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VOICE & DATA

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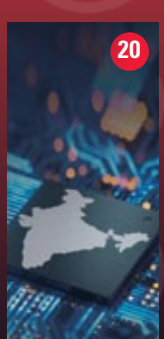
THE CONNECTIVITY ARCTIC IN INDIA

Despite extensive telecom coverage, 5G rollout, and growing fibre networks, India still faces connectivity gaps. Here's a reality check on the connectivity desert



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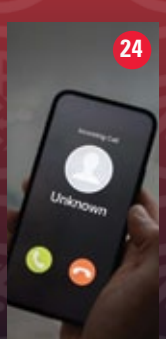

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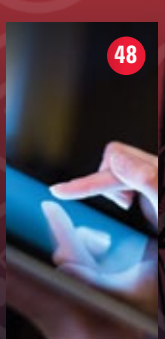

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[OPENING NOTE]

Paving the way for tech leadership through regulatory revamp

India's telecommunications industry stands on the cusp of a major revolution, propelled by visionary policy reforms and a relentless pursuit of innovation. In a move that dismantles a bureaucratic hurdle with a truly cathartic effect, Union Communications and IT Minister Ashwini Vaishnaw recently announced the formal abolition of the outdated Wireless Operating License (WOL). This antiquated requirement, a relic of a bygone era, needlessly burdened operators with unnecessary red tape. Its removal eliminates a major obstacle, allowing telcos to focus on their core function: providing seamless connectivity.

But this is just one of the few steps in a much broader initiative. The Minister also introduced the policy on Spectrum Regulatory Sandbox (SRS) or Wireless Test Zones (WiTe Zones), with the promise to foster global collaboration in the telecom sector. Imagine a safe space for experimentation, akin to a Platonic ideal playground for new ideas. This sandbox is part of the government's Millennium Spectrum Regulatory Sandbox initiative.

The initiative provides a simplified regulatory framework to facilitate Research and Development (R&D) activities. Within these zones, academia, R&D labs, telecom providers, and others can explore new spectrum bands and drive technological advancements in a controlled environment. The SRS or WiTe Zones can be set up in urban or remote areas, allowing for experimentation across various frequency bands. This move signifies the government's commitment to nurturing innovation and propelling India as a global leader in telecom technology.

To quote Vaishnaw, implementing regulatory sandboxes to streamline equipment testing procedures will go a long way in fostering innovation and ease of access. Similarly, removing the wireless operating license requirement reflects the ongoing reforms to facilitate technological progress.

In fact, the abolition of the WOL builds upon previous reforms. While the requirement for a WOL for Access Services authorisation was scrapped in November 2016, the Government of India eliminated the need to obtain a WOL for Very Small Aperture Terminals or VSATs in November 2022. This latest reform extends these benefits to all licensees under Section 4 of the Indian Telegraph Act, 1885. Henceforth, no separate WOL is required for establishing, maintaining, or working telecommunication infrastructure, including radio equipment.

The removal of the WOL requirement simplifies the licensing process, saving time for telecom service providers and aligning with the Department of Telecommunications' initiatives to drive innovation and improve the ease of doing business.

India's telecommunications sector stands at a pivotal moment. The government's bold decisions to abolish the WOL and introduce regulatory sandboxes represent a major paradigm shift. By embracing bold reforms and fostering a culture of innovation, India is poised to unlock the full potential of its telecom sector. This will also act as a catalyst for the nation's digital transformation, paving the way for a future brimming with connectivity and exciting possibilities. With these initiatives, India is well on its way to becoming a leader in telecom innovation and ensuring a digitally connected future for its citizens.

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Leveraging cloud solutions for competitive advantage

For success, establish a specialised cloud and data organisation to address specific challenges with a comprehensive strategy

BY RAMAKRISHNAN JONNAGADLA

A cloud strategy is a concise viewpoint on the role of cloud computing in an organisation. According to Gartner, it highlights the extent of operations in the cloud and its purpose. The surge in demand for cloud solutions originated with retailers and consumer goods companies, who showed the world the power of the cloud and what it has to offer. Other companies strategised to ensure uninterrupted availability of content by fast-tracking content delivery to end consumers, illustrating the scalability of content distribution.

This trend accelerated during the pandemic, as businesses transitioned to cloud infrastructure to maintain connectivity amid physical restrictions. This shift proved advantageous for companies established during the pandemic, where the lack of physical interactions paved the way for more contactless relationships through cloud ecosystems. This further enabled employees across the globe to connect through a simple broadband network.

Engineering firms, positioned as service integrators, find a well-defined cloud strategy essential for establishing themselves in a highly competitive technological landscape, offering clarity to client enterprises seeking suitable partners for their ventures.

THE POWER OF INFORMED SOLUTIONS

A 2023 HFS Horizons survey report indicates that the top two problems digital engineering services

> A robust cloud strategy is critical in the current business landscape, especially as data-driven real-time decision-making increasingly takes centre stage.

companies are asked to solve are accelerating speed to market for new products and services, and increasing operational efficiency.

