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## THE DARK SIDE OF THE MOON

The fifth-gen telecom technology is exciting and it's here. But are we ready for the **security-threat** tail that accompanies the arrival of **5G**?

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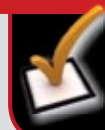
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# Is Make in India happening?



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[OPENING NOTE]

## Add IoT, 5G power for early warning of disaster

The 7.8-magnitude tremor that ripped Türkiye and Syria and caused deaths of over 24,000 so far is a crude reminder of how vulnerable the world is to the vagaries of nature. Closer home, geological factors are leading to land subsidence or 'sinking' of Joshimath, a town located in Uttarakhand. The town is situated on the Vaikrita Thrust, a tectonic fault line, and is close to two other main geological fault lines: the Main Central Thrust and the Pandukeshwar Thrust, which makes it highly vulnerable to sinking due to tectonic activities.

While NASA is using its synthetic aperture radar that can watch the earth in all weather conditions to provide aerial images and data to assist rescue efforts in Türkiye and Syria, the disaster has triggered a discussion on how to better use emerging technologies to predict, alert, and reduce the quantum of human tragedy.

The Internet of Things (IoT) and 5G technologies can play a significant role in improving the early warning system (EWS). IoT sensors, placed in strategic locations, can help monitor seismic activities and other environmental factors like ground movement, angle or tilt of the ground, temperature, and atmospheric pressure. Similarly, GPS sensors can monitor ground movement and deformations caused by earthquakes. These data can be transmitted in real-time to a central system via a 5G network for faster analysis and early warning.

Japan, for example, has a highly advanced seismic monitoring network driving the use of IoT for earthquake monitoring. The country is exploring the integration of 5G technology with its existing earthquake monitoring system to improve the speed and reliability of warnings. Similarly, China is exploring the integration of 5G with its earthquake monitoring system. In August last, Ericsson and China Mobile Zhejiang deployed 5G to aid in natural disaster management. The project included early-warning analysis, natural disaster monitoring, command and dispatch, and post-disaster assessment. The deployment followed the successful trial of the 5G Full-Closed-Loop system for Integrated Natural Disaster Management in ten cities across the Lishui region in China.

Far away from Asia, Italy too experiences a large number of earthquakes every year. Following the devastating L'Aquila earthquake in 2009, the city made several efforts to develop a better EWS. The city that lies in the central region of Italy has been a test bed for the deployment of 5G-powered IoT sensors to monitor seismic activity and ground movement that demonstrated the potential of 5G to enable early warning of earthquakes and help communities respond faster to reduce the impact.

Besides monitoring, 5G and IoT can also help improve disaster response efforts. For example, drones equipped with cameras and other sensors can be deployed to survey the damage based on the aerial images being sent by NASA and first responders can use augmented reality tools to get a better understanding of the situation on the ground. Together, IoT and 5G technologies have the potential to revolutionise the way we detect, respond, and mitigate the effects of natural disasters.

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# Technology, knowledge and skill-driven growth prospects

Budget 2023 is designed to strengthen the telecom sector and create a robust digital infrastructure critical to fully realise India's long-term growth potential

BY JAIDEEP GHOSH

**T**he Indian Union Budget 2023 places a strong emphasis on digital public infrastructure as a driving force for growth. The Economic Survey 2022-23 states that India's digital public infrastructure could increase its potential GDP growth rate by up to 1%.

India's digital growth has been led by initiatives such as Aadhaar, Jan Dhan Yojana, CoWIN, Unified Payments Interface or UPI, Central Bank Digital Currency, and various fintech developments. This trend is set to continue with the introduction of a simplified Know Your Customer, the KYC process and the strengthening of DigiLocker as a comprehensive data management solution. The establishment of a National Digital Library will provide access to information for a diverse range of socio-economic groups.

India is already the fastest-growing major economy in the world, with a 5.5% average GDP growth over the past decade. However, progress in Science and Technology has hardly been encouraging. India ranked 61st globally in World Economic Forum's recent Network Readiness Index report, which measures readiness to leverage ICT, among other factors. China is ranked 23, Indonesia is 39, and the US is ranked at the top.

In that context, plans to establish 30 Skill India international centres, 100 labs for developing 5G

applications and centres of excellence for Artificial Intelligence could bridge the efforts of the government, research institutions and the industry.

Telecommunications is the foundation of Digital Public Infrastructure. The budget announcements further enable the telecom reforms unleashed since 2021. It allocates Rs 97,570 crore (USD 12 billion) for the Department of Telecommunications, with the largest share going towards reviving the underperforming state-owned operator BSNL.

India is primarily a mobile telecom nation, with around 25 million fixed-line connections versus more than a billion mobile connections. India's mobile data usage is the highest in the world. However, the country is a late entrant in the 5G space, lagging China, the US, South Korea and EU states by around three years. China reported closing 2022 with one billion 5G connections; China Mobile alone reported more than 600 million. Contrast this with India's baby steps with perhaps around 25 million 5G connections till now.

Some nations are planning for 6G launches commercially in the later part of this decade. That is a significant time gap, which will be difficult to bridge for India.



## WHAT IS IN FOR THE TELECOM SECTOR?

- The government has allocated Rs 97,570 crore for the Department of Telecommunications.
- State-run BSNL, which is expected to roll out 4G and 5G services this year, will get a Rs 52,937 crore capital infusion from the government in 2023-24.
- Rs 2,158 crore has been allocated for Optical Fibre Cable (OFC) based network for Defence Services and Rs 715.8 crore for telecom projects in the North Eastern states.
- The Centre has made a provision of Rs 5.56 crore for 5G test beds in Budget 2023-24, down from Rs 7.74 crore in the previous fiscal.
- The Centre of Development of Telematics (C-DoT) has been allocated Rs 550 crore for the fiscal.
- Government to set up 100 labs for developing applications using 5G services, covering smart classrooms, precision farming, health care applications, etc. and three Centres of Excellence for Artificial Intelligence.
- Extension of concessional duty till 31 March 2024 for Lithium-ion cell that is used for manufacturing of battery or battery pack for cellular mobile phone up to 31 March 2024.
- Extension of concessional duty till 31 March 2025 for specific inputs and sub-parts used for manufacturing telecommunication grade optical fibre or OFC.

The allocation of Rs 5.56 crore for 5G test beds is lower than the previous year's allocation and the government must revisit this.

But the mere high speed of 5G is hardly a proposition. The success of 5G will hinge on applications for enterprise and individual customers. In that context, the proposal for setting up 100 labs for developing 5G applications in engineering institutions is crucial. Even a handful of well-functioning labs could make a difference. The allocation for 5G test beds is Rs 5.56 crore (USD 700,000), which, however, is lower than the previous year's allocation. This may need to be revisited.

Continuously providing large financial support for BSNL has been frequently viewed as more for social and political reasons and less from a business perspective. What is important now is the deployment of India 4G stack developed indigenously for BSNL. This, if successful, could be a game changer.

Continuing import duty concessions for mobile phone components will aid in fulfilling the ambitions of Make in India through the Production Linked Incentive or PLI Scheme and to emerge as a manufacturing base beyond China and Vietnam.

Similarly, skilling the 900 million-strong workforce is critical to harnessing the demographic dividend. The proposal to train our youth in emerging technology areas under the Pradhan Mantri Kaushal Vikas Yojana is a must. This initiative needs to be aligned with academic institutions and industry.

With an estimated current annual economic output growth of over USD 400 billion and the potential to exceed USD 500 billion post-2028, India is poised to be one of only three economies capable of such growth. This can be achieved through substantial investment in physical and social infrastructure. The allocation of 3.3% of GDP towards physical infrastructure is absolutely in the right direction.

While it is clear that the government has to do the 'heavy lifting' considering the modest private sector investment outlook amid global economic stress, the realisation of this growth potential is contingent on a robust digital public infrastructure on the backbone of India's telecom sector. 🧩

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# Positive outlook, focused approach

The government has set the ball rolling for creating a technology- and knowledge-focused economy with provisions in the budget supporting the intent



BY RAJESH SINHA

**A**t the onset of the Budget 2023 speech, Finance Minister Nirmala Sitharaman mentioned that India remains one of the world's fastest-growing economies, despite global headwinds. "In our 75th year of independence, the world has recognised the Indian economy as a bright star," she stated. The budget that followed contained several provisions that aim to

capitalise on this buoyant state of affairs and unlock the tremendous potential of enterprises and talent in India.

One aspect that particularly came across in the budget announcements was the government's commitment to building a technology- and knowledge-focused economy, which will be a key driver in the country's growth story in

AI is critical for India's digital transformation journey and the provision to set up CoE is bound to stimulate further innovation and growth in this area.

The Unified Skill India digital platform will equip youth with the requisite skills in coding, AI, IoT, robotics, mechatronics, and 3D printing.

the years ahead. Let us examine a few budget provisions that stood out, in terms of their overall implications for the economy in India, as well as for the technology and digital-focused sectors.

### BETTING BIG ON ARTIFICIAL INTELLIGENCE

The budget laid a special emphasis on AI, in line with the government's vision to 'Make AI in India' and 'Make AI Work in India'. The Minister announced the setting up of three Centers of Excellence for AI in premier educational institutions. AI is going to be a critical technology for India's digital transformation journey in the years ahead, so this is a welcome move that is bound to stimulate further innovation and growth in this area.

### INVESTING IN 5G

Another key technology-focused measure announced was the setting up of 100 labs in engineering institutions across the country to develop 5G applications, covering a range of areas such as precision farming, healthcare, smart classrooms and intelligent transportation systems. This will give a strong shot in the arm and drive the growth of 5G-enabled technologies and services in India.

### FOCUS ON UPSKILLING

The decision to launch a new Unified Skill India digital platform will bolster the much-needed effort to upskill talent in the country. This platform will facilitate demand-based formal skilling, link job-seekers with potential employers (including MSMEs) and provide access to entrepreneurship schemes. The Minister also announced the Pradhan Mantri Kaushal Vikas Yojana 4.0, which aims to equip youth with the requisite skills in areas such as coding, AI, the Internet of Things (IoT), robotics, mechatronics, 3D printing, etc. This is another important measure that will ensure the future readiness of the country's workforce.

### DATA GOVERNANCE

To unleash research and innovation by startups and academia, a National Data Governance Policy was announced as part of the budget. This policy will enable access to anonymised data, a move that will give a boost to data-driven business and research initiatives while also addressing data privacy concerns. Moreover, a one-stop solution for updating and reconciliation of individual

identities and addresses – as maintained by government agencies, regulators and regulated entities – will also be established, with the DigiLocker service and Aadhar serving as foundational identity.

### SUPPORT FOR STARTUPS

Sitharaman acknowledged the fact that entrepreneurship is vital for the nation's development. Previous measures undertaken by the government have contributed to India becoming the third largest ecosystem for startups globally, as well as the second in quality of innovation among middle-income countries. Furthering that trend, this budget included additional measures to aid startups.

Firstly, the date of incorporation, for income tax benefits to startups, has been extended from 31 March 2023 to 31 March 2024. Secondly, the period to benefit from carrying forward losses on change of shareholding has been extended from seven years to ten years since the date of incorporation of the startup. These are moves that will be welcomed by entrepreneurs and their stakeholders.

### RELAXATIONS IN PERSONAL INCOME TAX

The budget also introduced measures to bring relief to taxpayers across the country by revising the personal income tax. Individuals earning up to Rs 7 lakh will not have to pay tax, and there are significant reductions in tax rates across all slabs. The reduced tax burden will increase disposable income and likely stimulate spending. In addition, the simplified tax regime without exemptions will now be the default, while still providing taxpayers with the option to avail of the old regime. This will make tax compliance easier.

The country's Chief Economic Advisor recently said that India is poised to become a USD 7 trillion economy by 2030. The outlook certainly looks positive for the India growth story, and the provisions of the 2023 budget will go a long way towards strengthening our digital and technology space, supporting job growth and entrepreneurship, and bringing us closer to that goal. 🍀

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# Driving the telecom sector growth

Recognising its potential to propel India towards the USD 5 trillion economy goal, the budget lays down the foundation for robust telecom sector growth

BY PEEYUSH VAISH

**O**n Wednesday, 1 February 2023, while presenting the Union Budget 2023 in Lok Sabha, Finance Minister Nirmala Sitharaman laid down the foundation of Amrit Kaal and specified seven priorities to act as 'Saptarishi' or the seven stars for guiding the vision of an empowered and inclusive economy.

The government has long recognised the telecom industry's potential to propel India towards its goal of a USD 5 trillion GDP by FY 2025-26. While introducing 5G earlier this year, the Prime Minister described it as a significant step towards the objective of Viksit Bharat Abhiyan, the developed India mission. The Finance Minister announced the establishment of 100 labs for developing applications using 5G services. These labs will be set up in engineering institutions to realise the new range of opportunities, business models and employment potential. The idea is to leverage 5G technology to create applications in areas such as smart classrooms, precision farming, intelligent transport systems and health care. This clearly shows the government's intention to encourage 5G use cases and help unlock a plethora of opportunities for the telecom sector.

To accelerate the vision of Atmanirbhar Bharat or self-reliant India, incentives provided by the government including the Phased Manufacturing program led to an increase of mobile manufacturing in India from 5.8 crores units (valued at Rs 18,900 crore) in 2014-15 to 31 crore units (valued at Rs 2,75,000 crore) in the last FY. With increased production, India's mobile phone exports are expected to reach Rs 72,000 crore in the current fiscal year (FY23), up from Rs 46,400 crore in FY22. The domestic consumption of 5G smartphones over the next five years is projected to cumulatively touch a billion devices.

To further deepen domestic value addition in the manufacturing of mobile phones, the government has provided relief on customs duty on the import of certain parts and inputs like Basic Customs Duty on camera lenses; it has been waived off from 2.5% earlier. Besides, an extension of concessional duties was announced on Lithium-ion cells for use in the manufacturing of batteries or battery packs of cellular mobile phones up to

31 March 2024. Additionally, an extension of concessional duty up to 31 March 2025 was also announced for specific inputs and sub-parts for use in the manufacture of telecommunication grade optical fibre or Optical Fibre Cables (OFC).

To achieve the government's vision of Digital India, the telecom sector requires massive capital outlay to fund the investment in the fibreisation of towers to roll out the 5G services and to extend the network reach to all parts of the country. To support this, the government has allocated Rs 2,158 crore for OFC-based networks for defence services and Rs 715.8 crore for telecom projects in the North Eastern states.

Visualising the growth of the telecom sector, the government has increased the expected revenue from the sector in FY24 to Rs 89,649 crores as compared to the revised estimate of Rs 68,784 crores for FY23. The increase of 30% in the forecasted receipts seems to be on account of the introduction of 5G and further penetration in the rural market. The anticipated revenue will also include collections from the auction of E and V Bands along with satellite airwaves. The proceeds from spectrum auctions done earlier are also a factor constituting the increased revenue estimate. Apart from this, the government eyes around Rs 25,000 crores on account of license fees (8% of AGR) and SUC charges.

A recent order directing one of the telecom companies to convert the NPV of the interest related to the deferment of spectrum auction instalments and AGR dues into equity shares to be issued to the Government of India spells out the commitment made as a part of the reforms package announced by the government in September 2021.

The various announcements and allocations in the Union Budget 2023-24 including the expansion of DigiLocker services have paved the way for a promising new era for the telecom industry and progression towards a Digital India. 🌟

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# Shaping the digital future of India

The budget does well in ensuring that the telecom industry continues to play a pivotal role in driving growth across industries and boosting the digital economy

BY SAURABH KUMAR SAHU

**W**ith a strong focus on digital as an enabler for growth across sectors, the Union Budget 2023 has outlined the path for India to emerge as a global digital economy. The budget called out the role of technology in almost all the major initiatives be it digital public infrastructure for agriculture, the use of technology for accelerating skilling at scale, growing e-courts or powering green growth and sustainable mobility. As the backbone of innovation and new technologies, the telecom industry will play a pivotal role in driving growth across different industries and will continue to deliver on the multiplier effect of connectivity on communities, and society at large.

A key highlight of this year's Budget for the telecom sector is the intent to create 100 labs for developing applications using 5G services in engineering institutions. These applications will be across different sectors such as smart classrooms, precision farming, intelligent transport systems, and healthcare, resulting in opening up a range of business models and employment opportunities.

These labs are expected to drive the growth of enterprise use cases for 5G and benefit telecommunication companies which have recently rolled out their 5G services. The setup of these labs will not only foster innovation in critical sectors but also help meet the increasing demand for technical talent in the telecommunications industry.

With its potential to create new products, services, and revenue streams, 5G will play a disruptive role in the telecom industry and businesses across industries. The labs are expected to help the industry overcome the challenge of scalability of enterprise use cases and provide opportunities for private networks across India. There is also an urgent need to upskill the workforce in 5G and related digital technologies. According to a Telecom Sector Skill Council report, India will require over 22 million skilled workers by 2025. With the government's push to establish 30 Skill India international centres, 100 premier labs, and new Centres of Excellence for Artificial Intelligence, India is poised to meet domestic tech talent demand and prepare future-ready talent for global markets.

The push to establish 30 Skill India international centres and CoE for Artificial Intelligence will help India prepare future-ready talent for global markets.

To further promote the Make in India initiative, the government has provided relief in customs duty on the import of certain parts and inputs for mobile phone manufacturing. This decision is likely to provide a much-needed boost to the domestic manufacturing industry in today's hyper-competitive smartphone market. The move is expected to make it easier for domestic manufacturers to source components at lower costs, which could help them in producing more affordable smartphones and will help widen the adoption of 5G across India.

Another important aspect of the Union Budget is the allocation of funds for the Digital India programme. With increased fund allocation, the programme will further bolster the adoption of digital services and improve digital infrastructure. This move is expected to drive the growth of the digital economy and improve the connectivity of rural areas, where internet penetration is still low. Broadly, this will help increase the demand for telecom services, particularly in rural areas.

In conclusion, the Union Budget 2023 is expected to positively impact India's telecommunications and connectivity sector. The government's initiatives to promote investment, improve connectivity, and increase the adoption of digital services are expected to drive the telecom sector's growth and boost the digital economy. 🍌

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LT GEN DR S P KOCHHAR

# FACT-CHECKING THE FAD FOR DELICENSING MID-BAND SPECTRUM



India needs to secure and plan the availability of the 6 GHz band spectrum to meet the future needs of 5G mobile communications and beyond

In the world of telecom, the spectrum can easily be considered Oxygen. It is, without doubt, the most vital component in a complex mix of ingredients required to produce an efficiently working network and deliver connectivity services to the customers. It is no surprise then, that adequate spectrum is the primary factor to determine the efficiency of how the telecom networks perform.

Given that over 96% of subscribers in India access broadband through mobile devices, it is important to ensure that the spectrum supply is sufficient to cater to their incredibly fast-rising appetite for data. This is beside the fact that as we move to more advanced technologies like 5G, 6G and so on, the spectrum requirements are shifting to higher bands like mmWave, which have much higher capacities, but lack in coverage reach. This is where the mid-band spectrum comes into play, as they offer a great balance between both capacity and reach, and would be critical for the deployment of 5G in India.

The criticality of mid-bands for 5G and its evolution is established by the fact that out of the 176 global 5G networks rolled out, around 70% (~120 networks) have harnessed mid-bands.

However, a contention has been rising in this regard as certain quarters are lobbying for the mid-band spectrum, especially the 6 GHz band, to be delicensed for Wi-Fi use. The advocacy is based on how global economies like the EU, South Korea, USA, UK, etc. have dealt with it (partially in most cases). The prime issue in India, however, is the unrealistic comparison with such countries. One must understand that being a stationary technology, Wi-Fi is more dependent on last-mile connectivity for effective functioning.

The primary requirement, in this case, is a robust fixed line network with fibreisation of ~80%, which is true for the mentioned nations as compared to a meagre 35% in India. So, delicensing precious mid-band spectrum for Wi-Fi will not garner many benefits. The existing unlicensed spectrum in the 2.4 GHz and 5 GHz, amounting to 688 MHz bandwidth, is more than adequate for meeting India's needs for Wi-Fi connectivity in the 2025-30 timeframe. The sector regulator TRAI, in its Recommendations on Roadmap to Promote Broadband Connectivity and Enhanced Broadband Speed (31 August 2021), has clearly stated that "... in India the existing spectrum bands for Wi-Fi i.e., 2.4GHz and 5GHz have still not been fully utilised".

