.

What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?

Digital, Data analytics, IOT, AI are skills in high demands due to the changing nature of the services being offered to customers. To build and maintain the backbone of these services we will need strong IT infrastructure and project management skills.

While these skills will attract a pay premium, the hottest skill by far will be more on the softer side i.e. ability to think, unlearn and relearn. Those who have the agility to continuously re-invent themselves, apply insights from diverse experiences to completely unrelated fields will be the bold new citizens of this digital and hyper-connected world.

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**—Tilak Raj Dua**
DG, TAIPA

# "IDENTIFYING AND IMPLEMENTING DIGITAL PLATFORMS ACROSS AN ORGANISATION IS A CRUCIAL SKILL THAT WILL INCREASE OPERATIONAL EFFICIENCIES"

**As India gears up for 5G, broadband for all, IoT and a host of new telecom business and technology models, what are the key competencies that telecom professionals should possess?**

Telecommunication services has emerged as a key driver of economic and social development in an increasingly knowledge intensive global scenario. The Indian telecommunication sector has undergone a revolutionary transition in the last two decades to become the World's second largest telecommunication market with more than 1.1 billion subscribers connected through 5 lakh mobile towers mounted with around 20 lakh BTSs. As per the government report, the mobile sector's contribution to GDP which is presently 6.5 percent and will increase to 8.2 percent by 2020.

Now, with the advent of 5G technology emerging technologies such as IoT, M2M, AR, VR and AI etc., India is all set to witness technological paradigm shift and will unfold the new revenue streams and positive societal benefits through its numerous benefits in different sectors such as manufacturing, agriculture, automotive, energy, healthcare, retail and smart cities etc.

A recent report by by FICCI, NASSCOM and EY estimates that

- 9% of India's 600 million IT workers will be hired for the new – age jobs of the future while 37% of the Indian workforce will be deployed in jobs that call for advanced skill sets.
- 40% of IT professionals in India need to reskill themselves to stay relevant.

This clearly proves that the current business environment calls for reskilling the skilled professionals to match the new age industry dynamics. Identifying and implementing digital platforms across an organisation is a crucial skill that will increase operational efficiencies.

To reap maximum benefits, revenue and for optimum utilisation of this technology, the upcoming technologies and competencies that should be focused by companies across the industries includes

| Skills | Needed for |
|---|---|
| Artificial Intelligence | For making machines smarter by adding intelligence to understand perform tasks |
| Applied Machine Learning | For analysing existing data to predict future outcomes |
| Blockchain | For ensuring data authenticity and integrity in various areas |
| Big Data Analytics | For accumulating, storing and analysing data for enhancing efficiency of an organization and aiding better decision-making |
| Cloud Computing Technology | For reducing cost of maintaining IT systems of an organization by moving its business to the cloud |
| Cyber Security | protecting data captured by companies, generated by millions of apps |
| Financial Technology | For revolutionizing conventional financial services |
| User Interface & User Exchange | Design of mobile apps |

Further, with the constantly evolving technology deployment in the telecom industry, the skill requirement for the workforce of the tower industry players is also evolving. They need to regularly update the skillsets of their operational teams. A strong product innovation team can give a competitive edge to the tower players by driving the latest technology projects like fiberized backhaul implementation, alternate energy source installation and other key R&D projects. A new breed of energy managers will also have to be trained on analytics so that they can identify key issues with the energy management at the tower sites.

- Broadly, Tower companies would consider developing skills around:
- Product innovations team to drive alternate access technologies and backhaul related projects
- R&D and alternate energy sources (solar, fuel cell)
- Training programs for Energy Managers across circles on analytics
- RAN sharing services
- Additional skill set to provide highest order of quality operations & maintenance (O&M)
- Site Analytics management skills
- Technical skill set for managed services and small cell implementation

**What role can a company like yours play in building the right telecom talent pool for India?**

TAIPA closely works through the governing council of TSSC for the measures, plan and strategy for building the right telecom talent pool in India.

**What are the big challenges that you see today when you want to hire professionals that**

"The Government, the academia and the industry must focus on collaborating with private sector to revamp the conventional teaching, educational institutes to provide practical training to students for helping them learn industry skills required for a successful career."

**can build nextgen telecom networks, products, and services?**

In order to reap the demographic dividend of the young booming population, it is necessary to keep the pace with next generation technology or Digital skills. Disruptive technologies like Augmented Reality, Virtual Reality, Block Chain, Cyber Security, Artificial Intelligence, Machine Learning, 5G and Internet of Things etc. have unleased the digital realm and it is upon the sectors to ride the exponential growth wave that they offer.Using these technologies innovatively will require tremendous amount of expertise. However, we are facing a widening digital skill gap.

A recent report by Gartner points out that almost 60% of the Indian companies, while gearing up to boosting their data and analytics capabilities are facing a sever challenge with non-availability of talent.

A recent NITI Aayog National Strategy for Artificial Intelligence states that the country will have a demand – supply gap of almost 2 lacs data analysts in a couple of years.

In a nutshell, there are three challenges that demands immediate attentions are as follow:

- Future Skill Gap
- Business Skill Gap
- Learning and unlearning skills

**What would be your advice to educational institutes which where the foundations of aspiring telecom professionals are laid?**

We would like to recommend that institutes must collaborate with the industry to ensure comprehensive skill development of candidates and industry's hands on experience would give an impetus to the skill enhancement of the youth and prepare them for the real – world situation.

**What role and support from the Government do you think, will help the industry and the academia to speed up quality and scalable telecom talent pool?**

With marquee programmes such as Skill India Mission which includes various other programmes such as National Skill Development Mission, National Policy for Skill Development and Entrepreneurship, Pradhan Mantri Kaushal Vikas Yojana and Skill Loan Scheme etc. are helping extensively to develop skill and reskill youth of the nation.

In addition to this, the Government, the academia and the industry must focus on collaborating with private sector to revamp the conventional teaching, educational institutes to provide practical training to students for helping them learn industry skills required for a successful career.

The successful partnership will provide students with much need opportunities to develop skills and hone their capabilities under the able guidance of industry experts. This will make learning process more interactive.

Further, the choice of self-learning, being aware of the market needs and working smartly towards being value creators and being not just job seekers is in the hands of individuals.

Apart from this, the institutes must focus on creating skill-based Universities. For instance, the newly launched Bhartiya Skill Development University (BSDU) at Jaipur, is the first purely skills University in the world. Its mission is to create opportunities for skill develop for Indian youth to make them globally employable.

**What according to you will be the hot-selling skills that will be of very high value for service providers as well as equipment and handset companies?**

TAIPA strongly believes skill set around Artificial intelligence will be the most hot-selling skill that will be of high value for service providers as well as equipment and handset manufacturers.

This is because AI will extensively help in bringing operational efficiencies while mitigating the risk of errors and operating wastage. The technology will also help in mapping the forthcoming risk by analysing the data.

In Telecom infrastructure industry, AI will have a strong role to play by analysing the data consumption round the clock thereby finding out the lean and busy of the network site eventually brining-in the network operational efficiencies.

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# Telecom Manthan 2019: A Curtain Raiser

How rapid is the consolidation in the telecom sector? Are there emerging technology and business model transformations that are rationalising job opportunities, as well as re-defining skill requirements?

## Preparing the Stage

What will be the hottest technologies and skills in the next 5 years in terms of job openings, salaries, and career growth as telecom sector transformation gathers steam? Are new jobs getting created in place of the old jobs that are getting redundant?

These are just some of the many points that will be discussed at the forthcoming Telecom Manthan 2019, organised by Voice & Data, in association with the Telecom Sector Skill Council.

Telecom Manthan will focus on skills that include Artificial Intelligence, Business Intelligence & Data Science, Cyber Security, Blockchain, Internet of Things, Android, Augmented Reality and Virtual Reality, Robotics, etc. All of them are aimed to increase the efficiency and productivity, cut costs and time-to-market cycles, empower partners and customers. The objective is to enhance customer delight and average revenue per user in a highly competitive market.

## Spotlight

Sponsors include Sterlite, Vodafone, Spectra, Infinity Labs, 360BT and Demorgia and various Association supporting the iniative.

Telecom Manthan is being organised by Voice & Data, and TSSC. Gen. Dr. SP Kochhar, CEO, TSSC, has been the guiding light.

Some of the key speakers are Josh Foulger, MD, Foxconn Global, Randeep Sekhon, Group CTO, Airtel, Rajan Mathews, Director General, COAI, P Balaji, Chief Regulatory & Corporate Affairs, Vodafone Idea, Vipin Tyagi, Executive Director, C-DoT.

The event is expected to be attended by 250+ people drawn from the telecom sector, skills sector, academia, government, telecom training partners, content players, handset manufacturers, budding professionals etc.

There will be four sessions, to be followed by the awards and recognition for skilling.

### IN NO PARTICULAR ORDER, CAN THE CONFERENCE ADDRESS THE FOLLOWING?

- How can we bring about a better work environment in telecom start-ups?
- Are the folks aware of the various technologies? Are they following these technologies?
- Is the study curriculum up to the mark with recent developments?
- How confident are the HR themselves, while hiring?
- Are folks being paid enough to stay in the country?
- Do you provide any industrial training to undergraduates and schools to know the technology?
- Is the current training adequate? Is there any industrial training involved?

# Voicing the Digital Advertising

Voice technology is a watershed moment in the digital advertising, opening doors for advertisers and marketers to approach their target audience at a much faster pace


Advertisers and marketers need to give 'Voice to their brand'.

