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The e-commerce dilemma needs an ethical overhaul

We have all heard of stories from customers receiving bricks instead of the goods they ordered online or products not per the specifications mentioned on the e-commerce platform. Often there is a spurt in such incidents during peak seasons and major sales events like Black Friday. British author and filmmaker Oobah Butler, however, took this problem to an unprecedented level by exposing Amazon's harsh working conditions through a daring experiment.

In his documentary, The Great Amazon Heist, Butler shed light on the appalling working conditions faced by Amazon delivery drivers, including urinating in bottles to save time. To draw attention to this issue, he collected bottles of urine from these drivers and creatively marketed them as an energy drink called 'Release Energy.'

Soon, the fake product became a bestseller on Amazon in the 'bitter lemon' drink category, emphasising the platform's vulnerability to manipulation. To achieve this Butler got his friends to buy the product and leave positive feedback on the platform.

This experiment not only revealed the deplorable conditions faced by delivery drivers in countries like the US, UK, Italy, and Spain but also exposed the lack of oversight and understanding within powerful e-commerce platforms. The ease with which Butler managed to list a fake product on Amazon, and subsequently push it to the top of the sales charts, underscored the platform's ignorance of its inner workings.

In India, the situation for e-commerce delivery drivers is no better, with numerous reports of accidents occurring as drivers rush to meet tight delivery deadlines. Additionally, many e-commerce platforms lack control over their vendors and the quality of products supplied, raising concerns about customer safety and satisfaction.

To address these pressing issues, the government must take decisive action. Firstly, stringent regulations and oversight mechanisms need to be put in place to ensure that e-commerce platforms adhere to ethical standards. This includes verifying the authenticity of products, penalising vendors engaging in fraudulent activities, and implementing measures to safeguard the welfare of delivery personnel.

Secondly, the government should collaborate with e-commerce companies to establish comprehensive training programs for delivery drivers. These programs should focus on safety protocols, stress management, and effective time management, reducing the risk of accidents caused by rushed deliveries.

Moreover, there should be regular audits and inspections of e-commerce warehouses and facilities to assess the working conditions and ensure compliance with labour laws. E-commerce platforms should be held accountable for the well-being of their employees, fostering a safer and more respectful working environment.

Butler's audacious experiment serves as a wake-up call for the e-commerce industry and the government across the world. By implementing strict regulations, fostering transparency, and prioritising the safety and well-being of workers, governments can create a secure and trustworthy online shopping environment for consumers. With India's online retail sector expected to surge to USD 325 billion by 2030, the government must take immediate action to curb unethical practices, protect consumers, and uphold the integrity of the e-commerce industry.

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The future belongs to Web3, and it is time to back it

Though the Web3 startup sector is facing financial challenges, there is little doubt it is going to deliver economic and technological gains in the long run

BY PARTH CHATURVEDI

Web3 is envisioned to be the next generation of the Internet, built using blockchain technology. After Web1 (read-only), wherein users could just consume information from a source, and Web2 (read and write), wherein users could consume and interact with online information, Web3 (read, write, and own) promises to let users consume, interact and even own their data. Using the principles of blockchain, Web3 is more decentralised and secure than the current Internet, Web2, where centralised platforms dominate online economies. Web3 is an evolution of the Internet and has the potential to impact a wide range of industries beyond finance, including but not limited to governance, healthcare and education.

The world is already witnessing various applications of blockchain technology across the public and private sectors. Noteworthy government-backed projects in India include the West Bengal government's partnership with Airchains to establish blockchain-based land ownership and caste certificates recorded on-chain in Maharashtra, built by LegitDocs. India's corporate sector has also started recognising the potential of Web3, with industry leader Reliance expressing interest in exploring blockchain platforms in its latest AGM. This is a global phenomenon, with prominent brands like Nike, Reddit and Starbucks increasingly incorporating NFTs into their brand engagement strategies and major financial players like PayPal introducing their stablecoins for payments. The country is at the cusp of blockchain-powered innovations gaining mainstream adoption soon.

There is no denying that India is globally respected for its technological prowess and is recognised as a global hub for innovation. Even in Web3, the demand for Indian engineering talent is immense, and several world-class projects have been incubated by Indian blockchain developers. However, as India's Web3 ecosystem

> Corporate India has started recognising the potential of Web3, with Reliance expressing interest in exploring blockchain platforms in its latest AGM.

continues its rapid evolution, it finds itself at a crucial juncture in its development.

The Web3 startup industry, which was flourishing till the onset of the ongoing bear phase, currently faces multiple challenges spanning from a notable decline in funding, to a lack of clarity regarding a regulatory framework.

WEB3 FUNDING IN INDIA

The funding activity for Web3 startups in India has seen a sharp decline, in stark contrast to the bull market years. Even in 2022, the total Indian Web3 funding was an impressive USD 717.5 million, but halfway through 2023, the YTD total funding has dwindled to a mere USD 104.5 million. This has exposed the need for India to have capital earmarked for the Web3 ecosystem, from dedicated investors who have built an investment thesis for the sector and are in it for the long run.

However, it is worth highlighting that this trend is not unique to Web3 or India alone. It mirrors the global slowdown in funding across startups, as risk capital is being less actively deployed in an increasing interest rate regime. Web3 startup funding also gets impacted by price cycles and usually goes through periods of euphoria and despair.

But in the current downturn, most of what seems to have exited is 'tourist capital', i.e., funding from investors who entered the market out of FOMO during the bull run and could not handle the current market downturn. Web3 native funds based on a long-term thesis, are still actively deploying but with increased scrutiny. To survive the current bear market founders must exercise financial prudence by reducing burn rates and extending their financial runways. They should also explore applying for accelerators and incubators, or building during hackathons to gain more visibility from investors. This period presents a unique opportunity to construct resilient products capable of withstanding the cyclical nature of the market, thus shaping the future of India's Web3 ecosystem.

FUELING THE DIGITAL INDIA NARRATIVE

With the third largest global blockchain developer base of over 10,000 developers, a supportive Web3 ecosystem with a progressive regulatory framework can easily position India as a global player in the rapidly evolving digital landscape. This could be an Indian IT moment all over again, as we can build a new version of the Internet, that is more inclusive, decentralised and captures more value for end-users.

This focus on strengthening the Web3 ecosystem can, in turn, catalyse economic growth by adding billions of dollars to India's GDP. A thriving Web3 ecosystem is a magnet for investments, both domestic and foreign, resulting in an increasing number of 'crypto' unicorns that will propel the sector forward. This economic prosperity extends beyond the tech sector, benefiting various other industries and amplifying the impact of India's digital evolution. As foreign investments and collaborations flow into the thriving Web3 ecosystem, India not only benefits from capital infusion but also gains access to global expertise and best practices, elevating its overall competitiveness in the digital sector.

Beyond economic gains, the technologies underpinning Web3, such as blockchain and decentralised applications, have the potential to revolutionise critical sectors like governance, healthcare and supply chain management. Blockchains digitise trust and remove the need for middlemen, increasing efficiencies and decreasing attack vectors for any flow of goods, services, information or value. So we have only begun scratching the surface in terms of understanding what business models are possible with Web3 and will continue to be amazed by the value capture that the 'new' Internet will offer.

Crucially, supporting homegrown Web3 companies also safeguards digital sovereignty. It reduces dependency on foreign tech giants, ensuring control over data security and privacy, a pivotal aspect in today's digital age.

In this environment of innovation and research, Web3 companies foster a culture of continuous advancement. It is a decisive step towards realising the vision of a digitally empowered India, seamlessly connecting various aspects of national development and global leadership. ♻

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Data matters, so does intelligence

By embracing intelligent automation, organisations can reduce errors, and enhance innovation, effectively addressing the new realities of data

BY MANISH GUPTA

Automation is a hot topic these days. Most of us agree that automating business processes can save time and money, making our organisations more efficient and innovative. But there is often an unspoken fear surrounding it. Questions like 'How much time and effort will it cost to get my organisation up to speed with automation?' or the elephant in the data centre, 'Will automation leave my staff without a job?' contribute to inaction or the late adoption of automation.

IT managers today face multiple challenges in an increasingly competitive environment. According to the Dell Technologies 2023 Innovation Index report, 35% of Indian businesses are dealing with the lack of automation to manage complex security technology. Many of these businesses also share common frustrations that slow down processes, increase costs, and make life harder and less efficient than it should be.

Especially for medium businesses, lacking the extensive resources and specialist skills of large corporations, are vulnerable to facing risks. On average, medium-sized businesses have limited IT staff personnel, and with a lean team, time is precious. It is estimated that 47% of all cyberattacks target medium businesses, with extremely costly consequences ranging from lost productivity to business success. As the challenges of data protection continue to mount, the pressure for IT teams to reduce cost and to "do more with less" continues to grow.

INTELLIGENT AUTOMATION APPROACH

To accelerate innovation, an intelligent automation

> Proactive resilience automatically ensures data and network security with multiple layers of defence while eliminating blind spots before they can be exploited.

IN BRIEF

- **Fears:** Concerns about job loss and implementation costs hinder widespread adoption of automation in businesses.

- **Challenges:** IT managers in medium-sized businesses, face resource limitations and cybersecurity risks, with 47% of cyberattacks targeting such businesses.

- **Complexities:** Automation and intelligence help businesses tackle data complexities, enabling them to leverage valuable insights.

- **Benefits:** An intelligent automation approach, using AI and predictive analytics, offloads management tasks, enhancing efficiency and reducing human errors.

- **Support:** Intelligent automation empowers IT departments, enabling them to focus on high-value innovation initiatives and respond affirmatively to innovation-related requests.

approach uses machine learning, artificial intelligence, and predictive data analytics to offload the management burden and free teams to focus on high-value innovation initiatives.

To enable intelligent automation, organisations must incorporate infrastructure that is built with automation at the core. By automating with embedded intelligence, a business dramatically increases efficiency, reduces human error and improves productivity.

By leveraging automation and intelligence in the organisational value chain organisations can easily address the new reality of data while reducing the impact that complexity has on the business.

- **Leverage new technologies:** Intelligent infrastructure adapts to any workload to provide flexibility while helping IT simplify operations.

- **Reduce the IT burden:** A modernised infrastructure allows IT staff to spend less time on day-to-day activities and more time delivering business value. Intelligent systems can work together and independently, enabling rapid digital transformation and productivity while allowing organisations to scale without disruption.

- **Deliver "as-a-service" simplicity:** Infrastructure delivered using as-a-service operating models frees IT teams from having to deploy and manage hardware while improving the organisation's ability to acquire, scale, and manage infrastructure as the business grows.

- **Achieve proactive resilience:** About 35% of Indian businesses are still dealing with the lack of automation to manage complex security technology. Proactive resilience automatically ensures data and network security with multiple layers of defence that work in tandem to keep hackers out while anticipating and eliminating blind spots before they can be exploited.

- **Upgrade business agility:** By proactively replacing outdated resources at the optimised time, IT can better maximise the value it delivers for a business and its customers — while reducing costs.

In today's rapidly evolving digital economy, organisations must modernise and automate their IT infrastructure to leverage vast amounts of valuable data and draw relevant insights. An intelligent automation approach gives the IT department the ability to say "yes" more frequently to innovation-related requests. 🔶

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Fostering a secure global ecosystem

A shared regulatory framework is vital to ensure a robust digital landscape and a secure interconnected Digital Public Infrastructure

BY NSN MURTY *&* YUKTI SHARMA

In an increasingly interconnected world, the digital landscape has become a critical component of public infrastructure. Governments rely on digital systems for essential services, economic stability, and national security. However, as our reliance on digital technologies grows, so does the vulnerability of these systems to cyber threats. The Group of Twenty (G20) nations, a forum of the world's major economies, has recognised the imperative for collaborative cybersecurity efforts to secure digital public infrastructure.

Digital infrastructure includes physical and digital assets, and with the proliferation of technology, these systems now encompass everything from power grids to government operations and healthcare databases. Security of these interconnected systems is paramount in the digital age, as a breach can have cascading effects across multiple sectors.

Cyber-attacks on Digital Public Infrastructure (DPI) assets, including data, cloud services, and devices, can disrupt essential services, compromise sensitive data, and undermine national security. For example, a cyberattack on a power grid could result in widespread outages, affecting everything from homes to hospitals while attacks on financial institutions could lead to economic instability. To safeguard these critical components, a shared regulatory framework is essential, ensuring a robust digital landscape.

Cross-border transactions, from online shopping to international real estate investments, already exist and are integral to the global economy. Recognising their importance, the G20 has established a framework focused on payment system interoperability, regulatory frameworks, and cross-border data exchange and message standards, enabling secure and efficient information sharing.

COLLABORATIVE APPROACH
The G20 is implementing a collaborative approach to global cyber-security by combining resources, knowledge, and expertise among member nations, ensuring a more effective response to evolving threats.

IN BRIEF

- There is an urgent need for collaborative cybersecurity efforts to safeguard DPI, crucial for essential services and national security.
- Cyber-attacks on DPI assets can disrupt essential services, compromise sensitive data, and destabilize economies.
- G20 nations have adopted a collaborative strategy by combining resources, knowledge, and expertise to create a resilient digital infrastructure.
- Balancing national sovereignty with international collaboration, diverse cybersecurity capabilities, and evolving cyber threats pose challenges.
- Continuous adaptation is required to keep pace with new tactics and technologies employed by malicious actors.
- A cybersecurity framework, collaborative trade groups, audits, certifications, and adoption of global standards are key to secure cross-border transactions.

It will also strengthen the resilience of digital public infrastructure by creating a supportive network, making it harder for cybercriminals to penetrate critical systems. These initiatives can contribute significantly to global stability, as a secure digital infrastructure is a fundamental foundation for stability in today's interconnected world.

However, this joint approach to cybersecurity within the G20 also has its set of challenges such as balancing national sovereignty with the imperative of international collaboration, especially concerning sensitive information sharing and adopting global norms. Additionally, the diverse levels of cybersecurity capabilities and different stages of data privacy and security regulations among member nations pose a challenge, requiring efforts to ensure equitable participation and support, especially for countries needing more assistance.

Furthermore, the ever-evolving nature of cyber threats demands continuous adaptation from member nations, who must keep pace with the new tactics, techniques, emerging technologies, and procedures employed by malicious actors. Lastly, any international agreements on cyber norms and standards must navigate complex legal and ethical considerations, safeguarding individual rights and privacy while promoting global cybersecurity efforts.

CROSS-BORDER INFRASTRUCTURE

A comprehensive approach to enhance cybersecurity and facilitate cross-border trading and knowledge sharing within the G20 framework is now needed. Firstly, the establishment of a G20 regulatory framework on cybersecurity will set universal standards, allowing countries to subscribe to and adopt these guidelines for a globally cohesive approach. In parallel, a shared collaborative trade consortium that collectively defines data policies and guidelines may be established focussed on facilitating cross-border partnerships and supporting businesses

While the guidelines are established, it's crucial to emphasise the need for regular audits, particularly through third-party assessments. The process can be further strengthened by introducing verifiable certification mechanisms for countries that comply with shared standards and regulations. The technology landscape is constantly changing, and with emerging technologies on the horizon, there would be a need to adapt and continuously monitor the maturity of the guidelines. Simultaneously, implementing a shared incident reporting mechanism will bolster collective security awareness, ensuring rapid responses to potential threats.

Additionally, collaborative efforts to adopt and implement global standards, for instance, ISO 20022 for cross-border payments, and ISO/IEC 27017:2015 for the provision and use of cloud services, etc. are of paramount importance. By streamlining communication protocols and data exchange mechanisms, efficiency and security can be significantly enhanced.

With this, the G20 can establish a robust framework for secure cross-border transactions, promoting global collaboration and standardization for a seamless digital trading environment. The core of Digital Public Infrastructure is the well-being of citizens and data integrity, with the primary goal of fostering a trusted ecosystem for secure digital trade with other economies, ensuring non-negotiable safeguarding of personal information. 🕸

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The great Indian AI push

MeitY has come up with a multi-year plan to develop an India dataset platform and build indigenous compute infrastructure

BY VERNIKA AWAL

The Ministry of Electronics and Information Technology (MeitY)'s push for the creation of dedicated data platforms seeks to shape the future of Artificial Intelligence (AI) in India. This, going forward, can help create a centre-backed data platform, with data from Indic languages, to progress innovation that will drive the next generation of corporate data infrastructure in the coming years.

WHAT IS THE MINISTRY BACKING?

On 13 October 2023, Rajeev Chandrasekhar, the Union Minister of State for Electronics and Information Technology, in an interaction with the media, elaborated on the Centre's India AI strategy, which was based on reports compiled from seven working committee reports. There are two clear prongs to the strategy—first, a multi-year roadmap to develop an India Datasets platform, and second, the development of an India AI compute platform to indigenously build chips that will power super complex and powerful data operations.

"The India Datasets platform will be one of the largest and most diverse collections of anonymised datasets to train multi-parameter AI models… It will be deployed in real-life use cases that span across agriculture, healthcare, education, fintech, cyber security, governance through digital public infrastructure, and languages through the Bhashini program. We believe AI can have a transformational effect in these areas, and catalyse the startup ecosystem that is already fuelling Digital India," Chandrasekhar said at the press briefing.