Even during the Covid pandemic, it was observed that mobile users in India spent the least time on Wi-Fi, substantiating the fact that International Mobile Communications (IMT) and cellular networks continued to serve as the preferred source of connectivity in the country (see the table Mobile Experience during the COVID-19 pandemic).

It is also important to understand that delicensed and unlicensed spectrum comes with its own set of disadvantages.

**Higher congestion:** Some frequency bands are heavily utilised and, as a result, they may be completely useless to mobile network operators. This is especially true for the 2.4 GHz spectrum band, which is commonly used for personal and business reasons.

**Regulatory limits:** Many frequency bands operate under regulatory limits on effective radiated power. Users must be aware of and comply with the regulations for their region.

“An inadequate allocation in the 6 GHz band will lead to a 50% reduction in 5G speeds. The speed may go down by 80% if only 700 MHz is allocated to 5G.”

**Reduced security:** Since access is public, unlicensed spectrum increases the risk of unauthorised access, control and manipulation of information. This is vital given the aspects of both national security as well as data security of the consumers against fast-rising cases of cyberattacks and frauds. In future, this is expected to increase further, with more sophistication and technological advancement being adopted by such inimical entities.

Last but not the least, delicensing of the access spectrum creates a non-level playing field which goes against the principle of fair competition.

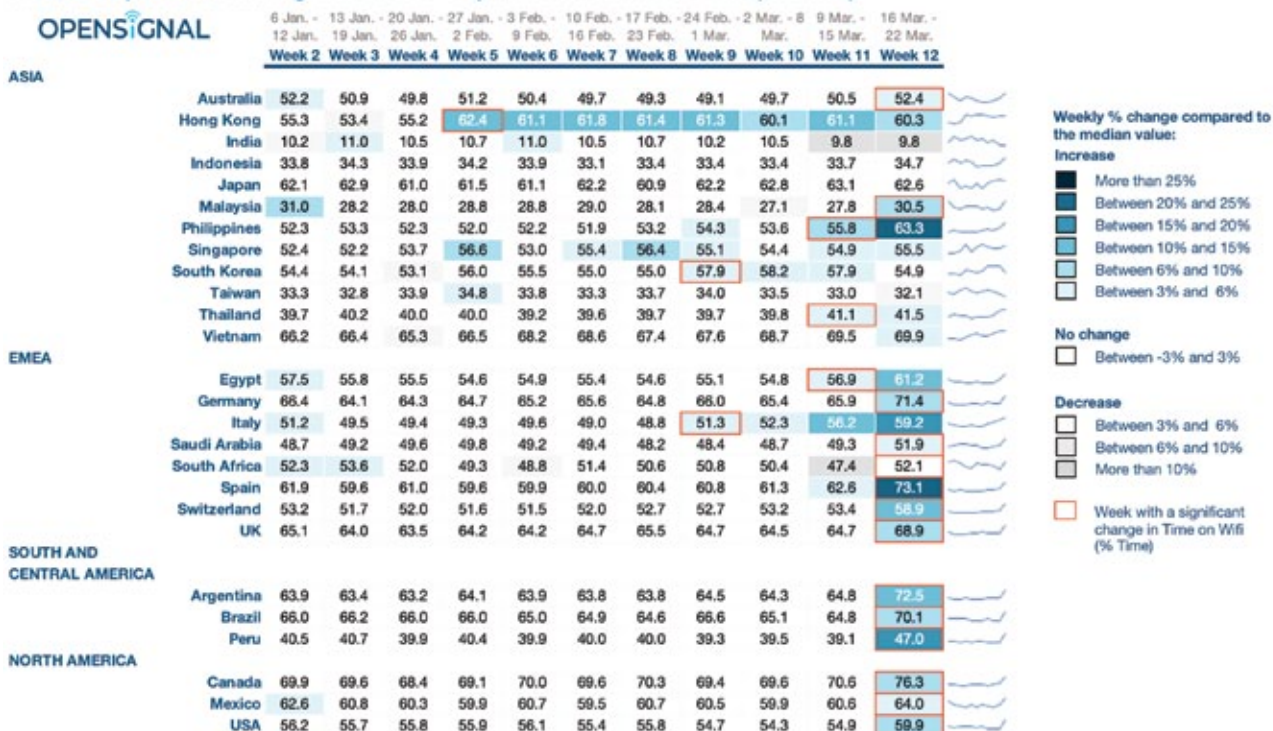
Industry data shows that 2022 has been the worst year so far for India when it comes to cyberattacks, a problem

that has only grown with increasing digitalisation. Unlicensed spectrum, though it may seem more cost-effective, greatly increases the risk of congestion and cyberattacks, threatening a system's operational integrity.

On a commercial level too, while unlicensed spectrum is favoured by new participants because of its availability and lack of acquisition cost, conversely, it leads to the national government missing out on revenue. While this may be an amicable solution in the short term while the technical viability of technologies is being established, it poses a long-term risk.

Moreover, managing interference between adjacent users is more difficult in unlicensed than licensed spectrum. Why? Because the usage is uncoordinated

### Mobile Experience during the COVID-19 pandemic: Time on Wifi (% Time)



Source: OpenSignal

and haphazard, with no regulatory restrictions other than a restriction on the transmission power.

The technical rules that are required to support unlicensed use of spectrum, like radiated power restrictions, also lead to some intrinsic limitations, such as the unsuitability for providing wide area coverage, 'on the go' services and predictable quality of service, which in turn, limit the use cases.

On the other hand, licensed spectrum offers greater reliability and better performance. For emerging applications such as IoT, companies using delicensed bands for IoT deployments run into reliability and performance issues more frequently than those using licensed spectrum, in part because they simply can't control what other people do. It may work today, but might not work tomorrow, for say, a baby monitor placed in the vicinity of your smart meter. That makes it a risky choice, particularly for companies concerned with liability and security issues. Licensed spectrum provides wider coverage, exclusive access, faster performance and supports high usage. This would help support 5G by enabling low-latency connectivity, security and increased data transfer rates, which are aligned with the growing demands of the users.

Importantly, it is understood that the National Frequency Allocation Plan (NFAP) should conform with the ITU Radio Regulations. This has been the practice so far and is important for ensuring a global harmonised approach, inter-operability and economies of scale, which are critical for the success of any technology or service. Spectrum identified exclusively for IMT Services should not be assigned for non-IMT services, and should not be delicensed either. Also, any spectrum below 2 GHz frequency (even non-IMT band) should not be delicensed. Any decision on delicensing of the new band(s) must be taken only after demand studies, current usage audit, impact on competition, impact on existing investments and due recommendations from the Regulator.

As of now, several spectrum bands are already unlicensed in India. These include 2.4 GHz and 5.8 GHz bands for Wi-Fi access, 865 MHz-867 MHz band used by RFID devices, 402 MHz – 405 MHz spectrum band used for medical wireless devices, 335 MHz for remote control of cranes, and so on. However, the provision of a minimum of 2 GHz of mid-band spectrum is critical for mobile communications in the country, especially beyond 2025. In that context, 6 GHz (5925 MHz – 7125

MHz) is the only mid-band spectrum range where a contiguous bandwidth of 300-400 MHz per TSP is available for evolving demands towards 2030, and can enable the growth of sustainable 5G capacity on 5G sites. It is also evident through various sources that the timely availability of 6 GHz, at reasonable conditions and price, will drive cost-efficient network deployment, help lower the broadband usage gap and support digital inclusion in the country.

As per a GSMA Intelligence study, any shortage of 6 GHz spectrum would compel TSPs to densify networks to meet the IMT-2020 performance requirement for 5G. The country would have to account for around 60% higher annual costs to achieve the performance expected from 5G services without adequate spectrum in the 6 GHz band, or 20% higher if only 700 MHz is allocated to IMT, compared to an assignment of 1.2 GHz. In addition to cost hikes, densification on large scale would negatively impact the commitments made by India in reducing the country's carbon reduction and related green objectives.

An inadequate allocation in the 6 GHz band will lead to a 50% reduction in 5G speeds. Similarly, the speed may go down by 80% if only 700 MHz is allocated to 5G. To overcome the speed issue due to the lack of spectrum, TSPs will have to undertake network densification. Hence, the most optimal allocation for the country in the 6GHz band is to identify the entire 5925-7125 MHz i.e., 1200 MHz spectrum for IMT applications as this would maximise the economic and societal benefits for achieving the national target of becoming a USD 1 trillion digital economy.

Given the experience of worldwide network deployments to date, it is reasonable to assume that, going forward, mobile technologies relying on the licensed spectrum will play a much bigger role than technologies relying on the unlicensed spectrum in closing the digital divide, especially in rural and remote areas. With the rapidly advancing global technology scenario, a forward-looking approach is necessary for India to ensure that future requirements would be met adequately going forward. It would, therefore, be crucial for the nation to secure and plan the availability of mid-bands to meet the requirements of the spectrum demand for mobile communications in the 2025-2030 timeframe. 🌱

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# INDIA 2047

INSIGHTS FROM THE VISIONARIES  
AND LEADERS FOR THE NEXT  
25 YEARS OF INDIAN ICT INDUSTRY  
AND THE FUTURE OF  
EMERGING TECHNOLOGIES

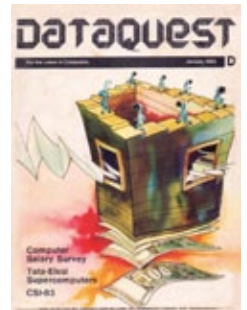
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# Charting the future of business in the coming techade

As digital transformation pushes enterprises to be more distributed and expand to the edge, businesses must keep an eye on strategic technology trends



## In a Nutshell

- The growth of technology is driving the adoption of cloud-based services and the proliferation of mobile endpoints, changing the enterprise security landscape.
- The next decade is expected to see an increase in automation using AI, RPA, and digital twins for process visualisation.
- Applied AI will bring AI into the real world and enable computers to execute real-world tasks.
- Networks will be at the heart of digital businesses, with 5G and 6G serving as an important fabric for the enterprise along with Secure Access Service Edge.
- Organisations will leverage the ecosystem clouds by participating and contributing to shared business processes like procurement, distribution, and payment.
- The rise of super apps is also expected to be a significant trend in the future.

BY ARUN KARNA

**W**e live in a very dynamic age with a huge increase in technology adoption and acceleration over the last few years. The ongoing digital transformation has led to technology getting embedded deeper and deeper into all businesses. Digital transformation is pushing enterprises to be more distributed and expand to the edge. There is exponential growth of the Internet of Things (IoT) and related data at the edge.

Cloud-based services are driving rapid change across industries, especially as organisations transition to SAAS applications in greater volume. The proliferation of mobile endpoints and the need to provide secure access to critical enterprise applications and data anytime, anywhere and to any device has altered the enterprise security landscape dramatically. This makes it imperative to discuss the strategic technology trends that will impact organisations and their customers in the coming decade.

More edge devices and smart machines will get connected to the network, moving from connected people and things to an era of Intelligence-of-Everything.

### **NEXT-LEVEL AUTOMATION**

As organisations grow and digitalise their business, one can expect to see more and more “things” getting connected to the enterprise. Digital transformation is forcing organisations to look at automation seriously. Consequently, organisations of every size and scope are making automation a critical part of their business strategy and long-term vision. This trend is fast-tracking the evolution of automation technologies.

Automation is accelerating because of digitisation, the explosion of data, and the transformative impact that cognitive technologies have on the enterprise. Combining Artificial Intelligence (AI) with Machine Learning and the operational efficiencies of Robotic Process Automation (RPA) and analytics creates a powerful digital platform that is rapidly transforming automation into a value-generating component of business toolkits, applicable across multiple business functions.

When it comes to industrial automation driven by Industry 4.0, the focus is shifting from increasing productivity and reducing labour costs to minimising error and improving quality and flexibility in the manufacturing process.

### **PROCESS VISUALISATION**

The use of digital twins to enhance process visualisation is catching on. The tools utilised for constructing digital twins are advancing in terms of capabilities and sophistication. The task of designing and performing multiple simulation processes has become easier and more efficient.

As organisations begin to interconnect multiple twins of different business domains, functions, and operational ecosystems, the enterprise metaverse could emerge. They can then simulate the complex relationships among different entities and generate deeper and more granular insights for even more sophisticated and innovative use cases.

As implementations mature further, enterprises would graduate from simply replicating what exists today to digitally reengineering entire processes and

reimagining entire experiences, thus leapfrogging the innovation process.

### **APPLIED AI**

Applied AI brings Artificial Intelligence out of the lab and into the real world, enabling computers and computer-controlled robots to execute real-world tasks. Along with the rise of quantum computing, AI and Machine Learning will move to the forefront of Enterprise business. Applied AI enhances software applications and puts advanced ML to practical use, providing high levels of accuracy and adaptation over time.

From improvements in availability and accuracy to cost savings and rapid, accurate decision-making, Applied AI puts businesses at a huge advantage in an ever-evolving tech landscape.

### **FUTURE OF CONNECTIVITY**

The network will be at the heart of digital business and technology trends of the next decade. 5G along with 6G, which is on the horizon, are going to be an important fabric of the enterprise. Software-defined Networking (SDN) and Network Function Virtualisation will continue to accelerate. More and more edge devices and smart machines will get connected to the network. From connected people and things, it would move to Connected Intelligence leading to an era of Intelligence-of-Everything.

The future of enterprise networks lies in Secure Access Service Edge or SASE – SD-WAN combined with cloud-delivered security services, and move to be close to the hybrid apps to a hybrid hub. It will give the power to control through a central orchestration platform. With SASE, organisations can utilise the converged power of their network and security as a business enabler. Administrators are empowered to provide users with low-latency access to applications hosted at the datacentre or on the cloud and to apply unified security policies virtually anywhere business is conducted through a single pane of glass.

Many of the use cases for 5G revolve around the combination of 5G and edge compute. Many use cases

Blockchain technology protects the data collected from IoT devices through cryptography and allows for a secure, digital ledger to be shared by the stakeholders.

are limited or unworkable if the applications are located in the traditional cloud. These applications have intense requirements for compute power and low latency right where the action is taking place at the edge. Using the edge cloud will enable more applications and endpoint devices.

The combination of 5G and Multi-Access Edge Computing (MEC), a cloud-based IT service environment which concentrates computing power and analytics power right at the edge of the network, closer to the actual action, will help bring to reality a lot of the use cases in smart manufacturing, healthcare, retail, etc.

#### INDUSTRY CLOUD PLATFORM

Industry cloud platform combines software, platform and Infrastructure-as-a-Service (IaaS) capability to provide specific solutions for different vertical industries. These industry solutions combine traditional cloud services with tailored, vertical-specific functionality to address industry-specific challenges. Organisations are turning to industry cloud platforms to accelerate time to market and benefit from cross-industry innovations.

The next step in the evolution would likely be ecosystem clouds which organisations would leverage by participating and contributing to shared business processes such as procurement, distribution, and payment. They will also participate in co-creation and co-innovation.

#### SOFTWARE 2.0

The race to build Super Apps has heated up and is seen as a significant global tech trend. The pandemic significantly increased consumer usage of Internet digital channels with more than 250 billion app downloads per year. Super apps are much more than a one-stop platform comprising numerous services on a single app.

As defined by Gartner, they also operate as a frontend platform where internal developers and third-party providers can publish micro apps while users can activate them. The rapid development of mobile networks and the growing popularity of mobile internet and smartphones will further drive the development of Super Apps.

#### TRUST ARCHITECTURE

Cybersecurity is moving from an IT-led agenda to a boardroom-led agenda. Zero Trust is an approach to designing security architectures based on the premise that every interaction begins in an untrusted state. This contrasts with traditional architectures which may determine trustworthiness based on whether communication starts inside a firewall. Blockchain Distributed Ledger Technology is becoming more mature in the enterprise.

Blockchain technology protects the data collected from IoT devices through cryptography and allows for a secure, digital ledger to be shared between trusted parties, like the manufacturer, supplier and distributor. The result: data can be quickly and securely shared with partners, resulting in real-time visibility and a reliable, immutable log of the product's condition. This would help create assured quality, accelerated revenue, guaranteed compliance and accurate data. Cloud security will be a huge component as enterprises build their digital business.

#### SUSTAINABILITY MATTERS

More than ever, technology is driving exciting breakthroughs to help sustain our planet. From being Carbon Neutral to RED Emissions to Climate Resilience, we believe technology will continue to play a critical role. Sustainability is and will continue to be a critical investment area where organisations will realise genuine returns and opportunities for competitive advantage. The time is right to embrace smart, sustainable, transformative technologies to ensure a green future.

The next few years will be exciting with waves of innovation. Most importantly, as we think about the future, the power of connectivity will always play a critical role. It would be the lynchpin that would enable the success of these latest trends to make the world a secure, safer, livable place. 🌱

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Dataquest is coming up with 30th edition DQ Digital Leadership Conclave & Awards. The aim of the conference is to focus on the government policy framework, enterprises focus, ICT market focus and the technology adoption with-respect-to the current market scenarios and their strategies towards the consumer market, B2B and B2C.

The discussion will also focus on the India's cybersecurity market, e-Commerce and digital payments, Health-tech, especially cloud-based solutions and remote diagnostics and telemedicine solutions, Emerging technologies like AI, Blockchain, Industrial automation including IoT and Industry 4.0.

## KEY HIGHLIGHTS

**FULL DAY  
CONFERENCE &  
AWARDS****7+ SESSIONS  
[3 KEYNOTES +  
4 PANEL  
DISCUSSIONS]****30+  
SPEAKERS****EXCLUSIVE CXO  
ROUNDTABLES****SPEAKER'S  
LOUNGE****NETWORKING  
ZONE****EXPERIENCE ZONE/  
DEMO ZONE****LIVE SOCIAL  
FEEDS****OPINION  
POLLS****LIVE FEEDBACK &  
SURVEY****150+  
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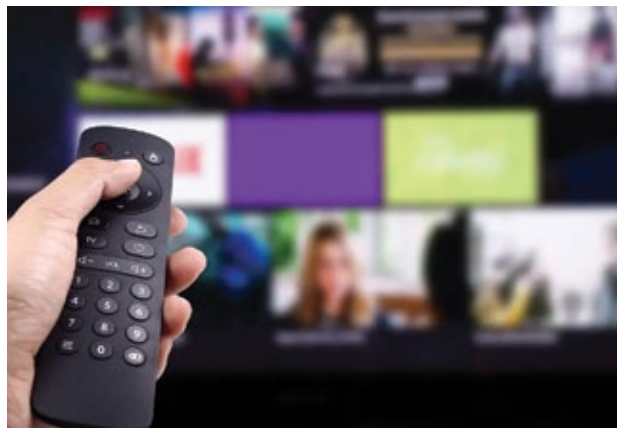
## Comviva to help Tata Play Binge accelerate its OTT play

**T**ata Play Binge has signed an agreement with mobility solutions provider Comviva for the use of its BlueMarble platform. The initiative aims to accelerate Tata Play's digital journey by bringing in multiple OTT apps under one roof, giving customers a simplified content-first approach through a single subscription.

The platform will also help Tata Play maximise its growth by targeting a more extensive customer base beyond its existing DTH subscribers, Comviva stated in a press release. It further added that the association will bolster Tata Play's standing as a content distribution platform.

BlueMarble is a cloud-native, containerised, microservice-based platform that is scalable and flexible to handle traffic and customer base surges on the app. Additionally, the solution allows Tata Play Binge to devise customer-friendly subscription plans that are in line with the evolving content-consuming market.

The platform provides an integrated suite of use cases like catalogue, order, CRM, subscription, billing,



and revenue management that enhances customer experience. It also helps media service providers to onboard, launch, manage, and stream new services quickly and seamlessly. In the current OTT ecosystem, customers download multiple content apps and subscribe to different paid content models to view their choice of content.

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## STL divests its telecom products software business

**O**ptical and digital solutions company STL has announced the divestment of its Telecom Products Software business as a part of its strategy to intensify its focus on driving scalable growth in optical networking and global services.