## Riding High

The new digital world is riding high on the voice search. This essentially means that 'search' is no longer confined to the traditional keyboard commands. The virtual world is going through a transition opening doors for advertisers and marketers to brand their strategy. This means that brands are no more just about a product but, now it is about making a personality of the product and what's more even given the product a voice.

Voice technology is a watershed moment where brands can approach their target audience at a much faster pace. According to research by Comscore, it is expected that over 50 per cent searches will be voice-generated by 2020. Concurrently, the rise of smart devices, personal assistants, smart homes and AI engines like Cortana and Siri, digital advertising is looking at the precipice of the next big thing in the digital marketing space—voice search and voice generated digital marketing.

The point of interest here is that the changed graph in how users consume and interact with voice search is on a steady upward trajectory. Businesses need to restructure strategies in content, brand awareness and cross-platform in these exciting times.

## New 'Voice-Search' Environment

Digital advertisers stand in front of a mammoth opportunity to transform and take the early mover advantage and gain a head start. Huge data centers are now processing millions of voice searches, voice commands, dictations, conversations and discussions with interest groups, multimedia content etc. to create a better user experience for individuals as well as curating the right advertisements for every search. Speech recognition and voice search are huge advancements in technology and at their core, they change how users search, using longer phrases as compared to short keyword searches. They also mandate a change in the content crafting by brands.

For marketers, the opportunity here lies in optimising processes to curate advertisements based on user identification and voice generated experiences.

## Targeting Consumers

It will become extremely crucial in the coming years for brands to target con-

"The changed graph in how users consume and interact with voice search is on a steady upward trajectory. Businesses need to restructure strategies in content, brand awareness and cross-platform in these exciting times."

— Sahil Chopra, CEO & Founder, iCubesWire

sumers based on the voice-based search queries. The first step is to craft content with useful information and optimise the content 'most searched' by the consumers. Next, yet important step is to prepare web content to rank for organic voice searches to integrate voice seamlessly. This will lay the foundation for acceptance of future paid voice search ads. The voice search must be responsive and interactive to cater to mobile and websites and to take advantage of voice-initiated traffic.

Advertisers can enhance 'paid search' through remarketing lists for search ads (RLSA). The voice search managers should define and build out RLSA lists. Advertisements can also be tailored according to the visitors based on Google searches. Once voice search ads are rolled out, it becomes easier to target users who have previously visited the site.

## Rapprochement

As it stands, we are yet to see an interface dedicated to voice search. Presently, search engine monetise on the basis of devices. Google, Amazon, Apple, Microsoft etc. all are moving mountains to sell devices. But, the imposing question is how will tackle the issue of persistent investments and their justification. Advertising will play a great role down the line.

The non-interruptive model employed by Google on its web search platform was turned on its head with youtube's interruptive advertising model. So, where are the future of voice search and advertising? The goal is monetising voice search and that resonates with the target audience.

The answer to the question lies in some simple strategies and options. One must look at Pre-roll advertising, Screen synched advertising, paid answers, post-roll advertising, and data-driven ads and results. Another option that is used commonly by apps is interrupting the voice with an advertisement like usually seen in music streaming apps. However, the last is least preferred as it spoils user experience and distracts attention as against non-interruptive advertising. Paid answers are also some of the lower ranking options, according to experts.

Globally, marketers agree due to the proven effectiveness that a pre-roll advertising like what you get before a video or a podcast works best. One may even acknowledge paid answers here.

## Future of 'Voice search' Advertising

Even though pre-roll has proven to be more effective on video, podcast and even TV and radio, development of voice search is premised on giving the user a better experience. Hence, the challenge of giving that experience with a pre-roll is tedious and a complicated task. This will require a lot of planning to position the brand.

The next is to make an interesting advertisement that can give a recall of the brand that stays with the consumer. The stage is set and the ball is in the court of advertisers, strategists, marketers. The secret ingredient essentially here is the way they adapt to the changing face of digital advertising. The transformation is moving on swiftly and show no chance of slowing down.

Voice is the inevitable future of search and advertising and the question is who steps up first.

If one is looking for an elegant solution to this challenge, adverts on synchronised screens are one solution. Though it isn't the most effective since you don't have your eyes on the screen most of the times and thus it becomes a challenging task. Therefore, the most obvious choice comes as voice ads. Pre-roll or post-roll, both are up in the air and marketers are yet to come on a consensus as to which works better. Both have their own benefits and limitations.

But, having said that, what everyone does agree on is that voice search providers would utilise the data to monetize searches.

There are over 3.5 billion searches being carried out on Google alone, not counting other platforms, that is undisputedly a gigantic amount of searches and given the fact that at least a third of it is voice search, it has to be a crucial part of advertising strategy. The ground is already laid for advertisers to jump on the wagon and reap the benefits of voice.

**Sahil Chopra**

*(The author is the CEO & Founder, iCubesWire)*

# Does Mobile Branding Work?

A research, based on a survey of more than 100 digital marketers, highlights the current landscape, challenges undermining the in-app programmatic advertising industry and gives a glimpse into its future Key findings

### This Survey Explores

1. Current Mobile Programmatic Landscape
2. Challenges and Opportunities with Programmatic in India
3. Future Trends in Mobile Programmatic and its evolution in the subcontinent

Changes in consumer buying patterns and growing competition have forced companies to relook their marketing strategies – to place renewed focus on engaging consumers and influencing their choices. Programmatic advertising is one of the best ways to achieve this close connect.

Hailed by advertisers for its potential to streamline the process of ad buying, programmatic advertising is set to dominate the Indian digital advertising sector. Thanks to the effectiveness, efficiency and control it lends to marketers, India has witnessed substantial growth in programmatic spends in recent years – a trend which is expected to continue into the near future. This report is a look at the current and future trends in Mobile Programmatic that the region is slated to witness.

### KEY FINDINGS FROM THIS RESEARCH INCLUDE

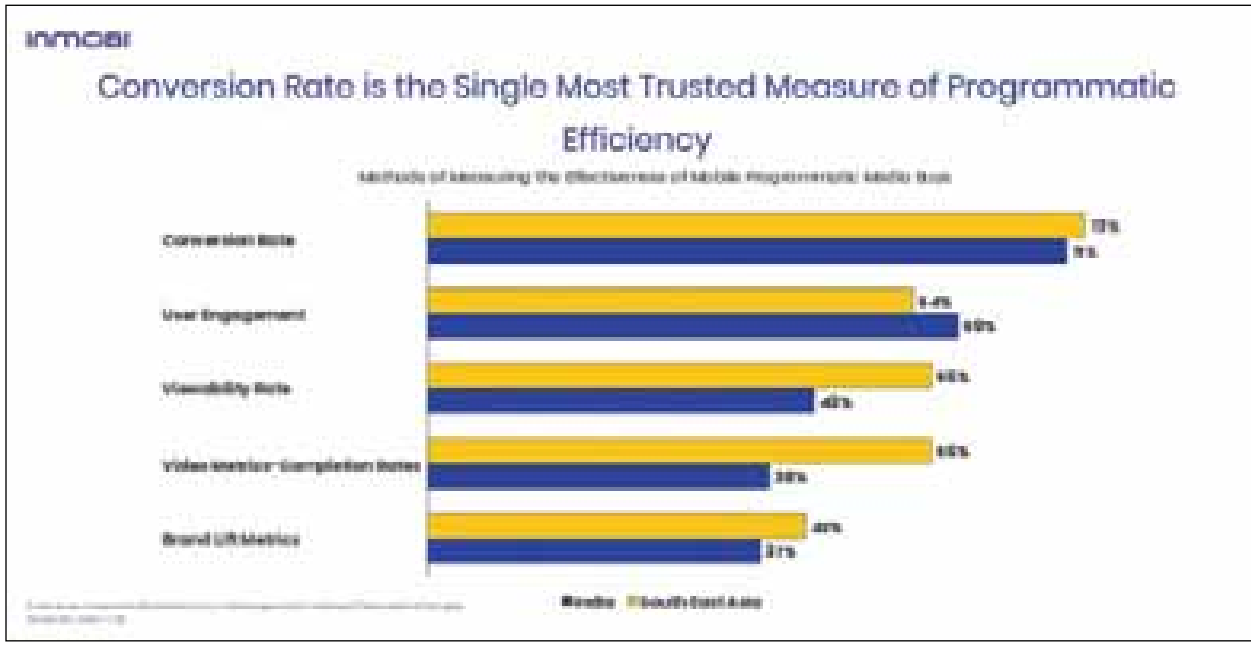
- 2 out of 3 brand marketers possess only a basic working knowledge of programmatic advertising. Despite that, 38% of these advertisers conduct their programmatic media buying in-house and another 52% do so via both in-house and agency channels.
- 8 out of 10 advertisers see efficiency gains with programmatic buying. Programmatic buying of inventory reduces the human involvement and the chances for errors and delays, thus improving the efficiency of a campaign instantaneously.
- When evaluating programmatic partners, performance along with control and transparency in reporting are the top two criteria for brands.
- Lack of education and awareness around programmatic processes is the single biggest barrier to programmatic adoption in India.