The foundation to address both these problem statements lies in defining a solid cloud strategy and executing it successfully. This execution enables service employees to access data and applications at scale from anywhere using any device. The flexibility has enabled enhanced collaboration and productivity, allowing teams to work seamlessly across different locations and time zones.

Post-global pandemic, as the corporate sector continues to adopt hybrid or remote working models, such an employment strategy becomes beneficial in addressing problems from a universal standpoint, where individuals are not constrained by rigid work hours. This form of cloud strategy enables people to experiment in a world of a boundary-less future of work, tapping into the best talent regardless of geography, fostering an agile, diverse workforce, and fast-tracked innovation.

For enterprise clients, a robust cloud strategy holds utmost importance in the current business landscape, especially as data-driven real-time decision-making increasingly takes centre stage and serves as the primary competitive lever.

BENEFITTING FROM DATA-CENTRIC STRATEGIES

An effective cloud strategy should encompass a roadmap for navigating the future, involving the migration of existing platforms and infrastructure to the cloud, as well as the development and maintenance of new cloud-native applications. Cloud platforms offer businesses robust analytics and data storage capabilities, empowering them to gather, analyse, and derive valuable insights from extensive and intricate datasets. These insights drive well-informed business decisions, process optimisation, and the discovery of untapped revenue streams.

A dedicated cloud services studio streamlines customers' cloud transformation, operations, and migration initiatives. This studio should be structured to formulate a comprehensive cloud strategy, optimise cloud expenses, ensure cost-effectiveness, and enable businesses to allocate resources effectively. Additionally, it should furnish comprehensive cost optimisation recommendations for Infrastructure as a Service (IaaS) across single and multi-cloud environments, optimising resources based on accepted IaaS recommendations.

DELIVERING MORE WITH INNOVATION

Cloud engineering plays a pivotal role in accelerating migration time, reducing deployment time, and enhancing scalability. Enterprise clients that have embraced cloud engineering solutions have reported significant benefits—over 50% acceleration in migration time, 90% workload movement to Azure and cloud-native platforms, 80% reduction in deployment time and scalability, and 30% increase in employee productivity.

Besides, the adoption of microservices architecture enables total independence for data management and a reduction in the cost of IT management operations by up to 25%.

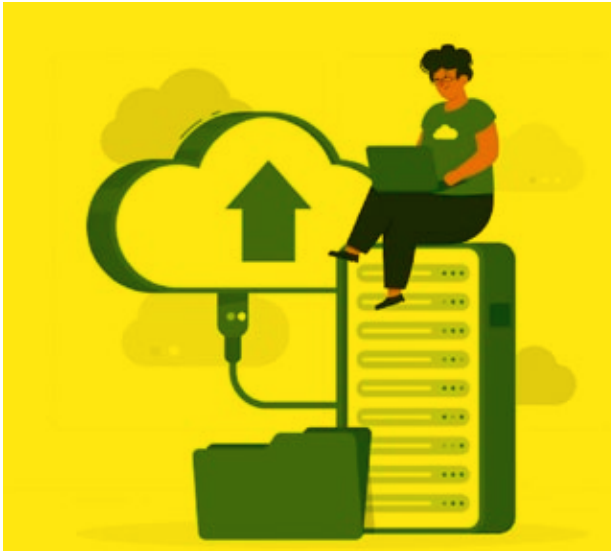
According to McKinsey's forecast for technological innovations, the cloud has expanded operational activity across industries by enabling the distribution of workloads across various locations. Instead of relying on a centralised source, the cloud fosters decentralisation, granting flexibility to data. This flexibility proves beneficial for both large and small-scale businesses, facilitating operations that transcend geographical boundaries.

The cloud revolutionises market entry barriers, shifting the focus from scale to skill. Smaller companies equipped with the right skills can now scale their businesses on cutting-edge infrastructure without the burden of upfront costs, providing a significant competitive advantage.

GAINING GROUND WITH HIGHER PRODUCTIVITY

In the digital age, the cloud, fuelled by data, serves as the cornerstone of strategic decision-making. Furthermore, the cloud enables greater development productivity through agile and DevSecOps methodologies, along with efficiency improvements through API-based or self-service-based workflows and automation. DevOps breaks down silos between development and operations, speeding up deployments and rendering infrastructure more flexible, resulting in faster releases and increased

> Enterprises embracing cloud engineering solutions have reported an 80% reduction in deployment time and scalability and a 30% increase in employee productivity.



IN BRIEF

- Cloud engineering accelerates migration, enhances scalability, and drives productivity, offering a competitive edge.
- Cloud platforms empower businesses with robust analytics, data storage, and valuable insights for informed decisions.
- Automation and DevOps in cloud engineering streamline processes, shorten development cycles, and ensure high-quality software.
- The cloud fosters decentralisation, flexibility, and innovation, enabling businesses to transcend geographical boundaries.
- Smaller companies can scale their operations on cutting-edge cloud infrastructure, levelling the playing field in the market.

user satisfaction. AIOps leverages AI to forecast issues and automate resolutions, pre-empting problems and conserving time and resources.