Chandrasekhar also said that a key part of India's AI strategy will be to create curated datasets as part of the broader platform, which will be managed by an independent National Data Management Office (NDMO) within MeitY. Further, there will be both government as well as private sector datasets within this platform, and only anonymised and non-personal information will be a part of it.

FUTURE OF INDIA'S DATA OPERATIONS

Such a platform is likely to play a crucial role in the future of India's academia, private sector and public sector data operations. In turn, data centres will begin playing increasingly crucial roles in storing, securing and

> "The India datasets platform will be one of the largest and most diverse collections of anonymised datasets to train multi-parameter AI models."
>
> **Rajeev Chandrasekhar**
> Union Minister of State for Electronics and IT, Government of India

processing with low latency the extent of indigenous data in India—all of which can potentially become equitable as a digital public good for a wide range of use cases.

Why, though, is this important? First, most of the world's datasets are based in the English language—which represents the only universal language that offers organised data across various industries such as economy, finance, medicine, energy, and others. In due course of time, each industry will feature multiple business intelligence platforms, which will process anonymised corporate data with trillions of parameters to process industry-wise data analytics.

These data analytics operations, in turn, will play increasingly important roles in every sector—including corporate decision-making, automation of sales and ancillary operations, and internal automation of various sub-segments. To do so, the creation of datasets, especially in diverse language subsets, will be key.

The backing of the government to create a public datasets platform, in this regard, could be key to offering a uniform base for corporations in the country to leverage a public data platform in future. This, in turn, could be particularly key for academic institutions to pursue AI research in applied and theoretical divisions. Startups and small enterprises can also leverage such platforms to create the base for AI operations, even without having substantial revenue for investment.

PUBLIC COMPUTE INFRASTRUCTURE

One of the biggest challenges to developing and processing AI models and infrastructure is access to compute power. Today, US tech firm Nvidia has a lengthy waitlist for corporates to get access to their graphics processing unit (GPU) chips—which require multiple billions of dollars to put together and build.

Under such circumstances, having an indigenous public compute infrastructure, akin to India's supercomputer infrastructure, can help companies and entities with limited resources have the ability to create advanced AI applications.

It is this that can help India leverage AI datasets and compute infrastructure as a corporate public good—enabling development at unprecedented levels. Going forward, this can help resolve one of the biggest challenges of AI development—how expensive compute resources have been. In turn, this can be further built upon by private firms, and in turn, be developed into an industry the way the domestic fintech sector was built by the advent of Unified Payments Infrastructure (UPI). 🔱

IN BRIEF

- **Government's vision:** MeitY's initiative aims to shape India's AI future, creating diverse datasets and powerful compute platforms to fuel innovation across sectors.
- **Diverse dataset:** The India Datasets platform will curate anonymised data, spanning agriculture, healthcare, fintech, and more, fostering AI-driven transformation.
- **Data management:** An independent office will manage curated datasets, ensuring a blend of government and private sector data while prioritising anonymity and non-personal information.
- **Digital public good:** The initiative addresses the challenge of English-centric datasets by creating diverse language subsets.
- **Compute power:** By establishing indigenous public compute infrastructure, the government aims to enable resource-limited entities to develop advanced AI applications.

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TV RAMACHANDRAN

FTTH + WI-FI = SOLUTION FOR
INDIA'S DIGITAL ECONOMY

India must explore FTTx and modern Wi-Fi solutions to address 5G monetisation challenges and create an inclusive, sustainable, digital society

In the rapidly evolving digital landscape, India strives to lead the global digital revolution by making significant progress in high-speed Internet connectivity. India has made commendable strides in deploying cutting-edge 5G mobile technology, covering approximately 10,000 towns and deploying 3.4 lakh stations by August 2023. Despite this achievement, the lack of 'killer' use cases poses significant monetisation challenges globally and in India.

Since a base station could have three or more cells, one could do a marketing stroke by stating that over a million cells have been set up. While this is indeed admirable, one must pause and note that it is also an open secret, globally and in India, that there are huge monetisation challenges in 5G due to a lack of 'killer' use cases.

NEED FOR A BALANCED DIGITAL ECONOMY

India can ill afford to waste its financial resources on projects with nil or negative returns and hence, alternative technological solutions need to be considered for digital progress. It needs to also be appreciated that a good digital economy needs to be a balanced one by technology.

A lopsided economy, with over-dependence on fixed broadband, mobile broadband, or any other technology, would not be adequately efficient or sustainable for the modern era. There needs to be balanced and holistic development of all elements of digital infrastructure including fixed networks, mobile, satellite, Wi-Fi, data centres, CDNs, etc. to ensure optimum results.

As is well known, mobile technology is subject to the characteristics of RF engineering. The speed delivered, the reliability, and the consistency are dependent on multiple variables like distance from the tower, foliage and/or thickness of walls between handset and tower, number of subscribers logging onto the tower at that time, as well as the speed of movement of the subscriber.

These factors are outside the control of the operator or the subscriber and hence result in quite variable and unpredictable quality. However, both fibre and Wi-Fi are less subject to variables and hence the combo of Fibre-to-the-home/ building (FTTH/B) and Wi-Fi can provide far more reliable and consistent quality.

ADVANTAGES OF FTTX AND WI-FI INTEGRATION

Implementing 5G infrastructure requires significant investment in expensive towers, network equipment and electronics. In contrast, FTTx can leverage existing infrastructure like utility poles, power lines and underground ducts, which can significantly reduce deployment costs. This makes FTTx a more cost-effective solution for a country like India with budget constraints and a price-sensitive market.

> " Fibre can have nearly infinite capacity and by optical characteristics, can deliver much higher speeds than even 5G.

> A lopsided economy, with over-dependence on fixed broadband and mobile broadband, would not be efficient or sustainable for the modern era.

Fibre can have nearly infinite capacity and by optical characteristics, can deliver much higher speeds than even 5G. When seamlessly integrated with Wi-Fi technology, these speeds transcend barriers, offering users an unparalleled online experience. This high-speed connectivity becomes the catalyst for various technological marvels, from seamless video conferencing and real-time data analytics to immersive virtual reality experiences.

Also, noteworthy is the situation as regards China, where at the end of August 2022, there were 622 million fixed-line broadband users, up 32.1 million from the start of the year as against mobile broadband users of about 1 billion by December 2022. Recent data reveals that 22% of broadband customers in China have access to downlink speeds of at least 1 Gbps. Media reports indicate that out of the total broadband users in China, 94% have a connectivity of 100 Mbps and above. However, even in China, 5G has not generated economic returns for the operators.

On the other hand, India, as of July 2023, clocked 832.5 million wireless broadband subscribers and 35.7 million wired broadband subscribers. This is a highly unbalanced digital situation and quite undesirable for achieving a healthy growth of Digital India. No wonder then, the country needs to step up fast to match and excel in the uptake of FTTH/B in comparable regimes. The Estimated additional FTTH/B connections during the January-March 2023 period stands at 1.36 million for Brazil, 14.6 million for China, and 1.75 million for the USA. In contrast, India stands at just 0.81 million.

EMBRACING MODERN WI-FI TECHNOLOGIES

An FTTH/B connection with a good wireless router at the endpoint makes for a compelling broadband connection and is particularly relevant for India. As earlier pointed out, this type of connection provides very good speed, and bandwidth as well as reliability and consistency in the home or building. Unfortunately, since the start of mobile communication in India, Wi-Fi did not get the importance it deserved and hence this segment languished completely until NDCP 2018 brought it to the fore and stipulated a goal of 10 million public Wi-Fi hotspots by December 2022. However, the achievement against this target has not been more than about 0.5 million.

It is noteworthy that the Bharat 6G Vision Document released by the Prime Minister of India in March 2023 emphatically restated an augmented goal of 50 million public Wi-Fi hotspots by 2030. Both NDCP and the 6G Vision Document thus clearly underscore the need for adequate public Wi-Fi backup to support the advanced technologies of 5G and 6G. India now needs to install at least seven million public Wi-Fi hotspots every year to meet the 6G Vision by 2030.

It should be noted that India needs to also ensure the use of the modern and advanced Wi-Fi technologies that are available. The country is, predominantly, still on Wi-Fi 5 (802.11ac) whereas the world has moved on to the advanced versions of Wi-Fi 6 and Wi-Fi 6E, and is on the verge of adopting Wi-Fi 7. Wi-Fi 6E is a powerful version of Wi-Fi 6 (802.11ax) offering several advantages, including wider channels of 160 MHz or even 320 MHz and lower latency making it ideal for applications like 4K and 8K streaming, sophisticated online gaming and other bandwidth-intensive tasks.

Many new devices and routers are now equipped with Wi-Fi 6E support to take advantage of these benefits. India can ill-afford to lag in this respect. Further, HFCL in India has already developed Wi-Fi 7 chips and is exporting them whereas the country is yet to adopt them. With such modern Wi-Fi versions on top of an FTTH/B connection, the possibilities are limitless.

FTTX AND WI-FI IN RURAL CONNECTIVITY

The recent approval of Rs.1.39 lakh crores for BharatNet presents an opportunity to extend FTTx and modern Wi-Fi connections to every village. This is probably the largest funding globally for reaching broadband connectivity to rural areas. This can prove to be an excellent method of taking FTTx + modern Wi-Fi like Wi-Fi 6E to reach rural citizens, enhancing healthcare, education, and work opportunities, thereby bridging the digital divide and creating a more inclusive society.

> An FTTH/B connection with a good wireless router at the endpoint makes for a compelling broadband connection that is relevant for India.
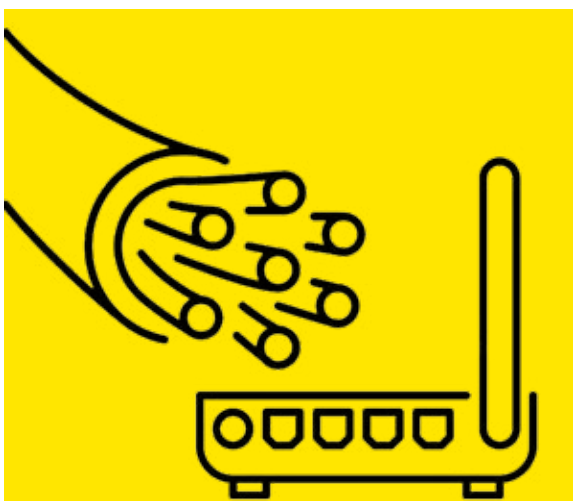
IN BRIEF

- **Monetisation challenges in 5G:** Despite 5G deployment, the lack of 'killer' use cases globally and in India poses significant monetisation challenges.

- **Balanced digital economy:** India needs a balanced digital economy, avoiding over-dependence on specific technologies for sustainability and efficiency.

- **FTTx and Wi-Fi:** FTTx leveraging existing infrastructure and high-speed Wi-Fi integration offer cost-effective, reliable, and scalable solutions.

- **Evolving Wi-Fi Tech:** India must adopt Wi-Fi 6E and Wi-Fi 7 for seamless connectivity and to keep pace with global standards.

- **Rural connectivity:** Investment in BharatNet offers an opportunity to extend FTTx and modern Wi-Fi connections.

- **Environmental sustainability:** FTTx and Wi-Fi contribute to environmental sustainability by consuming less energy as compared to other technologies.

Fibre-enabled Wi-Fi networks can play a big role in smart cities and smart villages. From intelligent traffic management and energy-efficient infrastructure to connected public services, the synergy between fibre optics and modern Wi-Fi can remarkably transform urban, semi-urban and rural living. Additionally, FTTx + Wi-Fi is also vital for the expeditious growth of IoT, which is essential for India.

Unlike other competing technologies which consume significant amounts of energy and give rise to environmental concerns, FTTx + Wi-Fi also contributes to environmental sustainability since fibre optics require less energy to transmit data over long distances. WIK Consult has shown that FTTH networks are 2.5x times more energy efficient per megabyte transmitted than 5G. A 15% transfer of traffic from fixed to mobile networks could result in 16% higher energy consumption which would lead to 3.2 megatons of additional CO_2 emissions in Europe per year by 2030.

It is undeniable that 5G technology has tremendous advantages in many 'mobile' applications but a vast and diverse country like India demands other complementary approaches as well. FTTx + Wi-Fi presents a compelling alternative that can effectively address the nation's unique challenges. Fibre and Wi-Fi combo offers a cost-effective, reliable and scalable solution to bridge the digital divide and provide high-speed Internet to nooks and corners of India. There is also the unique opportunity of deploying the innovation of PM WANI public Wi-Fi architecture which enables hassle-free movement from one public Wi-Fi hotspot to another for accessing broadband without repeated KYC authentication, verification etc.

Leveraging the landmark Cabinet decision, we now have an opportunity to take a giant stride towards a more inclusive society. Indeed, in the race for digital transformation, FTTx plus modern Wi-Fi might well prove to be India's winning combination. ♣

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Aprecomm to power Mercku WiFi mesh devices

Aprecomm has announced that Mercku will be adopting the company's AI-enabled analytics platform to power its innovative WiFi mesh devices. Mercku equipment will now have out-of-the-box support for Aprecomm's network intelligence cloud, which helps optimise connectivity experience for homes and small businesses. Communication service providers using Mercku's WiFi devices can benefit from complete network visibility, enabling them to swiftly resolve customer inquiries through fully automated root-cause analysis, reducing response times to mere minutes.

Aprecomm provides an Artificial Intelligence (AI) enabled software stack to measure WiFi Experience for broadband and enterprise users. Its patented WiFi intelligence solutions proactively identify and troubleshoot WiFi issues, improving subscriber quality experience. This helps ISPs and enterprises improve support efficiency, reduce downtime, and reduce operating costs. It currently manages more than five million WiFi equipment and has proven positive ROI for communication service providers across the world.

Pramod Gummaraj, CEO, Aprecomm, expressed his excitement about the partnership, stating that it will transform WiFi experience management for ISPs in Mercku's markets, boosting broadband rollout efficiency and ensuring unparalleled success. Mercku's Co-Founder and CEO, Shi Ge, emphasised the merger of art and technology, providing users and operators with solutions they love.

Guharajan Sivakumar, CTO of Aprecomm, highlighted how their AI-based solution will elevate WiFi performance, offering Mercku users a flawless Internet experience and empowering service providers with cutting-edge subscriber understanding technology. This collaboration marks a significant step forward in the evolution of WiFi connectivity, promising seamless experiences and efficient support for users and providers alike.

Safexpay launches neobanking platform for MSMEs

Safexpay, the digital payments company, has unveiled NeuX, a cutting-edge neobanking platform tailored for Micro, Small, and Medium Enterprises (MSMEs), corporates, and B2B businesses. NeuX seeks to revolutionise the B2B payment and workflow landscape by digitising entire business operations. Targeting 50-70 million merchants in key sectors, Safexpay aims to provide a comprehensive B2B digital solution.

The platform addresses challenges in the B2B payment sector, such as managing complex ERP systems, high integration costs, and outdated payment methods. NeuX is a holistic B2B platform, enabling seamless payments and offering value-added services on existing payout platforms. It promises to simplify business operations, including purchase and sales management, inventory control, and taxation, ushering in a new era of digital business.

NeuX caters to diverse sectors, including FMCG, pharma, agriculture, and e-commerce, accommodating businesses with or without supply chain modules. Unlike conventional neobanking services, NeuX goes beyond payments, guiding businesses through workflow.

While initially designed for Indian markets, NeuX is poised to serve MSMEs in the Gulf region, including Saudi Arabia, UAE, Oman, and Qatar. Safexpay's recent venture into the GCC region demonstrates its commitment, with plans to invest USD 8-10 million and an anticipated annual growth rate of 80-100% by 2025. NeuX signifies a significant leap towards digitisation, empowering businesses with seamless, secure, and efficient solutions in an ever-evolving digital landscape.

STL develops the world's slimmest 160-micron OFC

Indian optical and digital solutions company STL has unveiled the world's slimmest 160-micron Optical Fibre Cable (OFC). Engineered at STL's Centre of Excellence in Maharashtra, this indigenously developed technology enables the 160-micron fibre to carry 3 times more capacity than traditional 250-micron fibres. By significantly reducing the cable diameter to 6.4mm, approximately 32% less than the 250-micron fibre, STL's innovation will transform deployment, bandwidth capacity, and environmental impact of networks.

This breakthrough has significant implications for India's broadband landscape, especially in large-scale projects like Bharatnet, where deploying around 20 million fibre km cables by 2025 is a monumental task. The use of 160-micron fibre in place of the standard 250-micron fibre could potentially reduce deployment time by 15%. Moreover, this technology allows the use of smaller diameter ducts, thereby decreasing the plastic footprint in the ground by approximately 30%.

STL's 160-micron fibre meets stringent telecom-grade optical performance standards and complies with the ITU G.657A2 standard. The reduction in fibre size below 250-micron, a challenging feat, has captivated optical experts worldwide. The innovation marks a significant leap in the global optical technology landscape, showcasing India's prowess in the field.

Dr Badri Gomatam, Group CTO at STL, emphasised their achievement in overcoming challenges related to micro-bending sensitivity and complexity in the fibre drawing process, stating, "Through highly calibrated process and material engineering, we have achieved a breakthrough in manufacturing processes and glass compositions to realise micro bend insensitivity."