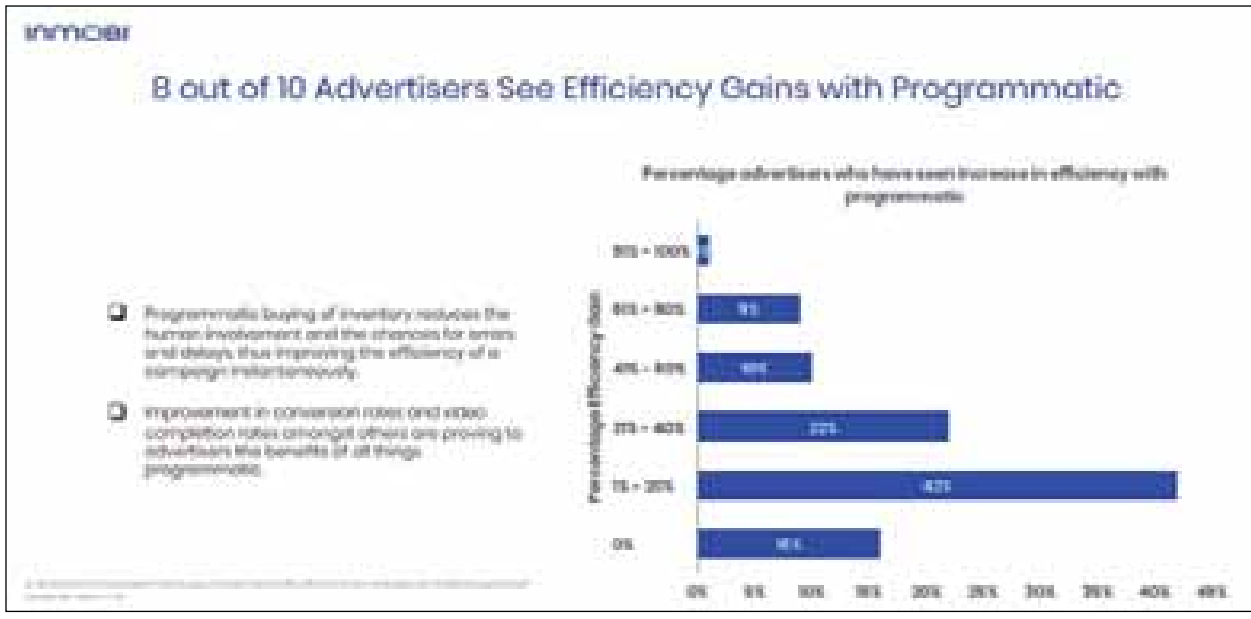
### THE PROGRAMMATIC ADVANTAGE KEY HIGHLIGHTS:

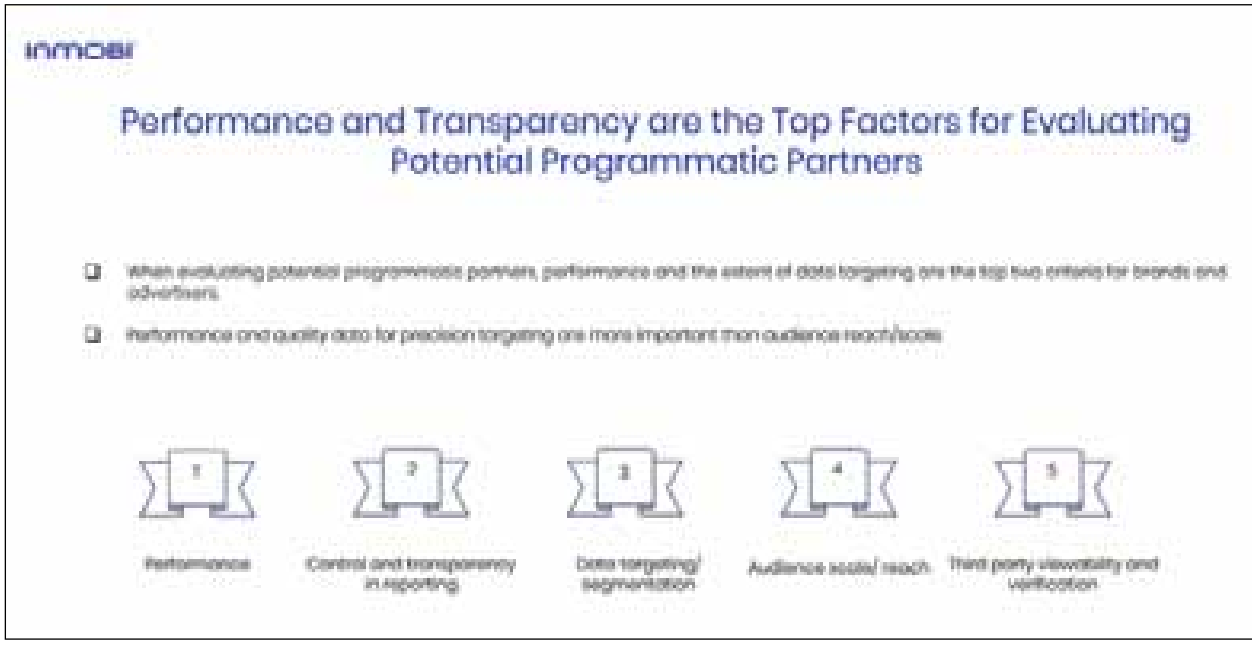
- Conversion rates and user engagement continue to remain one of the most crucial measures of the effectiveness of a programmatic campaign.
- On using programmatic, a majority of marketers have witnessed up to 20% increase in the efficiency of their ad campaigns. This is a direct result of automated systems that reduce error and delays, allowing marketers a higher degree of control over their money.
- Marketers want to work with a programmatic partner who offers a unique balance between performance, targeting capabilities and audience reach/scale.

"Thanks to the effectiveness, efficiency and control it lends to marketers, India has witnessed substantial growth in programmatic spends in recent years – a trend which is expected to continue into the near future."