For instance, automated patching, coupled with DevOps and AIOps, significantly shortens the systems' development life cycle and provides a continuous delivery system with high software quality. Collectively, these components make cloud engineering swifter, more effective, and more dependable.

For CXOs to successfully execute a comprehensive cloud strategy, establishing a specialised cloud and data organisation is crucial. This unit, whether internally formed or partnered with trusted consultants, focuses on addressing specific challenges related to cloud economies.

- A good assessment and planning framework driven by consultants.
- A solid to-be state architecture and design driven by cloud architects.
- A well-formulated migration plan and execution roadmap driven by specialists.
- A foundational cloud infrastructure setup team consisting of engineers and admins.
- Recommendations and best practices adopted for security and compliance needs, driven by security consultants.
- A solid bunch of cloud engineers with a focus on performance and continuous optimisation.
- A robust automation and DevOps execution model using Infrastructure-as-code (IAC) tools, practised by efficient cloud engineering PODs.

Thus, such a cloud strategy empowers businesses with scalability, agility, cost efficiency, enhanced collaboration, business continuity, innovation, global reach, and seamless experience. By leveraging these advantages, enterprises can stay ahead of the competition with their ability to adapt quickly to market changes, drive innovation, optimise cost models, and deliver superior products or services.

The author is Vice President of Engineering at Ascendion.
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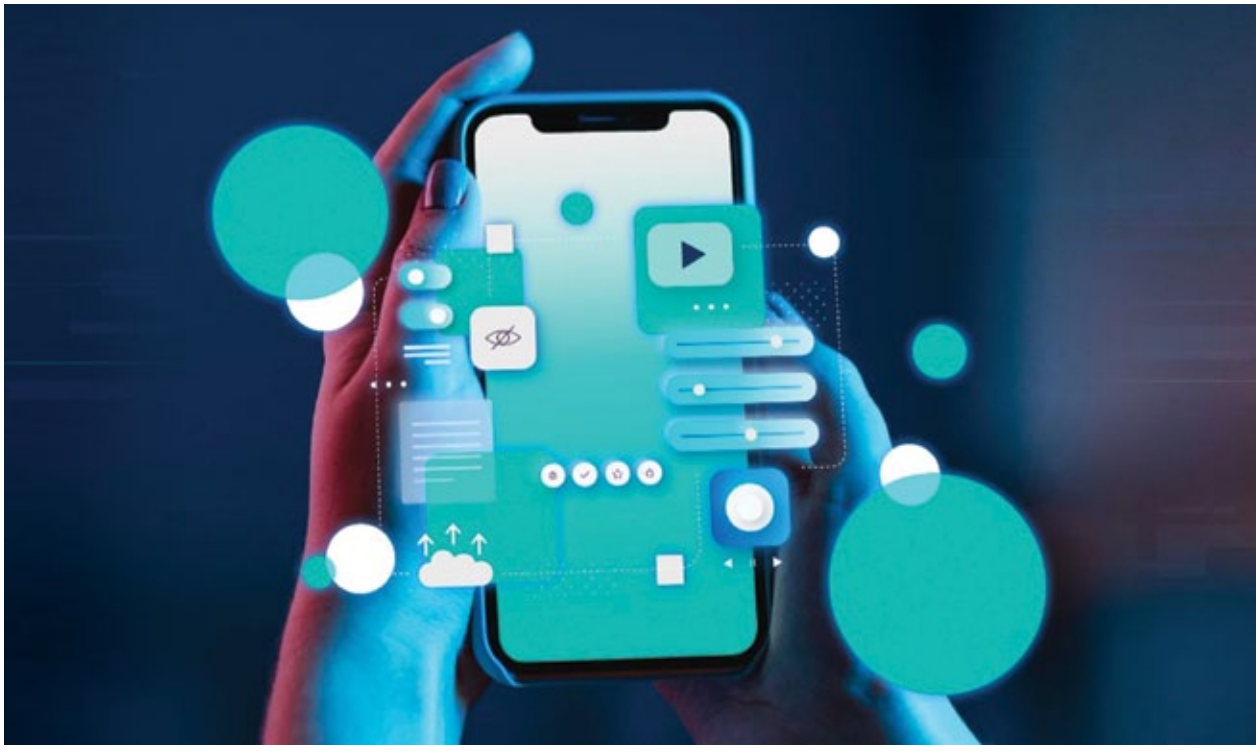
The emergence of super apps calls for better digital experiences

Rising consumer demand for seamless digital experiences is driving the emergence of super apps, but reliability remains a key challenge



BY ROHIT RAMANAND

Consumers today exhibit a higher level of sophistication and selectivity in their application usage compared to just a few years ago. They seek convenient, flexible, and innovative digital experiences, readily embracing new applications capable of simplifying and enriching their lives, such as super apps.