"With the strategic intent to accelerate its efforts towards focused growth in this decade of network creation, STL will sell its Telecom Products Software business to the US-based Skyvera, a subsidiary of TelcoDR. The divestiture will include STL's portfolio of telecom and network software capabilities in operations and business support, monetisation, networking and analytics," the company stated in a press release.

Commenting on this development, Ankit Agarwal, Managing Director, STL said, "As we set out earlier in this fiscal year, we are intensifying our focus on the most significant growth opportunities in the optical and digital domains. We have our eyes set on becoming one of the top players in Optical connectivity and driving toward our



purpose of transforming billions of lives by connecting the world."

This move is expected to help STL focus itself to drive scale and impact in its areas of strength. The divestment news follows the company's decision to divest its inside-data centre connectivity arm IDS to Hexatronic in October last year.

## NetApp unveils low-cost, capacity flash storage for datacentres



**N**etApp has announced the upcoming availability of its AFF C-Series, a new family of capacity flash storage options that deliver lower cost all-flash storage, and NetApp AFF A150, a new entry-level storage system in the AFF A-Series family of all-flash systems.

The new NetApp AFF C-Series delivers flash performance, while remaining cost-effective and efficient for a lower total cost of ownership (TCO) and a smaller storage footprint, the company said in a press release. The new offering that comprises AFF C250, AFF C400, and AFF C800, promises seamless scalability on-premises to allow organisations to scale capacity and performance as their data grows. It also comes with functionalities for data security, including ransomware protection.

This family of capacity flash arrays comes with the software suites, ONTAP One, an all-in-one license that includes all available NetApp software. “Customers can modernise their datacentre with the flexibility to choose the right storage (performance flash, capacity flash, or hybrid) for their VMware, database, and file workload requirements, all running on NetApp ONTAP and managed centrally by NetApp BlueXP for a seamless hybrid cloud experience,” the press release noted.

The company also announced, NetApp Advance, a new portfolio of storage programmes and guarantees to deliver best-in-class customer ownership experience and cost-effectively future proof on-premises environments. “This gives customers the flexibility and choice to safeguard their storage investment – whether the C-Series, AFF A150 or other newly acquired AFF or FAS systems – with the ability to right-size on-premises environment and transition to storage as a service or cloud storage as their business requires,” the company claimed.

### **NFTICALLY RAISES USD 1 MN FOR METAVERSE R&D**

Web3 ecommerce Martech platform, NFTICALLY has raised USD 1 million in an equity funding round led by Spartan Group and Polygon Ventures. The company will use the funds to expand its Gamified Social E-Commerce and Brand Engagement Metaverse ecosystem, Comearth. It also plans to ramp up hiring and invest more in R&D as it works towards building a seamless infusion of NFTs in sectors like e-commerce, manufacturing, and healthcare.

### **MYOPERATOR LAUNCHES DIGITAL PHONE LINE FOR SMB**

Cloud communication company MyOperator has announced the launch of Heyo Phone, a digital phone line for small and medium enterprises (SME). The digital phone will help SMEs manage all customer interactions and improve their call and WhatsApp chat experience through a single business number. Offering one number and a single dashboard to manage all customer calls and chats, Heyo aims to help SMEs convert every conversation to a business opportunity.

### **eMUDHRA LAUNCHES SSL/TLS CERTIFICATES**

Digital identity and transaction management company eMudhra Limited has announced its services to issue Secured Sockets Layer (SSL) and Transport Layer Security (TLS) certificates for large enterprises, SMEs, retail customers, and Internet of Things manufacturers. The service makes eMudhra the first company from India to get accreditation from Webtrust. The accreditation also means that its offering emSign is recognised by all major browsers in the world.

### **JIO, GSMA ROLL OUT DIGITAL SKILLS PROGRAMME**

Reliance Jio has tied up with GSMA to roll out Digital Skills Programme. The initiative, part of the GSMA Connected Women Commitment, aims to provide need-based training to rural women and individuals from marginalised and low-income groups enabling them to make meaningful use of digital access. The GSMA and Jio teams have worked together to assess prevalent digital skill gaps and develop need-based digital skills training toolkits that are India-specific.

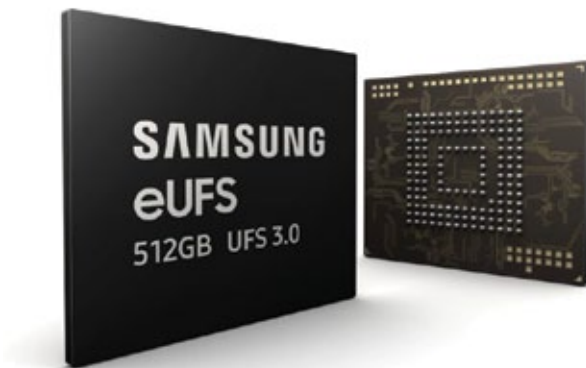
### **KYNDRYL TO DRIVE STELLANTIS' IT INFRA TRANSFORMATION**

Kyndryl has bagged a project from Stellantis to manage its core IT infrastructure. Stellantis will use Kyndryl Bridge, an open integration platform, for real-time insights and control over its IT environment. Kyndryl will infuse automation to drive efficiencies, align global service capabilities with business priorities, and improve the quality of day-to-day IT performance to ensure smooth and efficient operations across Stellantis' manufacturing facilities.

### **RED HAT, ORACLE TAKE ENTERPRISE LINUX TO CLOUD**

Red Hat and Oracle have signed a multi-stage alliance to enable certified configurations of Oracle Cloud Infrastructure (OCI) flexible virtual machines to run Red Hat Enterprise Linux. Businesses can also migrate existing workloads running on Red Hat Enterprise Linux to Red Hat Enterprise Linux on OCI. Besides, the OCI flexible virtual machines can scale in increments as small as a single CPU to optimise price-performance and minimise wasted resources.

## **Samsung joins hand with IISc to boost semiconductor R&D**



**S**amsung Semiconductor India Research (SSIR) has announced a new partnership with the Indian Institute of Science (IISc) to promote research and development in the field of on-chip Electrostatic Discharge (ESD) Protection. The partnership seeks to build cutting-edge ESD device solutions to protect ultra-high-speed serial interfaces in advanced Integrated Circuits (ICs) and system-on-chip (SoC) products.

ICs and SoCs are essential for practically any system, from small to big, that we see around us, but they are very sensitive to ESD failures, especially those developed using advanced nanoscale Complementary Metal Oxide Semiconductor (CMOS) technologies. The majority of IC chip failures and field returns are attributed to ESD failures. This is also rare expertise and industries holding the art of designing ESD protection devices and interface concepts lead the market.

R&D in ESD technology for highly reliable interfaces and SoCs that operate at low power and high speed is an integral part of the semiconductor innovation effort and IISc is one of the few institutes in the world leading ESD device research. The partnership with IISc will help SSIR boost semiconductor innovation and expand ESD knowledge base. "Our goal is to increase capacity building through training programmes at the postgraduate level, opening up opportunities for students to pursue industry internships, and encourage entrepreneurial ventures by young researchers," said Balajee Sowrirajan, CVP and MD, SSIR.

"We have been collaborating extensively with semiconductor industries worldwide on advanced nanoelectronics technologies, including solutions to ESD reliability threats to advanced SoCs. We have carried out both fundamental and applied research on ESD protection devices, with a strong emphasis on creating practical solutions for the semiconductor industry in a range of technology nodes," said Prof Mayank Shrivastava, head of the MSDLab, who will be leading the collaborative effort.

## Airtel partners with Vultr to offer cloud solutions for enterprise



Communications solutions provider, Bharti Airtel has announced that it has entered into a strategic partnership with cloud computing company Vultr to offer enterprise cloud solutions in India. Under the agreement, Airtel will offer Vultr's extensive suite of cloud solutions to its enterprise customers, especially those in the digital space and help them gain global reach and cost-performance advantage to build, test, and run demanding cloud workloads.

The cloud solutions will be hosted in Airtel's state-of-the-art datacentres across Bangalore, Mumbai and Delhi-NCR, enabling businesses to scale their digital operations globally. Businesses of all sizes and across all industries can now leverage cutting-edge cloud technologies to accelerate digital innovation, optimise global cloud performance, and maximise return on global cloud spend, the company said in a press release. They can also enjoy simple and transparent pricing to avoid billing shocks.

Airtel will offer all of Vultr's services as a part of its enterprise solutions, including Cloud Compute, Optimised Cloud Compute, Cloud GPU, and fractionalised GPU offerings for advanced workloads tied to Artificial Intelligence, Machine Learning, HPC, analytics, visual computing, and gaming use cases.

Talking about the relationship, Ganesh Lakshminarayan, CEO – Enterprise of Airtel Business said, "The partnership with Vultr will help us deliver complex cloud solutions at competitive costs which when combined with our legacy network strength and connectivity, offers an attractive proposition to our enterprise customers."

"With 30 cloud datacentre locations globally, including three locations of Airtel datacentres in India, Vultr can provide unrivalled price-to-performance and global reach. Combined with Airtel's unmatched connectivity and managed services capabilities, Vultr is an ideal platform for accelerating business transformation and digital success," said J J Kardwell, CEO of Constant, the parent company of Vultr.

### ZOHO UNVEILS UNIFIED COMMUNICATIONS PLATFORM

Zoho Corporation has unveiled its unified communications platform, Trident, as well as strengthened collaboration technologies making it easy to communicate across channels, reduce tool ambiguity, and improve an organisation's overall digital adoption. With the launch, Zoho now offers a full-featured business mail and cloud office suite that is built on a common data model and unified through search and AI, enabling users to operate seamlessly across applications.

### VI STRENGTHENS GIGANET IN ANDHRA, TELANGANA

Telecom service provider, Vi has enhanced the network experience for its customers in Andhra Pradesh and Telangana on the back of multiple network strengthening initiatives enabling faster speeds. Vi has deployed an additional 1800MHz spectrum band on all 11,000 sites in the two states enabling customers to enjoy faster downloads, uploads, and streaming while they work, study, socialise, and access entertainment, e-commerce and other digital services on the network.

### ROUTE MOBILE LAUNCHES CHATBOT ROUBOT

Communication platform company Route Mobile has announced the launch of Roubot, a customisable Artificial Intelligence- and Machine Learning-based chatbot solution to help businesses connect to their customers, enabling them to drive conversations, facilitate lead generation, sales and timely issue resolution. The chatbot can be created by businesses using Roubot's Flow Builder without writing any code and integrated across popular channels of communication, CRM systems and payment gateways.

TV RAMACHANDRAN

## WILL GREEN 5G HELP EMBRACE A MORE SUSTAINABLE FUTURE?

5G and the technologies it enables are critical tools in a wide arsenal that can help nations effectively address the climate challenges of our time



Telecom users in India as well as across the world have a ravenous appetite for data-rich services, particularly video. The humongous growth in data consumption per subscriber per month in India, however, is amazing and one of the highest in the world. With the onset of the 4G mobile broadband era, the consumption pattern changed from a level of less than 1GB per month before 2016 to the current level of over 16 GB per month (industry average). Some individual operators are reporting usage as high as 18 GB or 19 GB per month per subscriber.

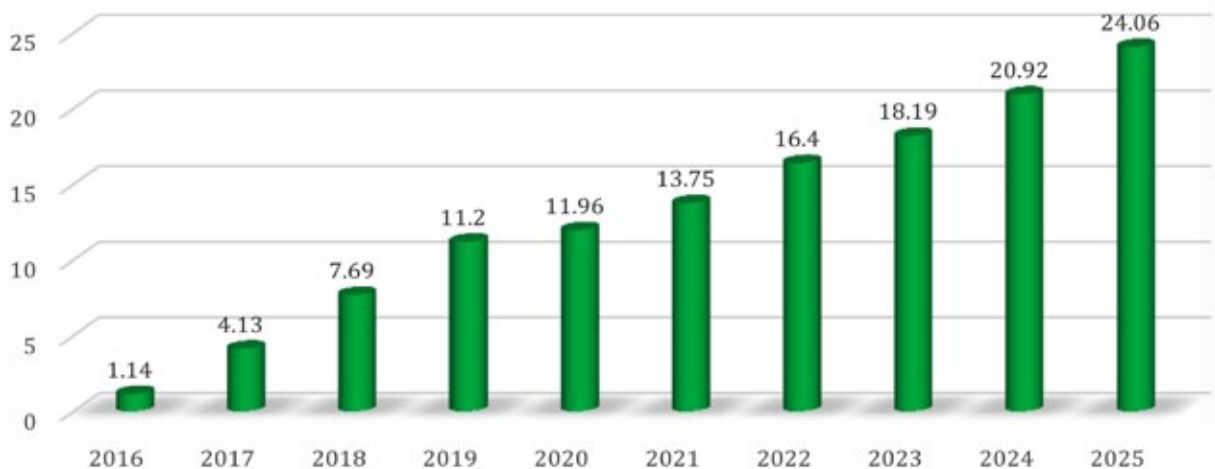
With India now having around 800 million broadband connections for a population of 1.4 billion, and growth shifting more to rural and semi-urban areas where the demand is higher for video traffic, it is clear that our growth in data consumption will continue to rise sharply. Apart from the rural pressure, our net penetration is expected to rise from the current level of less than 60% to about 80%-90% in line with economies like China, Korea, the USA, etc. This will provide a further sharp kick in data demand and consumption.

“Unlike its predecessors, 5G is capable of automatically shutting down when no data is being transmitted, reducing the base station energy usage by 40%.”



The major improvement in 5G's use of millimetre-wave spectrum bands allows for directed beams of communication, which helps save a lot of energy.

### Average wireless data usage per subscriber/month (in GB)



Source: TRAI Performance Indicator Reports

CAGR of data usage per subscriber per month is 15% (the average is based on various industry forecasts including that of Ericsson and Nokia)

The above scenario makes us consider the implication on energy consumption because, instinctively, one tends to associate the higher data requirement with a direct increase in energy consumption. However, the latter is true only if other aspects like technology remain the same. In this case of telecom, we have a good option in 5G which is a more energy-efficient technology as compared to 4G.

5G was designed to use less energy per bit right from the initial drawing board stage. Energy efficiency is improved because of two principal reasons. 5G, unlike its predecessors (2G, 3G, and 4G) is capable of automatically shutting down when no data is being transmitted, which can shrink base station energy usage by 40%. The other reason is the major improvement in 5G's use of millimetre-wave spectrum bands that allow for directed beams of communication, which saves a lot of energy.

Instead of bathing an entire area in radiation, 5G can localise data transmission over short ranges, a targeted approach like a spotlight following you around as opposed to lighting an entire area. 5G antennas already consume half the energy as their 4G counterparts per GB transported, and by 2025, widespread deployment will mean they consume 10 times less traffic per GB transported while accommodating more users.

Through the deployment of ultra-lightweight massive MIMO or multiple input multiple output radio access network gear, 5G has shown improved energy efficiency and network performance. Field measurements have shown a reduction of up to 40% in energy usage, helping deliver immediate energy savings thereby helping contribute to wider sustainability goals which are so incredibly important to our customers and the planet.

Deployment of ultra-lightweight massive MIMO or multiple input multiple output radio access network gear ensures up to 40% reduction in energy usage.

At COP26, along with targets to achieve net zero carbon by 2070, and reduce emissions intensity by 45%, India has set the ambitious target to reduce total projected carbon emissions by one billion tonnes (BT) by 2030. This would indicate a return to carbon emission levels last observed in 2007.

Fulfilling our ambitious commitments would require a whole-of-economy approach that strikes a balance between the integration of new energy technologies and the implementation of energy-efficient systems for all economic and industrial activity of the nation. 5G and the technologies it enables will be critical tools in a wide arsenal that will help nations effectively address the climate challenges of our time.

### ENVIRONMENT-FRIENDLY

The accelerated rollout of 5G networks globally will provide numerous opportunities for nations including India to advance to newer and more powerful technologies while still protecting the environment. By enabling the deployment of sophisticated AI and IoT networks at scale, 5G will make power grids more efficient, drive significant reductions in greenhouse emissions, as well as enable and optimise the integration of greater amounts of renewable energy.

A recent report from Ericsson in conjunction with BT highlights that 5G and IoT could yield carbon emissions savings of as much as 15%. At a micro or local level, one could expect even greater savings. As part of a technology upgrade, Ameresco, a Massachusetts-based company, discovered that replacing an old steam plant with a fully automated plant supported by 20,000 solar modules and its microgrid, reduced energy usage by over 75%.

The beneficial environmental impact of 5G will multiply as the technology touches a greater number of sectors and aids the integration of new smarter technologies. Notable products and services that improve decision-making across sectors already exist, and many firms are gearing up for enhanced offerings that would only be

possible with 5G. In addition to enabling other industries to become more energy efficient, the 5G network will itself be more power efficient than its predecessors.

An analysis of The Columbia Climate School reveals that one kilowatt-hour (kWh) of electricity is consumed to download 300 high-definition movies on a typical 4G network. On 5G, that same one kWh would be enough to download over 5,000 ultra-high-definition movies. Another study by the European Commission contends that power consumption per bit can be up to 90% lower on 5G than on 4G.

Notable controlled experiments, deployments and proof of concepts also reveal how the way 5G is deployed has a significant effect on its emission profile. In 2018, Nokia, Elisa and Efore commercially deployed a proof of concept (PoC) network with a liquid-cooled base station system in an apartment building in Helsinki, Finland. Analysis from Finland's VTT Technical Research Centre indicated that this tech stack directly reduced CO2 emissions by up to 80% and operating energy expenditure by a significant 30%.

Not only is 5G more energy efficient than its predecessors, but it is also best positioned to transform for better, interconnected supply chains and networks, improve data sharing, optimise systems, and increase operational efficiencies across the board.

Ultimately it boils down to this – as demand for data connectivity increases, it is best for the environment if that demand is addressed by 5G rather than by other available technologies. Failure to act quickly in rolling out 5G networks would mean that this increased demand would have to be served by 4G and older technologies, at a significant emission premium that we can ill-afford. 🙄

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*TVR is the President of the Broadband India Forum  
(The views expressed are personal)*

*Research inputs by Debashish Bhattacharya, Sr. DDG, BIF*

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National Health Authority]



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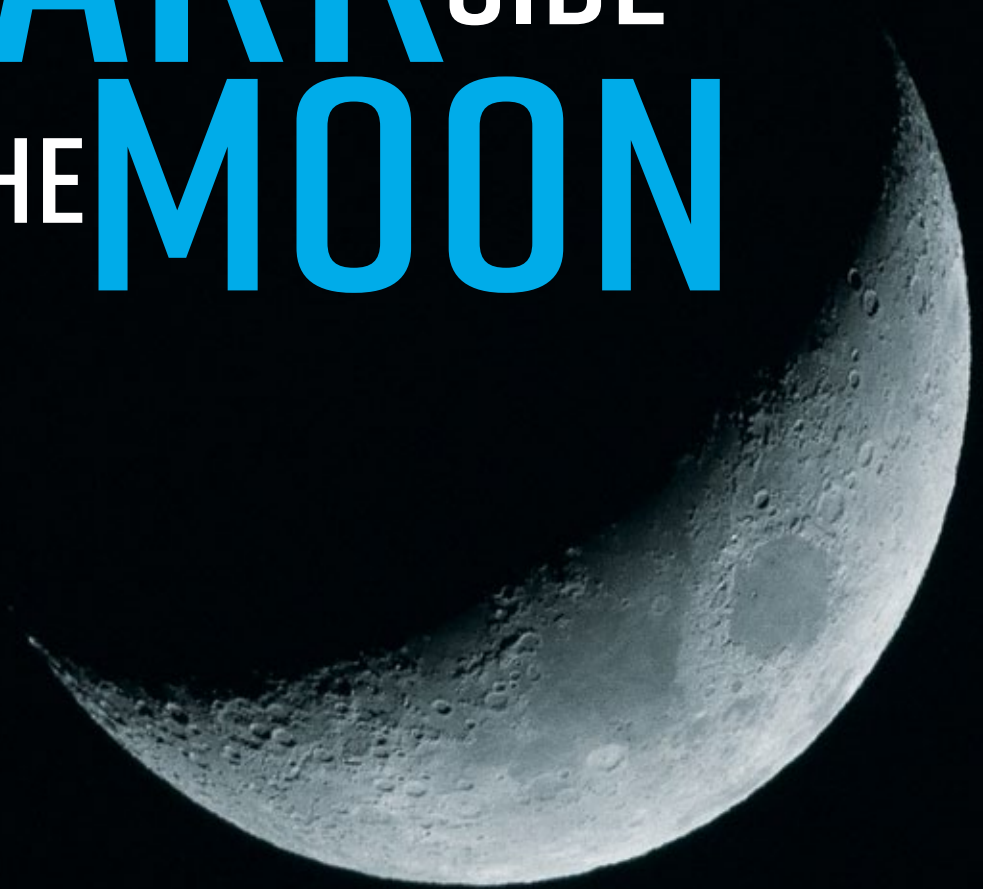
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[COVER STORY]

SECURITY

# THE DARK SIDE OF THE MOON



# The fifth-gen telecom technology is exciting and it's here. But are we ready for the security-threat tail that accompanies the arrival of 5G?