— Vasuta Agarwal, MD, Asia Pacific, InMobi

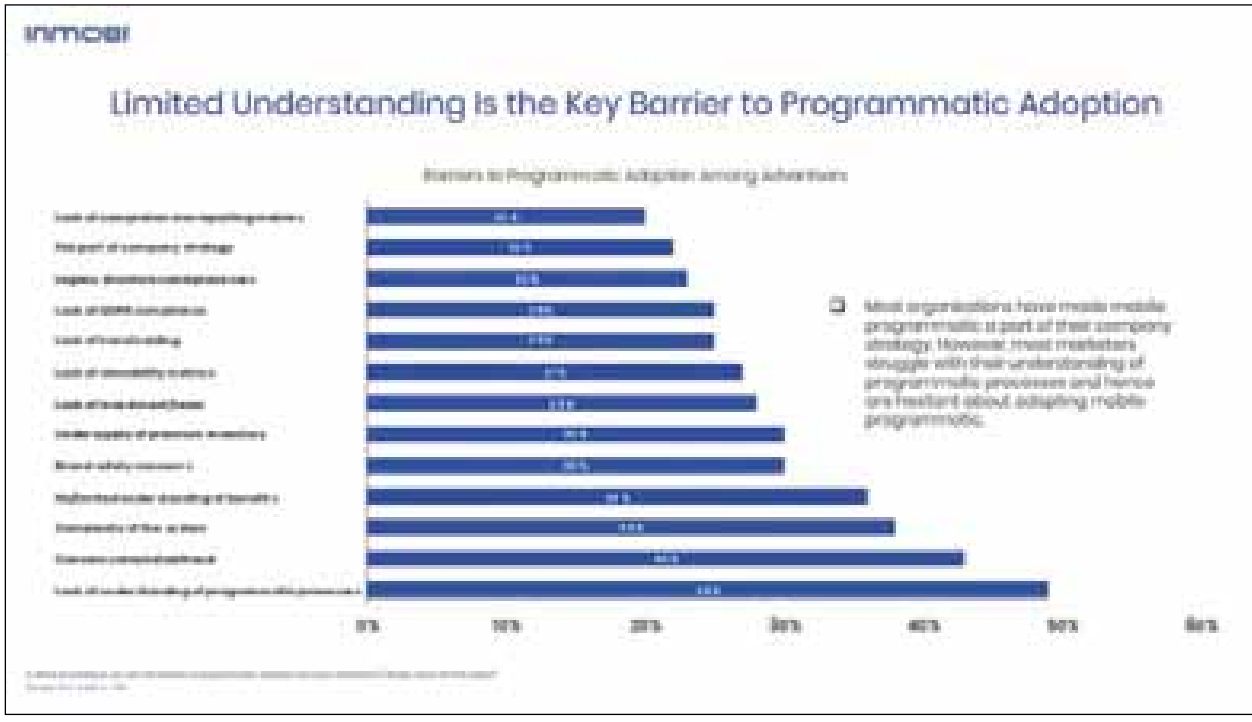


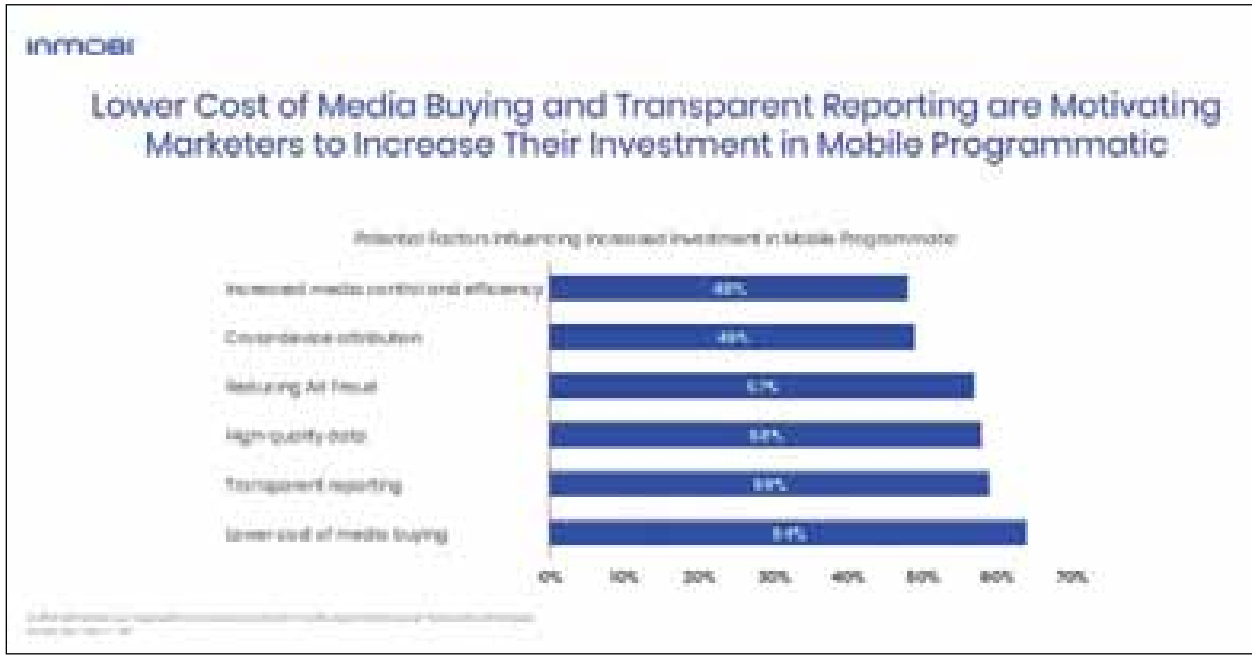






**FACTORS DRIVING PROGRAMMATIC ADOPTION KEY HIGHLIGHTS:**

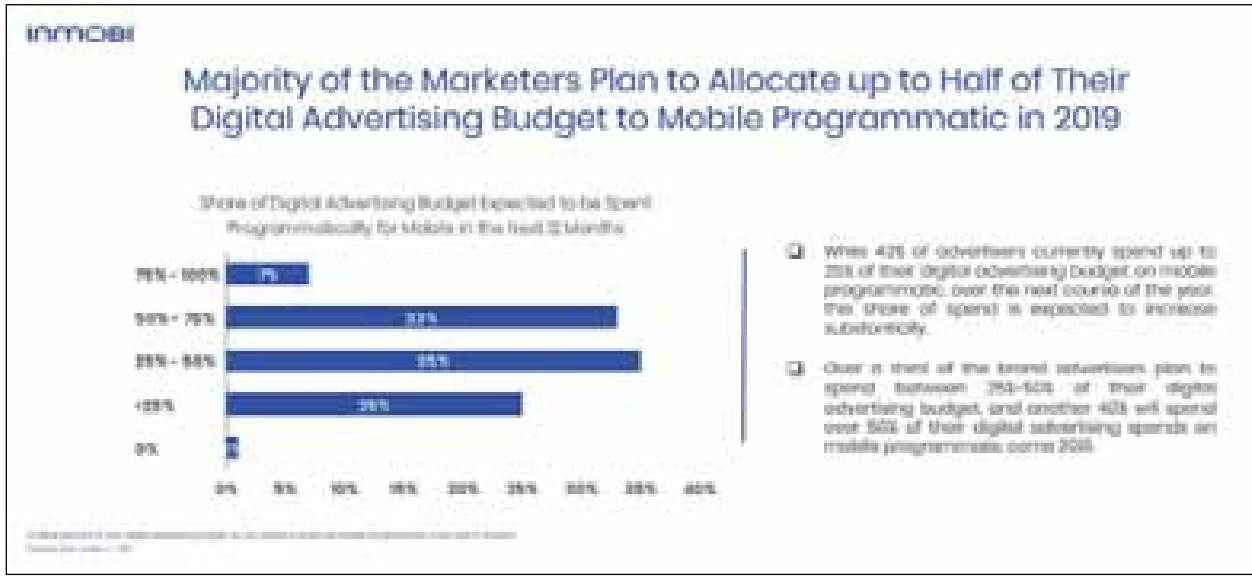
- Lower cost of media buying, transparent reporting and high quality data are key motivators for marketers to take the plunge into the world of programmatic.
- Frequent education and information sessions where information, concerns and questions around programmatic buying are discussed and answered, can go a long way in nudging marketers to try this channel.

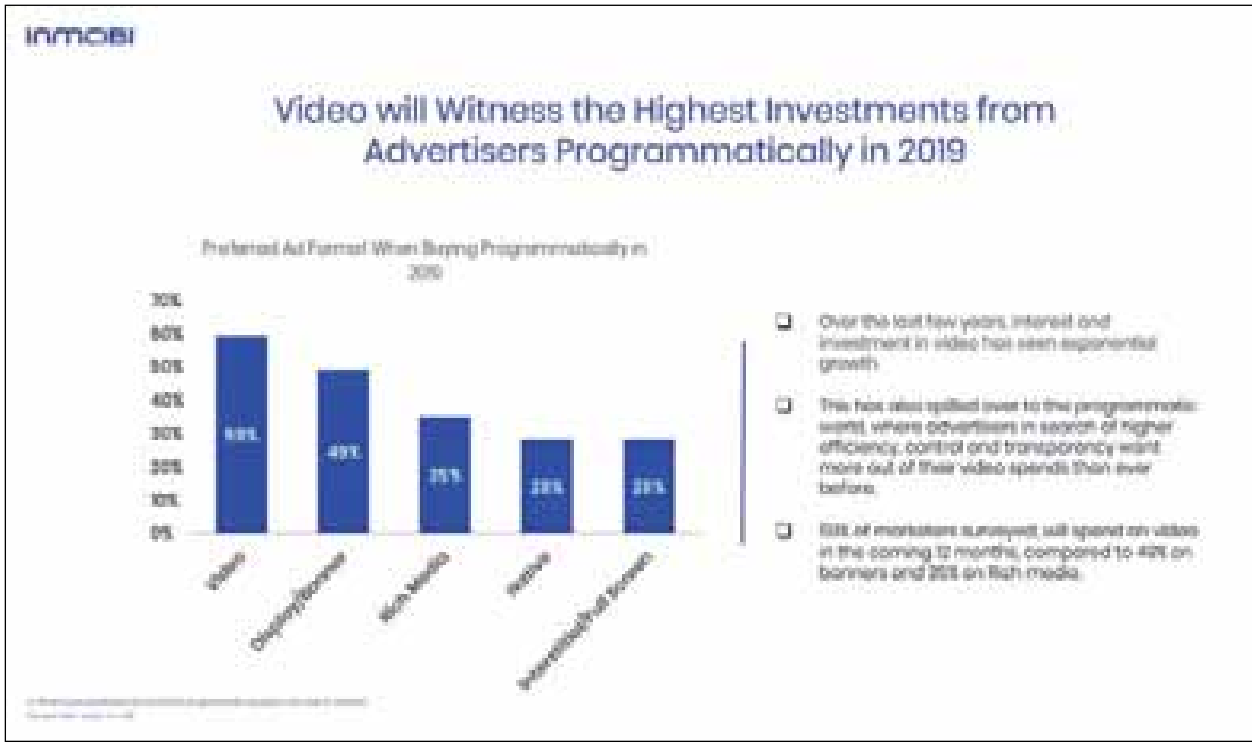





## THE FUTURE OF PROGRAMMATIC KEY HIGHLIGHTS:

- The effectiveness and efficiency of a Programmatic campaign is encouraging marketers to increase their spends on the channel. In 2019, 60% of marketers plan to allocate up to half their digital advertising spends towards mobile programmatic.
- While Video continues to grow in demand amongst users and advertisers, it will be the favoured format programmatically too, come 2019.
- Advertisers prefer programmatic guaranteed that can deliver the efficiency and effectiveness of programmatic buying with the comfort of a fixed price model.
- Header Bidding, OMSDK and TAG certification are the most popular technologies that advertisers are keen to adopt.