Exceptionally popular in Asia, super apps amalgamate various digital services, including social networking, e-commerce, banking, messaging, food delivery, and transportation, into a single application. A study conducted by PayPal and PYMNTS reveals that globally, 70% of people express interest in utilising super apps. Moreover, the report highlights the particular interest of Gen Z in applications that enable them to manage payments and everyday activities within a centralised solution. In markets like India, where smartphone adoption rates are high, the prevalence of local super apps is expected to increase as users seek more convenient, all-in-one solutions.

Nevertheless, the convenience offered by such apps is contingent upon the quality of the digital experience they provide. The 'State of Ecommerce in India' report by New Relic identifies potential concerns among Indian customers regarding super apps, notably related to bandwidth and storage. These concerns include the necessity for 4G and 5G Internet capabilities (45%) and the requirement for ample storage space on their devices

> Observability enables engineers to grasp the customer's viewpoint, empowering them to proactively address issues and enhance the reliability of super apps.

(42%). Despite the strong interest in this segment, reliability remains a significant concern for many Indians, presenting a barrier to widespread adoption.

NEED FOR 24/7 STRONG PERFORMANCE

Reliability and the quality of digital experiences are paramount to the success of popular super apps such as China's WeChat, Indonesia's Tokopedia, and India's own Paytm and Tata Neu. If customers are dissatisfied, they are likely to share their experiences with others. Studies show that over one in three customers will abandon a brand after encountering just one poor experience. Therefore, organisations must address customer pain points and identify issues before they escalate, particularly if they want Indian customers to rely on super apps to simplify their lives.

Although consumers acknowledge the potential benefits of super apps, such as saving time, streamlining daily tasks, and reducing app clutter, concerns about reliability persist. A recent survey indicates that 58% of Indians uninstalled apps in the past year, citing the overwhelming number of apps and subpar user experiences as the top reasons for doing so. Poor integration experiences pose another significant reliability challenge for super apps. Unless integrations are executed flawlessly, super apps may become more of a burden than a convenience for users, as it becomes difficult to pinpoint and resolve issues along the chain.

A subpar digital experience can have detrimental effects on business success. Therefore, implementing a robust observability strategy is essential to ensure that super apps operate smoothly with minimal performance issues, thereby facilitating agile digital experiences across the entire ecosystem.

DRIVING GROWTH THROUGH DATA-DRIVEN ENGINEERING

As super apps continue to integrate further into people's lives, ensuring swift and consistent response times becomes paramount. Utilising a data-driven approach to engineering, aimed at enhancing uptime and operational efficiency while fostering sustainable and scalable innovation, will be crucial for success. This approach entails bridging data from customer experiences with broader business teams, engineering, and operations. However, many organisations grapple with data silos stemming from a lack of a unified data management platform that provides a comprehensive view of all necessary components. This is where observability plays a pivotal role.

OBSERVABILITY: KEY TO SUPER APP SUCCESS

Comprehending the performance of a super app from a customer perspective is vital for assessing urgency and prioritising troubleshooting efforts. Doing this manually, particularly while ensuring the uptime of super apps with multiple moving parts, is a Herculean task. The manual process often results in sluggish response time, excessively long mean time to detection and resolution, and poor customer experiences.

Moreover, due to the fragmented nature of monitoring in most organisations, implemented solutions often fail to monitor the entire tech stack. Therefore, despite the tools and techniques an organisation employs to monitor issues, having a centralised data repository capable of displaying related entities and events becomes imperative.

Observability enables engineers to grasp the customer's viewpoint, empowering them to proactively address issues and enhance the reliability of super apps before customers are adversely affected. The efficacy of observability is evidenced by the 2023 Observability Forecast, which revealed a median annual ROI of 114% in India, with over half of respondents (53%) highlighting its significance in achieving core business objectives.

The benefits of comprehensive full-stack observability are clear—increased efficiency, business growth, improved uptime, reliability, and enhanced customer experience. Given these outcomes, observability emerges as a necessity for all organisations managing super apps.