HFCL launches 1728 fibre IBR cable

Integrated communications product and solution provider, HFCL Limited, has unveiled a cutting-edge product in the form of its 1728-fibre Intermittently Bonded Ribbon (IBR) Cable. This new cable empowers telecom operators and enterprises to expedite the installation of 5G network infrastructure, enhance Fiber-to-the-Home capabilities, and meet the escalating demand for high-capacity networks, particularly from data centres.

HFCL's 1728-fibre IBR cable offers twice the fibre packing density within the same diameter compared to traditional 864-fibre flat ribbon cables. The gel-free IBR cable is designed for high-productivity mass fusion splicing, ensuring cost-efficient deployment, easy installation in congested areas, and swift restoration in case of accidental outages.

As businesses migrate to the cloud and sectors like BFSI, e-commerce, manufacturing, and retail drive demand, India's data centre market is set to boom, with 45 new data centres, covering 13 million sq. ft, expected to be established by the end of 2025. These high-fibre count IBR cables play a crucial role in meeting the demand for dense fibre connectivity, essential for managing larger, sophisticated data centres.

Additionally, the Indian government's focus on fibreisation and significant investments in telecom infrastructure across global markets provide a substantial opportunity for companies like HFCL. Despite the progress with a 38.44% fibre penetration rate, India aims to achieve 70% tower fibreisation by 2024-25, as per the target set by the government. The recent approval of a Rs 1.39 lakh crore plan for rural broadband connectivity further amplifies the demand for fibreisation to bridge the digital divide.

# Scytale unveils first quantum secure communication platform

Delhi-based Quantum Security Company, Scytale Alpha, incubated by the Data Security Council of India (DSCI), has introduced India's first Quantum Secure Communication Platform, setting a new standard in secure messaging and video conferencing. Designed to fortify India's communication backbone amidst global uncertainties, the platform ensures unparalleled privacy, security, and data ownership.

Scytale Alpha's innovative solution offers on-premises security, ensuring user data never leaves a secure space, and granting absolute control over governance, law enforcement, strategic operations, and diplomatic exchanges. By incorporating advanced post-quantum cryptographic key exchange and a Quantum Random Number Generator (QRNG), the platform facilitates secure mutual handshakes between clients, making prediction and hacking virtually impossible.

Wing Commander Satyam Kushwaha (retd), Director of Scytale Alpha, emphasised the platform's significance in safeguarding India's sovereignty, addressing vulnerabilities posed by existing platforms with servers located outside India's jurisdiction. This pioneering solution protects formal and informal communications, mitigating risks to national interests.

Furthermore, the launch of the national quantum mission presents a significant opportunity for India to advance in quantum computing and related technologies. The mission's potential impacts across sectors like healthcare, sustainability, clean energy, climate change, and employment underscore its profound significance for all Indian citizens. Scytale Alpha's Quantum Secure Communication Platform marks a crucial step towards India's digital future, ensuring robust and sovereign communication channels in an increasingly complex global landscape.

NetApp, Equinix deliver BmaaS for Cloud adjacent experience
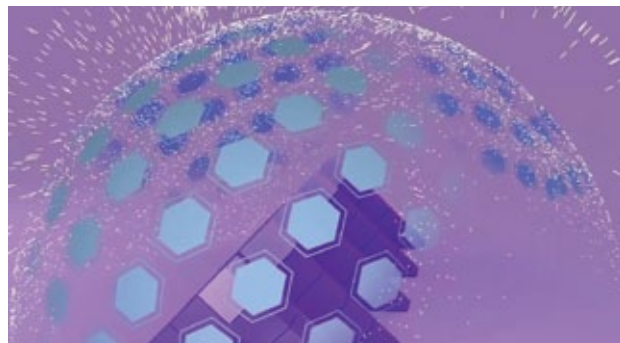
NetApp has partnered with Equinix to introduce a new Bare-Metal-as-a-Service (BMaaS) solution. The new offering integrates NetApp Storage with Equinix Metal to operate as an as-a-service model through NetApp Keystone. NetApp Storage on Equinix Metal offers a comprehensive hybrid cloud experience within a single subscription, enabling users to customise storage capacity and performance without unnecessary overprovisioning. It also integrates seamlessly with Equinix Metal's infrastructure, providing a unified full-stack experience for storage (file, block, and object), compute, and networking under one subscription.

Key advantages of this solution include cloud-adjacent capabilities, allowing users to build their hybrid multicloud experience while retaining control over their data in a low-latency, high-performance environment. The integration of NetApp Storage with Equinix Metal's dedicated bare metal servers ensures fast data access, minimal latency, and efficient handling of demanding workloads.

Users can scale storage resources on demand to meet evolving business needs, benefiting from NetApp Storage's robust data security features, including industry-leading encryption and ransomware protection. Equinix's global network enables the deployment of NetApp Storage on Equinix Metal in Equinix International Business Exchange data centres worldwide, offering simplified management through NetApp's unified control plane and Equinix Metal's automated provisioning platform.

This strategic collaboration expands NetApp's cloud strategy, delivering a hybrid multicloud experience. The solution optimally connects to major public clouds through local, high-speed connectivity, offering users full access to NetApp cloud services such as Cloud Volumes ONTAP on Equinix's global dedicated bare metal equipment. With this cutting-edge offering, NetApp and Equinix redefine the possibilities of hybrid cloud solutions, ensuring flexibility, scalability, and security for businesses globally.

Airtel offers omnichannel platform for CCaaS

Bharti Airtel has introduced a Contact Center as a Service or Airtel CCaaS, an integrated omnichannel cloud platform that merges Voice-as-a-Service (VaaS) and cloud connectivity, eliminating the need for enterprises to source voice, cloud, and software separately from various vendors. This approach significantly reduces capital and time investments for contact centre requirements.

The platform, in collaboration with leading providers like Genesys, offers a unified experience by combining the best of voice, cloud, and contact centre software. The platform enables enterprises to initiate contact centre solutions instantly at affordable monthly costs, simplifying management and enhancing customer contact experiences. Abhishek Biswal, Head of Digital Products and Services at Airtel Business, expressed confidence in revolutionising the segment, streamlining operations, and enriching customer interactions.

Airtel CCaaS enables seamless call handling for inbound and outbound calls, call routing, queuing, conference calling, redirection, and cloud monitoring accessible from any office location at any time. The platform also eliminates the need for enterprises to close requisite regulatory compliances and the challenge of longer wait time during troubleshooting requirements, which not only involve higher capital, operational expenses and time investments but also limit easy scaling to other locations.

Offered under Airtel's CPaaS platform, Airtel IQ, CCaaS underwent successful pilot testing with positive feedback from marquee customers, highlighting its convenience and affordable pricing options. This groundbreaking technology promises to reshape the contact centre landscape, providing businesses with an efficient and cost-effective solution for their communication needs.

Nokia to help Tata Play launch WiFi 6 services

Nokia has announced that Tata Play Fiber will deploy its fibre optical line terminal (OLT) technology across its network footprint in India. The OLT will enable Tata Play Fiber to offer WiFi 6 services, increase data capacity and improve seamless coverage to residential and SOHO enterprise customers.

Nokia will supply fibre-to-the-home and Wi-Fi equipment, including OLT, Optical Network Terminal, and Wi-Fi 6 mesh Beacons. A key feature of the Nokia solution is its Mesh technology which will ensure seamless coverage for large customer premises and areas with barriers like concrete walls, and the use of AI/ML software to identify traffic patterns, faults and potential outages in the GPON network.

Qualcomm tests 5G RedCap device in India

Qualcomm Technologies along with Ericsson and Airtel showcased the Reduced Capability (RedCap) device capabilities using Snapdragon X35 5G Modem-RF System and Ericsson's RedCap software on Airtel's 5G TDD network. It was the first-ever implementation and validation of RedCap in India.

RedCap is a device platform that bridges the capability and complexity gap between extreme-end 5G capabilities and mid-tier use cases, providing efficient support at 220 Mbps downlink and 100 Mbps uplink. The reduced complexity enables more cost-efficient devices, lower power consumption, longer battery life, and a smaller device footprint. This, in turn, enables the development of designs for a wide range of use cases.

Ericsson launches toolkit for differentiated 5G connectivity

Ericsson has unveiled a state-of-the-art software toolkit designed to enhance 5G Standalone network capabilities and deliver premium services with differentiated connectivity. This development addresses the growing demands of new use cases and increasing mobile user expectations for high-quality 5G experiences, which require superior network capacity and performance.

Targeted at communication service providers, the toolkit enables the delivery of use cases demanding high throughput, reliability, and low latency at agreed performance levels. These applications include lag-free mobile cloud gaming, video conferencing, live broadcasting, remote-controlled machines and vehicles, public safety services, and future extended reality applications.

The software toolkit focuses on delivering superior performance for mobile broadband services, offering differentiated experiences for new consumer and enterprise use cases, and creating programmable network performance on-demand through network APIs. It includes Enhanced Massive MIMO software algorithms, Advanced RAN Slicing, Time-Critical Communication, and 5G Core features. These enhancements improve capacity, optimise beamforming selection, automate radio resource partitioning, ensure efficient service-level agreement fulfilment, and enhance low latency capabilities.

Ericsson's toolkit responds to evolving user demands; 20% of smartphone users, according to the latest Ericsson ConsumerLab report, are seeking differentiated 5G connectivity and are willing to pay a premium of up to 11% for elevated network performance. By addressing these demands, Ericsson's innovative software toolkit aims to revolutionise 5G connectivity, ensuring seamless and superior experiences for users engaged in a wide array of applications and services

Cisco announces new AI strategy for Webex VC platform

Cisco has announced a new AI strategy for Webex that aims to improve communication and collaboration. Unlike AI offerings that solely focus on text or documents, Webex will use real-time communications for audio and video to solve everyday challenges, such as ensuring crystal-clear audio and video calls and meetings despite low bandwidth. It also announced the launch of the new Webex AI Assistant with new capabilities that will bolster productivity and accuracy for customers.

The Webex AI strategy and Webex AI Assistant will be applied across the full Webex portfolio — The Webex Suite, Cisco Collaboration devices, Webex Contact Centre, Webex Connect and Webex Control Hub. Customers like McLaren Racing and Team DSM are testing Webex's new AI capabilities.

The company also introduced innovative technologies to boost audio and video quality. The Real-Time Media Models in Webex enhance audio and video quality by incorporating AI for people and object recognition, movement, and gestures. The Webex AI Codec tackles audio quality challenges, ensuring crystal-clear audio even in areas with poor connectivity. Additionally, machine learning techniques improve video quality using Super Resolution, providing high-definition meetings regardless of bandwidth conditions.

Webex's approach involves harnessing the best Large Language Models based on specific use cases, incorporating a federated approach combining commercial, open source, Cisco-proprietary, and select customer models to optimise user experiences. These advancements, planned for rollout by the end of 2023, signify Cisco's commitment to revolutionising real-time communication and collaboration experiences for users across various sectors.

India needs 22 mn skilled workers to meet 5G era needs

The Telecom Sector Skill Council (TSSC) estimates that India will require 22 million skilled workers in 5G-focused industries by 2025 in areas such as cloud computing, robots, and the Internet of Things (IoT). The recently released report, 'Telecom Talent in 5G Era: Demand Supply Skill Gap Report 2023-24', revealed a current telecom demand-supply gap of 2.41 million, projected to surge 3.8 times by 2030.

India stands out globally, expecting a surplus of 1.3 million workers in the Technology, Media, and Telecommunications (TMT) sector by 2030. Currently, the Indian telecom industry employs 11.59 million, including 2.95 million corporate talent and 8.24 million blue-collar talent. The demand-supply skill gap report further highlights that across 15 top streams, network operation and maintenance and project engineering have the most corporate talent, while network operation and maintenance and sales and distribution have the most blue-collar talent.

The sector faces challenges as only 40% of Indian graduates in computer science, IT, and math meet industry employability standards due to academic-industry disparities. Arvind Bali, CEO of Telecom Sector Skill Council, emphasised the industry's potential in Tier-II and Tier-III cities and universities to bridge the demand-supply gap. India's telecom industry, contributing 6.5% of FDI inflow, is set to represent 11% of global 5G subscriptions by 2027.

The report predicted a threefold increase in software prominence in the telecom sector as technology moves into the Web 3.0 era. Trends indicate that, with the help of AI, and even more powerful 6G Network Technologies will emerge by 2023 and by harnessing the value of IoT & RPA, AI/ML, Metaverse, and 6G, the telecom and tech industry stand to reach new heights.

Optiemus plans 'Made in India' drones

Electronics and telecommunications manufacturing company, Optiemus Infracom, has entered the Unmanned Systems market with the launch of advanced drones designed and manufactured in India. The drones feature cutting-edge technology, including advanced sensors, secure communication systems, and stringent safety protocols. The company plans to invest Rs 250 million in Optiemus Unmanned Systems (OUS), a new division focusing on UAV research, development, and manufacturing.

OUS aligns with the Indian government's Make in India and Atmanirbhar Bharat initiatives. It will build on its experience and expertise in designing and manufacturing state-of-the-art drones, that would cater to a wide range of applications, including defence, healthcare, agriculture, logistics, mining, railways, and oil and gas sectors. Application areas for drones will also encompass asset management, disaster management, delivery, mapping and survey, and precision agriculture.

Netgear launches enterprise-class M4350 series switches

Netgear launched its enterprise-class AV M4350 Series Switches at InfoComm India in Mumbai. These AVoIP-certified switches feature redundant power supplies, up to 100G uplinks, and Netgear's AV user interface with pre-configured profiles for major audio, video, and lighting protocols.

The series includes IGMP Plus, Auto-LAG, Auto-Trunk, Advanced IPv4/IPv6 security, PoE+ and Ultra90 PoE++ options for up to 90W AVoIP endpoints, and intelligent thermal and acoustic controls. Netgear IGMP Plus allows out-of-the-box functionality for most multicast installations, modular switches accommodating copper, fibre, and HDMI inputs.

With over 200 switching products, Netgear enables businesses to connect various AV over IP devices, offering customisable solutions for AV needs and supporting Power over Ethernet devices like cameras and security products.

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THE CIM CARD ERA BEGINS

Despite the infrastructure, hardware, and skillset challenges, India is navigating its way to automation by adopting Connected Intelligent Machines

BY PRATIMA HARIGUNANI

The person who invented the wheel was, definitely, a genius. But what about the person who invented those three more wheels?

Machines have been around us for so long now that we cannot even imagine how our ancestors ever managed without them. But just a few decades from now, our progeny would wonder the same thing: how did we do without CIMs – Connected Intelligent Machines – for so long?

The three new wheels here are – connected, intelligent and easy to use, and very soon we would see their various avatars throbbing inside our factories, mines, oilfields, highways and whatnot.

WHAT ARE THEY?

We already had machines. So, what makes this new species different from what they have been doing so far? The definition, interestingly, changes as per the context but the essence is similar.

In KPMG's assessment, when we think of CIMs, we are thinking of an ecosystem of machines and plants that can talk to each other via IoT or any intelligent technology. Earlier, Individual machines could be sitting in India and Germany with no connection but now connectedness is a game-changer.

Ask Sridhar Gopalakrishnan – Senior Vice President, Hexaware Technologies and he says that a CIM is an autonomous device that is part of a large network of such devices. It is intelligent in the sense that a CIM will make decisions on its own, respond to incentives embedded in the network, maintain trustworthiness and learn from other devices.

> Human mediation is required between the output of a machine and the input of another, especially when the output is not deterministic.

> "CIMs will dynamically create personalised consumer experiences based on user contexts and interactions with other CIMs in the value chain."

Sridhar Gopalakrishnan
Senior Vice President, Hexaware Technologies

THE ADVANTAGES

- Avoidance of costly unplanned downtime

- Savings on service costs

- Reduced service time and fast responsiveness

- Immediate breakdown alerts and fixes

- Holistic communication across the machine footprint

- Services inside products- new revenues

"Machines today are specific operators with clearly defined process steps to follow. Human mediation is required between the output of a machine and the input of another, especially when the output is not deterministic. With CIMs, this mediation will be reduced substantially. CIMs will also be context-aware and take personalised prescriptive actions."

Sanjay Lodha, Chairman and Managing Director, Netweb Technologies explains this new paradigm from a data perspective. "The deluge of data is everywhere. Needless to say, we will need many intelligent machines to make sense of the continuous flow of incoming data. In recent years, the popularity of CIM has been gaining traction, with the concept of IoT becoming a reality and no longer just a theoretical construct. As per a report by Ericsson, CIMs are expected to be a crucial part of life by 2030, with consumers' predictions."

DOES 5G MATTER?

In the reckoning of Sam Fenwick, Principal Analyst, Opensignal, the importance of 5G and connectivity to a CIM depends on several interrelated factors including the machine's function and location, where its intelligence resides and whether the flow of data between it and the user (or other machines) needs to take place in real-time, and how long the machine can function in the absence of connectivity.

"If the machine just requires connectivity for infrequent software updates and the transfer of information on a non-real-time basis, then the consequences of an hour-long interruption in connectivity are very different to those experienced when a drone is being used to provide real-time aerial footage of an ongoing incident."

For telecom companies too, this change is a big shift as they are the key enablers through the Industrial Internet of Things (IIoT) and 5G, a KPMG report points out. 5G, Artificial Intelligence (AI) and IIoT are adjacent technologies that are big enablers for connected intelligent machines.