BY PRATIMA HARIGUNANI

Laws help us understand our world better, like tea leaves that predict patterns way before they catch us off-guard. In the world of telecommunications, there are two such intriguing tarot cards. One is Butter's Law which states that the amount of data coming out of an optical fibre is doubling every nine months. Second is Nielsen's Law of Internet Bandwidth which extrapolates that network connection speeds for high-end home users would double every 21 months. But this growth rate can be slower than the changes in processors, as pointed out by Moore's Law. This leads us to the fact that user experience would remain constrained by the bandwidth. It helped to gauge why users would need a lot more to see the gains of Butter's law and experience fibre-to-the-curb as a reality.

Interestingly, after a lot of Gs, the intersection between these two ideas seems to be transpiring into a last-mile delight for users. With ultra-low latency, high bandwidth, high reliability, high network capacity,

super-fast relay of information, and multi-GBPS data speed, 5G promises a new experience for both individual and enterprise end users.

But does it promise a better level of security too? If more information travels through these new pipes, and if more taps are drinking out of these pipes, should we be worried about how safe the 5G plumbing is?

## OLD SECURITY FEARS, NEW QUESTIONS

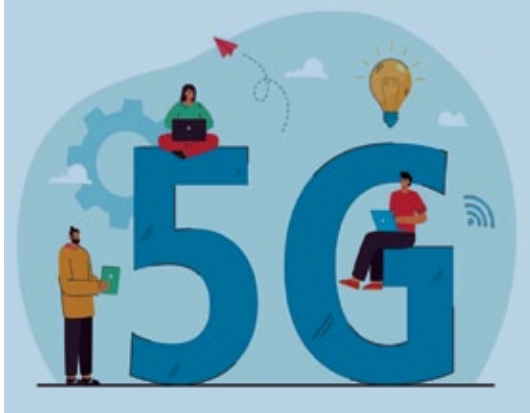
The security challenges of 5G would be higher, says John Strand, CEO of Strand Consult as he distils his first-row observations and deep experience on this topic. "You raise some very important questions, let me say it very simply: the security challenges associated with 5G are significantly higher than those we know from classic 2G, 3G and 4G networks."

He underlines the big difference: The Cloud becomes an integrated part of 5G networks and services in the same way that App stores are about our smartphones

5G end-to-end security represents a new set of challenges, particularly if one includes edge and slicing such as virtualisation, containerisation, and access control. With the open-source approach adding to the complexity, supply-chain security continues to be a concern for 5G.

## WHY 5G CAN BE A NEW SECURITY RISK?

- Wider attack surface and new points of entry
- Fragmentation in underlying pieces
- Increased dependency on Cloud
- Lack of adequate technical standards and specifications
- Uncertainty over network components
- Weak interfaces
- More software than hardware adds to the fragility
- New core based on SDN and NFV
- Expansion of small cells
- Hurried new entrants that ignore security for time-to-market goals
- More critical environments where 5G is applied
- More tempting targets for attackers
- Security choices highly dependent on operators
- Incorrect network configuration
- LTE and its associated risks
- Preference to flexibility at the cost of security
- Complexity of configuration in network slicing



and the apps you probably use every day. “Migration to 5G increases the attack surface and vulnerability and the number of challenges starts exploding. It is a risk that the security authorities in the EU and other economies have already described,” he adds.

5G may also open doors for new cyber threats, avers Pulkit Pandey, Principal Analyst, Gartner. “5G end-to-end security represents a new set of challenges, particularly if one includes edge and slicing such as virtualisation, containerisation, access control, use of open source, and supply chain risk.” And with the open-source approach adding to the complexity, supply-chain security continues to be a concern for 5G.

Pandey also dissects that not all network components are (yet) known and defence models may have to broaden as implementation progresses. Plus, 5G standards don’t cover everything. “Implementation will hugely influence outcomes, like private network versus public infrastructure or on-premises versus cloud-based infrastructure. Unlike in the previous generation technologies, the industry seems to be evaluating the multi-vendor play as it explores the ‘openness’ in the network with 5G. In some cases, the 5G standards do not cover all aspects of 5G implementation.” Pandey underlines.

Gains from a new technology standard will have new and tremendous security implications and Huzefa Motiwala, Director of Systems Engineering for India and SAARC at Palo Alto Networks seconds this view. “5G promises large-scale transformation as we will see an unprecedented rise in mobility-first services characterised by high speed across billions of devices and things. This will supercharge offerings such as self-driving cars, IoT, life- and business-critical functions, and more. But today’s evolving threat landscape will have tremendous security implications. It will define how 5G networks impact consumers, businesses, and even the operators’ mobile network.”

The adoption of 5G itself does not necessarily increase security vulnerabilities, reasons Shishir Gupta, a Principal Consultant at Mandiant. “However, the use of 5G for high-risk cyber-physical use cases such as cellular IoT and critical infrastructure, dependence on IP-based protocols, use of commercial off-the-shelf technology, and adoption of network function virtualization (NFV) or cloud-based architecture does increase the potential attack surface,” he argues.

The 5G standard provides several enhancements for security as compared to earlier generations of telecom standards. The adoption of certain recommendations and controls, however, is left to the choice of the operator, he explains. “The security posture of the 5G network is highly dependent on deployment

choices and implementation details for the operator environment,” he adds.

Maheswaran S, Country Manager of Varonis India apprehends that with a massive number of connected devices, 5G enables larger and more dangerous attacks, exacerbated by the current and future vulnerabilities of the existing Internet infrastructure. “The risk of more sophisticated botnets, privacy violations, and faster data extraction has increased, making 5G networks vulnerable to security attacks,” he comments.

Speaking about specific pockets, Strand argues that emerging markets like India will experience more security challenges when mobile operators start building and operating 5G networks. These challenges will be much bigger if they choose to use OpenRAN. “Open-source software, whether in OpenRAN or classic RAN, does not necessarily make a network more secure. Rather, OpenRAN presents significant new risks because of the introduction of multiple vendors, components, and interfaces each with different grades of security, quality, and product development,” points out a report by Strand Consult.

The report, OpenRAN and Security: A Literature Review, highlights that it is not clear how OpenRAN security will overcome supply chain risk. The supply security elements of 5G are important but are not necessarily secured through standardisation. “Network operators must rip and replace equipment from Huawei and ZTE because of security risk. Chinese equipment is a unique threat to 5G networks and can only be managed by excluding it from the network,” the report says. However, it also questions the assertion that OpenRAN can reduce reliance on Chinese vendors while it is in part designed and produced by Chinese vendors.

### TECHNOLOGY BLIND SPOTS

A research report on 5G security by Positive Technologies indicates several technology blind spots. “Transitioning to 5G will involve multiple stages, according to the 3GPP roadmap. One of these stages, 5G Non-Standalone, combines the use of 5G New Radio and an LTE network core. As a result, these networks inherit all the vulnerabilities of LTE networks,” the report points out. Research also indicates that almost 100% of LTE networks are vulnerable to denial of service (DoS) through Diameter exploitation. This means that 100% of 5G Non-Standalone networks will be vulnerable to DoS, too.

Hacking 5G could become as simple as hacking the web. The 5G network core will be based on software-defined networking (SDN) and NFV that make heavy use of the HTTP and REST API protocols. These protocols are well-known and widely



### HOW TO FIX THE SECURITY HOLE?

- Cognizance of, and priority to, security
- Ensure automation of security and security-by-design
- Treat security early on, as a process and not as a one-time event
- Use GPRS Tunnelling Protocoling for visibility
- Get advanced threat intel for quick isolation of infected areas
- Design and deploy security for virtualised environments
- Use Cloud-ready NFV that can support open APIs
- Secure 3G and 4G infrastructure
- Adopt multi-layer security and micro-segmentation
- Get 5G-ready access controls and permissions
- Conduct regular audits and timely monitoring
- Use AI-ML for predictive maintenance and anomaly detection
- Adopt digital twins in telecom

## In a Nutshell

- As applications and services move out to the mobile edge and 5G networks become home to enterprise services, Layer 3 and Layer 4-based security approaches will not be enough.
- Implementation of 5G involves an expansion of small cells connected over untrusted networks along with greater use of cloud RAN and 5G-NR across unlicensed spectrums. This will add to the intrusion point threat.
- Migration to 5G also increases the attack surface and vulnerability, which drastically increases the number of security challenges and incidents.
- To execute slice-level security policy, operators need to configure each slice separately and any misconfiguration can open doors to a security threat.
- The use of 5G for high-risk cyber-physical use cases like cellular IoT, dependence on IP-based protocols, and adoption of NFV may also increase the potential attack surface.
- Service providers will need to revamp their approach to security and adopt enterprise-grade security covering all locations and across layers.
- Service providers must secure previous-generation networks to prevent cross-protocol attacks through 4G or 3G vulnerabilities.

used on the Internet. “Tools for finding and exploiting vulnerabilities are available to any adversary. And now, these protocols will also be used on 5G networks,” the report explains.

The report also highlights that software development is rife with mistakes that impact security. The average web application contains 33 vulnerabilities and 67% of web applications contain high-risk vulnerabilities. Lowering the barrier to entry will pave the way for an upswing in attacks on 5G networks.



“Security challenges associated with 5G are significantly higher than those we know from classic 2G, 3G and 4G networks.”

**John Strand**  
CEO, Strand Consult

In his assessment of the security threats in the 5G era, Securonix VP and General Manager for India Ramakrishna Murthy agrees that 5G increases the attack surface considerably. “It is characterised by high speed and low latency which means a lot of data can be exchanged within seconds. It is a step towards a new world of interconnected networks where technologies like Artificial Intelligence (AI), the Internet of Things (IoT), Augmented Reality (AR), and Virtual Reality (VR) will be commonplace. Such data in the hands of malicious attackers can cause a lot of security challenges. The dynamic nature of the 5G network will allow varying degrees of cyber risks, especially with its network slicing capability.”

Explaining this further, Murthy tells how slicing technology splits the network into isolated slices wherein each slice has its resources like bandwidth, service quality, etc. “Each slice has its security policies and since they are

isolated, a breach of one should not impact other slices or the whole network. But now operators have to configure each slice separately. This involves greater complexity and service requirements, which in turn increases the chances of a breach. According to GSMA, one out of every three successful attacks on 4G networks resulted from the incorrect configuration of equipment,” he says.

No wonder then, the industry expects a massive uptake in security solutions to deal with the threats that come with 5G. Research firm MarketsandMarkets estimates the 5G security market to grow from USD 1.3 billion in 2022 to USD 7.2 billion by 2027. Similarly, Polaris Market Research expects the global 5G security market to grow at a CAGR of 41.4% during the forecast period of 2022-2030. The global 5G security market stood at USD 1.10 billion in 2021.

### **NEW ANSWERS, ANYONE?**

So, shall we throw the baby out with the bath water or can something be salvaged even as the industry tries to suss out 5G as the new paradigm?

Establishing a strong security framework will have to go beyond just stitching together ad hoc security modules to offer 5G security, warns Motiwala. “Disconnected security modules will not scale. It will lead to inconsistent application of security across the network. If these kinks are not ironed out, 5G networks will see a worrying expansion in intrusion points; attacks could come from anywhere, even from within the operator’s network, through a botnet comprising thousands of large-scale, weaponised IoT devices.”

Gupta recommends that enterprises must consider security architecture early in the design process and implement a multi-layered, micro-segmented network for 5G environments, with emphasis on network segmentation between the core network and access network. This should be supplemented with best practice security controls for each network function and vulnerability testing across different parts of the network such as core, RAN, backhaul, BSS and OSS. It is also critical to implement log collection, security monitoring and incident response processes to detect, respond and recover from evolving threats to telecommunications infrastructure, he explains.

Strand reckons that even though India has skilled IT resources and security experts, the country is yet to understand the quantum of the security challenges that will come with 5G. “We are not only talking about security



“Unlike in the previous generation technologies, the industry seems to be evaluating the multi-vendor play as it explores the openness in the network with 5G.”

**Pulkit Pandey**  
Principal Analyst, Gartner



“To ensure security, operators must configure each slice separately. This involves greater complexity and service requirements, which in turn increases the chances of a breach.”

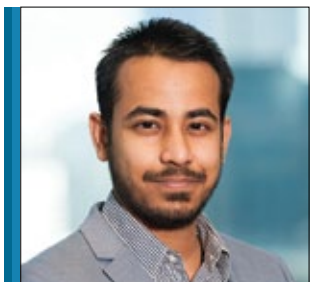
**Ramakrishna Murthy**  
General Manager (India) and VP - Technology Services (APJ & ME), Securonix



“The evolving threat landscape will define how 5G networks will impact consumers, businesses, and even the operators’ mobile network.”

**Huzefa Motiwala**

Director - Systems Engineering,  
India and SAARC, Palo Alto Networks



“Enterprises must consider security architecture early in the design process and implement a multi-layered, micro-segmented network for 5G environments.”

**Shishir Gupta**

Principal Consultant, Mandiant

in the networks but also the security that is related to the many 5G services private companies will use in the future. Unfortunately, private companies do not have many competencies in this area,” he highlights.

On the enterprise front, even though 5G has a built-in signalling layer, the enterprise data, applications, and networks will still create a large attack surface identical to any other enterprise network. As such, cloud-native 5G security with real-time contextual threat recognition and correlation will be critical in curbing the risks.

Motiwala recommends that enterprise-grade networks will require enterprise-grade security which enables visibility and enforcement across all layers, from applications to signalling, data, management, and slice, across all locations with RAN and Internet-facing nodes. This must cover all vectors and be well-equipped to deal with malware, command and control, remote code execution and botnets, and all lifecycle stages starting from DevOps right up to CI/CD, and runtime.

One can also look at securing previous-generation networks: In some cases, attacks on 5G networks can begin by exploiting 4G or even 3G vulnerabilities. “This is known as a cross-protocol attack in which hackers exploit weaknesses in one protocol against others that are more secure. So, enterprises will have to secure previous-generation networks to protect the 5G network,” Murthy advises.

Enterprises should know when, where and how to launch a product, service or operational experience based on 5G capability as it requires huge investment and resources. The whole strategy needs to be worked out carefully considering all variables, suggests Maheswaran. “If the business is deploying IoT models across its verticals to carry out operations effectively, then it may see lower operational costs but if it is using a solution that requires 5G’s low latency and high connectivity features, then the cost might go up. If an enterprise is investing in 5G services, it may need to reorganise its technical capabilities,” he elaborates.

These steps will have to be taken seriously by enterprises, operators and providers as we embrace 5G with fervour and hope because it looks like, there is one law that still rears its head no matter what part of life, work or technology we are thinking of. Murphy’s law... the teacup always spills when you least expect it to. 🍵

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## ASSISTIVE TECHNOLOGY: LEADING A NORMAL LIFE DESPITE A DISABILITY

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# Up on the digital communication wave

Emerging communication and connectivity technologies are transforming businesses in many ways – from how they operate to how they can make more money



BY VINAY K MAYER

**T**he next five years for communication technology are predicted to bring even more advancements and higher total value than the last decade. A study recently found that the business value derived from communication services will reach a total of USD 2.5 trillion by 2025.

This growth is being driven by several emerging technologies, including 5G, Artificial Intelligence (AI), the Internet of Things (IoT), AI-powered chatbots, and much more. With so much potential on the horizon, now is the time to start planning for how your business can benefit from these exciting innovations.

**I**IoT devices can provide real-time insights into customer behaviour and enable new levels of customisation and personalisation.

Virtual Reality has the potential to completely change the way businesses communicate with their customers and employees.

### THE INTERNET OF THINGS

IoT involves the interconnection of sensors and devices that collect information about their environment and communicate with each other. This data can be used to improve efficiency, safety, and productivity in a variety of industries.

IoT devices are becoming increasingly commonplace, and as more devices are connected to the Internet, the amount of data generated by these devices will continue to grow exponentially. This data can be used to improve a variety of industries by increasing efficiency, safety, and productivity.

There are many benefits of using IoT devices in business. For example, they can help reduce energy consumption, improve asset tracking, and optimise supply chains. Additionally, IoT devices can provide real-time insights into customer behaviour and enable new levels of customisation and personalisation.

However, there are also some challenges that businesses need to be aware of when implementing IoT technologies. For instance, data security and privacy concerns are significant considerations. Additionally, the scale and complexity of IoT deployments can pose significant challenges for IT departments.

Despite these challenges, the potential benefits of IoT make it a technology worth investigating for businesses across all industries. With the right strategy in place, businesses can use IoT to improve operations, drive growth, and gain a competitive edge.

### THE AI AND ML UNIVERSE

AI and ML are becoming increasingly widespread as businesses attempt to automate tasks and improve efficiency. While still in its early stages, AI has the potential to transform how businesses operate by providing employees with predictive analytics and automating decision-making processes. Meanwhile, ML can be used to improve customer service by analysing customer data and identifying patterns.

AI is being used in a variety of categories, including customer service, marketing, and supply chain management. In customer service, AI can be employed to provide personalised recommendations with AI-powered chatbots and resolutions to customers' inquiries. In marketing, AI can be used to target ads more effectively and track customer engagement. In supply chain management, AI can be used to optimise inventory levels and improve warehouse operations.

Another use that is gaining popularity is AI-powered chatbots. By using natural language processing (NLP), chatbots can understand the intent of a customer's message and provide a helpful response. Chatbots can be used for tasks such as customer support, sales, and marketing.

### THE BLOCKCHAIN TECHNOLOGY

Blockchains are distributed databases that continuously store records in a list known as blocks. Each block contains a timestamp and a link to the previous block. Blockchain technology is used to create novel applications that can be used to store, track, and manage digital assets.

Blockchain technology has the potential to transform businesses, especially in the healthcare sector by providing a secure, tamper-proof way to store data and conduct transactions. This could potentially reduce costs and increase efficiency in many industries. For example, banks could use blockchain technology to streamline the process of clearing and settling payments.

According to recent reports, approximately 61% of Indian businesses are moving towards integrating blockchain technology into their core operations. This shift indicates a growing belief in the potential of Blockchain to revolutionise businesses across a wide range of industries. As more and more businesses adopt this cutting-edge technology, we will likely see an increase in the number of innovative applications of Blockchain in the coming years.

As the world grows more connected, businesses are turning to cloud-based solutions to help them communicate and collaborate more effectively.

There are numerous other potential benefits to blockchain technology. For example, it could be used to create tamper-proof voting systems, identity management systems, or supply chain management systems. The possibilities are nearly endless.

### CLOUD-BASED SOLUTIONS

As the world grows more connected, businesses are increasingly turning to cloud-based solutions to help them communicate and collaborate more effectively. For example, Voice over Internet Protocol (VoIP) is becoming increasingly popular with businesses because it can be very cost-effective, especially for long-distance or international calls.

Similarly, video conferencing is another way that businesses can communicate using the Internet. With video conferencing, businesses can hold meetings or presentations with employees, clients, or customers who are located in different parts of the world.

Unified Communications as a Service (UCaaS) enables businesses to unify their voice, video, messaging, and collaboration tools into a single platform that can be accessed from any device, anywhere. This makes it easy for employees to stay connected and collaborate no matter where they are located.