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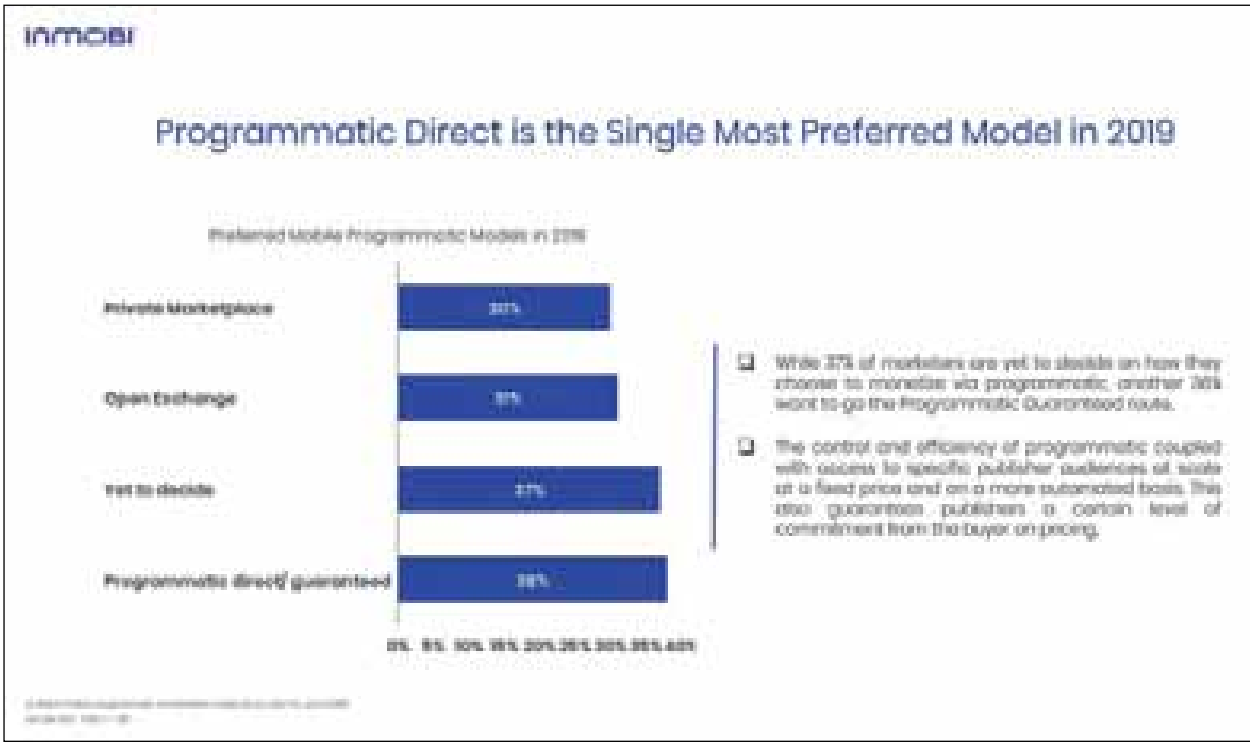
Video will Witness the Highest Investments from Advertisers Programmatically in 2019
Preferred Ad Format When Buying Programmatically in 2019
60%
50%
40%
30%
20%
10%
0%
49%
45%
35%
28%
28%
Video
Display/Banner
Rich Media
Native
Interstitial/Full Screen
Over the last few years, interest and investment in video has seen exponential growth
This has also spilled over to the programmatic world, where advertisers in search of higher efficiency, control and transparency want more out of their video spends than ever before
53% of marketers surveyed, will spend on video in the coming 12 months, compared to 49% on banners and 35% on Rich media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Programmatic Direct is the Single Most Preferred Model in 2019
Preferred Mobile Programmatic Models in 2019
Private Marketplace
Open Exchange
Yet to decide
Programmatic direct/ guaranteed
0%
5%
10%
15%
20%
25%
30%
35%
40%
While 37% of marketers are yet to decide on how they choose to monetize via programmatic, another 36% want to go the Programmatic Guaranteed route.
The control and efficiency of programmatic coupled with access to specific publisher audiences at scale at a fixed price and on a more automated basis. This also guarantees publishers a certain level of commitment from the buyer on pricing.

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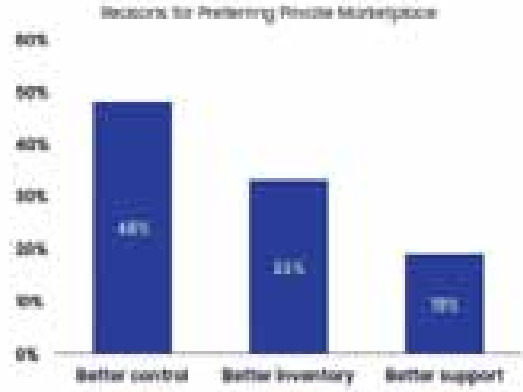
## Marketers Prefer Private Marketplaces for Better Control and Access To the Superior Inventory




- Of the 30% who plan to use Private Marketplaces when transacting programmatically, 48% of marketers do so for better control on their campaigns and another 33% do so for the premium inventory

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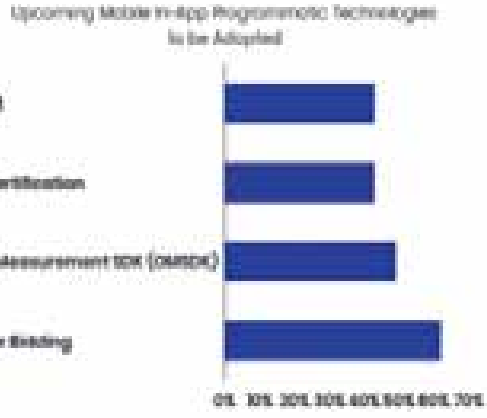
## Marketers are Keen to Adopt Header Bidding, OMSDK and Tag Certification in the Near Future




- New technologies in Programmatic buying are pushing the envelope and taking an already efficient system to new highs
- Amongst all the new technologies available, Indian marketers are most keen about Header Bidding, OMSDK, and TAG certification

**Vasuta Agarwal**
*(The author is MD, Asia Pacific, InMobi)*

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# Make 5G Deployment Low-Risk and Green

This solution simplifies the deployment of 5G networks. Built on open systems with pre-deployment integration, the solution minimises the need for the time-consuming and costly post-deployment integration that is a challenge for service providers

5G is bringing not just an incremental step up in network performance, but a transformation in capacity, latency, throughput and flexibility that far exceeds anything yet delivered by the telco industry. 5G networks have the potential to deliver many times higher peak and average data rates than 4G networks, achieve near zero latency response and be adaptable to support an extreme diversity of use cases at massive scale.

"The potential of 5G will only be unleashed by tight interworking between network elements within each domain and between network domains. The complexity of 5G means post-deployment optimization will be too costly, too slow and ultimately unable to deliver the highest end-to-end performance"

5G is more than just an innovative radio technology using new spectrum. It introduces a new approach to network architecture that builds on:

- Densification by deploying mmWave small cells to boost capacity
- Centralisation of radio functions on distributed edge clouds for pooling gains
- Placement of core functions, content and services on the same distributed edge clouds for low latency and high reliability
- Decomposition of network functions, especially the separation of user and control plane to enable scalability and the use of a common data layer for stateless operation
- Programmable transport, including Software Defined Networking (SDN), IP, optics and microwave, to interconnect the distributed data centre infrastructure
- Automation, Analytics and Artificial Intelligence to run end-to-end automation and orchestration
- Network slicing to create new as-a-Service business models for diverse demands.

However, the highest performance, and thus the best return on investment for Communications Service Providers (CSPs), will only come when the complex interworking of network domains, technologies, components and services work together effortlessly.

In the past, CSPs have often treated the core, transport and radio access network domains independently, with those parts of the infrastructure then needing to be integrated after deployment. Integration in a multi-vendor environment, including the integration of the telecom network with the CSP's IT systems, is highly complex. Post-deployment integration is costly, time-consuming and risks degrading the quality of the services being delivered.

Cost overruns are a constant challenge for CSPs deploying new technology, even in the initial phases. And that's before any consideration of the deployment of more complex and diverse services to address new vertical market opportunities.

The potential of 5G will only be unleashed by tight interworking between network elements within each domain and between network domains. The complexity of 5G means post-deployment optimization will be too costly, too slow and ultimately unable to deliver the highest end-to-end performance.

Unless cross-domain design and pre-deployment integration techniques are applied, CSPs risk wasting new business opportunities. For example, many business-critical applications in enterprises will depend on ultra-reliable

## WHAT IS CROSS-DOMAIN DESIGN?

Nokia is applying its cross-domain know-how to sweep away inefficiencies created by the conventional organisational silos built around the core, transport and radio network domains.

Take the example of the planning and design of radio sites for a specific use case. Nokia applies cross-domain tools that assess the needs of not just the radio sites, but the transport network and edge data centres too.

The first step is traffic analysis using call records to create a 3D map of an urban area showing call volume and data throughput across buildings and streets, including different levels within the buildings. This is followed by site assessment based on a huge database of site build costs such as power deployment, fiber tower costs and more. The result is a radio plan and a detailed cost/benefit analysis of coverage and costs of every site.

Nokia then applies its data centre planning tool which shows where the edge data center should be placed to serve the sites, taking into account the physical space required, power needs, cooling and so on.

This joined-up planning based on comprehensive data to calculate site costs provides an accuracy not achievable by conventional approaches.

Experience of using this approach in pe-5G projects with CSPs has shown the following benefits:

- 45 percent reduction in time to market
- 30 percent lower total cost of ownership
- 14 percent higher end-to-end service reliability

low latency communication (ULLRC) and extreme network reliability that can only be achieved by the seamless, error-free interaction of radio, transport, core, data centers and Management and Operations.

## Faster deployment, lower costs, higher performance

Nokia's approach to building a closely synchronised 5G network is founded on its Future X-architecture and is ready today to make the deployment of 5G simple. This is because the solution is built on three pillars:

- Pre-design: Nokia 5G solutions take advantage of the cloud native and open 5G Future X architecture to leverage the latest teahnology developments
- Pre-integration: Nokia 5G products feature comprehensive pre-deployment integration for faster time to market and lower implementation costs
- Pre-validation: Each use case for 5G is validated before deployment. Performance evaluation and Total Cost of Ownership (TCO) analysis are performed jointly with the CSP at the Nokia 5G Future X Lab.

By completing nearly all integration and testing of the network infrastructure before it is deployed in a live network, Nokia can reduce the amount of time and cost CSPs expend on their 5G roll out. This helps them to meet tight budgets and extreme customer performance requirements, while at the same time bringing customized services to market quickly to win a competitive advantage.

The Nokia 5G Future X solution tightly merges core, transport and radio access networks to achieve the highest gains in performance, scalability, agility and automation.

## Pre-Design: Cloud-Native Plus Deep Adoption of Openness

Nokia's approach brings the benefits of tight integration of solutions from a single vendor with the confidence and choice that only open architecture can offer. Taking advantage of open industry initiatives at all layers of the network speeds up the pace of innovation. With many vendors and operators working to enhance the same code, CSPs can enjoy the agility not possible when every vendor works on its own proprietary software. Openness also decreases vendor lock-in as CSPs can mix and match the best components. For example, third-party Virtual Network Functions (VNFs) can be brought onto Nokia Future X solutions quickly as required.