Fenwick argues how the degree to which the users of a machine can expect it to nearly always be connected strongly influences the importance of connectivity to its function. "A machine that will always stay within the confines of its owner's premises and can be supported

> "CIMs can streamline order processing, reducing waiting time and enhancing the accuracy of orders, particularly in high-traffic quick-service restaurants."

Manoj Gupta
Associate VP — IT, Restaurant Brands Asia

by a hardened private network — one that can be engineered to eliminate all coverage black spots — is at one extreme of this continuum. In such a case, it can be designed and used under the assumption that connectivity will always be present, potentially allowing much of its intelligence to be present in the cloud — thereby reducing the machine's cost and complexity. However, if the machine's function requires ultra-reliable and low latency communications, then its intelligence has to sit closer to the network edge."

CIM frequently need to transmit a vast amount of data quickly, Lodha explains. "The prominent features of 5G, such as high data rates, low latency, network slicing and increased connectivity are ideal to ensure that CIM survives and thrives in the long run. IIoT plays a crucial role in enhancing productivity, supporting predictive maintenance, ensuring safety and supply chain and inventory management."

"One of the key things to understand about 5G in this context is that it is still developing as a technology. For example, work is underway on 3 GPP Release 18 — the first Release to be branded as 5G Advanced. In addition, while the first 3GPP Release to include the standards for 5G was Release 15, the bulk of the major work on supporting edge computing with 5G didn't start until 3GPP Release 17." Fenwick reasons.

In addition, the bulk of initial 5G deployments worldwide focused on using 5G new radio technology in combination with 4G core networks, referred to as 5G non-standalone access, as opposed to 5G standalone access — where 5G new radio is used together with a 5G core network. Upgrading to the latter is complex and difficult, but enables new capabilities such as network slicing.

CHANGING THE GAME

When we comb through the 2022 KPMG Whitepaper, Connected Machines: A Game Changer in Industrial Manufacturing, we see that these machines bring several advantages to different entities.

Cost savings for manufacturers. Remote maintenance for dealers and service providers. Reduced downtime and service costs for end customers. For instance, Siemens Electronics Works, Germany saw a 140% jump in their factory output between 2017 and 2021. Similarly, Schneider Electric, Indonesia saw a 70% improvement in supplier service rate.

Their strength lies in what they bring to enterprises, the KPMG report reminds us. From reducing downtime to boosting efficiency to even enhancing end-customer experience, they bring a lot of advantages. Even unexpected ones: the need for less maintenance staff and hours, since everything is automated, or adding a new revenue pipeline through servitisation. Now someone who sells a compressor to a company can also offer proactive repair, thanks to real-time updates on the equipment's health.

> "Prominent features of 5G, such as high data rates, low latency, network slicing and increased connectivity are ideal to ensure that CIM survives and thrives."

Sanjay Lodha
Chairman and Managing Director, Netweb Technologies
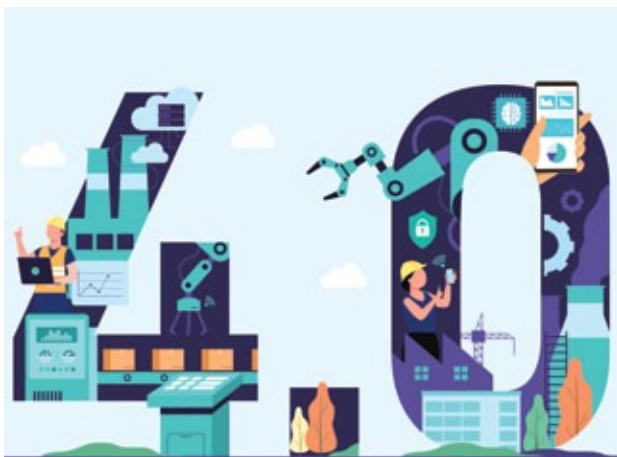
CIM CHALLENGES FOR INDIA

- Regulatory framework: India lacks a comprehensive policy for CIMs, leading to fragmented and conflicting regulations across sectors and regions. Addressing aspects such as standards, certification, data protection, and ethics is crucial.

- Infrastructure bottleneck: Despite ongoing 5G efforts, delays in infrastructure deployment can impede the growth of connected devices, relying on high-speed, low-latency communication.

- Interoperability and standards: The absence of standardised protocols makes seamless communication between devices challenging. India must adopt or develop industry-wide standards to ensure compatibility and enhance user experience.

- IPR issues: Protecting intellectual property rights (IPR) is essential for innovation. While India has made progress, concerns persist regarding patent, copyright, and trademark enforcement, especially in the tech sector.

- Talent and awareness: Specialised training programs in emerging technologies like AI, IoT, and machine learning are lacking. Although India produces numerous engineers, there is a demand for expertise in these specific areas.

It is not just heavy-duty industries where they find relevance. Even verticals like healthcare, FMCG, food and retail can tap them for various outcomes. Manoj Gupta, associate vice-president of IT at Restaurant Brands Asia (formerly known as Burger King India) adds how CIMs can streamline order processing, reducing waiting time and enhancing the accuracy of orders. This is particularly valuable in high-traffic quick-service restaurants.

"Intelligent machines can handle routine customer interactions, such as taking orders and processing payments, freeing up human staff to focus on more complex tasks and providing better customer service. These Machines can collect and analyse data on customer preferences, ordering patterns, and operational efficiency, enabling data-driven decision-making for menu optimisation and business strategy. Also, they can monitor and predict equipment maintenance needs, reducing the risk of equipment failures that could disrupt service."

Even leasing companies can tap this new form of intelligence. Case in point, how Hexaware enabled improved tracking of vehicles for one of the largest leasing companies in Europe finding difficulties in monitoring the leased vehicle's location, thereby impacting the bottom line due to the high cost of recovery.

Sensors were attached to the vehicles to capture their location using a telematics device. Data points about harsh braking, engine temperature, idle time and distance travelled were captured. The idle time data was integrated with the Idle fuel flow factor to calculate the fuel savings. Information and details about every breach were recorded. The details helped reduce the idle time for leasing the vehicles. According to the company, the initiative also helped save fuel costs by 2–8% and maximise equipment uptime and lifespan.

CIMs are the next stage of evolution in increasing productivity, emphasises Gopalakrishnan. "In manufacturing, CIMs can run completely autonomous production lines and supply chains, propagating the response to market movements across the value chain. In services industries, CIMs will dynamically create personalised consumer experiences based on user contexts and interactions with other CIMs in the value chain."

ARE THEY EASY TO START?
Not really. There are a host of aspects to consider before enterprises can think of putting their feet up and leaving

> "Integration issues are a big fence to cross for anyone thinking of embracing CIM and one needs to explore this before buying any such machines."
>
> **Bhoopendra Solanki**
> Chief Information Officer, Sakra World Hospital

everything in the hands of these smart pixies around. With more machines talking to each other with sensors and software sprawled everywhere, security becomes a big chink in the armour now. Recent data by SonicWall shows a 133% surge in ransomware along with a 311% jump in IoT attacks in India alone.

KPMG's analysts also point out security and control issues as an important concern, especially since the smarter a machine gets, the easier it can become for attackers to exploit a vulnerability. Plus, chances are thin that an enterprise would go this route via greenfield investments. Most just choose to enhance existing infrastructure through the addition of sensors and connectivity.

Also, integration issues are a big fence to cross for anyone thinking of embracing this huge shift. "Before raising any process to buy any such machines, we find out the possibilities of integration with the system. So as soon as we receive such machines we connect into the system for its optimal use," shares Bhoopendra Solanki, Chief Information Officer, Sakra World Hospital.

Then there is the gap in interoperability. This area requires the creation of common ontologies and data formats, Gopalakrishnan contends. "Without standardisation, we should be concerned about how CIMs interpret information. For CIMs to be effective, interpretations must be commonly understood and specifically implemented by each machine. Its actions will influence other machines in the network. So, it is important to ensure that the resulting network complexity does not become unmanageable. Detecting path dependencies,

simulating outcomes and taking early corrective steps will be crucial."

Not to forget, the industry would need new skills to steer these new wheels too. Sanjoy Paul, Program Director – Technology, Hero Vired. "The adoption of connected intelligent machines across industries, especially in manufacturing, would necessitate addressing several skill gaps and require upskilling in key areas. Technical expertise in Full Stack Development (FSD) would be essential. Full Stack Developers possess the knowledge and skills required to work on both the front-end and back-end of applications and systems. This proficiency is vital for building and maintaining the software components of connected intelligent machines."

He also adds how a strong understanding of DevOps practices would be crucial to ensure operational efficiency. Proficiency in system integration and management is key.

"Full Stack Developers and DevOps professionals play a pivotal role in integrating new technologies with existing systems and ensuring their seamless management. This involves ensuring that all components work cohesively and efficiently, minimising disruptions in operations." Lodha avers: "While the talent pool is vast, there needs to be more advanced, specialised skills for the next generation of connected technologies."

Lodha also highlights areas like visibility and privacy. "The visibility issue arises when the CIM are not transparent or accountable for their actions and decisions. Some CIMs can use complex and opaque algorithms that need help understanding or interpreting. This can make

> Security and control issues are key concerns, especially since the smarter a machine gets, the easier it can become for attackers to exploit a vulnerability.

"Expertise in front-end and back-end applications and systems is vital for building and maintaining software components for connected intelligent machines."

Sanjoy Paul
Program Director – Technology, Hero Vired

verifying, validating, or debugging these machines and trusting their outcome or behaviours difficult."

Since the CIM gathers data, there are pertinent questions regarding who is accessing the data, how it is being used, and if it is sold or shared with third parties, he warns. "Moreover, there is also the possibility of misuse in surveillance and monitoring, resulting in invasive tracking of individuals without their knowledge or consent." He also observes how the existing law does not cover the intricacies and challenges connected intelligent machines pose. "New regulations are needed to ensure the safe and just use of technology."

However, current signs of adoption hint that interest and investment, are pouring strongly into this lane. KPMG's analysts have noted how companies are already, visibly, implementing such machines. Paul echoes the growing interest. "We have observed a notable surge in demand for skills in FSD, DevOps, and cybersecurity as industries increasingly embrace connected intelligent machines."

Gupta also lets on the path laid out ahead. "Regarding our own QSR operations, we are actively considering and, in some cases, already using CIMs. We recognise their potential to improve efficiency, reduce costs, and enhance the overall customer experience. However, the specific implementation and extent of their use may vary based on the type of QSR, its size, and the technological infrastructure in place. The pace of adoption will depend on factors like the availability of suitable technology solutions, cost considerations, and alignment with our business goals."

India is getting into top gear here too.

As digitisation deepens across industries, CIMs open tremendous opportunities for creating new AI models and, ensuring interoperability across systems, data standardisation, security and network optimisation, portends Gopalakrishnan. "The government's infrastructure, 'Make in India' and 'Digital India'

investments augur well for the future of CIM tech development in the country."

Lodha seconds that. "India has a booming hardware and electronic manufacturing industry duly supported by government initiatives. Many global companies have already set up assembly plants in the country. India is already home to several global and domestic OEMs in the automobile, electronics, and industrial machinery sectors. These OEMs adopt connected intelligent machines to improve productivity, efficiency, quality, and safety."

He also points out that Hindustan Unilever Limited has launched the 'Reimagine HUL Program', which aims to transform its business from a linear FMCG value chain to an intelligent enterprise built on a connected consumer, customer, and operations ecosystem. "However, India will need more OEMs in other sectors, such as healthcare, education, and entertainment, to create more demand and innovation for connected intelligent machines," Lodha says.

We would also need some more work to be done on the chip level. As Lodha notes: "Companies such as Micron Technology, Vedanta, and Foxconn are actively exploring the possibilities of setting up large semiconductor chip plants in India. However, as of now, India has a limited capacity for designing and manufacturing chips for CIMs. Most of the chips used in India are imported from countries like China, South Korea, Taiwan, and the United States."

Most companies need to start at some point, as KPMG has observed. It is good to be ready for the transformation process. After all, CIMs could be the new future for not just machines but the humans and companies around them.

There is no point in spinning the wheel when the world is moving on a new axis. Better have these three wheels, than be a third wheel. ♣

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23rd edition Telecom Leadership Forum '24 will focus on the vision of a seamless, connected world brought about by advancements in telecommunication technologies, mobile platforms, and digital infrastructure. It will also highlight the potential for collaboration, innovation, and transformative changes that can occur when communication service providers, businesses, and individuals harness the power of connectivity.

KEY DISCUSSION POINTS

- Connected Future
- 5G and Beyond
- Satcom Innovations
- Monetization and User Experience
- Threats and Countermeasures
- Digital Transformation
- IoT in Business
- Real-world Applications
- Sustainable Connectivity

KEY HIGHLIGHTS

- Full day conference & awards
- Parallel Tracks [Strategy & Technology]
- Reach 5,000+ industry professionals
- Jury & Category Awards
- Demo Zone

HALL OF FAME TELECOM PERSON OF THE YEAR

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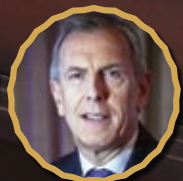
Siki Giunta
EVP, CloudSMART, Industry Cloud Consulting,
Google Ecosystem Unit, HCL Tech

"Cloud is not inherently vulnerable"

*A seasoned executive with over 20 years of experience in international operations, marketing and sales, **Siki Giunta** leads CloudSMART Business, Industry Cloud and the Google Ecosystem Business at HCL Tech. In an interaction with **Shubhendu Parth**, she talks about the technologies driving Cloud, challenges of Network Cloudification, security issues, and the impact of Cloud operating models and data engineering on generative AI. Excerpts:*

How is the industry Cloud evolving and what are the key technologies driving the trend?

Cloud is evolving to become the optimal business platform for companies that are transforming to grow at scale. Each industry, be it life sciences, retail, manufacturing, financial services, or media, has its drivers but the one thing that every industry has in common is the need for speed. Accelerated response to compelling events, whether they are global like a pandemic or unique to a business like a competitive threat, is a requirement for businesses to act quickly.

To succeed, to achieve desirable business outcomes, organisations are prioritising the ability to analyse the volumes of collected data, use analytics to discover insights and then apply these constantly changing insights to innovate and drive profits – we say to supercharge progress by making innovation a habit.

We live in a "5-star culture" – the impact of social media and the ever-present opportunity for customers, patients, and partners to rate a company or a product creates pressure to improve services and products. Success requires innovative technology that is dependent on using the Cloud as a business platform.

What are the top workload requirements that are driving the adoption of the Cloud by businesses beyond the hygiene remote working and integrated communication needs?

Each industry is unique, but the drivers are consistent: increase the productivity of knowledge workers, improve price-performance ratios, deepen customer engagement, and streamline processes. From a technology perspective, 5G is estimated to be a USD 12 trillion market. 5G smartphone subscriptions are likely to reach 3 billion in 2026. 5G brings innovation and dramatic transformation to how we live and work having 10-20 times higher data speeds with greater device connectivity. It is also essential to realise smart cities, smart hospitals, smart manufacturing and more.

Another trend is Generative AI (GenAI). Even school children are aware of ChatGPT and similar technology for the consumer market. Our clients are interested in the enterprise adoption of GenAI. We are engaged in many projects from consumer safety to clinical trials to investor portfolio management. Our clients and HCL Tech are concerned with ethical use and related security and compliance issues.

Taming the tsunami of data is a powerful trend for every business. Here we see data gravity propelling successful GenAI initiatives. Many companies and service providers are improving skills in developing large language models (LLMs) but data gravity is the necessary ingredient in the GenAI recipe for success.

What are the primary obstacles stopping faster adoption and utilisation of Cloud technology and what can businesses do to overcome it?

Cloud adoption is happening very quickly in many

> ❝ More agile, cost-effective and adaptable networks are fundamental to successful Cloud initiatives.

> If organisations neglect to tie Cloud deployments to business outcomes, migrations can fail to return measurable value and workloads may end up back on-prem.

industries in most regions of the world. We are partners with all the hyperscalers, and they are seeing an increase in the number of new customers and continued subscriptions from existing customers. But I think there are situations where businesses hit a wall. First, IT may lose sight of the strategic intent driving the move to the Cloud. Second, technology adoption requires an experienced team and while their workforce may have the technical training, they may not have the experience. Third, ever-changing business requirements create the need for continuous modernisation and previous decisions have sometimes left businesses with technical debt – depressing the appetite for innovation.

Our research indicates that the collaboration between IT and the business is not happening consistently which makes it difficult for leadership to stay the course. Businesses may sometimes also have to deal with unexpected costs of Cloud and organisations may not always have experienced financial operations – Finops – to optimise their Cloud spend.

My advice to these companies will be to find a trusted partner who can help them stay on the course and engage business and IT leadership together to extract all the value from the move to the Cloud.

Recent digitalisation efforts have seen organisations shifting network functions from traditional hardware-based systems to software-based ones. What challenges does Network Cloudification bring with it?

Network cloudification, also referred to as network function virtualisation is the process of transforming traditional network infrastructure into more agile, Cloud-based solutions. This represents a shift in how network services are designed, deployed, and managed.

The CloudSMART SMART Ways, Connected Cloud and Secure Cloud, focus on security and compliance and provides guidance and services to protect users, consumers and partners when doing business in the Cloud. The goal of network cloudification aligns with the modernisation of applications and data. More agile, cost-effective and adaptable networks are fundamental to successful Cloud initiatives.

What about the security challenges that the Cloud environment brings in?