### THE VIRTUAL REALITY

Industry reports show that virtual reality (VR) could have a market value of up to USD 4.56 trillion by 2030. This is an extraordinary figure, and it highlights VR's potential as a key technology in the coming years. Businesses and consumers alike are beginning to see the potential of VR, and it is clear that there are many applications for this technology. It has the potential to completely change the way businesses communicate with their customers and employees.

VR can be used for a variety of purposes such as product demonstrations, training simulations, meetings

and conferences. There are already several businesses using VR to improve their communications and it is only going to become more popular in the years to come.

### THE 5G NETWORK

5G Networks are a type of optical networking technology that enables businesses to transfer large amounts of data quickly and efficiently. 5G networks have many benefits, including high-speed data transmission over long distances. This makes them ideal for businesses that need to quickly and efficiently transfer large amounts of data.

The next generation of wireless technology, 5G, is said to be a game changer for businesses. The speeds and capacity afforded by 5G will enable businesses to do things they never thought possible, like streaming high-definition video and connecting large numbers of devices at once. But 5G isn't just about speed; it's also about reliability and low latency, which means businesses can rely on it for mission-critical applications.

Businesses are already starting to experiment with 5G, and the results are promising. With theoretical peak speeds of 20 Gbps, businesses will be able to move large amounts of data very quickly. This will enable businesses to do things like stream high-definition video and conduct video conferencing with ease.

Lastly, 5G is said to have a much higher capacity than current 4G networks. This means that more devices can be connected to the network at any given time without impacting performance. For businesses that have a lot of employees who need to access the Internet or use cloud-based applications, this will be a major advantage. 🧑🏻💻

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# Managing the Herculean network upgrade

CIOs face the challenging task of modernising CSP and ISP networks to keep pace with the growing demand for digital services and evolving customer needs



BY SRIVIDYA KANNAN

**T**he year 2023 has come with promises of unprecedented opportunities and experiences for communication service providers (CSPs) and Internet Service Providers (ISPs). With the rapidly evolving marketplace, new opportunities are emerging particularly with the shift in customer demands

and needs. This also brings in a new set of challenges, both on the strategy and technology front.

No wonder then, CIOs of telecom service providers, CSPs, and ISPs are faced with many uphill tasks and critical challenges that they must address in

CIOs must employ advanced Digital Experience Monitoring techniques to manage 5G networks and ensure the highest level of customer satisfaction and loyalty.

The development of 5G technology will increase the demand for faster Internet speeds and more robust services. This will pressure CIOs to upgrade their networks to provide these services while ensuring they are secure, reliable, and cost-effective.

the days ahead. One of the critical challenges that Chief Information Officers and technology teams of communication and Internet service providers will have to deal with in 2023 is the increased demand for digital services.

The development of 5G technology will increase the demand for faster Internet speeds and more robust services. This will pressure CIOs to upgrade their networks to provide these services while ensuring they are secure, reliable, and cost-effective. They will need to be able to quickly scale up their network capabilities as demand grows while at the same time dealing with complexities such as managing bandwidth congestion and ensuring compliance with regulations.

5G requires investment in new infrastructure and complex network upgrades to ensure high-speed, low-latency communications that meet consumer demands. While 5G will bring many opportunities, it also comes with new complexities that the CIOs must manage. 5G deployments require a complex combination of hardware, software, and services, which must be managed effectively to ensure that the 5G networks are secure and perform optimally.

CIOs must employ advanced Digital Experience Monitoring (DEM) techniques to identify and address any issues that arise. DEM tools can help CIOs monitor network performance in real time, detect potential problems before they happen, and respond quickly to maintain customer satisfaction and loyalty. Additionally, CIOs must be able to accurately track 5G network utilisation, usage patterns and customer service levels. This data can then be used to make informed decisions about 5G infrastructure investments, allowing CIOs to provide the best 5G services at a competitive cost.

By adequately managing 5G networks with Digital Experience Monitoring, CIOs can ensure the highest level

of customer satisfaction and loyalty while staying ahead of their competition.

The CIOs will also need to maintain data security and privacy standards across their network. As digital services become more widespread, they also increase the risk of data breaches and other cyber-attacks. CIOs must ensure that their networks are secure enough to protect customer data while still being able to provide service levels as per customer expectations. To ensure their networks remain secure, they must continuously stay abreast of the newest security technologies and best practices.

Another challenge is the increasing competition in the marketplace. As customer demands rise, new competitors enter the playing field, putting unprecedented pressure on service providers. To remain competitive, they must be able to quickly develop and deploy new services and products while leveraging existing infrastructure and resources.

To remain competitive, CIOs of the service provider companies must leverage digital, including emerging technologies such as cloud computing, virtualisation, and analytics, to drive innovation, streamline processes and reduce operational costs.

These challenges are complex, but they also present tremendous opportunities. By leveraging the right technologies and creating an agile environment, CIOs at the service provider end can ensure that their organisations remain competitive and well-positioned for success in 2023. By preparing now, CIOs of TSPs, CSPs, and ISPs can ensure their organisations are ready to address tomorrow's trials and thrive. 🌟

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# Riding the innovation horse

As new communication technologies move from the fringe to the mainstream, businesses can expect better agility, improved CX, new services, and higher margins

BY PRATIMA HARIGUNANI



**W**hen the telephone came, globalisation began. When the Internet arrived, business models changed. When smartphones bloomed, every business became a digital business. Today, most businesses across sectors and industries have an app, a new customer platform, and a disrupted business model, thanks to extreme and irreversible digitalisation.

As we move ahead and embrace deeper imprints of 5G, the Internet of Things (IoT), metaverse, and Open RAN, there is a lot that will change for enterprises worldwide. A recent report by Research and Markets indicates that over 800 million people started using the Internet during the last six years. The report India Telecoms Industry Report - 2023-2028 estimates that another 200 million users will go online by 2028. If we turn to a recent Kearney survey in North America, 45%- 50% of consumers prefer digital service, while 40%-45% prefer physical stores. A similar survey by the consulting firm in 2022 found that digital channels comprise nearly 20% (or higher) share of the total sales volume in Europe and Asia. Interestingly, in smaller markets, the share of digital channels is 30% or more for some operators.

### In a Nutshell

The emerging communication, connectivity and networking technologies would help enterprises get faster, better, leaner, and smarter. Here is what they should get ready to leverage.

- Wi-Fi 6
- 5G in a stronger shape
- Cloud model
- Datafication
- Edge
- Intelligence in many forms
- Metaverse
- AR, VR, and XR
- ChatGPT

As augured by STL Partners in its report Telecoms 2023, ten years down the line, telcos could find themselves growing into national or regional champions of connected technologies, working with enterprises and governments to help the world run better.

Let's look at some key communication, connectivity, and networking technologies that have the potential to transform businesses in 2023. It would also be a smart move to keep an eye on what is changing in these areas so that organisations can switch to customer intimacy, new services, and low-cost models to deliver better margins and value to the stakeholders.

### BYE-BYE OLD ROUTES

Connectivity is paramount for expanding the business reach and serving customers with exceptional speed. In today's limited patience span, when the thumb is always on the verge of another



“Cloud, mainly in the form of software as a service, will see more proliferation in 2023 as enterprises require smart solutions for their business growth.”

**Joyjeet Bose**, Senior Vice President, Tata Teleservices



“OFDMA allows multiple devices to talk at the same time, a big plus for businesses intending to expand customer footprints.”

**Raghav Arora**, Co-Founder and CTO, Statiq

swipe- businesses cannot afford to miss even one precious moment. That’s where one has to watch for Wi-Fi 6E. Unlike Wi-Fi 5’s 6Gbps data rate, Wi-Fi 6 offers 10 Gbps speed, nearly double, says Raghav Arora, Co-Founder and CTO of Statiq.

“The high spatial streams at 8x8 allow servicing of more client devices simultaneously, and more efficiently. Further, the Orthogonal Frequency Division Multiple Access (OFDMA) allows multiple devices to talk at the same time, again a big plus for businesses intending to expand operations and customer footprints. When not in use, the freed-up bandwidth can lead to greater battery life, again a cost-effective proposition for businesses,” he explains.

This new generation is the next step in Wi-Fi evolution that improves wireless connectivity by opening new dedicated channels previously unavailable, reasons Hemant Agrawal, CTO, Netweb Technologies. “With 2.4 and 5 GHz bands getting crowded, 6 GHz has been opened to address the issues of congested devices and networks. Wi-Fi 6E will provide speeds up to six times faster than Wi-Fi 5. Some of its benefits include greater Access Point (AP) capacity, larger channel width, efficient bandwidth sharing, Wi-Fi sleeping, and backward compatibility.”

With faster speeds, businesses can not only improve service times but also do away with many inefficiency pockets and cost areas in their supply chain, distribution

footprint, and inventory. This would be supplemented well with Cloud’s elasticity and fast uptime.

Joyjeet Bose, Senior Vice President, Tata Teleservices adds that Cloud, mainly in the form of software as a service (SaaS), will see more proliferation in 2023 as enterprises require smart solutions for their business growth. “Pay-as-use models as well as faster turn-up of applications will provide further impetus. Cloud growth is feeding datacentre growth,” he says.

And as that happens, businesses should ensure their networks are ready for the influx of traffic coming their way. Recommends Shibu Paul, Vice President – International Sales at Array Network: “They should consider upgrading their networks to support higher speed and bandwidth, as well as investing in technologies such as Artificial Intelligence (AI) and Machine Learning (ML) which will help them make better use of available bandwidth.”

#### **HELLO METAVERSE AND THE GANG**

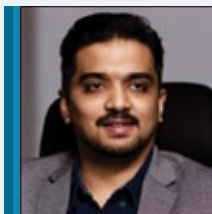
Metaverse and IoT are big disruptions that smart players will leverage well – and should. They could herald a completely new way of doing business, a completely new spectrum of products, and a new avatar of the customer.

Primarily, the metaverse has dual-ecosystem priorities, catering to industrial efficiency through



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**Ananth Vinnakota**, VP – Engineering, Qentelli

replicated workplaces and consumer metaverses for unparalleled experience marketing, dissects Sunil Gopinath, CEO of Rakuten India. “With virtual and extended reality gaining greater market interest, the metaverse will be transformational in simulating physical experiences. For example, retailers can let shoppers try different outfits to see what looks best on them, architects and interior designers can bring blueprints to life with visualised seating plans, while manufacturers can capture data from mirrored realities to optimise process quality.”

For this, the backend has to be in good shape. As Anand Bhaskar, Managing Director - Service Provider Business Cisco India and SAARC, advises, “Low-latency applications will require intelligence distributed to the edge where the use cases reside. Therefore, as the demand for real-time processing and low-latency connectivity applications and services increases, edge computing will become indispensable as part of a hybrid cloud computing model.”

Ananth Vinnakota, VP of Engineering at Qentelli highlights how Phygital will dominate the conversations on social media platforms and influence business decisions across the sectors. It will open up new and innovative ways of marketing products and redefine user experience in an entirely new way. “With the metaverse on the virtual horizon, Phygital will go

through a seismic shift, which will unleash a new wave of possibilities and opportunities. Metaverse is considered a communication revolution as it promises to make communication more personalised, data-driven, and immersive. The business’s operation will be no more limited to traditional methods and marketers will find themselves experimenting with unique ways of engagement,” he adds.

The communicators have hopes that the metaverse will bring about a new era of digital advertising and overcome the limitations of a two-dimensional virtual world. According to Vinnakota, for businesses, it will mean an opportunity to get an edge over the rest and access to newer revenue streams.

Another huge change-switch would be pressed by the deeper impact of Augmented Reality (AR) and Virtual Reality (VR), and who knows, even Extended Reality (XR).

“The near future will witness a boom in wearable devices that will be used to consume content beyond two dimensions and in a more intuitive way. A simple hand gesture or voice commands will be used to control devices. While this is already the trend, it will gain more prominence and widespread adoption in the near future. The AR and VR markets will expand, and these technologies will become more and more embedded in our everyday life.” Vinnakota spells out.



“VR and AR will continue to expand and have a significant impact on marketing in 2023 as it creates new opportunities for promoting the business.”

**Rajasekhar Gummadapu**, CEO, Techwave



“Enterprises can use voice analytics to analyse audio calls and generate insights to enhance CX and ensure compliance with standards and specifications.”

**Uthaman Bakthikrishnan**, Executive Vice President, ClearTouch

Virtual and augmented reality will continue to expand and have a significant impact on marketing in 2023 as it creates new opportunities for promoting our businesses, seconds Rajasekhar Gummadapu, CEO of Techwave. Adds Kaavya Prasad, Founder of Lumos Labs: “The consumption of smart devices is expected to rise as we incorporate emerging tech such as VR, AR, AI, and more in our lives. With the increasing popularity of the metaverse, VR headsets demand will also increase.”

Similarly, Dr Ananthakrishnan Gopal, Co-founder and CTO, DaveAI counts XR as the thing to watch for. “Since we all yearn to go beyond the supposed actual boundaries of the globe, it is a significant technical trend right now. Gamers, medical specialists, retail and modelling experts all adore this technology since it produces a reality free of any physical existence,” he points out.

Rishi Kapal, Director of Innovations and Employability at Vijaybhoomi University stresses that Deep and Hyper Artificial Intelligence is going to alter how businesses operate, make plans, and create designs in the future. “AI will transform the fundamentals of numerous sectors, including customer service, marketing, banking, healthcare, company accounting, public safety, retail, education, and public transportation, and how they operate,” he says emphatically.

### **CUSTOMER SERVICE GETS THE EDGE**

When technologies change, the way businesses seek, serve and support customers also undergoes a big shift.

It can be incremental or exponential but it changes the industry in more than one way. With the emergence of new communication and connectivity technologies, customer support will push a big reset button to deal with the always-on, real-time, and highly-intelligent future.

Dr Gopal explains further: “By 2025, over 95% of multinational corporations, according to Gartner, will adopt communications platform as a service (CPaaS) capability. Also, even though contact centre as a service (CCaaS) has long been popular among SMBs, we are now seeing an uptake in adoption among major organisations.”

Next, enterprises can expect more datafication. Karunya Sampath, Co-founder and CEO of Payoda Technologies feels that with data as the new oil, datafication is simply transforming everything in our life into devices or software powered by data. “Industrial machines, office applications, AI-powered appliances, and everything else will further rely on data. AI and ML will churn disparate and complex data, making humans take faster decisions in areas like healthcare, banking, finance, investments, logistics and transportation, and robotic process automation,” he explains.

Enterprises can also expect to explore possibilities with forces like voice analytics. Uthaman Bakthikrishnan, Executive Vice President, ClearTouch delineates that voice analytics is the process of analysing recorded voice calls and generating insights to improve customer



“ChatGPT is still in its infancy and most people currently use it for simple tasks but it will likely have a major impact on businesses in the future.”

**Krishna Tammana**, CTO, Gupshup



“The consumption of smart devices is expected to rise as businesses incorporate emerging technologies such as VR, AR, AI, and more.”

**Kaavya Prasad**, Founder, Lumos Labs

experience (CX) and ensure compliance with standards and specifications in the customer experience function.

Of course, the poster boy of all big and small changes in businesses is 5G. “The long wait for the 5G is finally over with its grand rollout in the month of October. The technology is expected to unlock enormous benefits for both consumers and businesses by leveraging shorter and higher frequency bands of the radio spectrum. Low latency, greater density per area, and unprecedented broadband speed will drive the growth of Industry 4.0 technologies like the IoT, smart manufacturing, AI and ML, and cloud computing,” points out Agrawal.

On the consumer end, telecom subscribers will enjoy a great time with mobile gaming, fixed wireless access, and new immersive user experiences. Moreover, the exhilarating experiences of augmented and virtual reality can be accessed over the phone via many different applications.

As regulatory approval for 5G technologies is likely to see a sustained upward trajectory in 2023, its adoption will be fueled by greater accessibility and its capability to manage mass data flows efficiently, Gopinath predicts the pragmatic impact.

“Asia-Pacific business zones are expected to drive enterprise-wide 5G deployment to offer improved reliability, security, and reach across geographies. By delivering additional speed and bandwidth, 5G becomes more scalable and predictable than the latest 4G and Wi-Fi networks and can significantly impact precision engineering sectors like manufacturing. Notably, 5G technologies encourage the development of AI, ML, and RPA which can run flawlessly on the network,” he says.

Prasad points out that going ahead in 2023, one can expect to see a rise in 5G adoption driven by its pioneering network speed, significantly reduced energy consumption, low latency, and wider reach. That means businesses have all the plumbing they need for designing

extremely-innovative offerings and bridging the distance between the factory and the customer.

While 5G will make communication faster, ChatGPT will make communication smarter, chimes in Krishna Tammanna, CTO, Gupshup. “ChatGPT is still in its infancy and most people currently use it for simple tasks but it will likely have a major impact on businesses in the future. Conversational AI for businesses is already quite advanced, with some tools having intuitive intelligence built in. For example, most digital shopping assistants are pre-trained in retail knowledge and can provide accurate recommendations based on customer needs. Having said that, ChatGPT is a significant advancement in language understanding and will likely improve language usage across a wide range of applications.”

The business sector will also see a rise in edge computing, a distributed computing paradigm that bridges the gap between data, devices, and end-users, Gopinath weighs in. “It involves placing computing resources at the edge of an existing network, thereby simultaneously reducing the latency of processing data while improving the efficiency of transmission. However, to effectively embed edge computing into the business model, organisations need to consistently monitor and observe data from multiple telemetry sources to anticipate anomalies, disruptions, or possible concerns in the consumer experience.”

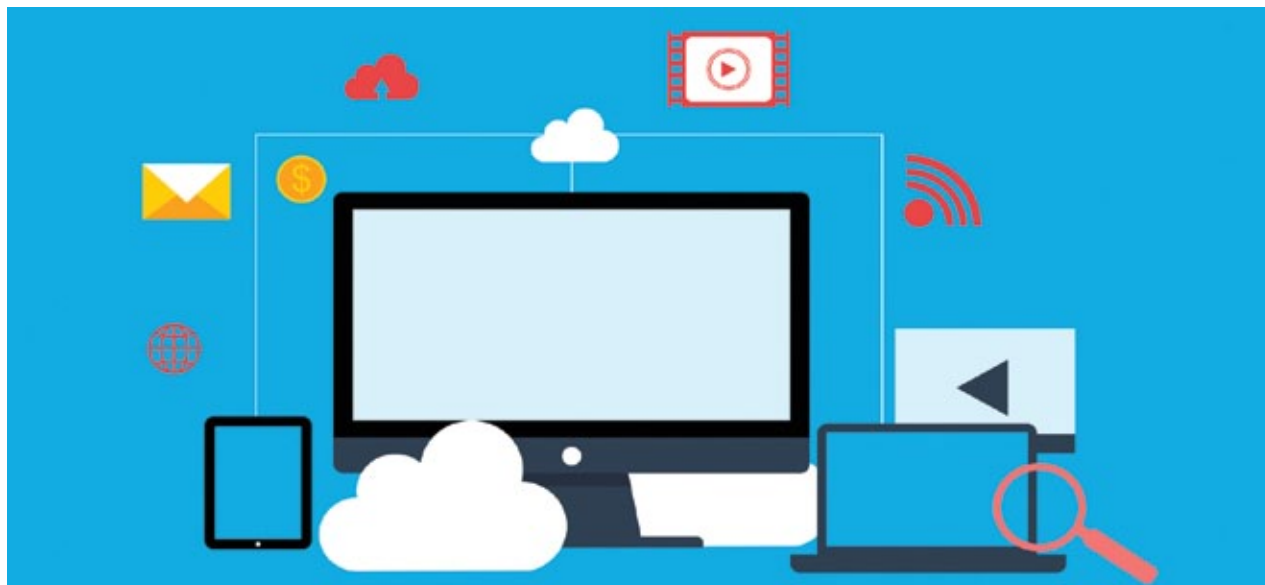
New devices, tools, and software are continually being developed to advance communication technology, while old popular technologies are always being updated and improved, reflects Pramod Sharda, CEO of IceWarp India and the Middle East. “To be successful, businesses must use this new technology in their communication.”