Open solutions are also more transparent and offer high levels of security and quality compared to less widely-used proprietary code. Nokia's deep adoption of openness is already creating field-proven benefits. Third-party VNFs are being onboarded in less than one month, substantially faster than the six months other solutions require. Furthermore, once prepared, VNF instances can be created immediately with full functionality, without the need for workarounds that proprietary systems need.

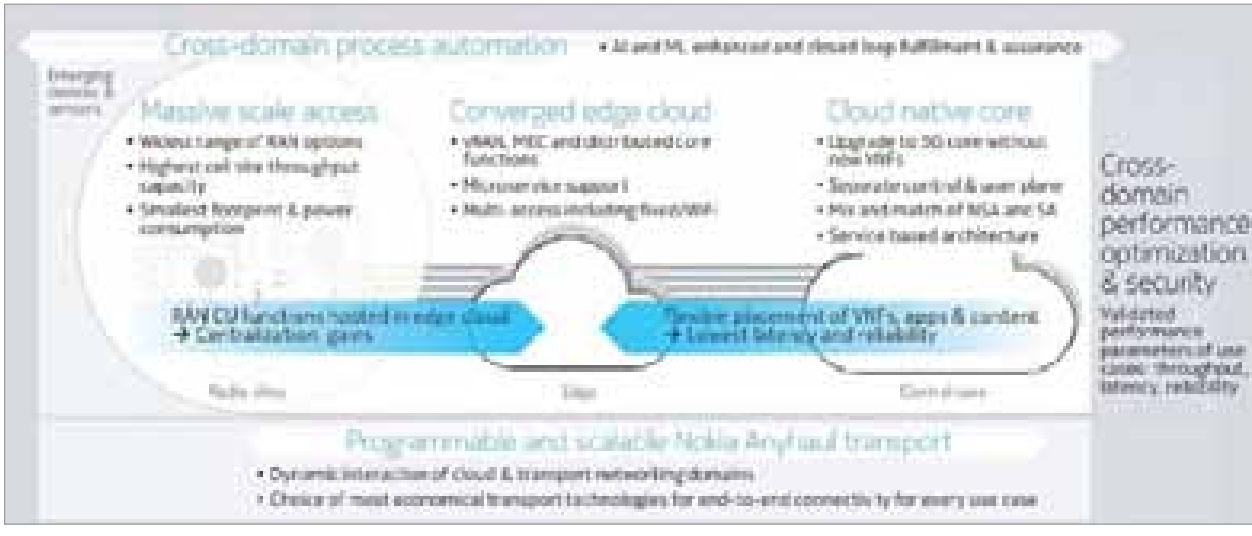
## Pre-Validated: Testing and Optimising the Use Cases

Nokia has set up its 5G Future X lab to help ensure the use cases behind a CSP's business case for deploying 5G will deliver the expected cost-performance ratio. The evaluation is performed jointly with Nokia customers and addresses end-to-end performance evaluation and TCO analysis for different applications. It also helps to ensure the highest level of automation for network slicing to serve a wide array of applications for the different customers of a CSP.

## A choice of deployment options

The Nokia 5G Future X solution comprises 5G RAN, core, transport and Management and Orchestration. Tailored to the specific use cases that a CSP targets and in line with market development, the initial solution supports Non-Stand Alone (NSA) option NSA-3x followed by Stand Alone (SA) option SA-2:

- **5G NSA-3x:** Most initial 5G deployments will start with option NSA-3x. The Nokia pre-integrated solution for initial 5G deployment focuses on



"Liquid cooling, rather than air cooling can rebalance the cost and environmental deficits. As a medium, liquids are 4,000 times more effective at transferring heat compared to air. Plus liquid cooled BTS equipment become 50% smaller and 30% lighter, so we can get rid of noisy fan units."

— Harry Kuosa, Head, Single RAN & Zero Emission Marketing, Nokia

## ECO-FRIENDLY 5G DEPLOYMENT

*By Harry Kuosa*

Nokia has ambitious environmental targets and actions to reduce global CO2 emissions. Following #EarthDay 2019, we continue with our reviews looking at our active contributions to reduce power consumption and carbon emissions, not just at a corporate level, but also to ensure that our products meet the same standards now and in the future. Here we take a look at how one of our products, Liquid Cooling, could make a significant contribution to lower energy consumption in the world of 5G and the 4th Industrial Revolution.

Mobile operators face a huge global energy bill and this is only set to increase as demand and consumption of mobile data grows exponentially. What is needed is the ability to decouple mobile data growth from energy usage to avoid environmental and fiscal damage. A lot of waste heat is generated by base stations (BTS). Usually base station sites will be cooled by air condition equipment which transfers the waste heat out of the site. However, every kW of heat power requires 1kW of cooling power and air conditioning equipment is expensive to buy, requires regular and often expensive maintenance (e.g. changing filters) and also generates noise pollution.

Removing air conditioning equipment can reduce BTS site power consumption by 50%. When heat is inside liquid, it can be transferred for long distances for other uses, for example, to heat a building. And when heat is re-used for other purpose, then BTS site CO2 emissions can be reduced by 80%. For example, we are working with Elisa to use previously wasted heat for the heating system in a Helsinki apartment block.

Liquid cooling for all generations of BTS are a Nokia BellLabs innovation, and at MWC19 we were the first to demonstrate our liquid cooled 5G base station. Read about our 5G Liquid cooling, and join Nokia in taking the path to a low energy, low emissions and so much brighter future for everyone.

*The author is Head, Single RAN & Zero Emission Mrketing, Nokia*

radio performance and low latency services for enhanced Mobile Broadband and ULLRC use cases with initial network slicing

- **5G SA-2:** This option is being considered by some early launch CSPs and a wider range of CSPs planning to launch 5G services later. The Nokia pre-integrated solution provides network slicing, new QoS control and multi-access. Network slicing is enabled by cross-domain automation to minimize TCO while running and constantly adapting multiple slices.

Both initial variants of the Nokia 5G Future X solution can be deployed in their entirety or as one of six sub-solutions to address specific CSP needs and legacy situation. By eliminating the need for ad hoc interworking and integration, the Nokia 5G Future X solution delivers substantial benefits for CSPs compared to the conventional disjointed, isolated systems currently being offered to the industry.

### Nokia 5G Future X Solution: overview

- Combines Nokia's end-to-end portfolio in massive scale access, converged edge cloud, cloud-native core, programmable and scalable Anyhaul transport and process automation
- Based on cloud-native functionality across domains, enabling virtualized functions to be rapidly deployed across a distributed cloud infrastructure to simplify service scaling, speed time to market and deliver cost efficiencies across the radio, core and transport network
- Leverages Nokia cross-domain services and tools, as Nokia works with customers to tailor and optimize network design and deployment based on evolving business needs
- Leverages Nokia's product development processes that ensure security and privacy are in-built across the network.

**V&D Bureau**

**—Parag Naik**
CEO & Co-Founder, Saankhya Labs

# 5G For Radio and TV

*Saankhya Labs have patented 5G technology for radio and TV, which is a path-breaking innovation. We had an exclusive interaction with Parag Naik, Co-Founder & CEO, Saankhya Labs. Excerpts follow:*

**Voice&Data:** What is Saankhya Labs?
**Parag Naik:** My Co-Founders and I have been in the high-tech startup world since 2000 when we cofounded Smart Yantra Technologies (SYT). We built the world's first OTT solution in India but did not know how to monetize it, as networks those days were not of high speed. SYT was then acquired by Genesis Microchip and after our lock-in period, we founded Saankhya Labs in 2007. During the fag end of our lock-in period, my Co-Founders Vishwakumara Kayargadde and Hemant Mallapur and I were evaluating various options for the company. The name "Saankhya" was first coined by my Co-Founder Dr. Vishwa. It means 'Digital' in Sanskrit.

One thing we were clear about was our collective intention to build India's first semiconductor product company. Saankhya Labs was thus formed after 6 months of deliberations. Our early employees were Anindya Saha, Sunil HR and Abdul Aziz. Angel investor, Late SS Mahantshetti, was the first one who backed us. Our later Angel investors were truly angels and wrote out cheques for a crazy venture which was unheard of. In the initial years, the VC ecosystem in India treated us with derision. The journey was tough but soon we onboarded marquee investors like Intel Capital, General Motors and now Sinclair Broadcasting Group. The name "Saankhya" was first coined by my co-founder Dr. Vishwa. It means 'Digital' in Sanskrit.

**Voice&Data:** Saankhya Labs claims to be the first developer of an electronic chipset that has various applications. Can you give an insight into it for our readers?

**Parag Naik:** Saankhya Labs is India's first fabless semiconductor company for the wireless communication industry. At Saankhya, we developed the world's first Software defined Radio (SDR) chipset that as the name suggests, can be used for multi-standard multi applications including broadcast, wireless broadband, and satellite communication applications. We have 30 international patents on the SDR architecture.

True to its nature, Saankhya has developed applications spanning broadcast, modems for rural broadband, satcom, military communications and now 5G.We decided to build an SDR platform, which is one of the most challenging technology problems. It needs knowledge of the entire gamut of electrical sciences from RF, communication DSP and electronics, CPU/DSP architecture, and compilers. This was not attempted anywhere in the world and we are the first ones to build a consumer grade SDR. SDR has been in the military world for more than 3 decades before we came in. We chose to focus on a future proof architecture that could support all standards and applications. True to its nature, Saankhya has developed applications spanning broadcast, modems for rural broadband, satcom, military communications and now 5G.