Indeed, people and companies in early-stage Cloud adoption often express security concerns. Cloud is not inherently vulnerable. The network considerations for accessing the Cloud have matured and are less reliant on hardware to manage access with user access managed by sophisticated multi-authentication protocols and digital IDs. Today, we secure applications by authenticating user access. In general, security depends on how well systems are implemented, configured, and managed – whether it is a legacy or Cloud implementation. We take security very seriously and find clients appreciate our approach to security and compliance. We believe that properly configured and managed Cloud solutions can be as secure.

A recent HCL Tech report indicates that 24% of organisations are considering repatriation due to a lack of optimisation of workload. What steps should businesses take to become Cloud-native?

When organisations neglect to tie Cloud deployments to business outcomes, migrations sometimes fail to return measurable value and workloads may end up back on-prem. Often, organisations think about how to get to the Cloud but overlook the required operational know-how to securely operate in the Cloud. The second reason for repatriation is the expectation that Cloud costs less. The cost of the Cloud is relative to how the applications are implemented, how resources are being used, and the ability of the company to make sense of different pricing scenarios.

Avoiding repatriation requires leadership to define the relationship between the Cloud project and the strategic intent of the business. For example, if the strategic intent is to improve customer service, the decision to repatriate may delay the business outcome and cost the company profits over time. Having a financial plan for the Cloud is important.

> GenAI models require massive processing power and memory and Cloud can scale up or down as needed, which is important for training models.

How does advancement in Cloud operating model and data engineering underscore the success of generative AI?

The Cloud operating model is essential for many reasons, but fundamentally Cloud provides scalability, accessibility, and elasticity to enable generative AI. GenAI models are computationally intensive and require processing power and memory and Cloud can scale up or down as needed, which is important for training models. The GenAI models are hosted in the Cloud and are accessible with APIs. The accessibility of the Cloud makes it easier for developers to integrate generative AI into applications. Cloud also offers elasticity – the ability to allocate resources dynamically and this is essential for handling spikes in demand as GenAI applications find their way into the mainstream.

The success of a project that incorporates GenAI is largely dependent on data engineering – the ingestion, storage of the data and data quality and validation. Data gravity, the ability of data to attract additional data, applications and services as the data sets grow, requires the flexibility of Cloud. Language models prompting the data are most effective when the data sets are vibrant and robust.

What is HCL Tech doing in the Cloud space and Generative AI?

As an IT services company, HCL Tech collaborates with clients on a variety of projects. Our job is to advise them and ensure the underlying Cloud platform – the data, governance, and security – is accessible and secure to support GenAI initiatives. For example, we have deep expertise in Integrated Management Systems. GenAI can improve how organisations integrate all current systems in one place within an organisation to prevent unforeseen conflicts between systems and enable them to work as a whole, boosting efficiency and productivity.

Engineering is in the DNA of HCL Tech. We are working on the best ways to use GenAI for code generation. There are already commercial implementations like GitHub CoPilot, Google CodeGen, or Generative AppBuilder. These will generate the scaffolding. We see a different role for HCL Tech. While GenAI will generate a lot of code you still need to validate the code before it is deployed into production. Trusted application development must meet the business requirements and identify bugs. Our engineers are automating the inspection of GenAI-generated code and how to accelerate testing and apply modifications with its help.

What investments is HCL Technologies making in building GenAI capabilities and strengthening Cloud technology?

We have built on our model – the HCLTech Cloud Native Labs – and will be offering a Lab just like it specifically geared to GenAI knowledge transfer and hands-on learning for clients. The Lab experience surrounds the client with our best people and the processes enabling clients to generate LLMs, core to GenAI, and other sessions that underscore the importance and operation of data engineering. Data engineering is critical for successful generative AI projects.

We are investing in our people by working with our global ecosystem of partners to train and certify our engineers on modern generative AI tools and processes. We have many examples of successful GenAI projects today.

Telcos are both users and drivers of the Cloud. What solution does HCL Technologies have to support the TSPs?

Telcos drive Cloud adoption through initiatives such as OSS, BSS modernisation, NFV, 5G, MEC and IT-OT convergence, which rely heavily on Cloud infrastructure provided through AWS, Microsoft, and Google as well as traditional technology OEM partners. The CloudSMART SMART Way – Connected Cloud – provides the platform and ideal ecosystem that partners require to operate these technologies. Enabling Cloud-native transformation for the internal IT OSS/BSS transformation services will optimise their operations and improve their abilities. IT services are complemented by business services and services like 5G, Edge and IT/OT converge to leverage Cloud, Edge, and advanced analytic use cases.

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LT GEN DR S P KOCHHAR

NAAS: THE FUTURE OF NETWORKS

This cloud-based networking paradigm is here to stay and transform modern IT, enhancing flexibility, security, and efficiency for businesses globally

Network as a Service (NaaS) is a cloud-based service model that enables users to easily operate the network and achieve the outcomes they expect from it without owning, building or maintaining their infrastructure. NaaS represents a paradigm shift in networking, providing organisations with a powerful tool to address challenges such as recurring capital costs, staffing and skills shortages, and the increased complexity associated with securing remote access for employees and managing multi-cloud environments.

It brings software-defined networking (SDN), programmable networking, and API-based operation to WAN services, transport, hybrid cloud, multi-cloud, Private Network Interconnect and Internet exchange points. NaaS is capable of replacing several legacy network configurations such as multi-protocol label switching or MPLS and virtual private networks or VPNs, as well as on-premises networking hardware like firewall hardware and load balancers.

NaaS providers enable their customers to set up their networks without hardware, instead, using software delivered over the Internet. NaaS services can range from managed software-defined WAN and network access including wireless to security, unified communications services and more.

> "NaaS has the potential to drive innovation and efficiency in the telecom industry and beyond, making it a technology to watch closely in the coming years.

> By offering a flexible, scalable and efficient networking solution, NaaS is poised to become a cornerstone in the modern IT landscape.

WHY DO WE NEED NAAS?

To appreciate NaaS fully, it's essential to trace the evolution of networking. Traditional networks relied heavily on physical components like fibre optics, copper cables, routers and switches. However, the advent of SDN introduced a transformative approach, enabling the management of network traffic through software and orchestrating the interactions between network components. This, coupled with the emergence of Network Function Virtualisation (NFV), which allowed network functions to be executed through software rather than dedicated hardware, laid the foundation for NaaS. The synergy between SDN and NFV ushered in an era where service providers could offer NaaS, heralding a new era of networking possibilities.

NaaS offers a multitude of benefits to businesses. One of its key advantages lies in IT simplicity and automation. By continuously integrating new features and capabilities, NaaS keeps businesses updated with the latest technological advancements. Additionally, it ensures enhanced security by integrating network and security solutions, creating a robust defence against cyber threats with advanced firewall capabilities.

Moreover, NaaS provides valuable visibility and insights through proactive network monitoring, powered by AI technologies. This allows businesses to gain crucial insights into network performance and user behaviour. The service also guarantees an improved application experience through AI-driven network optimisation,

Network-as-a-Service - Digital, Global and Invisible
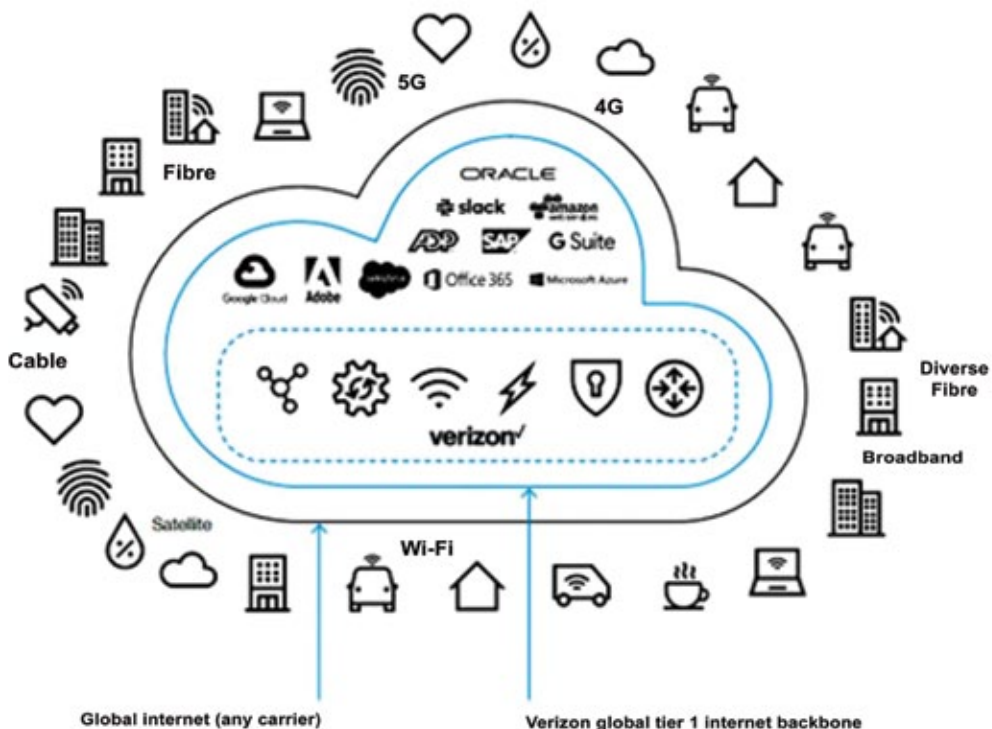
Source: Network-as-a-Service explained. Verizon; 2021.

> A reliance on specific features from a single NaaS provider can result in vendor lock-in, inhibiting the flexibility to switch to alternative providers.

WHY NAAS?

- **IT simplicity and automation:** By integrating new features and capabilities, NaaS ensures that businesses stay at the forefront of technological advancements.

- **Enhanced security:** The integration of network and security solutions creates a fortified defence against cyber threats, bolstered by advanced firewall capabilities.

- **Visibility and insights:** Proactive network monitoring, augmented by AI-powered technologies, provides insights into network performance and user behaviour.

- **Improved experience:** AI-driven network optimisation guarantees a seamless user experience for critical applications.

- **Flexibility:** NaaS offers the agility needed to promptly adapt to changing business requirements.

- **Scalability:** The ability to expand network infrastructure effortlessly, without the burden of acquiring new hardware, makes scaling operations a breeze.

- **Anywhere access:** The cloud-based nature of NaaS ensures accessibility from any corner of the globe.

ensuring seamless user interactions with critical applications.

Flexibility is another major perk of NaaS. It offers the agility required to promptly adapt to changing business requirements, enabling businesses to stay responsive in dynamic market environments. Scalability is simplified with NaaS, allowing for the effortless expansion of network infrastructure without the need to acquire new hardware. This streamlined scalability process makes expanding operations smooth and efficient.

Furthermore, NaaS's cloud-based nature ensures accessibility from any location worldwide. This means businesses can access their network services from anywhere, providing a level of convenience and connectivity crucial in today's global business landscape.

CORRELATION OF NAAS AND 5G
The intricate correlation between 5G and NaaS represents a transformative shift in the telecommunications sector. At the heart of this synergy lies the ability of NaaS to amplify the inherent capabilities of 5G through dynamic network configurations, enabled by SDN. This agility ensures rapid service deployment and optimal resource allocation in real time.

Furthermore, by harnessing Network Functions Virtualisation, NaaS eliminates the dependency on dedicated hardware, making 5G deployments more cost-efficient. The convergence of NaaS and 5G also shines in the realm of edge computing, where NaaS provisions resources closer to end-users, enhancing the performance of latency-sensitive 5G applications.

This collaboration extends to 5G network slicing, with NaaS dynamically managing slices to cater to diverse service requirements, from

> NaaS can amplify the inherent capabilities of 5G through dynamic network configurations, enabled by SDN.

IoT to high-definition streaming. Security, a paramount concern in 5G, is bolstered by NaaS's integrated security features, ensuring robust data protection and resilience against threats. Additionally, in Multi-access Edge Computing or MEC environments within 5G, NaaS's ability to manage computational resources further optimises latency and localised data processing.

Additionally, NaaS is instrumental in realising the "network as a sensor" concept. By virtualising sensing capabilities, NaaS transforms networks into adaptive sensors, enabling real-time data collection and the 6G vision of creating authentic digital twin representations of the physical world with multi-layered maps of our environment. In short, NaaS acts as a bridge, seamlessly connecting the present capabilities of 5G with the future potential of 6G.

THE FUTURE PROPOSITIONS

The future of NaaS appears exceedingly promising. A report by Forrester reveals that nearly two-thirds of IT leaders are actively transitioning to NaaS and other "as-a-service" models. Much akin to the meteoric rise of SaaS, NaaS is poised to revolutionise networking functions in the decade ahead, ushering in an era of heightened connectivity and efficiency.

Challenges in NaaS implementation: While NaaS offers a plethora of benefits, it is not without its challenges. Compatibility issues may arise when attempting to integrate legacy systems with NaaS infrastructures. On-premise data centres may not seamlessly mesh with cloud-based NaaS models, leading to potential operational hiccups. Furthermore, a reliance on specific features from a single NaaS provider can result in vendor lock-in, inhibiting the flexibility to switch to alternative providers.

NaaS vs. other service models: It's crucial to distinguish NaaS from other service models like Infrastructure as a Service (IaaS) and Platform as a Service (PaaS). Unlike IaaS, which provides infrastructure resources, or PaaS which offers software platforms, NaaS's primary focus is on delivering networking services. It does not encompass the provision of business software or data storage, thus carving its unique niche within the realm of cloud services.

Relation with SASE: Secure Access Service Edge (SASE) aligns seamlessly with NaaS infrastructures. SASE focuses on securing individual applications, making it an ideal complement to NaaS. NaaS providers can secure specific applications without compromising performance, thereby ensuring a seamless and secure networking experience.

NaaS stands as a transformative force reshaping how businesses approach networking. By offering a flexible, scalable and efficient networking solution, NaaS is poised to become a cornerstone in the modern IT landscape. Its potential to drive innovation and efficiency in the telecom industry and beyond is undeniable, making it a technology to watch closely in the coming years. With NaaS, the future of networking is brighter and more adaptable than ever before. ♟

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Driving the future: Automotive industry's digital revolution

India's automotive sector is fast embracing connected technologies and V2X advancements to improve safety, efficiency, and user experience
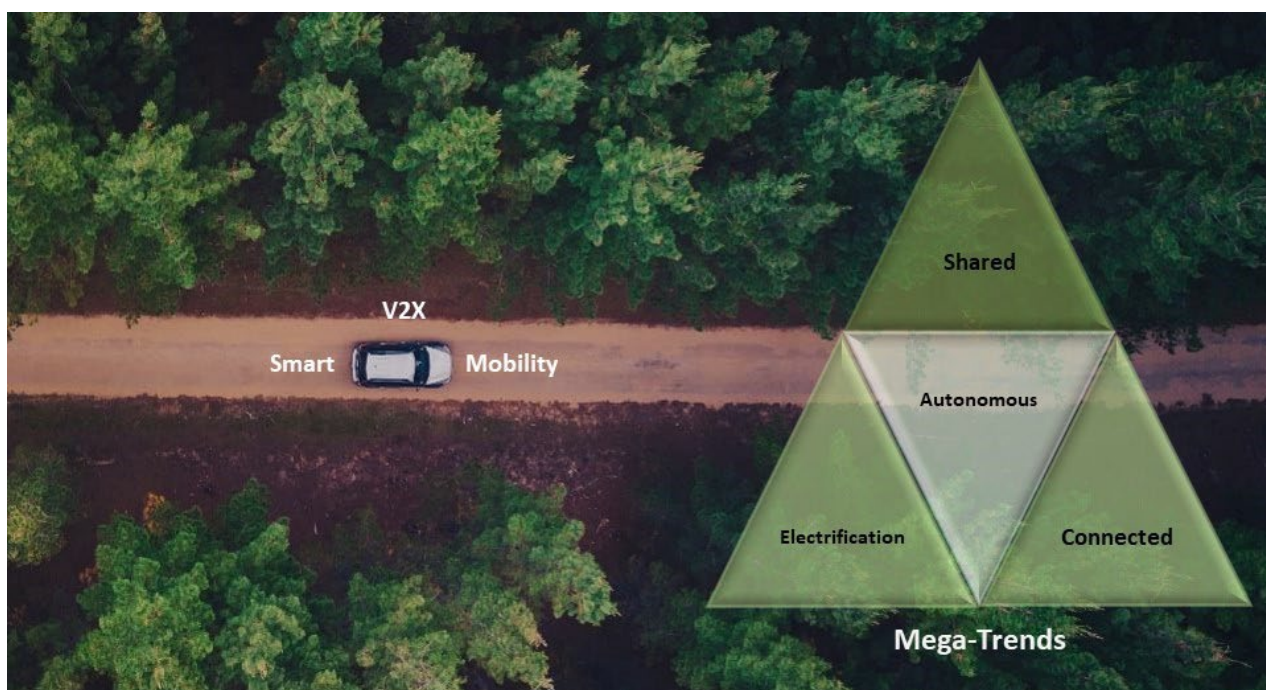
BY JOHN MARTIN

The automotive industry is experiencing a profound transformation, driven by the rapid integration of cutting-edge technologies. This evolution is reshaping the automotive landscape, making it smarter, more environmentally friendly, safer, and more efficient, while significantly enhancing the overall user experience. Central to this transformation is connected technology, which not only fuels today's most innovative advancements but also charts the course for the industry's future.