Looks like it is a fresh new world of products, customers, and what-ifs, with communication and connectivity adding wind beneath these wings, in a new way. 🌪️

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# Redesigning the content delivery model

Emerging technologies are dramatically improving the content delivery network making them scalable, fast, secure, and cost-efficient



BY ARJUN KALLAWAR

**C**ontent is king. Businesses that deliver content such as applications, video, or software downloads in an effective and optimised way, will have a greater impact than those who lag. However, organisations can benefit from the content-led business strategy only if they have the delivery infrastructure in place. A content delivery network or CDN is a smart network of inter-connected servers that caches the requested content and delivers it to consumers in an efficient and accelerated manner. These high-performing CDNs are capable of delivering content across almost all industry verticals, including e-commerce and streaming platforms, as well as online gaming and social media networks.

No point guessing that globally the expectations from the CDN have been rising with the increase in the demand for these services. Fortunately, the CDN landscape is shaping up for some exciting transformations.

## A BOOMING TRAJECTORY

According to a study conducted by Mordor Intelligence, the CDN market was valued at USD 11.76 billion in 2020. It is growing at a compound annual growth rate (CAGR)

of 27.30% and is projected to reach USD 49.61 billion by 2026. The study attributes much of its growth to a huge spike in demand for rich video content during COVID-19, the trend of digitalisation of businesses, and the increased use of social media.

## THE GROWTH DRIVERS

One of the largest drivers of this growth is rising levels of over-the-top (OTT) video streaming consumption. Several factors such as improved and localised content as well as the improvements in supporting infrastructure like the adoption of 5G, and faster computing power of smartphones are worth mentioning.

India has an additional advantage on this front in terms of the largest youth population in the world, which is a key demographic for OTT services. The renewed push for online gaming, which has taken a cue from its increasing popularity globally, is also driving the growth of the CDN market. Besides, the rising adoption and implementation of the Internet of Things (IoT) and an ever-increasing number of connected devices on the network have also led to a higher demand for CDNs. Together the factors like OTT streaming, online gaming, and IoT are pushing

The rising adoption and implementation of IoT and an ever-increasing number of connected devices on the network have led to a higher demand for CDNs.

for faster, more efficient and consistent delivery of high-quality content in a reliable and scalable manner.

### TECHNOLOGIES STEERING THE MARKET

The emergence of newer technologies and advancements in others is not only making content delivery faster and improving the user experience, but they are also facilitating valuable insights into consumer behaviour and network conditions, helping organisations take informed strategic decisions. These technologies are also enabling organisations to reach a global audience, reduce the cost and resource requirements for hosting and delivering content, and drive higher user engagement and conversion.

**Software-defined networking:** Traditional networks use dedicated hardware such as switches and routers to communicate with each other and direct traffic. However, an SDN architecture primarily uses the software or application programming interfaces (APIs) installed on the hardware infrastructure to direct traffic. This approach offers several benefits such as enhanced speed while allowing greater flexibility and control over the network using the software.

**Network function virtualisation:** In NFV, the software is used to replicate the networking functions of hardware components by creating virtual machines. Thus, a varying range of network functionalities can be configured using the software. While NFV sounds similar to SDN, there is a significant difference between them. For instance, SDN allows flexible and faster routing of traffic through the network, whilst NFV is the instrumental technology that allows communication between the underlying hardware and the software.

**Security add-ons:** CDN operators design and perfect their network services to withstand distributed denial-of-service (DDoS) attacks on networks and sometimes genuinely unanticipated levels of website traffic. In an emerging trend, several major CDN operators are throwing in security add-ons to their customers. Some of these add-ons include DNS protection, bot mitigation and firewall services amongst others. As cloud networks continue to face risk from data breaches, hackers and malware, cloud security is further expected to evolve into more tailored solutions integrated into CDNs.

**CDN switching:** The basic premise of CDN switching is the ability to switch between CDNs to manage capacities efficiently. New software in the market allows enterprises to switch between CDNs whenever there is a requirement such as an unprecedented ISP capacity crunch or if the content requires to be switched to another bandwidth.

**Artificial Intelligence and Machine Learning:** With content cached across the network, CDNs route the traffic through global servers to deliver the content by identifying servers closest to the user. However, CDNs need to ensure minimum latency while doing so. Hence, the operational challenge is finding such servers that will reduce latency to the minimum. AI and ML are being deployed to continuously optimise the networks for identifying speedy network patterns in the SDNs. They can also predict traffic bottlenecks and reroute traffic to prevent such scenarios.

### FUTURE OF THE CDN MARKET

Globally, North America holds the largest share of the CDN market. However, with increasing infrastructure improvements and demographic advantages, India is well-positioned to see growth in its CDN market. The increasing digital push in healthcare, the growth of the fintech industry, and increased demand for video and gaming content are expected to grow the CDN space in the country. However, there are several pressing challenges to be resolved for this growth story to become a success story. For one, the biggest challenge that CDN operators currently face is not from efficiency or technology adoption, but security. For example, in 2020, the number of cyber security attacks faced by India increased almost threefold in a year to reach 11.5 lakhs. Globally, cyber-attacks are on the rise, targeting enterprises.

CDNs must evolve to overcome the security risks posed by malware, DDoS attacks, hackers and bots, through the employment of technology and partnerships within the industry. It will be exciting to see how the CDN market will innovate in the future to overcome these challenges. 🌟

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# Enabling connected enterprises of the future

Together with Blockchain and IoT, the newly rolled out 5G technology will accelerate Web 3.0 adoption in India to spur the Industry 4.0 revolution



BY VAIDEESWARAN SETHURAMAN

**5G** telephony is a reality in India, with telecom players like Airtel and Reliance Industries officially rolling out services in several cities, promising affordable and total connectivity across the country by December 2023. This will mark a massive shift in the way enterprises operate, especially when advanced telecommunication systems work in conjunction with

rapidly evolving Blockchain and the Internet of Things (IoT) technologies.

The integrated approach brings in a multitude of advantages, adding efficiency and visibility to the supply chain ecosystem. It opens up the door to the connected factory of the future and also enables near real-time data management riding on the lower-latency networks.

Blockchain and 5G will complement each other in increasing the adoption of decentralised networks for enhanced supply chain collaboration and visibility.

While 5G will provide the infrastructure for M2M interaction, Blockchain will ensure data reliability and security for smart enterprise operations.

Blockchain and 5G technologies will complement each other in increasing the adoption of decentralised networks for enhanced supply chain collaboration and visibility. While 5G will provide the needed infrastructure for machine-to-machine interaction, Blockchain will ensure data reliability and security, enabling smarter and faster value to the enterprise's operations.

The day is not far when enterprises across industries be it retail, automotive, healthcare, manufacturing, construction, energy and utility, agriculture and more will be able to build more resilient and efficient supply chain systems, thanks to the coming together of these foundational technologies.

#### **LOWER LATENCY DRIVES NEAR REAL-TIME DATA MANAGEMENT**

IoT sensors are designed to give companies real-time visibility of their supply chain by providing data on the location and condition of the supplies as they are transported across the world. With the coming of 5G-enabled networks, however, IoT sensors embedded into trucks, or moving assets can communicate across lower-latency networks – minimal delay in the processing of computer data over a network connection – for truly real-time data management and automation of tasks.

With ubiquitous connectivity made possible by 5G, communication lines will remain open even in low-density areas and smart contracts can be implemented more easily, even on tiny devices like sensors. In simple language, this means 5G will power Blockchain IoT applications to better track the movement of goods ensuring that they stay within specified conditions like temperature, position, arrival times, and status of shipping containers as they are shipped from point A to point B. While blockchain can store, manage, protect and transfer these massive flows of smart information the coming of 5G will accelerate the actual flow of information even in challenging contexts.

#### **SMART CONTRACTS FOR INTELLIGENT, RESILIENT SUPPLY CHAIN**

Blockchain-powered programmable smart contracts are

self-executing contracts that trigger transactions when pre-specified contractual obligations are met. This is one of the more disruptive effects of blockchain, but for smart contracts to be enforced automatically, there is a continuous need for data that can be transmitted and verified.

One common way of implementing this is through 'Oracles,' whose role is to provide this data. And with the coming of 5G, IoT-led data can be delivered with greater efficiency across faster networks with better cloud connectivity, to support intelligent decision-making and smart contract-led automation on the go.

#### **TRUSTWORTHY, IMMUTABLE AND DECENTRALISED DATA FLOW**

With a growing number of next-gen smart connected devices all with their processing and storage capacities, there is a high need for trust and security within different nodes of the network. Web 3.0 technologies make available indelible electronic records for every transaction on a decentralised, public or permission-led network and Blockchain attributes such as the immutability of transactions help ensure that all parties can trust the data and take action to move products quickly and efficiently. This decentralised peer-to-peer system of digital ledgers of transactions has inbuilt safeguards in place eliminating the risks of hacking, third-party changes, or cheating.

In the decades to come, the interplay of these foundational technologies will lead to the creation of new markets and innovative services in the fields of intelligent transportation, smart cities, medical treatment, smart agriculture and many others. With 5G connectivity becoming a reality in Indian cities, and Web 3.0 technologies powering the effective monitoring and control of connected IoT devices, we look forward to a truly open, connected, inclusive and profitable future, for enterprises and consumers alike. 🌟

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# Rolling out stronger with the AI power

Telcos must utilise Artificial Intelligence to launch 5G-enabled services that can meet the evolving needs of enterprise customers

BY ANAND MAHURKAR

**5G** promises speeds of up to 1 GBPS in India. It's a game changer in communications. As an equally exciting technology, Artificial Intelligence (AI) will play an enabling role for 5G telecom companies and their enterprise customers.

Telecom companies will benefit from the insights that AI brings in during deployment and monitoring, while enterprise customers will leverage 5G Multi-access Edge Compute (MEC) and AI capabilities to deploy revolutionary applications.

## 5G PLANNING AND MONITORING

Nationwide 5G deployment is an expensive and time-consuming process. For telecom companies, it is important to deploy the coverage in a manner that creates the greatest impact on demand and customer sentiment. Traditionally, the rollout was prioritised based on historical customer density. However, this approach ignored the impact on sentiment, churn, and potential customer expansion. Telcos are now deploying AI models to maximise their competitive advantage. Including external data such as socioeconomic variables, market distribution, sentiment, churn, and propensity to pay for rollout planning helps prioritise rollout on a granular regional level and increase ROI from the network upgrade.

Network deployment impact needs to be measured

across telephony and data KPIs. Telecom providers leverage Operations Support Systems (OSS) to collect KPIs from every node of the deployed 5G network. Comparable data is available from the 4G LTE nodes. Rule-based AI is used to calculate scores for telephony and data components of the network, such as setup times, throughput, and latency. The weighted source of truth provides a single quantifiable metric that can be explored in more granularity as desired.

The comparison of performance before the 5G deployment and after is called pre-post analysis. With the analytics software, pre-post analysis can be conducted with statistical significance to calculate confidence in the computed differential. Additionally, AI can readily determine the cause of the differential at the base KPI levels. This analysis is called attribution. With attribution, the operations team significantly reduces diagnosis time.

The data stack as explained in 'Hierarchy of performance and quality indicators' helps compute the network quality score. However, customer sentiment is another metric to measure the rollout's impact. NPS stands for Net Promoter Score. It's a customer satisfaction benchmark that measures how likely your customers are to recommend the business. A correlation can be created between the network quality score and the promoter score to observe the ROI from 5G deployment in each region.

Rule-based AI can be used to calculate scores for telephony and data components of the network, such as setup times, throughput, and latency.

Visualisation is key in monitoring the network health across regions. Exploratory Data Analysis, a key step in the AI journey, is applied to the OSS dataset to build a dashboard. The dashboard displays visualisations, correlations, and comparisons between quality indicators across regions.

### 5G MEC UTILISATION AND APPLICATION SUPPORT

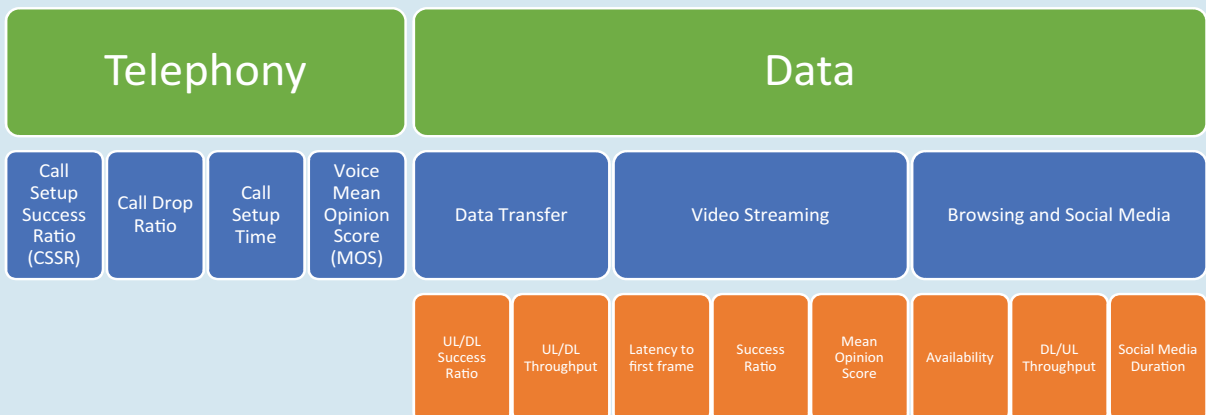
With 5G implementation, an exciting add-on is MEC. Edge Compute is the collection of cloud instances on network nodes near the user that help avoid latencies caused by communication with the central cloud. Telecom companies have partnered with cloud providers such as AWS, Azure, GCP, and IBM to roll out nationwide MEC.

AI will help the MEC ecosystem in multiple dimensions. Third-party Developers will need to develop low-latency, high-throughput applications. Real-time compute-friendly SDKs will be provided for technologies such as Machine Learning, Natural Language Processing, computer vision, remote (3D) rendering, customer support (conversational AI), and content delivery. These will enable exciting applications such as Immersive Bots that will allow conversations via text, speech, and movement of 3D models.

Once an application is developed, it will need to be deployed on certain instances. MEC is more expensive than the regional cloud computing counterpart. AI will forecast the traffic from different regions to help select relevant locations. Once launched, the app will provide traffic and performance

## Hierarchy of performance and quality indicators

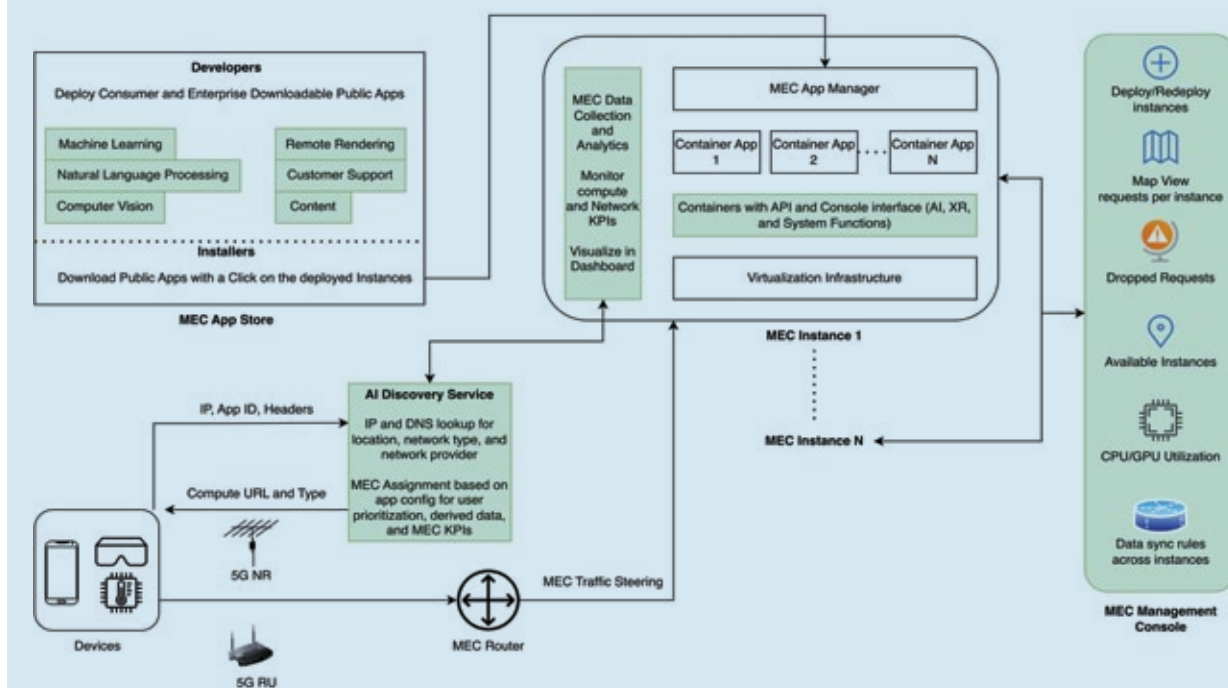
### Calculated Network Quality Score by Region and Customer



As indicated, the Key Performance Indicators (KPIs) such as the upload and download rate, latency, interruptions, success rate, and availability are tracked across calls, data transfer, video streaming, browsing, and social media at the user and region levels on the OSS. The KPIs are assigned weights based on relative importance and the weighted sum is calculated for each operation to arrive at the Key Quality Indicator (KQI) score. The sum of KQIs leads to an aggregate score for data and telephony.

Telcos track the data and telephony scores by region and investigate further with KQIs and KPIs as needed for diagnostics. AI can enable the automation of scoring, analytics, alerts, diagnostics, and prescriptive recommendations based on the hierarchy of performance and quality indicators.

## Multi-access Edge Compute Architecture



The flow chart represents the software stack for Edge Compute components and their interactions. The devices are endpoints accessing the network on an application deployed on one or more edge instances. The AI discovery service provides a MEC or Central Cloud Instance IP to the device based on availability and proximity for API requests.

The MEC instance represents a compute node on the network that can receive the API requests, perform operations, and provide a response. Each request is sent to the respective container (application) on the instance. The instance contains firmware components that are used as middleware by applications. It is also responsible for capturing KPIs for analytics and availability management.

The MEC management console is responsible for deploying new instances, providing analytics to application owners, and recommending redeployment on different MEC instances to provide better MEC coverage to the App audience. The developers are application owners responsible for building and deploying applications on the MEC. They leverage the libraries and installers provided by the Telcos.

statistics analytics through a MEC management console with redeployment recommendations.

Similarly, deployment of the application on the MEC will help in real-time data collection enabling the monitoring of the network and compute (CPU/GPU) usage. When devices need to connect to a nearby instance, an AI-powered discovery service will evaluate the optimal instance based on proximity and availability. Optionally, additional parameters such as network plan, subscription level, and device may be considered at the application developers' discretion via a config.

In conclusion, the rollout of 5G technology in India presents a significant opportunity for telcos to enhance

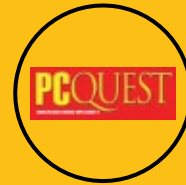
their enterprise services offerings and stay ahead of the competition. AI has the potential to play a critical role in enabling telcos to make the most of the capabilities of 5G and meet the evolving needs of enterprise customers. By optimising their network infrastructure, enhancing customer experience management, offering customised services, ensuring network security, and automating network operations, telcos can provide more value to their enterprise customers and position themselves as leaders in the 5G space. 🍀

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# An uphill task ahead for telecom service providers

The 5G network architecture needs to support up to ten times the capacity of the current 4G infrastructure, requiring a massive spike in Capex



BY RAJESH KAUSHAL

**W**ith major telecom players gearing up for the launch of the 5G network, the industry needs a lot of investments for network densification and active and physical infrastructure. Even though 5G has been launched in several cities across India, its complete roll-out demands an extensive undertaking.

A quick look at the data on global 5G infrastructure and one can note that China's 1.5 billion subscribers are served by two million towers as compared to 7,00,000 towers in India. Of these, only 30% of towers in India are fibreised, compared to 70–80% in China, Japan, Korea, and the USA. These data points indicate that India needs 2X–3X more infrastructure to meet the

These data points appear to show that India needs 2X–3X infrastructure to deliver this data demand and provide better Quality of Service (QoS) to users.