The author is the Group Vice President of Engineering India at New Relic.
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LT GEN DR S P KOCHHAR

HARNESSING THE POWER OF TERAHERTZ TECHNOLOGY IN ICT

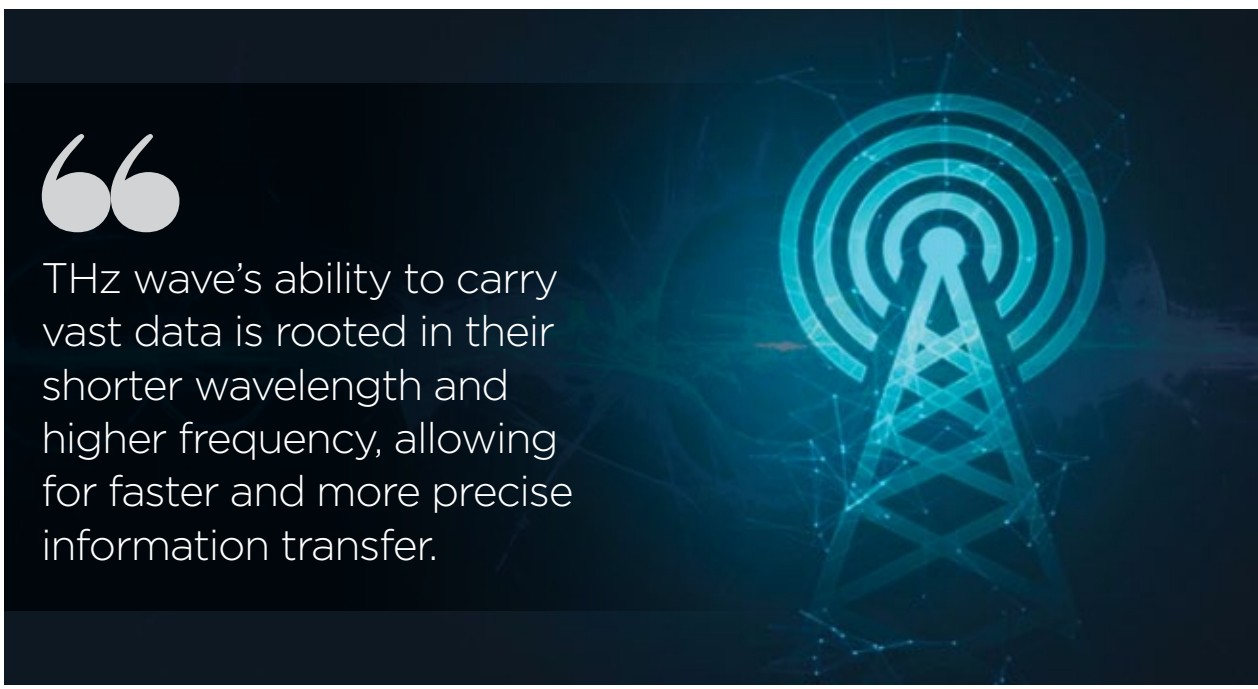
THz technology can bridge the gap between the technical and regulatory landscape, ushering in an era of communication that is faster, more reliable and adaptable

In the ever-evolving world of wireless communications, the allocation and utilisation of the electromagnetic spectrum has emerged as critical elements in ensuring seamless flow of data, voice and information, across the globe. In this regard, Terahertz (THz) technology presents an exciting frontier within the spectrum landscape. THz frequencies occupy a unique position in the electromagnetic spectrum, offering both an alluring promise and formidable technical challenges.

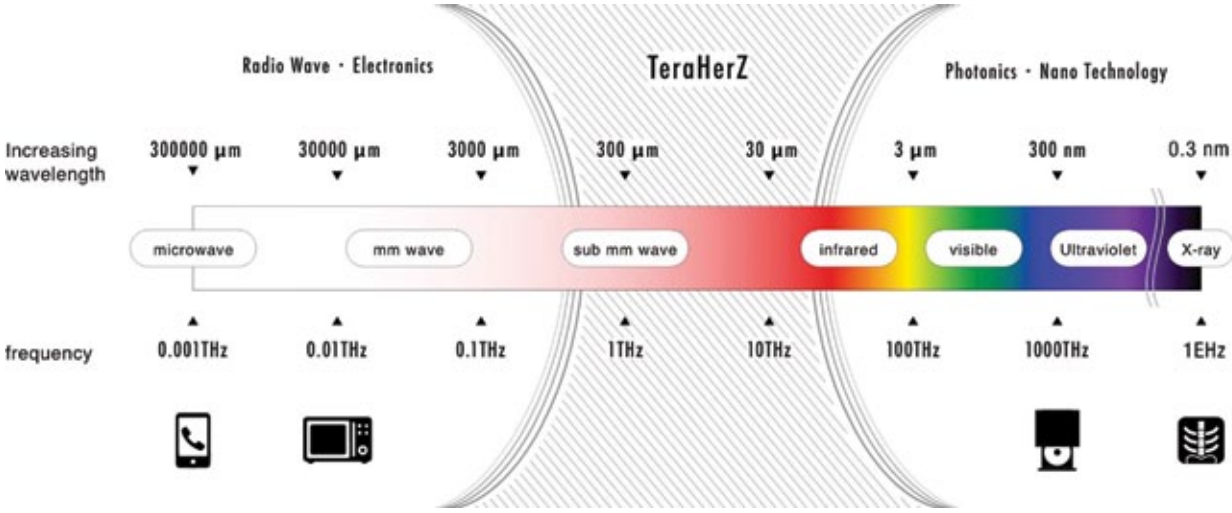
This article explores the world of THz frequencies, their strategic significance in modern communications, the global and regulatory perspectives that shape their utilisation, and the innovative solutions that are reshaping the way we harness this valuable portion of the spectrum.