Connected technology has ushered in the era of the Internet of Things (IoT), Artificial Intelligence (AI), and Machine Learning (ML) within vehicles, manufacturing

> Cellular V2X technology provides real-time vehicle connectivity, offering a host of conveniences to vehicle and fleet owners.

> Real-time connectivity is pivotal for Advanced Driver Assistance Systems, enabling real-time processing of data from cameras, sensors, radar, and lidar.
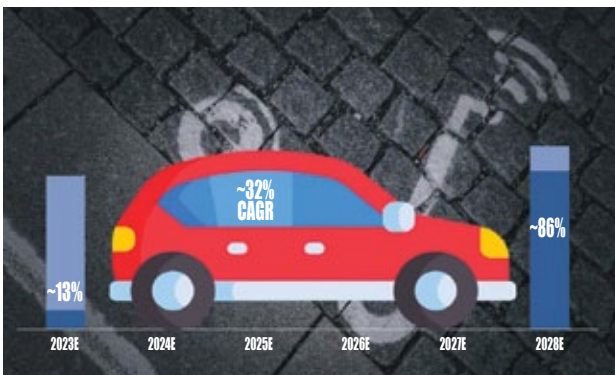
Types of V2X Communication

Source: CyberMedia Research, 2023.

C-2VX Volume Forecast: India Market

Source: CyberMedia Research, 2023.

processes, and mobility infrastructure. Through these software-driven technologies, vehicles can communicate seamlessly with each other and the cloud, elevating the entire ecosystem to unprecedented levels of intelligence.

V2X GAINS GROUND

A prime example of this revolution is the concept of Vehicle-to-Everything (V2X), which is reshaping the automotive sector and enhancing mobility intelligence. According to CyberMedia Research (CMR), V2X technology is making significant inroads in India, accounting for a substantial share of the market, with passenger vehicles at 30% and a yearly growth rate of >60%.

Cellular V2X (C-V2X) technology provides real-time vehicle connectivity, offering a host of conveniences to vehicle and fleet owners. These include features like remote engine activation for cabin pre-conditioning, driving behaviour enhancements, and the ability to plan routes with estimated travel times. Moreover, V2X offers robust safety features, including vehicle tracking, geo-fencing, alerts for towing or theft, and predictive maintenance capabilities.

The electric vehicle (EV) sector, a catalyst for significant industry transformations, has witnessed exceptional growth. Overall, the electric passenger segment has surged by >120%, and the electric two-wheeler segment has seen a growth of >40%. Roughly 80% of electric vehicles in the passenger and two-wheeler segments are equipped with connected technology. This seamless integration empowers consumers with real-time information, enabling them to meticulously plan inter and intra-city routes with access to charging stations, select traffic-efficient pathways, and ultimately optimise both EVs – battery life and range.

V2X technology is also making waves in shared mobility services, particularly in the electric vehicle sector. Connected technology enhances ride-sharing, mid- and last-mile delivery, and rental services, delivering lesser travel time, convenience, improved performance, and enhanced efficiency.

Besides, safety remains paramount in the sector with Advanced Driver Assistance Systems (ADAS) gaining rapid adoption in India, surpassing 350%. Real-time connectivity is pivotal for processing data captured by various cameras, sensors, radar, and lidar, especially as ADAS evolves towards higher levels of autonomy.

THE ERA OF INDUSTRY 4.0

As the automotive industry advances into Industry 4.0, manufacturing processes continue to evolve. The transition began with the shift from traditional mass

> Connected technology enhances ride-sharing, mid- and last-mile delivery, and rental services, delivering lesser travel time and convenience.

IN BRIEF

- **V2X revolution:** Vehicle-to-Everything, especially Cellular V2X, enhances vehicle connectivity, safety, predictive maintenance, and real-time communication.

- **EV-led innovation:** Connected technology empowers EV users with real-time data, optimising routes, charging, and battery life.

- **Safety through connectivity:** Advanced Driver Assistance Systems utilises data from cameras, sensors, radar, and lidar for enhanced driving assistance.

- **Industry 4.0:** By integrating IoT, big data, cloud computing, and AI, the automotive industry can optimise production, quality control, and maintenance.

- **Evolving tech:** 5G and upcoming 6G technologies can enable high-speed cloud connectivity, enhancing V2V and vehicle-to-infrastructure (V2I) communication.

production to the adoption of digital technologies like computer-aided design and manufacturing, accompanied by automation.
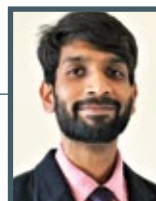
Industry 4.0 introduces a wealth of innovations, including the integration of machines embedded with the IoT devices, the utilisation of big data, the harnessing of cloud computing capabilities, and the application of artificial intelligence. Today, smart factories exemplify Industry 4.0, featuring interconnected machines that enable predictive maintenance and streamline quality control. Machine learning optimises production processes, and the introduction of 3D printing and autonomous robots is revolutionising vehicle design, manufacturing, and maintenance.

The subsequent phase, Industry 5.0, underscores the industry's commitment to human-machine collaboration and advanced automation. This new chapter in automotive manufacturing emphasises cooperation between humans and machines, heralding even more profound transformations in the years to come.

In the near future, the automotive industry will become increasingly reliant on digitalisation, embracing real-time, high-speed connectivity. With the introduction of 5G and plans for the next generation of connectivity like 6G, the industry is set to heavily leverage cloud connectivity, enabling instant data transfer and responses. The reduced latency will bolster vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, thereby enhancing road safety and ushering in features like vehicle autonomy and augmented reality.

This transition promises a future of smoother operations, enhanced consumer experiences, greater safety, and the integration of sustainable energies. The automotive industry is on the brink of a profound and exciting transformation that will redefine the way we experience and interact with vehicles. 🔥

Martin is the Lead - Smart Mobility Practice with the Industry Intelligence Group at CyberMedia Research.
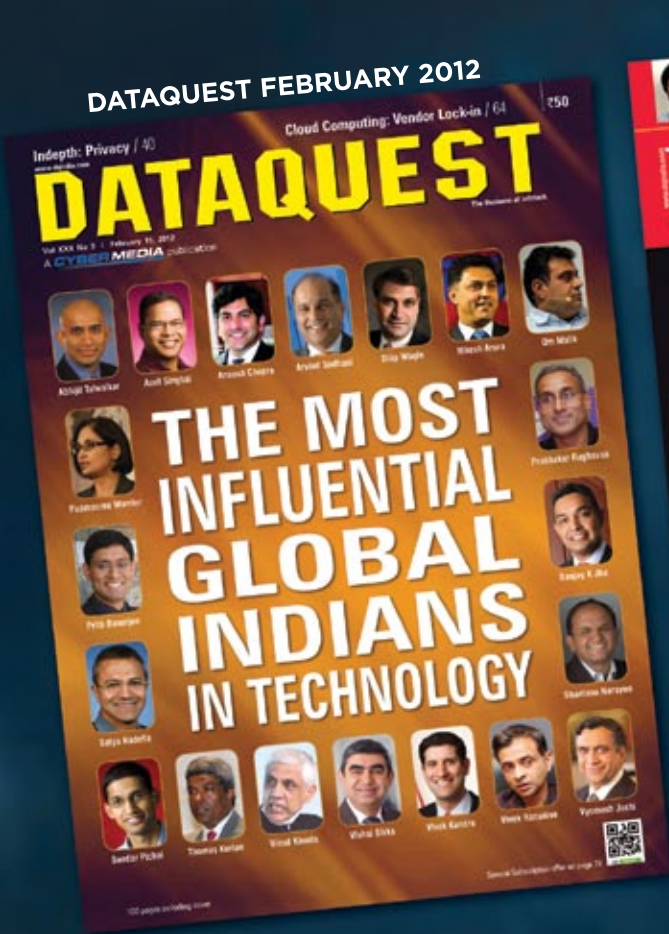feedbackvnd@cybermedia.co.in

Beyond 5G, into a faster future

Future telecom services will enable quicker downloads, higher remote work efficiency, and seamless access to cloud-based services and apps

BY VIKAS SHARMA

From the invention of telephones to smartphones, computers, and social media platforms, the advent of the digitalisation and Internet has certainly changed the way we communicate with each other. In this context, taking digital transformation and connectivity to new heights, the government launched 5G technology—a fifth-generation wireless technology that promises faster speeds, lower latency, and the ability to connect more devices simultaneously—in 2022 for various industries, with telecom being no exception.

Currently, India is the world's second-largest telecommunications market, with a subscriber base of 1,170.75 million in January 2023, and has registered strong growth in the last decade. Indeed, 2G, 3G, and

> The launch of 5G services and the subsequent improvements will propel an expansion of USD 12.5 billion in the Indian telecom industry.

> With a speed of 20 Gbps, the 5G network is poised to gradually increase the average data usage per subscriber.

IN BRIEF

- 5G technology offers high-speed Internet, boosting data consumption and revolutionising how people interact, work, and access information.

- Beyond 5G, the industry anticipates faster speeds, lower latency, and seamless integration of AI, virtual reality, data analytics, and blockchain technology.

- Innovations beyond 5G aim for lower energy consumption, reducing carbon emissions and connecting billions of devices.

- The launch of 5G services and the subsequent improvements will propel an expansion of USD 12.5 billion in the Indian telecom industry.

4G have effectively delivered most of those promises, primarily by offering faster data connectivity speeds. However, the adoption of 5G has influenced how people and professionals interact, work, and acquire information, revolutionising the future of telecom services. A Deloitte-Confederation of Indian Industry study projects that every three years, the launch of 5G services and the subsequent improvements will probably propel an expansion of USD 12.5 billion in the Indian telecom industry.

Therefore, considering the rapid pace of technological advancement and innovation, it is expected that the telecom industry will continue to experience significant growth in the coming years. This future may include technologies such as 6G networks and even more seamless integration of Artificial Intelligence (AI), the Internet of Things, and data analytics into our daily lives. With these advancements, we can expect even greater connectivity and enhanced virtual reality. So, before delving into the future of the telecom sector, let us dive into the details of 5G and its potential benefits.

THE 5G ADVANTAGE

There is no denying the fact that the rollout of the 5G network has been a game changer for the telecommunications industry, providing speedy downloads and uploads for every operation. Unlike its predecessor, this technology does not require specialised networks, since it is built for greater versatility, working simultaneously with a variety of other networks.

As a result of 5G's quicker Internet speed and more dependable network, users will be able to download easily and conveniently. With a speed of 20 Gbps, the 5G network is poised to gradually increase the average data usage per subscriber. The average data consumption per user has risen sharply since 2018, reaching 19.5 GB per user per month in 2022, the equivalent of 6600 songs, according to Nokia's annual Mobile Broadband Index (MBiT) report.

Even though 5G was only introduced a year ago, it has already caused significant disruption in the Indian market. Thus, technology has undoubtedly become the norm, and to experience a paradigm shift, astute leaders

Beyond 5G services, the technology is creating new opportunities for India's most significant industries, including telecommunications.

and professionals are already forecasting what the next stage of telecom services will hold beyond 5G.

SERVICES BEYOND 5G

The telecom industry is seeing a sharp rise in innovation when it comes to moving beyond 5G offerings. While 5G has made enormous headlines, as technology continues to advance at an astounding rate, experts are conceptualising 6G networks to stay ahead of the curve. Recently, the Indian government released the Bharat 6G Vision Document as a proactive step. The goal for the upcoming wave of wireless technology is to provide high-speed Internet, which is faster than 5G's maximum speed and would support economic growth in the Indian telecom sector.

Eventually, this next generation of telecom services will not only offer faster and more reliable connectivity but also enable advanced technologies such as AI, virtual reality, and data analytics. Additionally, the integration of blockchain technology is expected to enhance security and privacy in the telecom industry. Therefore, it is reasonable to say that, beyond 5G, we will be able to enjoy faster speeds with less latency than we have now.

Furthermore, the technologies will be able to facilitate quicker downloads, which will improve the user experience and change a lot of elements of users' lives. For instance, customers will be able to download large files quickly and watch high-definition videos without any issues with higher download speeds. This will improve entertainment experiences while also making remote work and collaboration more effective and facilitating seamless access to cloud-based services and apps.

Moreover, transcending beyond 5G services, it is anticipated that the telecom industry is envisioned to witness lower energy consumption, promoting sustainability by reducing carbon emissions. When all is said and done, it will connect billions of devices and technological systems, fundamentally altering how people engage with the digital world.

Owing to these innovations and their significance, the future of telecom services beyond 5G seems promising. Thus, with the continuous advancements in technology, telecom services are expected to become even faster, more reliable, and more efficient. Ultimately, going beyond 5G services, the technology is creating new opportunities for India's most significant industries, including telecommunications, as well as bringing in a new era of quicker networks and improved network performance.

A Mordor Intelligence report indicates that the Indian telecom market is expected to grow at a CAGR of 9.40%, up from USD 44.43 billion in 2023 to USD 69.62 billion by 2028. 🔥

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Empowering India's future communication landscape

The telecom equipment and electronics market in India stands at a crucial juncture, requiring significant R&D investments to move forward

BY ANEEF TAS

In the heart of India's fast-growing electronics scene, there's a big opportunity. As the country's economy keeps getting stronger year after year, more and more people want electronics like smartphones and cool gadgets. This creates a great chance for companies to make and sell these products. We can see this happening with new businesses and brands popping up, showing off India's spirit of creativity and innovation.

The introduction of 5G technology has accelerated the pace of innovation and consumers' awareness of the latest technological advancements. To compete and stay relevant, brands must invest in research and development (R&D) to incorporate 5G capabilities and other cutting-edge features into their products. Indian consumers are well-connected globally and are increasingly tech-savvy. They have higher buying power

> The launch of 5G services and the subsequent improvements will propel an expansion of USD 12.5 billion in the Indian telecom industry.

> The telecom equipment manufacturing industry has the potential to generate more than 1.7 million jobs in India by 2025.

IN BRIEF

- Communication revolution: Rapid mobile data growth necessitates substantial R&D investment in 5G technology to ensure seamless connectivity for diverse consumers across India.

- Networking excellence: India's massive online user base demands innovative networking solutions, urging R&D efforts for efficient, widespread, and reliable Internet access.

- Telecom self-reliance: Indigenous telecom equipment production enhances self-reliance and generates significant job opportunities, aligning with India's global manufacturing aspirations.

- Customised devices: R&D investments enable manufacturers to customise electronics, ensuring products resonate with India's varied demographic.

- Innovation fuel: Strategic allocation of resources to R&D, approximately 10% of the budget, is vital for driving technological growth and innovation to foster a connected future.

and are willing to invest in products that make their lives more convenient and efficient. This places a premium on products with innovative features.

In a competitive market, simply launching a new product is not enough. To stand out and succeed, brands need to constantly evolve and differentiate themselves through innovation. This is where R&D comes into play. It can also help brands design products tailored to different age groups and specific needs in India.

COMMUNICATIONS: PAVING THE WAY FOR CONNECTIVITY

The importance of reliable communication cannot be overstated, especially in a vast and diverse country like India. The new 5G technology is a game-changer, promising super-fast Internet and connections, but there are big challenges. We need to invest in R&D to make the technology and systems that will bring 5G to all parts of the country.

To explain how urgent this is, think about how fast mobile data usage is growing in India. Consumer data consumption in India will grow at a CAGR of 16% between 2022 and 2028, moving up from 26GB (per user per month) recorded at the end of 2022. This means we need to spend a lot on R&D to make sure 5G can work well for all kinds of Indian consumers, whether they live in big cities or far-off villages.

NETWORKING: STRENGTHENING DIGITAL HIGHWAYS

Just as roads need maintenance, digital highways need continuous improvement to ensure the seamless flow of data. The surge in Internet usage, both for work

> A strategic allocation of around 10% of the budget for R&D can significantly contribute to technological growth and innovation.

and leisure, requires innovative networking solutions. R&D is the key to creating efficient and cost-effective technologies that can adapt to the country's diverse topography and population density.

In 2021, India had approximately 624 million Internet users, making it the second-largest online market globally. This statistic emphasises the pressing need for R&D in networking solutions to ensure that these millions of users can access fast and reliable Internet services regardless of their location.

TELECOM EQUIPMENT: SELF-RELIANCE AND JOB CREATION

India's aspiration to become a global manufacturing hub hinges on the local production of telecom equipment. Currently, India relies on imports for some essential telecom equipment, which poses challenges to self-reliance. R&D can address this by enabling companies to design and manufacture telecom equipment that meets the unique demands of the Indian market.

Creating indigenous telecom equipment is not only a strategic move for self-reliance but also a significant job creator. A report by Invest India indicates that the telecom equipment manufacturing industry has the potential to generate more than 1.7 million jobs in India by 2025.

DEVICE MANUFACTURING: CUSTOMISATION FOR DIVERSE NEEDS

The Indian consumer base is incredibly diverse, with varying age groups, lifestyles, and needs. One of the critical roles of R&D is to understand and cater to this diversity. By investing in research and development, manufacturers can create products that align with specific consumer requirements.

In 2020 a record 54.3 million smartphone units were shipped during the quarter with 17% year-on-year growth in the third quarter of the year. This growth underscores the importance of customisation through R&D to cater to the diverse and evolving needs of Indian consumers.