## Operators must increase the capacity of existing sites while they set up new sites to upgrade and expand 5G coverage.

increasing demands for data and deliver better Quality of Service (QoS) to users. For network densification closer to the point of data consumption, numerous cell sites, thousands of small cells, and IBS solutions would be necessary. Large-capacity new datacentres must be constructed to compute many Exabytes. This opens up several greenfield possibilities for the entire infrastructure ecosystem.

Similarly, 30% to 40% of towers constructed in the 2G era have significant levels of outdated equipment. To reach the level of automation and efficiency of the modern world, telcos and tower companies will need to improve the infrastructure in such locations gradually. Several topologies have changed since then, necessitating an upgrade to eliminate old inefficiencies. Thus, telecom brownfields present a potential for the business.

It is also important that operators increase the capacity of existing sites while they set up new sites to upgrade and expand 5G coverage. To reach the coverage goals, operators plan to commission 2,500 new base stations and upgrade 2,500 existing ones per week. However, the disruption in raw materials brought on by COVID, such as the rise in commodity prices, spot purchases, and semiconductor shortages, has temporarily impeded the operators' ability to increase execution speed. The telecom industry is working nonstop to clear all obstacles to meet infrastructure needs significantly and hence aid in the development of the country.

In a nutshell, the expected challenges to prepare for the complete roll-out of 5G services will revolve around three perspectives.

**Huge surge in data demand due to 5G:** The massive amount of data that 5G networks must process, store, and distribute may put a burden on data centres. It raises the demand for computing power as well as supporting infrastructures, such as storage, communication, and edge computing. For international investors and developers, datacentres in the nation have already established themselves as one of the most alluring

growth opportunities. Investments are pouring into the datacentre market as numerous new markets are emerging at once, and existing datacentres are expanding quickly in important cities like Mumbai and Chennai.

**Push for Capex to catch up with the demand:** During the last five years, the telecom and digital industry has seen the largest increase in its percentage of overall Capex across all businesses, going from 9% in FY13–17 to 17% in FY18–22. And this number is bound to increase in the coming years. According to estimates, the 5G network architecture will need to support up to ten times as much capacity as the current 4G infrastructure. In India, just 35% of all towers are currently fibreised, or connected by optical fibre, as opposed to the optimum need of 70% for the introduction of 5G services.

**A surge of infra may cause supply chain issues:** 5G is no more a vision but a reality that is shaping up fast. But India has to do a lot of catching up clearly. Even though the infrastructure gaps do create many opportunities with such a sudden surge, it might lead to various short and long-term challenges for the vendors. With 5G knocking on the doors, this high demand for infrastructure is expected to last for a period of months. The market is ready for 5G acceptance, but it would be interesting to see how efficiently the supporting infrastructure gets set up in conjunction with suppliers and manufacturers.

5G is ushering in a new world era for many industries, including but not limited to retail, entertainment, automotive, manufacturing, etc. From autonomous vehicles to connected logistics, smart healthcare to the industrial Internet of Things, and smart factories to augmented, and virtual reality – 5G will facilitate innovations of all kinds. Thus, a lot depends on how well the industry prepares for the next five years to meet the ambitious plans of 5G technology. 🌟

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# Getting ready to turn more heads

Communication and networking technologies are driving digital transformation in many ways. Here is how different sectors can benefit from these



BY HEMANT AGRAWAL

Communication and networking technologies are an integral part of the digital transformation (DX) journey. And they have witnessed a phenomenal rate of growth in the last three decades. According to estimates, the global spending on DX could be around USD 1.6 trillion in 2022 and it is expected to reach USD 3.4 trillion by the end of 2026.

The accelerated growth opportunities can be attributed to the rising demand for 24\*7 connectivity and unified communication that includes voice, video, and data.

These technologies have been instrumental in changing the lives of people and integrating the common people with the elite on the technology embracer pyramid.

More people are expected to reap the benefits that new technologies will render. While some of them are already in the adoption stage, others have just started to get heads to turn.

## 5G CELLULAR

India's long wait for the 5G is finally over with its grand

Wi-Fi 6E is the next step in Wi-Fi evolution that improves wireless connectivity by opening new dedicated channels previously unavailable.

An intent-based network applies a granular level of intelligence to replace the time-consuming manual approach of configuration and issue resolution.

rollout in October last year. The technology is expected to unlock enormous benefits for both consumer and enterprise businesses by leveraging shorter and higher frequency bands of the radio spectrum. Some of its highlights include low latency, greater density per area, and unprecedented broadband speed. Telecom subscribers will enjoy a great time with mobile gaming, fixed wireless access, and new immersive user experiences. Moreover, the exhilarating experiences of augmented and virtual reality can be accessed over the phone via many different applications.

The growth of Industry 4.0 technologies such as the Internet of Things (IoT), smart manufacturing, Artificial Intelligence (AI), Machine Learning (ML), smart factories, and Cloud Computing will be accelerated with the adoption of 5G. Some early mover industries such as manufacturing and healthcare are geared up to extract maximum benefits out of private 5G networks. With its capabilities, process automation will become faster with the remotely controlled deployment of simulators, drones, and robots.

Post Covid-19 pandemic, the need to provide quick healthcare services has become imperative. 5G technology can do wonders for online interaction between healthcare professionals and patients – located even in the most remote corner of the world. Apart from healthcare and manufacturing, other sectors that are expected to benefit include retail, defence, airports and ports, government, and education.

### WI-FI 6E

It is the next step in Wi-Fi evolution that improves wireless connectivity by opening new dedicated channels previously unavailable. With 2.4 and 5 GHz bands getting crowded, 6 GHz has been opened to address the issues of congested devices and networks. Wi-Fi 6E will provide speeds up to six times faster than Wi-Fi 5.

Its benefits include greater access point (AP) capacity, larger channel width, efficient bandwidth sharing, Wi-Fi sleeping, and backward compatibility. The industries that are poised to benefit from Wi-Fi 6E are manufacturing, healthcare, government, hospitality, education, retail and commerce, and transportation and logistics sector.

### SD-WAN

It is an acronym for Software Defined Wide Area Network in which a virtualised overlay of the network is created by abstraction from its hardware.

An intelligent network based on pre-defined metrics has been the need of industries for many years. Thanks to the advent of SD-WAN, wonderful things are possible now. An SD-WAN helps to connect many remote branch locations to a hub location. The hardware abstraction increases the network's flexibility and automation more than a standard WAN.

The network efficiency is underpinned by four central components including Edge Connectivity Abstraction, WAN Virtualisation, Centralised Management, and Elastic Traffic Management.

### NETWORK AUTOMATION

To introduce agility and flexibility to the network, its automation is crucial. Network automation enables the team to configure, scale and integrate the infrastructure and application services much more quickly compared to manual performance.

A more sophisticated version of intelligent network automation leverages the power of big data and machine learning to determine the best configuration and management of the network.

### INTENT-BASED NETWORK

It is an improvement on previous networking concepts that apply a more granular level of intelligence to replace the time-consuming manual way of network configurations and issue resolution.

To achieve the final objective, the network administrators initially define the intent or the objective. Based on the pre-defined conditions, the embedded software determines the approach to achieve the goal, credit to the capabilities of artificial intelligence and machine learning. 🧠

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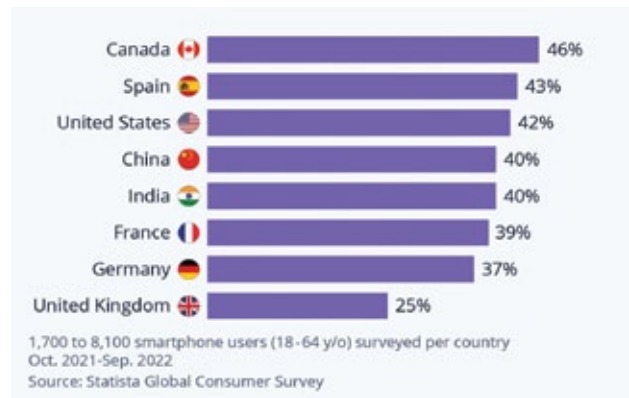
# Smartphone users have a soft spot for photo-editing apps

BY FELIX RICHTER

The overnight success of Lensa AI, a photo editing app powered by Artificial Intelligence (AI), should not come as a surprise to anyone who remembers the rapid rise and subsequent fall of FaceApp in 2019. Back then, FaceApp went viral after users all across social media had shared pictures of their older and younger selves generated by the app, quickly luring millions of people to try it themselves.

It seems like many smartphone users have a soft spot for photo editing apps, maybe because they appeal to people's inherent vanity. Regardless of the reasons behind it, camera and photo editing apps are among the most popular app categories, often high up the rankings of the highest-grossing apps. It appears as if many people are more than willing to spend a few dollars to brush up on their digital presence or to create some nice pictures of themselves and their loved ones.

According to Statista's Global Consumer Survey, photo editing apps are regularly used by roughly four in 10 smartphone users across several major markets, putting them behind basic apps such as email, browsers and social media and messenger apps but way ahead of the news, video, dating and fitness apps.



Share of smartphone users in selected countries who regularly use camera and photo editing apps.

Source: Statista.com

For the uninitiated, Lensa AI is a photo-editing app that uses Artificial Intelligence to create magic avatars. Having been fed 10 to 20 photos of any person, the app uses the open-source Stable Diffusion model to create realistic avatars of that person that look like they were made by an artist.

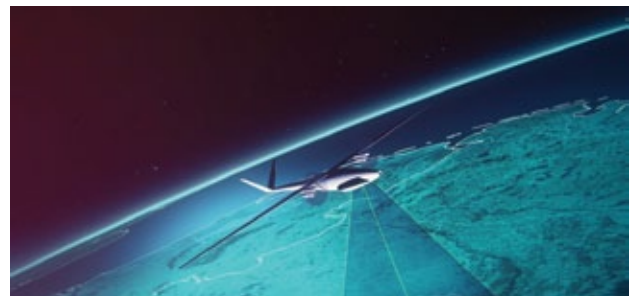
*Felix is a data journalist with Statista.*

## BT, Stratospheric Platforms to test beaming 5G from aircraft

British communication company BT has announced that it is partnering with Stratospheric Platforms to test the beaming of 5G from a High-Altitude Platform Station (HAPS) aircraft. The two companies intend to demonstrate that the new antenna technology can provide 4G and 5G connectivity in most rural and difficult-to-reach areas.

SPL's phased array antenna uses 500 individually-steerable beams to deliver speeds of up to 150 Mbps across areas as wide as 140 km or 15,000 sq km. Both the antenna and flight platform are powered by hydrogen to lower costs and improve sustainability. SPL delivered the 5G signal for five hours from 45,000 ft and achieved a download speed of 90 Mbps in its demo last year.

According to SPL, the Stratomast HAPS, which is under development, should be able to stay in the air for a week on a full tank of hydrogen. It also claims the



technology is more energy-efficient and less emission-intensive than terrestrial infrastructure.

Connectivity from a HAPS aircraft could be used for a variety of purposes, including search-and-rescue, supporting humanitarian aid, enhancing maritime security, and delivering more reliable connections to consumers in remote areas.

## Nokia unveils microwave solution to extend 5G reach



**F**inish telecom company, Nokia has launched Wavence microwave solutions to expand 5G network coverage in urban and rural areas. The UBT-m XP, the latest addition to the Wavence product family, is designed to support mobile operators and enterprises with premium coverage in both dense urban and rural environments.

The company also launched SteadEband, a stabilised three-foot antenna, that helps overcome common issues in the E-Band frequency, such as tower vibrations and thermal effects. This can increase typical E-Band link distances by up to 50% and support mobile operators in delivering multi-gigabit 5G connections to customers. The products improve both link distance and energy efficiency in the Wavence portfolio, the company stated in a press release.

The UBT-m XP is a single ultra-broadband transceiver with an integrated modem and diplexer. It offers best-in-class energy efficiency with twice the transmit power compared to the industry average. In recent tests, Nokia demonstrated a 12-km-long link using the Nokia UBT-m XP and the SteadEband antenna. It also announced the launch of the Outdoor Channel Aggregator (OCA) to support mobile operators looking to expand the reach and capacity of their networks for rural broadband applications. The OCA combines multiple UBT-T XP radios for increased throughput and improved system gain, leading to greater link distance and cost savings on antenna or repeater systems.

Nokia also introduced the Carrier Aggregation High Density (CAHD) card, which adds 'single pipe' capacity to the backhaul to support the link distance. The innovative CAHD module enables 10 Gbps backhaul capacity over multiple channels and supports seamless migration from existing low-capacity backhaul to high capacity hence preserving an operator's investment.

## Ericsson, Intel, Microsoft take network slicing to laptop



**E**ricsson along with partners Intel and Microsoft have demonstrated end-to-end 5G standalone network slicing capabilities on a Windows laptop. The trial demonstrates the applicability of the technology on devices beyond smartphones, paving the way for new business opportunities for cellular-connected laptops, Ericsson stated in a press release.

Powered by Intel processors and running on Windows 11 (OS), the interoperability development testing (IoT) carried out at the Ericsson Lab in Sweden showed the use of multiple network slices on cellular-connected laptop devices for consumer and enterprise use cases such as mobile gaming and collaboration applications.

The network slicing trial utilised User Equipment Route Selection Policy (URSP), the capability that enables devices to automatically select between different slices according to which application they are using. It also used Ericsson's Dynamic Network Slicing Selection, Ericsson's dual-mode 5G Core, and Ericsson's RAN Slicing capabilities to secure end-user service differentiation. Together they deliver the required network capabilities for this solution.

"The trial illustrates the opportunities for 5G monetisation beyond smartphone devices and opens the door to a wider 5G device ecosystem. It also allows CSPs, telcos, and IT companies to expand their horizons when considering opportunities to generate profitable use cases for 5G," the company stated, adding that the inclusion of Windows 11 laptops in the ranks of devices that can be used for commercialising 5G network slicing is a sign of maturing ecosystem.

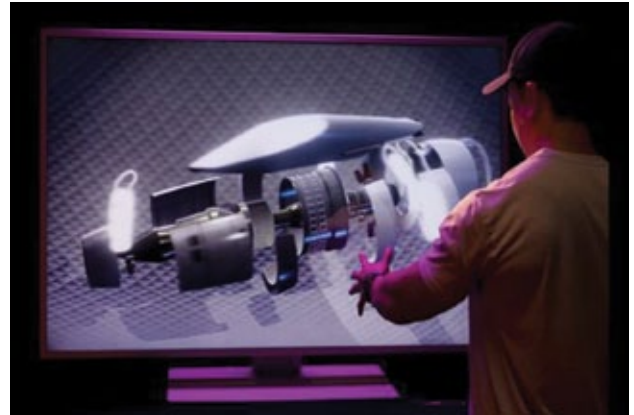
## Accenture invests in hologram company Looking Glass Factory

Global professional services company, Accenture has announced its investment in Brooklyn-based hologram company Looking Glass Factory that enables businesses to offer immersive experiences to customers buying products online. Accenture wants to help its portfolio of online business clients to bring immersive experiences to e-commerce stores.

Looking Glass has developed a holographic platform that showcases content in life-like 3D. Unlike several platforms that require users to wear a 3D headset to interact with content immersively, Looking Glass can offer the same experience without VR/AR headsets. This makes its technology perfect for adoption by e-commerce businesses looking to offer 3D experiences to customers.

Looking Glass' display technology allows brands, designers, and consumers to showcase 3D content that is typically viewed in 2D. The company believes that the rapid shift towards 3D experiences could have a significant impact on the future of communications and retail. Eventually, the consumption of 3D media could become a norm at home, further boosting adoption and use cases.

Further, the Looking Glass Blocks sharing platform enables the same content to be shared seamlessly through any internet browser and across a variety of environments: mobile, social and even the metaverse. This marks the first-ever platform for hosting and sharing 3D holograms on the internet, allowing brands to provide



their fans with an immersive consumer experience anywhere, on any device.

"Looking Glass' 3D technology can be deployed in physical environments along with paired metaverse experiences to create deeper, more immersive interactions between brands and their customers," said David Treat, Senior Managing Director and global lead of Accenture's Metaverse Continuum business group. "We believe this technology has the potential to play a valuable role in metaverse content creation and across enterprise applications that bridge the physical and digital worlds, including retail marketing and holographic communications."

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## Ciena, Intelia boost capacity of Honotua submarine cable

French Polynesian telecom operator ONATi, a subsidiary of the OPT French Polynesia Group, has selected Intelia and Ciena to increase the capacity of the Honotua international submarine cable to 300 Gb/s.

The Honotua international cable was upgraded using Ciena's GeoMesh Solution powered by the 6500 Packet-Optical Platform and WaveLogic Ai technology providing 300 Gb/s of information-carrying capacity on a cable system supporting an upgrade path to 5Tb/s of total capacity to rapidly address future growth.

The Honotua international cable is a 4,500km submarine communication system that interconnects several islands of French Polynesia from Tahiti to Hawaii. The Honotua international cable system was deployed in 2009, and it is owned and operated by the OPT French Polynesia Group to supply connectivity to more than



220,000 mobile subscribers, 45,000 fixed internet customers and 16,000 audio-visual multimedia users.

"This turnkey project is an important milestone for boosting French Polynesia's international connectivity and we are proud ONATi has collaborated with Intelia and Ciena to implement it," said Romain Dhalluin, CEO, Intelia.

## Huawei enables Telecom Egypt set up green tower in Africa



**H**uawei Technologies has announced the activation of the first eco-friendly wireless network tower made of Fibre Reinforced Polymer (FRP) for Telecom Egypt. With this, Telecom Egypt has become the first operator in Africa to install a green tower, the company stated in a press release. The material used for building the tower emits less CO<sub>2</sub> than steel. Highly resistant to wind and high temperatures, the tower is approximately 18 metre high and has a special camouflage fence made of environmentally-friendly materials. It supports wireless network antennas and radio units featuring the latest energy-saving technologies and partially powered by solar cells.

Telecom Egypt's green sites also feature the latest Radio Access Network technologies, such as radio units optimised to offer top performance with 40% less energy consumption than traditional sites. The company also claimed that these new technologies contribute to improving the signal quality by about 20% as compared to regular antennas. "This means that fewer base stations need to be installed resulting in a lower environmental footprint and an additional step towards environmental sustainability," said Adel Hamed, Managing Director and CEO of Telecom Egypt.

Jim Liu, CEO of Huawei Egypt explained that energy solutions for green sites depend on passive cooling, which eliminates the need for air conditioning, and thus leads to a 47% reduction in energy consumption compared to sites with equipment rooms. Finally, Liu noted that the site is fitted with solar panels providing about 2 kilowatts, leading to an additional 20% reduction in carbon dioxide emissions.

Liu also pointed out that recent studies show that FRP poles produce 43% less carbon dioxide emissions, compared to steel, and also reduce end-to-end energy consumption by nearly half during manufacturing and shipping.

## Mavenir, AMD to help CSPs transition to cloud-native network



**N**etwork software provider Mavenir has announced that it is collaborating with AMD to drive a new initiative that will help Communication Service Providers (CSPs) transition to cloud-native telecommunication networks. A company press release stated that Mavenir has incorporated AMD Zynq Ultrascale+ RFSoc devices into its OpenBeam Radio Portfolio to introduce new functionality, features, and capabilities for its customers.

The company also informed that its Converged Packet Core has been validated on AMD EPYC CPUs. "This means Mavenir's cloud-native, fully containerised, virtualised Converged Packet Core (4G and 5G) solution can now be deployed on AMD EPYC server CPUs to provide CSPs with more options to implement virtual network functions in cloud data centers," the press release stated.

The OpenBeam radio portfolio is designed to meet the growing needs of CSPs with agile, cost-efficient, intelligent radios to meet the critical demands on the network as well as meet the changing needs of the future. The radio solutions can be used for a wide range of use cases, including basic coverage across all frequency bands, outdoor small cells, and for public and private networks in both urban and rural environments.

Mavenir's Converged Packet Core is an end-to-end, fully containerised portfolio that offers multi-generational support to modernise existing mobile networks while providing a cost-effective journey to 5G. Its cloud-native architecture, with applications and services purpose-built for the cloud model. Its web-scale granular microservice architecture meets carrier-grade requirements such as high availability, security, and performance.