TERAHERTZ BAND: UNVEILING THE SPECTRUM

The electromagnetic spectrum, a continuum of electromagnetic waves, spans from radio waves to gamma rays. Terahertz frequencies occupy a distinctive space in this spectrum, typically ranging from 0.1 THz (100 GHz) to 10 THz. Positioned between microwave and infrared frequencies, THz waves offer a sweet spot for communication technologies. Their ability to carry vast amounts of data is rooted in their shorter wavelength and higher frequency, allowing for faster and more precise information transfer.



Terahertz Gap



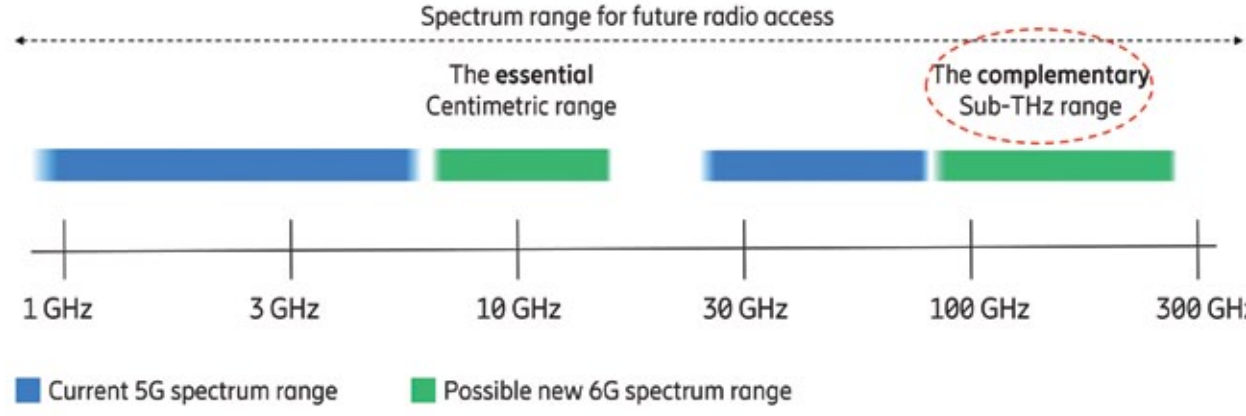
Source: National Institute of Information and Communications Technology

They combine properties of both microwaves and infrared light, enabling them to penetrate various materials, while offering high-resolution imaging capabilities. This dual nature has historically made the generation and detection of THz waves challenging, leading to the term 'terahertz gap' in technology, which is used to explain the infancy of this band as compared to well-developed neighbouring spectral regions. This has led researchers from disciplines such as physics, material science, electronics, optics and chemistry to investigate the various unexplored or less-explored aspects of THz waves.

SIGNIFICANCE IN MODERN COMMUNICATIONS

The insatiable demand for high-speed, high-capacity wireless communications has fueled the quest for next-generation technology. Terahertz technology holds the promise of breaking through the bandwidth limitations that plague current wireless technologies. Communication in the sub-terahertz (sub-THz) range is expected to be a feature of 6G systems. With the unique ability to serve very high data rates, sub-THz communication can enable the extreme speeds and low latencies required to enable 6G use cases such as professional high-resolution holographic communications and machine-to-machine interactions.

Sub-Terahertz Range for Use in 6G



Source: Ericsson

> THz waves can overcome the limitations of traditional radio waves, enabling faster and more reliable communications between spacecraft and Earth.

Further, Terahertz waves are ideal for remote sensing due to their ability to detect low-mass molecules and ions, making them useful in environmental monitoring and space exploration. They can identify water, oxygen and carbon dioxide on other planets, aiding in space exploration and the search for extraterrestrial life.

CHALLENGES AND INNOVATIVE SOLUTIONS

Despite its immense potential, THz communication faces some technical challenges. One such challenge is signal attenuation, which limits the effective range of THz waves. The atmosphere absorbs THz waves, particularly in the 0.1 THz to 1 THz range, making long-distance communications challenging.

When it comes to tapping into terahertz waves, the world of electronics faces a fundamental problem. To enter the gap, the silicon chips in our electronics need to pulsate quickly, at trillions of cycles per second (hence a terahertz). The chips that power phones or computers can operate perfectly well at millions or billions of cycles per second, but they struggle to reach the trillions. The highly experimental terahertz components that do work can cost as much as a luxury car. Engineers are working to address this issue and bring the prices down.

The other realm, the world of light, has long sought to make devices like lasers that could cheaply create terahertz waves at specific frequencies.