FUELING THE FUTURE

The electronics market in India stands at a crucial juncture, and R&D is the engine that can drive it forward. A strategic allocation of around 10% of the budget to R&D can significantly contribute to technological growth and innovation. It is not merely about creating products; it's about creating products that resonate with the diverse and dynamic Indian consumer base.

To summarise, the need for greater investment in R&D in India's electronics industry is backed by facts and figures. The statistics tell a compelling story of growth, opportunity, and the pressing need for innovation. It's a call to action for electronics brands to invest in research and development, paving the way for a brighter and more connected future for India's electronics sector. 🌐

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Skulls, crossbones and QR codes

From the second man to the second-story man, QR codes have moved from being a thing of convenience to a sneaky window for cybercriminals to tap

BY PRATIMA HARIGUNANI

From the days when black pepper was transported through the sea to the nano-seconds when money moves in the form of bits and bytes via fibre optics- one person has continued to haunt merchants in ever-evolving ways. The pirate. The way they look may have changed but pirates still shadow every penny they can rob or steal.

It was just a matter of time till they came for QR codes. The upper storey that we built after bar codes, and cemented during the pandemic for faster and contactless commerce, has now caught the patched eyes of these burglars. It is the storey that was meant for speed, convenience and easy access. It is, now, the storey that is being used by burglars to sneak into the building we carry in our pockets. Our devices. And data.

WHAT DO THEY LOOK LIKE?

Quishing is now as common and as dangerous as phishing or vishing. Yes, QR Code threats are on the rise. They come in the form of masquerades that lead the user to malicious sites or download malware on the device. The result can range from pennies slipped out to pounds cut away from one's pocket, from the user being subscribed to a marketing list and newsletter without consent to stealing sensitive information from devices or spying through the device. The most serious blow is, of course, the theft of the credit card or bank information of the user and the downloading of malware on the device. It can also lead to the hijacking of devices for misuse.

Harshil Doshi, Country Director, Securonix avers that QR codes have become commonplace in our lives and with it, the related scams are also rising. "Attackers are using various techniques to alter QR codes on business websites and scam unsuspecting users. After scanning these codes, the user is directed to a malicious website that asks them for their credentials or a malicious application which typically contains viruses or other malware. Knowing how the digital landscape is fast evolving, these scams are only going to become more sophisticated."

Vivek Srivastava, Country Sales Leader, Fortinet India zooms in on the unique aspect of QR code scams which, he explains, lies in their ability to serve the same malicious intent as other cyber-attack vectors, such as phishing emails.

"Cybercriminals employ QR codes to infiltrate malware onto users' devices with the ultimate goal of pilfering user credentials and passwords. In our daily routine, we are constantly using the Internet and various applications, entering our usernames and passwords across numerous online platforms, including e-commerce, work-related tasks, bill payments, social networking, and entertainment streaming," he says.

This practice comes with inherent risks. In case any of these platforms become compromised, the stolen username and password information typically ends up on the dark web, where it is offered for sale. This data can be incredibly valuable to cybercriminals, especially when it can be reused on high-value targets like financial institutions or online shopping websites, resulting in potential financial loss for the individual.

Nader Henein, VP Analyst, Gartner points out other facets. The scam is not targeted at a specific individual, when you scan a QR code for an offer for pots and pans, and you land on a site with pictures of pots and pans, you are more likely to share your data thinking this is the correct site. "People have an implicit level of trust towards QR codes that are not earned and it can easily be manipulated. This compromise builds on authentic offers which have authentic campaigns behind them."

> "QR scams have the potential to damage a merchant's reputation, erode customer trust, and deter users from engaging in online transactions."
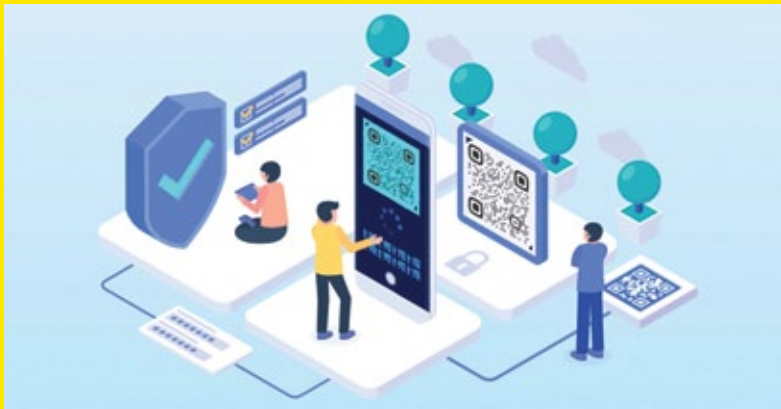>
> **Vivek Srivastava**
> Country Sales Leader, Fortinet India

> "QR codes posted in public or provided through untrusted channels could be easily manipulated to send the user to a compromised site."

Nader Henein
VP Analyst, Gartner

IN BRIEF

- **Rising threat:** QR code scams are escalating in India, jeopardising users and merchants, and causing financial losses and reputational damage.

- **Scam variants:** Scammers utilise tactics like quishing, leading users to malicious sites, stealing data, or redirecting them to phishing websites.

- **Financial impact:** The QR code payment market's rapid growth (projected to reach USD 55.60 billion by 2033) emphasises the urgency to combat such scams.

- **User vigilance:** Users must avoid scanning QR codes from untrusted sources, verify recipient details, and refrain from sharing sensitive information.

- **Collective effort:** Combating QR code scams necessitates a collaborative effort involving users, industry stakeholders, policymakers, and regulatory bodies.

- **Business responsibility:** Companies should deploy robust cybersecurity solutions, educate users on recognising malicious content, and collaborate with regulatory bodies to establish a safer digital environment.

In an illustrative instance, FortiGuard Labs identified a phishing campaign earlier this year, which utilised diverse QR codes to target Chinese-speaking users, cites Srivastava. "A document was attached to this campaign, featuring a prominent QR code at its centre. Upon scanning this QR code with their desktop or mobile devices, users were redirected to a website controlled by threat actors. The primary objective of this QR code scam was to deceive users into disclosing their credentials on a phishing website operated by the malicious actor."

HOW MUCH THEY HURT?

There is a reason the bad guy is chasing this door. According to Future Market Insights, the QR code payment market could surpass USD 11.67 billion in 2023 and move up to USD 55.60 billion by 2033. The Bitly 2023 QR Code Trends Report confirms that QR Codes are being used by businesses and brands at an accelerated pace with global creations up 41% compared to 2022.

Notably enough, The Retail and Consumer Packaged Goods (CPG) industries experienced an 88% jump in QR Code creation in 2023. This is echoed in a December 2022 survey report from Pymnts, wherein many retailers believe that tech-enabled in-store features determine loyalty, with 81% pointing at the ability to use QR code scanner apps

"Apart from exercising user caution, e-commerce websites should deploy robust cybersecurity solutions which can detect fraudulent activities."

Harshil Doshi
Country Director, Securonix

to check prices and inventory, and 51% highlighting self-service kiosks.

That pushes us to confront the bigger fear. Apart from harming the users, the ripple effect of these scams can be massive. They can jeopardise merchants and the digital commerce ecosystem. A landscape that is in full blossom now in India with Unified Payments Interface (UPI), Open Network for Digital Commerce (ONDC), digital currencies and other fast-growing digital interfaces.

Srivastava affirms that QR code scams present a significant threat to merchants and the digital commerce ecosystem. "These scams can result in substantial financial losses, affecting both merchants and their customers through fraudulent transactions and chargebacks. Furthermore, they have the potential to damage a merchant's reputation, erode customer trust, and deter users from engaging in online transactions. Regulatory consequences may also come into play, as lax security practices can lead to fines and legal issues. Additionally, these scams can disrupt operations as resources are redirected to address security breaches and compensate affected customers."

In India's dynamic digital transaction landscape, there has been a concerning upswing in QR code scams, Maheswaran S, Country Manager – South Asia, Varonis also puts forth. "Recent reports indicate a notable surge in such incidents over the past couple of months, with hundreds of cases reported across the country. Furthermore, an extensive study revealed that from 2017 till 31 May 2023, Bengaluru alone witnessed approximately 20,662 cases, accounting for 41% of total cases related to QR codes, malicious links, and debit or credit card frauds."

As Henein dissects, this attack weakens the impact of a merchant's campaign because potential prospects are being redirected to the attacker's site and once the attack

is discovered by the individual, there is a residual distrust that has a market-wide impact. "The victim is not likely to share their data with any such campaign thereafter."

HOW TO BE BEAT THE PIRATES?

When you are on a ship, the best way to fight pirates is to have someone on the deck watching for them all the time. One has no choice but to be extra alert and equipped and not careless or lazy.

The same formula applies to digital oceans too.

Doshi suggests that to avoid QR code scams, users have to be more alert and wary of their online transactions. "Some useful tips come in handy in these times. Never share your bank account details or UPI ID. Never scan any QR code to receive money. QR codes do the opposite. It is used for sending money. Also, while scanning any QR code, always check the details like the recipient's name, account number or IFSC code. There are also apps available today which can detect fraudulent websites and QR codes. Never share your OTP with anyone. Also, try not to share your mobile number when not needed."

Individuals should not use QR codes posted in public or provided through untrusted channels, reminds Henein. "They could be easily manipulated to send the user to a compromised site where their data could be stolen or where they could be exposed to malware. If an individual wants to avail themselves of an offer, they are better off 'Googling it' and the nature of search engine optimisation makes it highly unlikely that the attacker's site will be featured on the first few pages of the search results.

Regardless of the attacker's motivations, users are strongly advised to exercise caution in their online activities, Srivastava recommends. "This includes verifying the authenticity of received emails, refraining from opening suspicious attachments or links and

> "Combating QR code scams is a collective effort. Users, industry stakeholders, and regulatory bodies must collaborate to establish a safer digital environment."

Maheswaran S
Country Manager – South Asia, Varonis

WHERE THEY POP, AND HOW?

- Disguised as legitimate codes
- Marketing offers in public places like cafes, retail stores
- Duplicate code pasted over a genuine one
- Parking tickets
- Flyers and stickers in malls
- Contactless menu tweaked by threat actors
- Tempting and free Wi-Fi network offers

abstaining from entering their credentials on unfamiliar websites. When dealing with QR codes, it is imperative to authenticate the source and legitimacy of the sender's credentials before scanning the code. Instead of clicking on received links, users should navigate directly to the official website of the vendor for any transactions. Additionally, users can employ the practice of hovering over links to identify any unusual or suspicious URLs.

To counter this evolving threat, it is of utmost importance to prioritise public awareness and education, underlines Maheswaran. "Initiatives aimed at educating citizens on secure QR code practices and the necessity of source verification before scanning are crucial. Additionally, the development of robust cybersecurity measures, such as two-factor authentication and secure payment applications, is essential to safeguard users. Policymakers should contemplate regulatory interventions to deter scammers and ensure accountability.

Apart from exercising user caution, businesses like OLX or other e-commerce websites where most of these scams are happening should deploy robust cybersecurity solutions which can detect fraudulent activities, Doshi stresses.

Organisations should also take the initiative to educate their users on recognising and avoiding malicious email attachments and links, as this awareness is a critical defence against QR code scams and other cyber threats, insists Srivastava.

Combating QR code scams is a collective effort, as Maheswaran S sums up well. "Users, industry stakeholders, and regulatory bodies have to collaborate to establish a safer digital environment for all citizens."

It will take time and many steps. One sparrow does not make a summer. Well, notwithstanding a Jack Sparrow. 🌐

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Sky wars: India's satellite spectrum battle heats up

While Airtel and R-Jio are gearing up to launch satellite Internet services in India, the country's satellite spectrum allocation saga is far from over

BY VERNIKA AWAL

On 27 October 2023, standing at the keynote stage of the India Mobile Congress in Delhi, Sunil Bharti Mittal, chairman of Airtel's parent firm Bharti Enterprises, made an announcement that wasn't entirely expected. "By next month, we will be launching OneWeb's satellite Internet services," Mittal said.

Airtel, though, was beaten to the stand by cross-industry rival, Reliance Industries' Jio Infocomm. Earlier on the same day, Jio chairman, Akash Ambani, announced the launch of JioSpaceFiber, which would offer the same satellite-based Internet services that OneWeb promised.

While the announcements were potentially headlining, a few eyebrows were raised as India continues to deal with the bottleneck of how satellite spectrum would be made available to its customers. How, then, did the two telecom operators, which account for nearly 81% of all Indian network connectivity customers as per the Telecom Regulatory Authority of India (TRAI)'s July 2023 report, announce a service that technically cannot be provided in the country?

THE STORY SO FAR

Satellite Internet, or satellite connectivity, isn't exactly new. In at least limited capacities and forms, it has been present in India and around the world for a while. But things have largely flown under the radar, for the lack of a better pun.

In fact, for the longest time, access to connectivity powered by satellites was very limited. Not only was satellite access tightly regulated, it was also prohibitively expensive for most entities. As a result, barring sectors such as government affairs, defence communications and other such niche use cases, satellite services were largely unavailable and unseen to the average consumer. Also, for
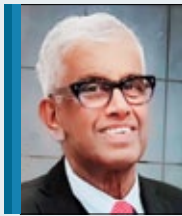
"Satellite spectrum is more akin to shared common resources like air, water, and roads and it is unfeasible and impractical to consider auctioning it."

TV Ramachandran
President, Broadband India Forum

the longest time, the only touch point for the average Indian consumer to use satellite Internet was through in-flight Internet connectivity on a few international air routes.

All of this changed in August 2021, when the domestic space economy was liberalised. Satellite services were opened up for usage by the private sector, which had a two-part effect: companies could soon be satellite operation providers as well as satellite service users. This led to a spurt in space startups, with satellite services at the centre of it all.

However, even as the sector has been liberalised, there are plenty of challenges ahead, the biggest of which was on how private entities would get access to satellite spectrum. Given that connectivity is a government-regulated subject, the Centre needed to decide this.

Over multiple rounds of consultations by TRAI, and legal inputs on the matter by telcos and enterprises, the industry awaits a decision on how satellite spectrum will be accessed.

WHY THE DEBATE?

Typically, spectrum for terrestrial connectivity is auctioned to telecom operators by the government. Companies pick up airwaves depending on their requirement and make bulk payments to the government, often, over a certain period. This time, however, non-telecom operator companies proposed that satellite spectrum could be offered directly to enterprises, and in an allocation format that many in the industry said was the norm for when shared spectrum is involved.

In terrestrial connectivity, when the Centre auctions airwaves to telecom operators, the winning bidders get exclusive access to the spectrum in concern. Subject to the payment of spectrum usage charges, and related levies and fees, the telecom operator who won the bid for the respective spectrum would have exclusive rights of usage.

For the supplementary satellite connectivity in question here, usage of satellite Internet services would be driven by shared spectrum usage. This is done to optimise the usage of airwaves and help operators offer services despite the crowded connectivity spectrum.

This, many industry stakeholders and veterans say, is a precedent that India should follow to ensure that the same auction model that is applicable for terrestrial networks is not used for satellite spectrum.

In a Voice&Data column published in March 2023, TV Ramachandran, President, Broadband India Forum pointed out that nowhere in the world is satellite spectrum auctioned. He also shared several reasons for that. "Satellite spectrum is a shared resource unlike terrestrial mobile spectrum which can be partitioned into small or large chunks that can be exclusively allotted to particular users and therefore the latter can be auctioned," he said.

Ramachandran further added that in the case of satellites, the entire band is used by all operators in different slots. If the band is partitioned to enable sharing, there would be a major drop in spectrum efficiencies and utilisation, which is unacceptable. He also highlighted that the satellite spectrum is more akin to shared common resources like air, water, roads, etc. and it is unfeasible and impractical to consider auctioning it.

Opinions, however, differ based on which side of the fence you are on. Both Bharti Airtel and Reliance Jio have individually submitted legal representations to the Department of Telecommunications (DoT), claiming to explain why they feel that any mode of derivation of spectrum, apart from an auction, could be "unconstitutional". In Jio's representation to the DoT, former Supreme Court judge L Nageswara Rao wrote that "natural resource allocation must only be by auction."

The Centre, on this note, has so far held steadfast that TRAI's ruling will be tantamount. Speaking with

> The initial cost of the satellite-based service is likely to be higher than terrestrial network service, posing a challenge for mass adoption.

journalists on the sidelines of the India Mobile Congress, Union IT minister Ashwini Vaishnaw said that the issue is progressing at a steady pace but refused to offer a timeline by stating that the IT ministry does not want to put undue pressure on TRAI's natural decision-making process.

STRING OF CHALLENGES

The first and foremost issue to this entire saga is the retirement of the TRAI Chairman, PD Vaghela, end of September. With a new TRAI chairperson due for appointment, who will become the authorised signatory for the spectrum allocation, the current roadblock is a systemic one which will only see resolution in due course of time.

Beyond that, other roadblocks include rationalising one faction of the industry, versus the other. The Centre does not want to antagonise enterprises in their quest to procure satellite spectrum, but telcos are still the mainstay for procuring spectrum and translating them into taxable, monetisable services across multiple sectors pan India. Yet, the Centre would have taken cognisance of the topic, and the notion that there have been ample lobbying for spectrum auction by telcos, instead of administrative allocation.