What we refer to as 5G Broadcast is our patented technology that enables the convergence of Mobile Broadband and Broadcast Networks.

**Voice&Data:** What is Saankhya's 5G broadcast system and how are you revolutionizing the broadcast industry with the launch of the multi-standard next-generation TV system on the chip?

**Parag Naik:** What we refer to as 5G Broadcast is our patented technology that enables the convergence of Mobile Broadband and Broadcast Networks. This will not only revolutionize the Broadcast industry, but also the mobile networks. With the launch of our new chip, we enable the reception of the next generation of IP based digital Terrestrial TV reception directly on a mobile device. And also, our chip enables 'cellularising' the Broadcast transmit systems, thus enabling a convergence of broadcast and broadband networks. 5G broadcast is not just for the reception of Linear TV directly on mobile, but it will also enable other applications such as OTT Video, IoT, Automotive Data including Firmware Upgrade over the air, Emergency alert systems etc.

5G broadcast is not just for the reception of Linear TV directly on mobile, but it will also enable other applications such as OTT Video, IoT, Automotive Data including Firmware Upgrade over the air, Emergency alert systems, etc. With this, the Broadcaster can substantially increase their revenue as it gets into mobile devices, and the mobile operator gets almost an unlimited pipe to deliver broadcast content to their subscriber. Saankhya provides an intelligent mechanism to offload video traffic (such as viral videos or live video) from the mobile network onto the broadcast network freeing up the mobile spectrum.

**Voice&Data:** How is the broadband-broadcast convergence technology suited to eliminate call drops and improve call quality?
**Parag Naik:** The most constrained and precious part of the mobile network

We are propounding an open and dynamic platform which we call as the 'India Telecom Stack". The advent of SDN/NFV on the core will help a lot more startups to gain market share. In the semiconductor space, the modems are quasi-open

is the availability of spectrum, which determines the amount of bandwidth available for various kinds of data traffic. Today almost 70% of the bandwidth is consumed by video traffic which chokes the network. This leaves much lesser bandwidth available for other traffic including a voice in LTE network. With 5G broadcast (which is broadband-broadcast convergence), Saankhya provides an intelligent mechanism to offload video traffic (such as viral videos or live video) from the mobile network onto the broadcast network freeing up the mobile spectrum substantially and improving the call drop issues, etc.

**Voice&Data:** How does Saankhya's chipset separate video content from a mobile network in reducing the load on the spectrum?

**Parag Naik:** As I mentioned earlier, the main idea in 5G broadcast is to offload some of the viral content from the mobile network to broadcast network, which means that the receiver which is mobile handset, in this case, should have the ability to receive broadcast content. At Saankhya, we have developed a mobile optimized chip that enables a mobile phone to receive broadcast content. On the other end, at the broadcast transmitter side, we need to provide a 'cellularised' low power transmitter that is collocated with mobile base station for uniform coverage and be able to receive content in a mobile phone without roof top antenna (like in today's case where a single high power transmitter for a region transmits and we need a roof top antenna to receive the signal).

Saankhya is also developing the network side of intelligent switching software that makes it a complete solution to offload data to the broadcast network. A low power Broadcast Radio Head (BRH) uses Saankhya's chip that plugs the system. Saankhya is also developing the network side of intelligent switching software that makes it a complete solution to offload data to the broadcast network. We want to be India's first semiconductor unicorn from a revenue standpoint, not just valuations.

**Voice&Data:** What are your future plans for Saankhya? How do you intend to steer the company ahead under the Made in India/Make in India plans?

**Parag Naik:** We want to be India's first semiconductor unicorn from a revenue standpoint, not just valuations. We have now the right platform and partners to take our technology global. We have some essential patents for a 6G network that will hold us in good stead. We have a product and market mix that can take us to the revenue of $1 bn in the next 5-6 years.

**Voice&Data:** As a seasoned entrepreneur, you have been a witness to the evolution of the telecom industry and the technologies involved with the evolution. Can you give a gist of this evolution and its future?

**Parag Naik:** The industry has evolved from wire line to wireless on the access side. The wireless standards have gone from a few to about 10 standards. This is one compelling reason for us at Sannkhya to work on SDR technology. On the access side as semiconductors get cheap there is a good chance of applying cognition. Current networks are static and deployed through a centralized body like the 3gpp. Future networks will be decentrailsed with a Machine Learning bot making decisions on the fly to optimize and bring dynamism to the networks. Saankhya is working on some of these technologies.

We are propounding an open and dynamic platform which we call as the 'India Telecom Stack". The advent of SDN/NFV on the core will help a lot more startups to gain market share. In the semiconductor space, the modems are quasi-open. We are propounding an open and dynamic platform which we call as the 'India Telecom Stack". On the lines of the India stack, we believe that India can lead the world in 6G through this open and royalty free platform that will even out the playing field, thereby bringing much needed wider innovation from a large set of players.

Other innovations like the 'virtualized core' can change the core networks. IoT networks can take off on a massive scale in the future. Instead of bigger and fatter pipe, we as an industry should be concentrating on inclusivity and new business models for ubiquitous wireless connectivity.

**Anusha Ashwin**
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# The Automation of Everything

## The issue and challenges with automation

The first industrial revolution unleashed the steam engine to drive powered machinery, such as textile looms. Fast forward 150 years later, we have seen successive waves of technology transform our lives. And now we're entering the fourth – the revolution dubbed "Industry 4.0" – operational technology (OT)-focused sectors such as manufacturing, transportation, energy and mining begin adopting digital transformation strategies as a way to streamline their operations.

### The Challenges

It's understandable why companies are forging towards Industry 4.0 – the benefits enable more than one could imagine. In manufacturing, they can implement predictive maintenance and automate logistics. The transportation industry can improve fuel efficiency and inventory tracking. No matter the industry, embedding data and analytics will ensure they become more efficient, productive and secure.

With any new technology era, comes challenges. However, the companies operating in these OT-focused industries are hit with more obstacles during digital transformation compared to others.

With any new technology era, comes challenges. However, the companies operating in these OT-focused industries are hit with more obstacles during digital transformation compared to others. The retail and finance field typically rely on their digital systems, whereas physical assets are still critical to OT-focused industries. Consequently, digitising operations in these sectors is often a slow and complicated process. OT-focused organisations have to manage a wide range of physical operational technologies, ranging from manufacturing equipment to tractor trailer trucks that may be older, difficult to integrate

"With any new technology era, comes challenges. However, the companies operating in these OT-focused industries are hit with more obstacles during digital transformation compared to others."

— Nitin Dahiya, Head, End-to-End Solutioning, Nokia India

and siloed from traditional IT systems and oversight.

Physical industries are vital contributors to national economies, accounting for around 70% of total GDP in leading economies. The primary issue is that these industries lack the following four elements required to become fully optimised digital organisations:

- Massive instrumentation with sensors;
- Intelligent systems that can analyse and interpret the massive amount of data coming from these sensors;
- Advanced robotic systems to optimize actions; and
- High-performance, business- and mission-critical networks that support the dynamic, secure, highly reliable interconnection of these systems.

Despite considerable progress in the first revolutions areas over the last few years, the creation of new mission-critical networks will be an integral component for this transformation. In the third revolution – the information age – the driver was consumer web services. The only service delivery parameter of importance was capacity, and not even constant capacity, only aggregate or verage capacity. The industrial and infrastructure services that are driving Industry 4.0 are an entirely different proposition, which require an end-to-end 5G network.

There are five characteristics of 5G that make it such a key piece and the 'nexus' of new value creation:

- It is based on virtual infrastructure and is almost infinitely scalable in terms of capacity;
- It is truly multi-service and can accommodate any kind of traffic, thus it the platform over which everything can and will flow;
- As part of its virtual architecture, it includes multi-edge computing and can, thus, host all critical high-performance functions and services, including analytics, security and AR/VR functions;
- It is the foundation for critical security threat detection and protections; and
- It is the source of all high-precision, real-time localization information for all connected things enabled by very low latencies

## 5G and Automation

The 5G network platform includes everything needed to power this revolution: cloud technologies, multi-edge processing, analytics, machine learning and AI. By leveraging a 5G network, operations technologies (OT) and information and communications technologies (ICT) will come together symbiotically to redefine how we meet our social and economic needs.

We are entering the era of the Automation of Everything. Entire physical industries and infrastructure will be transformed, from electric grids and logistics centers to transportation hubs, farms and agricultural processing plants, and everything in between. It will revolutionize the ways first responders handle emergencies, how healthcare is delivered, and the way our built environment,buildings, roads and cities,intelligently respond to us as we go about our daily lives.

To fully reap the benefits of Industry 4.0, industrial organizations must converge OT with IT, embrace emerging technologies and build out 5G end-to-end networks that can securely support and bridge both types of technologies.

**Nitin Dahiya**

*(The author is Head, End-to-End Solutioning, Nokia India)*

# The Digital Divide

## On World Telecommunications Day, India's startups pledge to address the widest gap

Set on Bridging the Standardization Gap as the theme for 2019's World Telecommunication and Information Society Day, the global telecommunications industry at large is celebrating the day. This year marks the 50th anniversary and it is on this day that was marked originally as the founding of International Telecommunications Union (ITU) in 1865. This was when the first International Telegraph Convention was signed in Paris. Setting standards is a fundamental pillar of ITU's mission as the specialized agency of the United Nations for information and communication technologies (ICTs). ITU standards help accelerate ICTs for all Sustainable Development Goals.