Researchers are exploring various strategies, including the development of metamaterials that can manipulate THz waves and reduce signal loss. Beamforming techniques, like those used in millimeter-wave technology, are being adapted to THz frequencies to focus and direct signals efficiently. Additionally, advancements in ultra-sensitive detectors and high-power sources are enhancing the viability of THz communication systems.

PROSPECTS AND APPLICATIONS

The future of THz technology extends far beyond high-speed Internet. Telemedicine, environmental monitoring, space communications and more, await transformation through THz waves.

In telemedicine, THz imaging can provide non-invasive, high-resolution scans, enabling early detection of diseases. Environmental monitoring systems can leverage THz technology to precisely analyse atmospheric conditions and detect pollutants. In space communications, THz waves can overcome the limitations of traditional radio waves, enabling faster and more reliable communications between spacecraft and Earth. THz systems have a potential market for security applications, solid explosive material detection and mail screening.

Moreover, the synergy between THz technology and emerging technologies like Artificial Intelligence (AI) and Machine Learning (ML) holds tremendous potential. AI-powered THz devices can autonomously optimise communication parameters, adapt to changing conditions, and enhance security.

Terahertz technology stands at the forefront of innovation in wireless communications. Its unique position in the electromagnetic spectrum and its potential to revolutionise various industries make it a technology worth pursuing. However, the journey ahead involves not only technical advancements but also the creation of supportive regulatory environments.

As we continue to explore the transformative potential of THz technology, collaboration, research and regulatory foresight will be the guiding stars on this exciting journey. Terahertz technology is poised to bridge the gap between the technical and regulatory landscape, ushering in a new era of communication that is faster, more reliable and adaptable to the demands of our ever-connected world. The future might be THz, and its possibilities can be limitless.

The author is a decorated military veteran who retired as Signal Officer-in-Chief, the head of the ICT wing of the Indian Army. He was also the first CEO of the Telecom Sector Skill Council (TSSC) and is presently the Director General of the Cellular Operators Association of India (COAI).

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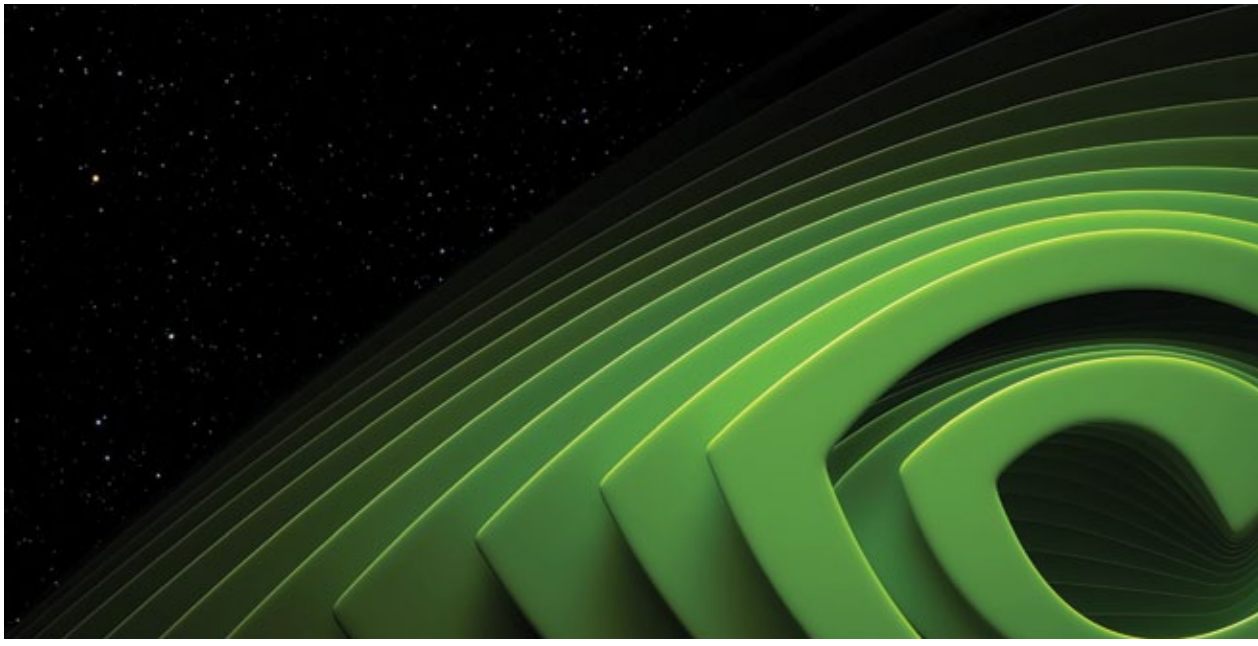
[COMMENTARY]
NVIDIA

From a garage startup to a $2-trillion tech giant

Nvidia's journey from a modest start-up to becoming a trillion-dollar giant is a testament to its vision, and ability to adapt to a fast-paced market



BY JAIDEEP GHOSH

It took Nvidia, the global AI chip powerhouse, 24 years as a public company to reach a valuation of USD 1 trillion in June 2023. The second trillion took just eight months! Nvidia touched USD 2 trillion this February, becoming the third most valuable tech company globally, after Apple and Microsoft.