Apart from this, a key roadblock lies in the very core nature of the satellite spectrum, and its use cases. At present, satellite spectrum is not a consumer-facing offering, and will largely be used as backhaul for terrestrial networks, as well as in powering enterprise use cases such as in aviation and maritime communication. On this note, telecom operators will see initial limitations in proliferating the service to consumers. This is where the latest launches from Airtel and Jio come in.

With the new services, the two telcos will offer the satellite-based network service as an add-on or standalone service. However, the initial cost of the satellite-based service is likely to be higher than any other terrestrial network service presently available in the country. This could pose a challenge for mass adoption.

Further, satellite spectrum wasn't ever meant to be a mass-market solution, and even going forward, will largely play a role in filling gaps in terrestrial solutions where the latter is weak. This, in turn, automatically reduces the reach of serviceable areas within satellite networks, making them a potentially limited offering.

TERTIARY PRESSURES

Amid all this, Elon Musk, known for helming electric mobility startup Tesla and space startup SpaceX, two of the most successful so far in their respective industries, created an entity named 'Starlink'. In May 2019, the latter started launching small satellites that would reside in an orbit that is considerably closer to the Earth, thereby called Low Earth Orbit (LEO). Musk's vision was to create a constellation or chain of satellites that would work in relay, and cover the entire world in a web of Internet connectivity.

While this, in ways, boosted the hype around space satellite offerings, Starlink has already received regulatory clearance to offer its services in India. Media reports also indicate that Jeff Bezos and Amazon-backed satellite Internet service, Project Kuiper, has also recently applied for a regulatory satcom licence in India, and could launch its services as early as the end of next year.

This is not all. While enterprises are slated to become the primary customers for satellite Internet services, tech and networking expenditures by companies across verticals have steadily declined, as the September quarter's IT earnings showed. This suggests that if tech spending remains low, most initial deployments of satellite Internet services could be pilots or early-stage expressions of interest at best. Large, multi-million-dollar deployments, in this regard, could be deferred for the upcoming quarters, which means that even if spectrum auction or allocation clearance is given by the end of this year, adoption of the service could remain limited.

With limited initial market scope, plenty of competition, high costs, and stuttered confusion regarding spectrum auction or allocation at hand, India's efforts to liberalise and open up satellite connectivity for all are seeing a shaky start at best. While companies remain bullish on a potentially large market size, none of the challenges are frivolous, and definitely cannot be overcome in a blink. ♻

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Why is India talking about net neutrality again?

Talks from telcos for higher pricing of data for the most popular Internet services mean that the net neutrality debate is back

BY VERNIKA AWAL

I n September, telecom operators wrote to the Department of Telecommunications (DoT), urging it to reconsider the pricing of data packets to rightly account for the amount of data consumed by over-the-top (OTT) Internet-based services. Their rationale was based on OTT services consuming more data, thereby having a lopsided impact on the overall operating expenditures incurred by these telcos.

What the telcos did not expect to see here was a partial resumption of the entire net neutrality conversation in the country. After having closed it off following the landmark

> **❝** The TSP's rights over the network created by them need to be restored in a manner in which Big Tech protects its intellectual property rights.
>
> **Reliance Jio**

> **"** Large traffic originators must contribute a fair share through a direct contribution to telecom service providers.
>
> **Bharti Airtel**

debate that involved Facebook (now Meta), net neutrality is a subject that has so far not seen turmoil. Until now, that is.

WHAT DO TELCOS WANT?

On July 7, the Telecom Regulatory Authority of India (TRAI) released a consultation paper for industry responses, titled 'Regulatory Mechanism for Over-The-Top (OTT) Communication Services, and Selective Banning of OTT Services'. Multiple parties and entities raised responses to TRAI's consultation, which was published by the regulatory body on September 5.

The most scathing of the lot came from Bharti Airtel, Reliance Jio and Vodafone Idea—the three main telecom operators of India. Airtel's representation to TRAI, which sums up the crux of all three operators in one, said, "Given the large requirements for meeting the vision of digital India, large traffic originators that account for a disproportionate amount of these (network infrastructure) investments must contribute a fair share. This should be through a direct contribution to TSPs (telecom service providers)."

The surcharge that telcos want companies to be charged, as per the submissions, could be "their share of contribution to the capital cost of broadband networks. This may be computed basis of traffic, revenue, number of consumers or some other parameter that should be decided soon."

Each of the three telecom operators chose to hide behind the garb of "fair share" in telecom charges, with Airtel and Vodafone going so far as to claim that if a selection criterion such as a service having at least 5 million concurrent active users, or accounting for at least 5% of all broadband traffic at peak traffic from that platform, is achieved, only then should this supposed surcharge be levied. In other words, implementing such a strategy, as per the telcos, would not affect all companies.

Airtel's submission claims that such a plan will "protect innovation and allow smaller OTTs to thrive and compete." Jio further likens its claim on network fees to Netflix restricting account sharing on its platform. "The TSP's property rights over the network created by them need to be restored in a manner in which Big Tech protects its intellectual property rights—for instance, Netflix restricting account sharing or password sharing."

It is this consultation paper, and its responses, that led to the renewal of the net neutrality debate in the country—seven years after it had first raised huge public outrage towards India's prominent telecom operators.

NOT THE FIRST TIME

This, though, is not a first for India. The landmark 2016 battle for net neutrality resonates with how the telcos' presentation escalated the topic into the limelight out of nowhere. Back then too, operators ultimately attempted to promote unfair pricing or usage tactics. Users would have either had to pay more to access a popular service or bundle themselves into a company's plans entirely to pay less.

TRAI, in its landmark 2016 verdict that has so far defined net neutrality in India, noted that discriminatory pricing of services would not be permitted under the law of the land, thereby pushing back the telcos' efforts towards a multi-billion-dollar monetisation avenue.

In 2018, the Ministry of Communications hard-coded net neutrality as a clause into the unified licence that telecom operators obtain to provide telecom services in the country. This means that telcos cannot go behind the scenes and order a private firm to pay them separate fees to be treated the same as any other service. In other words, in India, telcos cannot coerce companies, websites and apps into extra money, or threaten them with slower connectivity.

> The surcharge that telcos want companies to be charged, could be their share of contribution to the capital cost of broadband networks.

WHAT HAPPENS NEXT?

The Centre has so far held steadfast that no discussions to revisit net neutrality clauses have been entertained as yet. Media reports indicate that the government will likely remove any clause or mention of OTT platforms from the upcoming new Telecom Bill, to reduce confusion between them and traditional broadcasters or telephony service providers.

On 29 September 2023, the Union Minister of State for IT, Rajeev Chandrasekhar, noted during a media briefing that the battle for net neutrality against telcos was "a hard-fought one", and recalled his involvement in writing to TRAI to retain consumer rights. Chandrasekhar's statement came around a letter signed by notable figures from India's startup community, such as Paytm founder Vijay Shekhar Sharma, Razorpay chief Harshil Mathur, and Zerodha cofounder Nithin Kamath, as well as 125 others, who wrote to TRAI urging them to retain confidence in favour of net neutrality.

Media reports quoting government officials point out that the Centre presently has no plan to go back on its stance towards net neutrality, to protect consumer interest to the fullest.

The battle, though, is not over. While TRAI presently awaits its appointment of a new chairperson, industry bodies, such as the Cellular Operators' Association of India (COAI), are continuing to push in favour of the telcos. Reports also indicate that COAI has urged the TRAI not to entertain letters written to them in favour of net neutrality.

THE IMPACT ON USERS

Simply put, if the telcos were to win, companies would be left without any protection from what would essentially be arbitrary pricing claims from telcos. This could either lead to disruption in services or a levy of additional fees by companies such as Netflix or WhatsApp from the users for accessing the services. This could make such services more expensive and also give telecom operators a lopsided amount of power to control the flow of information.

Telcos, on their part, cannot conclusively argue that their development of network infrastructure would be any different if the said OTT services were not present. Industry stakeholders, on this note, believe that telcos do not have a compelling case backing up their "fair usage" claims this time either—leaving consumers to potentially retain a second victory in net neutrality this time as well. 🔀

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Sanjeev Chhabra
Managing Director and CEO
Beetel Teletech

"Beetel can execute larger SD-WAN turnkey projects"

Beetel is a name we have known since the good old landline days. It was founded in 1987 and became one of India's leading home-grown brands and an established market leader in the landline phone category. Fast forward to the present, and the company is excited about its new journey as a pioneer in IT enterprise and networking solutions, SD-WAN, and collaboration solutions. **Sanjeev Chhabra,** *Managing Director and CEO, Beetel Teletech in an interview with* **Pratima Harigunani** *provides a closer look at the pendulum's big swing – from landlines to the software-defined networking world.*

Tell us about the current strategy and portfolio of Beetle in India.

At Beetel, we follow a two-fold strategy. The first revolves around strengthening our partner base, enabling them to provide innovative solutions, and managing their customer relationships by establishing deep partnerships with OEMs and strategic accounts. Beetel ensures that its partners have a clear understanding of its product offerings, empowering them to address complex customer challenges. This includes emphasising, but not limiting, the development of MSI as a segment and software, security, and services as categories.

Next, Beetel is expanding and strengthening its project and services arm, with a special focus on its strategic accounts. We have established a PMO and governance layer consisting of technical and commercial representatives. Beetel is committed to providing 360-degree support, from pre-sales to post-sales, and proof of concepts.

How vast is your footprint today?

With our comprehensive network comprising 1,500+ channel partners – the system integrators, 10,000+ retailers, and 500+ distributors spanning 400+ cities in India and several cities globally, we have been able to bolster our presence and serve technology that not only connects businesses but also people together.

How strong is your enterprise segment?

We take pride in our commitment to transforming boardrooms into centres of efficient and seamless collaboration. Our offerings are designed in such a way that they ensure business communications are not just reliable but also technologically advanced. Whether it is conducting important meetings, presentations, or team discussions, Beetel's solutions are there to support our customers every step of the way.

> We take pride in our commitment to transforming boardrooms into centres of efficient and seamless collaboration.

> By promoting R&D, and encouraging local manufacturing, the Government of India is creating an environment that is conducive to innovation and competition.

Our mission is to help organisations do more in their business, and thus, we have formed alliances with top-rated brands such as Arista, Avaya, Derwiser, E42 AI, Poly, HPI, and Samsung to name a few, owing to their mastery of different enterprise solutions be it data centre networking products, unified communications solutions, cabling solutions, end to end automation through AI, audio and video conferencing solutions, large format displays and digital signage.

What is happening in the SD-WAN space? What is the company doing on this front?

Beetel represents over half a dozen brands and their SD-WAN solutions in India, supported by Beetel's technical team with the capability to successfully install and commission customer sites in India. With this capability, Beetel is ready to take the lead in the market and execute larger SD-WAN turnkey projects.

How has the drive for indigenisation or 'Make in India' impacted the industry?

The Make in India initiative has had a significant impact on the telecom and electronic manufacturing industry in India. By increasing investment, promoting R&D, and encouraging local manufacturing, the Government of India is creating an environment that is conducive to innovation and competition. This is already leading to the development of new products and technologies and the improvement of the quality and affordability of existing products.

The initiative has emerged as a win-win for both consumers and manufacturers. While the consumers have benefited from lower prices and a wider range of products to choose from, Manufacturers have benefited from a large and growing market and the government's support for the sector.

How tough or easy was indigenisation for you back then, as a pioneer?

As an organisation, Beetel is always recognised for its consistency, quality, innovation, and ability to deliver exceptional value to both our partners and their customers in the field of manufacturing. We consistently maintain our customers' preferences by continuously evolving to meet the demands of this competitive market and ensuring sustainable growth for all our stakeholders. This has been a long journey, never an easy one. With our joint venture, we are now actively participating and becoming more aggressive over time to achieve a higher level of excellence to support the Make in India initiative in a big way.

So, what is the next exciting area that Beetel is focusing on?

India stands out as a prominent player in the global IT landscape, owing its significance to a compelling blend of factors that establish it as an IT hub. This enhances the appeal of the overall market, given India's consistently advancing IT infrastructure, featuring a robust digital ecosystem, extensive connectivity, and world-class data centres. The government's initiatives, such as the Production-Linked Incentive scheme to bolster domestic manufacturing or Make in India, have further contributed to India's allure.

In summary, India's amalgamation of skilled talent, cutting-edge infrastructure, cost-effectiveness, innovation, advantageous time zones, and a proven track record firmly cements its status as the guiding star in the realm of global IT requirements.

And what does all this translate into for the company?

We are eagerly anticipating the next couple of years, which promise to open a floodgate of opportunities for us. As mentioned earlier, we are proactively preparing Beetel for the future by venturing into emerging technologies like industry software, Artificial Intelligence, Machine Learning, and security solutions. Furthermore, we are expanding into projects and services, reinforced by a pool of talented individuals and a robust governance framework. 🧩

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Yerramreddy Nivesh Reddy
Founder and CEO, Mydhili Aerospace

"Drones need the right apps to take off"

A company committed to manufacturing locally, Mydhili Aerospace is a good example of innovation brewing strongly in the young minds in India. While the company specialises in manufacturing drones for agricultural and delivery purposes, it aims to get a step ahead and also produce all components that go into the making of a drone locally, without relying on imported raw materials or parts.

The company's Founder and CEO **Yerramreddy Nivesh Reddy***, in an interaction with* **Pratima Harigunani***, shared how Mydhili came into existence, the distance it has covered and where it heading. He also talked about what spurs and what stops this segment's trajectory. Excerpts from the interaction:*

What triggered the idea behind Mydhili Aerospace? How difficult or easy was it to get where you are today?
My journey into this business began in my 11th class when I developed a keen interest in entrepreneurship. Initially, I envisioned selling agricultural drones, but extensive research led me to pivot towards manufacturing drone frames. This shift was driven by the high demand and a desire to reduce India's dependence on Chinese drone components. The path was challenging, particularly due to limited capital from bootstrapping and difficulties in prototyping, especially with 3D printing. As pioneers in India's drone frame manufacturing, we lacked high-end equipment initially. Looking ahead, our focus is on growth and innovation in the drone frame industry.

What progress areas are you most excited about?
One of our achievements includes the successful delivery of a drone with a payload capacity of 15 kg. While we encountered challenges during our initial order, we used these experiences to gain insights and effectively overcome obstacles. Our first drone model, named BARISH AD-01, has been completed, and we are currently developing the second drone frame, BARISH AD-02, which boasts enhanced specifications surpassing those currently available in the market.

> "
> Balancing security, safety, and surveillance concerns is a priority, and we are committed to adhering to stringent standards for responsible drone usage.

> The Make-in-India initiative provided a catalyst by encouraging domestic production, a positive force driving Mydhili to contribute to this vision.

What is so special about BarishAD-1?

Breaking new ground in drone manufacturing, BarishAD-1 is designed as a hexacopter, a configuration widely recognised for its exceptional flight stability, especially suited for agricultural and delivery applications. What truly sets BarishAD-1 apart is its impressive weight-to-lifting capacity ratio. Weighing in at just 16 kg, this drone boasts an impressive lifting capacity of 25 kg, a testament to its cutting-edge engineering.

The drone's canopy has been meticulously crafted to optimise aerodynamic flow, ensuring enhanced endurance and performance. Its payload holder, designed with a sleek and streamlined airflow structure, adds to its efficiency. At the heart of our agriculture and delivery drone lies a sophisticated array of electrical components, including a navigation system, GPS, multiple sensors, high-quality cameras, programmable controllers and tools to facilitate autonomous flight. It opens doors for farmers seeking advanced agricultural practices, engineers engaged in surveillance activities and product shipping companies looking for innovative delivery solutions.

What sets your drones apart?

Our drone frames stand out due to their durability, ease of maintenance, and cost-effectiveness. We prioritise high-quality materials and design for longevity, making them rugged. Simplicity in maintenance ensures that users can easily keep them in top condition. The total cost of ownership is reduced, making our frames an economical choice for drone enthusiasts.

Can you share some details on the emphasis on indigenisation and the challenges you may have encountered there – or any boost from the Make-in-India impetus?

Indigenisation has been a central theme in our journey. We aimed to reduce reliance on foreign components and promote local manufacturing. However, this posed challenges, mainly related to capital constraints and prototyping difficulties. The Make-in-India initiative provided a catalyst by encouraging domestic production. It's been a positive force driving us to contribute to this vision.

What role do indigenisation and 3D printing play in terms of costs, environmental impact, G2M speed, testing edge and so on?

Indigenisation and 3D printing have critical roles. They reduce costs by avoiding import expenses and also in prototyping, minimise environmental impact by promoting local manufacturing, accelerate Go-to-Market speed, and offer testing advantages. These factors combine to enhance the overall competitiveness of our products.

Do we lack the right equipment or the right applications, when it comes to drones in India?

In India, there's a need for more advanced drone equipment and applications. While strides have been made, further development in areas like agriculture, surveillance and disaster response can unlock the full potential of drone technology.

What kind of clarity or regulatory support can be helpful for players like you – and how can you balance security, safety, and surveillance concerns?

Regulatory clarity and support are essential for our industry. Clear guidelines and streamlined approvals can foster innovation. Balancing security, safety and surveillance concerns is a priority, and we are committed to adhering to stringent standards to ensure responsible drone usage.

What next?

We are excited about the future of our drone frame manufacturing business and the broader spacetech sector in India. We are dedicated to contributing to indigenous production, innovation and responsible use of technology. 🪁

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