### Last Connectivity

The availability and accessibility of smartphones, laptops and high-speed voice and data networks, in urban and rural India, have also culminated to bringing about the necessary tools to address the gap. Since the intervention of these communication tools and gadgets has grown, startups are more confident in providing

"As we celebrate World Telecommunication Day, it is important to recapitulate that there are millions of people in India who are still deprived of the benefits of a smartphone. We believe that low-cost loans to people in tier-3 cities, largely to purchase smartphones will allow people from different social classes and with No credit scores or low scores, to reap benefits of a connected digital world."

— Neel Juriasingani, CEO & Co-Founder, Datacultr

new-age solutions that can ease one's life. The advent of E-commerce and its large players like Flipkart, Amazon, Myntra, etc., have all touched our lives be it in urban, semi-urban or rural India. Last mile connectivity is the umbrella word for solutions under it.

India's startup industry has proved its efficiency in bringing out several innovative solutions, and young entrepreneurs are completely aware and are being very patriotic in designing products that can address this digital divide. Among most rural demands, providing a basic to an advanced educational system has topped the list. It is believed that giving Internet access to rural school going children can bring several changes to India's economic progress. Let's take Chotta Internet for example. Chhota Internet has an innovative solution designed to strengthen the content delivery system in rural India, where internet connectivity is an issue. It provides multimedia education tools, without banking on internet connectivity. The company also provides free Wi-Fi access to the relevant content to the audience through E-books, audio and video-based lectures without the need of Internet and at no recurring cost. Chhota Internet's solutions solve issues related to information dissemination to the remotest area. Empowering schools with such a facility only mean that we are empowering more talent and that talent will the ultimate reflection to a skillful delivery in any profession.

## Different Sectors

Today, India is a symbol of a Digital Powerhouse. Our country's startups are very aware that harnessing new-age solutions like Artificial Intelligence, Machine Learning, IoT, Virtual Reality, Cybersecurity, Chatbots, etc. will result in solutions that can solve hoards of problems. Sharing his viewpoint on the advent of new age solutions in banking and fin-tech, Neel Juriasingani, CEO & Co-Founder, Datacultr, said, "As we

"For a country to be fully developed, rural development has to take place. Lately, rural development has become the new buzz word for developing economies. Today, when we say banking in urban areas, we talk about disruptive technology like Internet Banking, Digital wallets etc."

— Subramanian NN, Director, Delivery & Co-Founder, Maveric Systems

"Healthcare, especially in developing nations like India, is poised to gain great benefit from Artificial Intelligence. With Machine Learning combined with standardised medical protocols and deep domain knowledge-base, we are able to create a very powerful virtual assistant to doctors."

— Prasad Kompalli, CEO & Co-Founder, Mfine

celebrate World Telecommunication Day, it is important to recapitulate that there are millions of people in India who are still deprived of the benefits of a smartphone. We believe that low-cost loans to people in tier-3 cities, largely to purchase smartphones will allow people from different social classes and with No credit scores or low scores, to reap benefits of a connected digital world. This will ensure that a maximum number of people across the country, even those in the hinterland, is connected to the mainstream. In achieving this, fintech startups will play a key role by using technologies like IoT, AI, ML etc. to bring these first-to-credit people under the digital umbrella and will help them stay connected while building a positive credit score."

Subramanian NN, Director, Delivery & Co-Founder, Maveric Systems, puts forth his views on banking for rural India. He says, "For a country to be fully developed, rural development has to take place. Lately, rural development has become the new buzz word for developing economies. Today, when we say banking in urban areas, we talk about disruptive technology like Internet Banking, Digital wallets etc. These technologies are increasingly changing the way we go about our day-to-day lives, but it appears that efforts towards reaching the last mile rural areas are just not in the right direction. However, with the advancement of technology and the emergence of low-cost banking channels, there are solutions available today to assist banks to extend their reach to rural areas. By building the right ecosystems, banks and rural people both can win. If the banking industry takes initiatives to provide technology solutions, it can help the Indian government deal with financial transaction transparency and pushing India towards digital economy."

Telemedicine is fast emerging as the solution to solve several health-related crises in rural India. Communicable and Non-communicable diseases require early intervention that prevents unwarranted death and loss of lives in rural India and telemedicine can bring that early intervention is saving a life. Prasad Kompalli, CEO and Co-Founder, Mfine, has a point to share. He says, "Healthcare, especially in developing nations like India, is poised to gain great benefit from Artificial Intelligence. With Machine Learning combined with standardised medical protocols and deep domain knowledge-base, we are able to create a very powerful virtual assistant to doctors. Doctors are 3 to 4 times more efficient in delivering quality care to people. AI combined with mobile tech is significantly solving the access issue. AI can augment doctor's capacity solving the poor doctor-patient ration and mobile is powerful in removing distance barriers. At mfine, we have seen people from over 800 small towns and villages consult with reputed doctors in Bangalore, Hyderabad, Pune and Chennai."

Agriculture, being the backbone of India's economy, has been the best benefiter for the new-age solutions. Several initiatives by startups have brought about applications that can save a farmer and his practices from failing in crop cultivations. Startups have provided Apps, drones, E-portals, E-trading, E-logistics, E-commerce, etc to boost agribusiness in India. It is true that the solutions provided by several startups like CropIn, Ninjacart, StellApps etc. have eased farming practices at large. Airtel, Vodafone Idea and other service providers are also in support of India's agribusiness. The service providers provide a slew of services and mobile agriculture plans and data packs that can help ease their day to day communication.

In conclusion, it is only fair to say that India's startup world is doing much more than its part to bridge the Digital Divide. As you know, mentioned here are only a minuscule of the large startup population in India who are relentlessly working on solutions that have the power to transform our lives from better to best, empowering India (not to forget women empowerment) and last mile connectivity.

**Anusha Ashwin**
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- ☑ IT buyers/IT decision makers of the engineering colleges
- ☑ Strategists, consultants & experts from education fraternity

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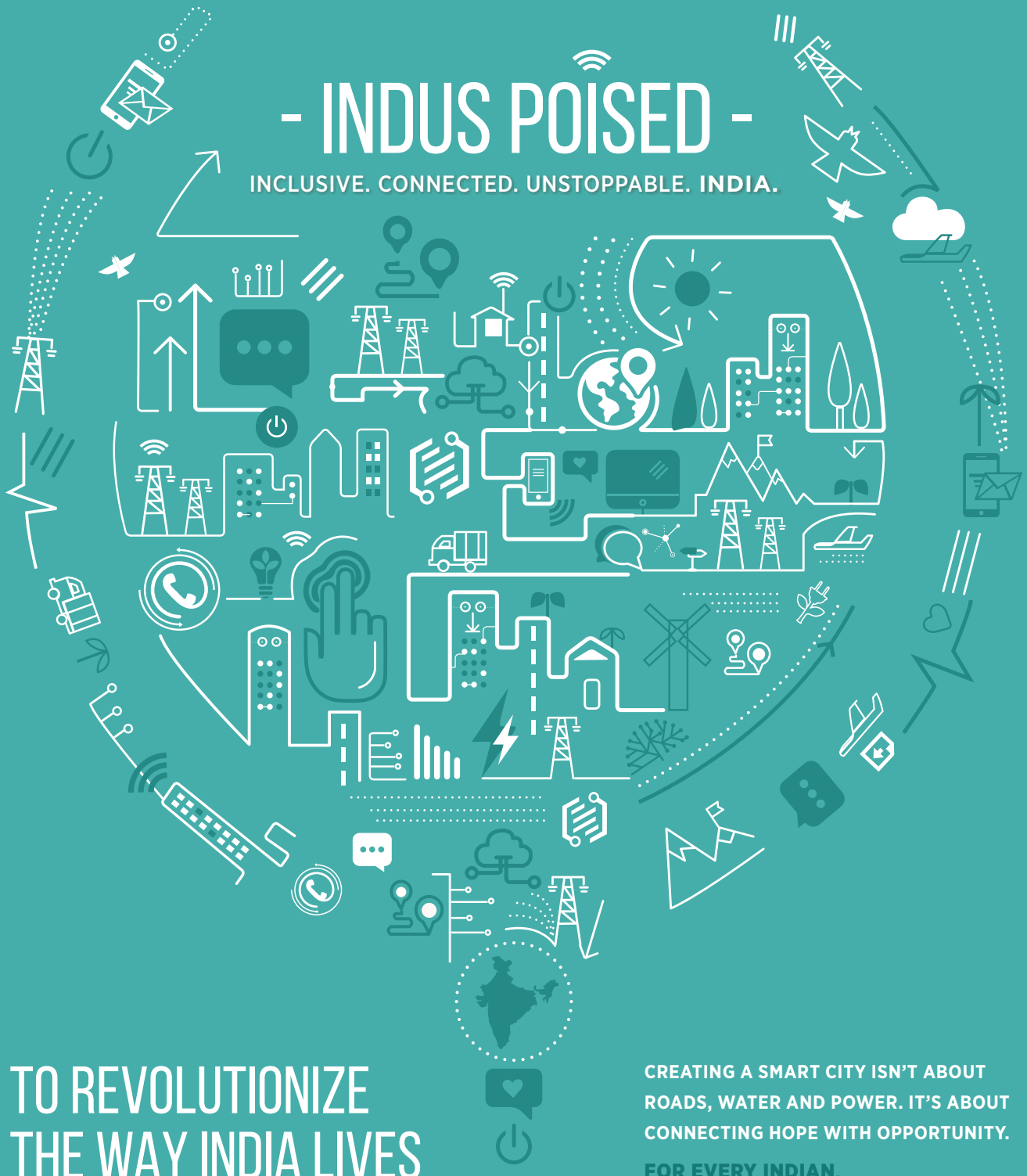

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