## Cisco intros cloud management tools for IIoT application

Technology major, Cisco has announced new cloud management tools for Industrial Internet of Things (IIoT) applications. The cloud services comes with simplified dashboards to increase industrial asset visibility, securely manage assets from anywhere and provide IIoT customers with a seamless path to cloud automation for Operational Technology (OT) teams.

The company also informed that its ThousandEyes now supports OpenTelemetry, the open-source framework and industry standard that partners, customers and providers rely on to generate, collect, process and export cloud-native and distributed telemetry data. "As the first network visibility solution to support OpenTelemetry, ThousandEyes is making it possible for customers to interconnect cloud and Internet intelligence across a wide range of solutions for unmatched data correlation and insight," Cisco stated in a press release.

Cisco also announced that its unified SASE solution, Cisco+ Secure Connect, now supports integration into Cisco SD-WAN fabrics using Viptela technology. Cisco



SD-WAN customers now have access to fast, secure private applications and internet access, enabling them to deliver a secure experience to their employees anywhere.

This unified solution converges networking and security to provide customers with a single platform and a streamlined operational model that simplifies and scales the visibility, management and control over a hybrid work environment. This converged operating model also provides IT teams with enhanced visibility and control over the network, making the experience easy for them to manage.

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## Airbus to provide tactical defence satcom to Belgium

Airbus has announced that it has signed a contract with Belgium's Ministry of Defence to provide tactical satellite communications services for 15 years. The armed forces will utilise channels of the Airbus Ultra High Frequency (UHF) military communications hosted payload on-board a commercial telecommunications satellite manufactured by Airbus. The company plans to launch its UHF communications service in 2024 for the armed forces of European countries and NATO allies.

An Airbus-manufactured commercial telecommunications satellite will carry the Airbus UHF military communications hosted payload for use in land, sea, and air operations. The UHF payload will be operated from Airbus's Network Operations Centre in Toulouse. Its 18 UHF channels will enable up to 200 simultaneous communications over Europe, the Middle East, Africa, large parts of Asia, as well as the Atlantic Ocean (to eastern Brazil) and the Indian Ocean (to western Australia).

As the UHF frequency band is a relatively scarce orbital resource, this offering will make up for the capacity shortage around the world. Airbus has already



signed several firm orders for this capacity, well ahead of the satellite's scheduled launch.

Military UHF satcoms are used by the armed forces for operations on land, at sea and in the air. They have a high level of interoperability and are therefore very useful for multinational and coalition operations. The UHF band is very flexible and offers a lightweight, robust and highly secure means of communication. An extensive range of terminals for use on land, at sea and in the air is available to meet the needs of the various armed forces.

# Disneyland after the carnival

Connectivity, healthcare, and automotive ecosystems – CES 2023 showcased where communication is moving next, and in a tangible way



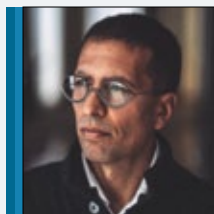
BY PRATIMA HARIGUNANI

**A**fter a two-year pause button, the drum roll at the world's annual tech mecca was quite audible, even if you are sitting miles away. There was a flying electric boat and wireless surprises – TV and other boxes. The Consumer Electronics Show (CES) 2023 also showcased eye-glass size Virtual Reality (VR), a BMW with an Augmented Reality (AR) display, a Mercedes with Dolby Atmos, and pee sensor analytics for home toilets. Visitors also got a whiff of the digital scent wearables and witnessed the power of smart John Deere excavators. On the smart agriculture front, there were fertiliser analytics, crop-watching robots, and smart sprinklers. Impressively

enough, Indian innovators were betting high on the future too with 3-D printing, e-mobility, drones, audio wearables, and mixed reality.

## DEVICES AND COMMUNICATIONS

Communication devices and gadgets rule the roost in the new digital world and the CES 2023 had several innovations to showcase. While satellite innovators like the Bullitt Satellite Connect presented satellite messaging solutions, Qualcomm displayed its satellite offering for Android phones with two-way messaging via the Snapdragon Satellite tech. We also had a big



“We hope to see more technology focusing on delivering purely emotional comfort, which is lacking from the mostly performative tech world.”

**Kwame Ferreira**, Co-founder, Impossible and Bond Touch and CEO, Impossible Group

disruption in the ‘black rectangle’ form fatigue of smartphones with a new era of foldability, like the Samsung promise of Flex Hybrid.

There was, of course, a separate space for 5G and Smart Cities, showcasing the connected ecosystem that brings together the technologies, solutions, players, and audiences in the smart city sector. The focus was clearly on the Internet of Things (IoT), 5G connectivity, transportation and smart automotive, energy and utilities, health and public safety, artificial intelligence, and data analytics.

There was a lot of buzz in the accessibility area too, with screen and text readers to speech input software, voice activation, advanced screen readers for Braille displays, and adaptive devices for gaming. This space

also talked about how Microsoft and Google are working to fully unravel the tech marketplace for people with disabilities.

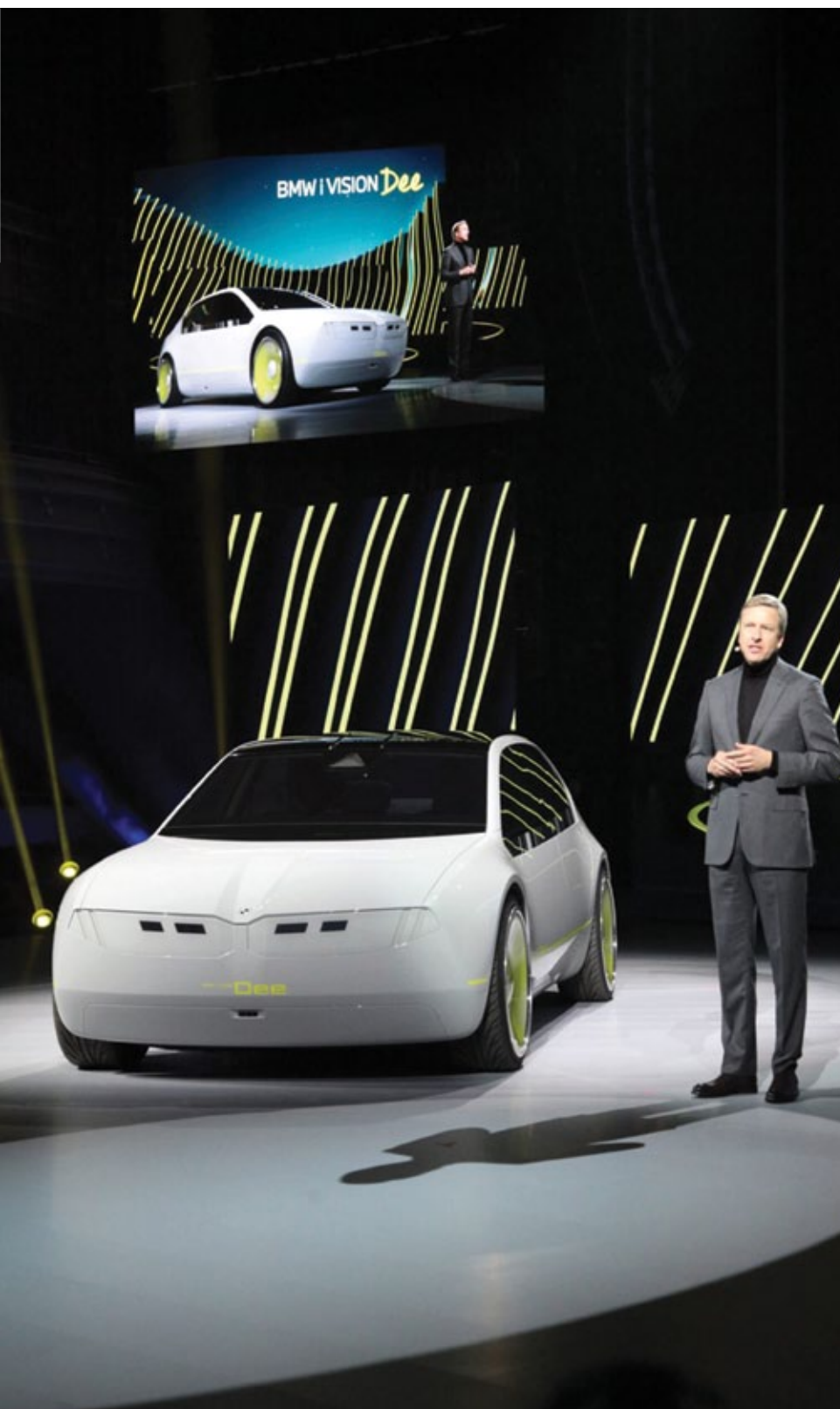
Interestingly, however, a lot of curtain-raisers this year were from industries like automotive and digital health. Nevertheless, their trickle-down effect would show in communication and connectivity areas sooner or later.

### NEW SECTORS, MORE INNOVATION

There were splash-making exhibits by BMW and Stellantis along with a lot of eye-popping material on self-driving technology, electric vehicles, and personal mobility devices for land, air, and sea. Delivering the keynote, BMW AG Chairman of the Board of Management and CEO Oliver Zipse talked about how the future of mobility can merge the real and virtual worlds with



The 2mm thin tracking device and printed battery unveiled by the Pod Group enables new logistics use cases.



Oliver Zipse, BMW AG Chairman and CEO presents the BMW i Vision Dee based on the Neue Klasse platform and promises to offer the next level of human-machine interaction.

BMW's vision of the ultimate digital driving machine.

"With the BMW i Vision Dee, we are showcasing what is possible when hardware and software merge. In this way, we can exploit the full potential of digitalisation to transform the car into an intelligent companion. That is the future for automotive manufacturers, and, also, for BMW – the fusion of the virtual experience with genuine driving pleasure," Zipse said.

Analysts have also singled out communication-related leaps this year. We saw, for instance, digital cockpits in EVs, and also a big move towards text-to-speech technology. Besides, there were a lot of offerings in digital therapeutics, mental wellness, women's health technology, and telemedicine.

### THE HARDWARE SWAGGERS

The tech-innovation Mecca with exhibitors from over 170 countries and regions also saw the emergence of third-party chips which can pose as better alternatives for devices that come out of Apple's stable. Incidentally, in a keynote, AMD CEO Dr Lisa Su highlighted AMD's vision of high-performance and adaptive computing.

And then, there was the IoT aisle which was packed to the brim with new announcements and handshakes, like MediaTek which introduced the Genio 700 IoT chipset targeting the industrial, smart home, and smart retail applications and is expected to be available by Q2 2023. It also gave a peek into the Wi-Fi 7-supported products like gateways, mesh routers, televisions, streaming devices, smartphones, tablets, and laptops along with partners like TP-Link, Lenovo, Hisense, ASUS,



“A lot of work is shaping up on connectivity and how various devices, vehicles, and home appliances can talk to each other and create a luxurious environment.”

**Muzammil Hassan**, Head - IP Licensing and Commercialisation, GreyB

Buffalo Inc, Skyworks, AMD, Qorvo, LitePoint and MAC MLO among others.

Another one of interest was the paper-thin smart label tracking device from Pod Group. Launched in partnership with SODAQ and Lufthansa Industry, the device utilizes low-power cellular connectivity (LTE-M) to offer a battery life of up to six months. It aims to disrupt the tracking and logistics industry by improving supply chain efficiency and reducing operational costs. This is in line with similar efforts by SODAQ with Vodafone and Bayer by utilising NB-IoT technology. The use of a Low Power Wide Area Network (LPWAN) here could be path-breaking for telecommunications operators.

Then there was Quectel, partnering with Skylo to integrate satellite connectivity into its 5G-ready BG95x/BG77x series of LPWA modules. It claims to improve network coverage and usability for applications, such as trackers, wearables, smart cities, and smart meters.

As pointed out by Counterpoint Research, the satellite-related announcements made by chipset and module players were salient for IoT companies as a way to focus on new use cases. What could not be missed was the sense of Wi-Fi 7 becoming mainstream and roll-outs of Matter-certified home products being rolled out, leading to an uptick in demand for smart home products. “These developments and more continue to shape the future of IoT and solidify the role technology plays in our daily lives. With more innovation, the possibilities are endless and we are excited to see how the industry will continue to evolve,” its analysts noted.

### CONNECTING THE DOTS

For Kwame Ferreira, the Co-founder of Impossible and Bond Touch and CEO of Impossible Group, voice and foldability were hard-to-miss colours in this year’s splash. “We loved to see voice everywhere. We feel the way we interface with technology is becoming increasingly natural, like Fufu, a pillow that pulsates as though one would be hugging

another human. It was a nice outlier in the emotional wearable space. We hope to see more technology focusing on delivering purely emotional comfort, which is lacking from the mostly performative tech world,” he said, adding that foldable have become more common and as the technology evolves there is little reason why most phones won’t become iPads and vice versa.

Apart from the domino effect seen in other industries, two patterns stood out this time. And when we look at the way innovations are moving, it’s hard to ignore the leitmotif of Design and Talk-ability. Muzammil Hassan, head of IP licensing and commercialisation at technology research firm GreyB augurs that a lot of work is shaping up on the theme of connectivity, and how various devices, vehicles, and home appliances can talk to each other and create a true luxury environment for the user. What is also worth noting is how the latest standards have kicked in for WiFi, 5G, Bluetooth, audio, and video encoding. Hassam finds it remarkable how the layman today is aware of the latest developments.

He also pointed out that environmental sensibility would be a dominant theme this year and ahead. “We will see batteries with environment-friendliness, or re-usability elements and overall innovations that can create better environments than before for plants and animals, apart from making life easy and fun for humans.”

Omdia’s Principal Analyst for Data Center Compute and Networking, Manoj Sukumaran points out to the hype around the metaverse losing steam. “There were quite a lot of AR/VR headsets and holographic displays were showcased, but broadly the vendors accepted the fact that the metaverse is a long shot than an immediate opportunity,” he said.

Well, overall, we can only hope – what happened in Vegas, does not just stay there. 🎰

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# The 100-million sprint

Backed by Elon Musk and Microsoft, the AI chatbot has become the fastest-growing app in the world

**T**he conversational AI, ChatGPT, has rapidly gained popularity since its launch last December. Developed by OpenAI, the chatbot crossed the 100 million user mark in just two months. As reported by SimilarWeb, ChatGPT had an impressive 13 million daily users in January 2023 alone. This growth is unprecedented compared to other social media apps like Instagram and TikTok, which took 2.5 years and nine months respectively to reach 100 million users.

Similarweb estimates that the chat.openai.com site has attracted around 25 million visitors per day in recent weeks and has seen an average daily growth rate of 3.4% over the past month. On 31 January this year, the site hit its peak with 28 million hits from 15.7 million unique visitors.

Early on its journey, the Elon Musk-backed AI chatbot, crossed the one million users mark within five days of

its launch leaving behind popular online platforms and services like Instagram, Spotify, Dropbox, and Facebook that reached the milestone in less than a year. Instagram, for example, achieved one million users in 2.5 months, as measured by app downloads. Spotify and Dropbox also reached the mark in five and seven months, respectively, as they offer practical, immediate benefits to users.

While social media services generally took longer to reach one million users in the past, this has changed over time as the Internet has become more widely available. Also, Netflix which was launched as a subscription-based service in 1999 took 3.5 years to reach one million users. Similarly, it took Airbnb 2.5 years and Twitter two years to reach the one million user base.

The rapid growth of ChatGPT has caught the attention of incumbent internet giants, including Google, with CEO Sundar Pichai referring to the capabilities of AI and the

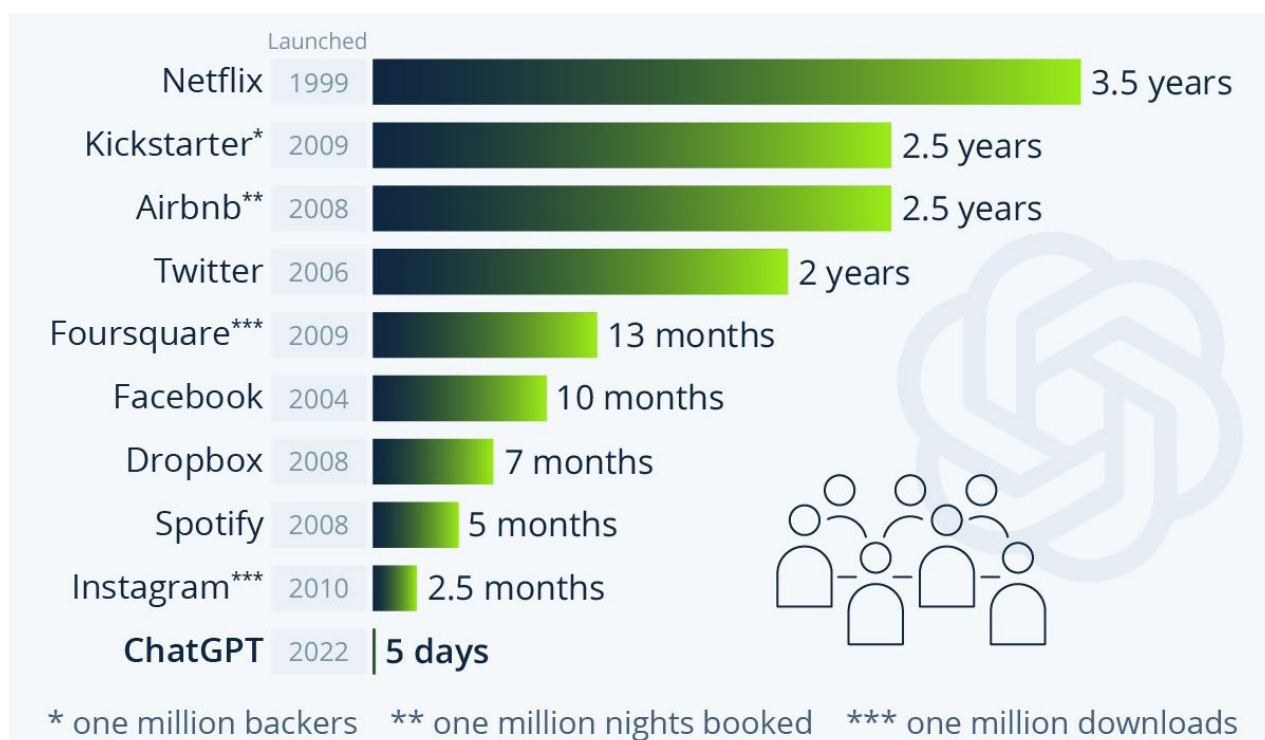


ChatGPT website has attracted around 25 million visitors per day in recent weeks and an average daily growth rate of 3.4% over the past month.



“We formed our partnership with OpenAI around a shared ambition to responsibly advance cutting-edge AI research and democratise AI.”

Satya Nadella, CEO, Microsoft



ChatGPT is the fastest among popular online services to reach the one million user base.

Source: Statista.com

world's eagerness to use it in a recent earnings call. This has led to increased competition in the AI chatbot space, with China's Baidu announcing plans to develop their own ChatGPT-rival soon.

Interestingly, while Bill Gates has warned that AI technology like ChatGPT could replace human workers in white-collar jobs, Microsoft has announced a multimillion-dollar investment in OpenAI. “We formed our partnership with OpenAI around a shared ambition to responsibly advance cutting-edge AI research and democratise AI as a new technology platform,” Satya Nadella, Microsoft's CEO, said in a statement.

Microsoft is also reported to have said it would soon add ChatGPT features to its cloud computing service,

Azure. If ChatGPT becomes available on that service, businesses could use the tools directly within its apps and services. Experts believe that the investment could also establish Microsoft as an AI leader and ultimately pave the way for the company to incorporate ChatGPT into its office tools.

OpenAI has also introduced the ChatGPT Plus model, which offers a faster response time, priority access to new features, and guaranteed service during peak hours for a monthly subscription fee of USD 20, currently only available in the US. 🧠

(This report has been written by ChatGPT using the information fed as a prompt by the V&D edit team)  
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