Let us take a quick look at Nvidia's remarkable journey, its current market dominance, and the potential challenges it faces.

FROM HUMBLE BEGINNING TO COMPUTING POWERHOUSE

Founded in 1993 in California, Nvidia began its foray into the world of Graphics Processing Units (GPUs), chips responsible for generating visuals on computers. In the early days, the company focused on gaming GPUs, catering to the growing demand for immersive and realistic experiences.

As market and technology evolved, they pioneered the concept of general-purpose computing GPUs, which leveraged the parallel processing power for tasks beyond graphics, such as running scientific simulations and complex artificial intelligence (AI) models.

This strategic shift proved to be a game-changer. With the explosion of AI in recent years, GPUs have become the backbone of AI models. Nvidia's GPUs are now the go-to choice for leading tech giants like Microsoft, Amazon, Google, and Meta who spend billions of dollars on their AI projects.

MARKET DOMINATION

Nvidia has transformed itself in the space of three years from a company focused on chips for video games to those that run AI. With billions flowing into AI and Generative AI, the company has a massive market share of around 80%.

> Nvidia's GPUs are now the go-to choice for leading tech giants like Microsoft, Amazon, Google, and Meta who spend billions of dollars on their AI projects.

This growth can be attributed to strong demand for AI solutions across diverse industries, including finance, telecommunications, manufacturing, and healthcare. Further, diversification into non-traditional markets such as gaming consoles, data centre solutions, and automotive cemented Nvidia's market position. Frequent investments in complementary AI start-ups also strengthen its market standing.

FINANCIAL PERFORMANCE

The stock is up six-fold in 16 months.

The past months have witnessed an unprecedented surge in Nvidia's financial performance, culminating in a staggering USD 2 trillion market capitalisation. Its recent fiscal Q4 revenue has tripled compared to the corresponding period of the previous fiscal year. Earnings grew nine-fold. This is unparallel.

Such exponential growth is exemplified by recent instances where Nvidia's single-day rallies eclipsed the entire market capitalisation of established entities like Coca-Cola or Reliance Industries. However, even amidst this success, it is crucial to acknowledge the competitive landscape and potential risks for Nvidia's growth.

COMPETITIVE LANDSCAPE

Nvidia faces competition from established players like AMD and Intel, as well as from China's Alibaba and Baidu, who are making significant investments in AI hardware development. Even some of Nvidia's biggest customers such as Google and Amazon, wary of the company's strong position, are racing to make their own AI chips that could supplant its products. Microsoft and Meta have started their chips more recently.

This competition will necessitate continuous innovation and strategic manoeuvring from Nvidia to maintain its market position.

NAVIGATING UNCERTAINTIES

While Nvidia's trajectory appears meteoric, it is vulnerable to other headwinds. The current supercharged investment in AI could eventually saturate, leading to a slowdown in demand for Nvidia's products. Over-reliance on a handful of customers is also a clear risk.

Anticipated economic downturns could dampen the demand for tech infrastructure, while geopolitical tensions as well as trade disputes and sanctions may disrupt global supply chains, limiting Nvidia's access to China and Russia, among others. Regulatorsin some countries have launched probes into Nvidia's dominant position, which could lead to unfavourable situation(s).

INDIA'S SEMICONDUCTOR ASPIRATIONS

The success stories of companies like Nvidia serve as a strong motivator for others to join India's exciting journey in the semiconductor landscape.

India has embarked on a journey in the semiconductor landscape. The government's ambitious initiatives, such as the Rs 76,000 crore (about USD 9 billion) Semicon India Program, aim to attract both domestic and international players to establish semiconductor fabs, design houses, and packaging facilities.

Leading companies like Micron, Foxconn, PSMC Taiwan and Tower Semiconductor, alongside Indian conglomerates such as Tata Group, HCL, Vedanta, CG Power and the Murugappa Group, are actively contributing to India's semiconductor ecosystem. Notable among these is the proposed USD 11 billion foundry unit of Tata and PSMC in Gujarat, which has just received government approval.

Nvidia's journey from a modest start-up to becoming a trillion-dollar giant is a testament to its vision, and ability to adapt to a fast-paced market. Analysts predict that, amidst a global proliferation of AI solutions, the company's stock could triple over the next four years.

As the future of AI unfolds, Nvidia is undoubtedly positioned to play a pivotal role in shaping the computing landscape for years to come.

The author is a former Partner at KPMG in India. Views are personal.
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[NEWS ANALYSIS]
SEMICONDUCTOR

The first 'fab' step forward

India's first chip fabrication plant marks a pivotal step towards self-reliance in electronics. Here is how it will impact the communication sector

BY VERNIKA AWAL

On 29th February, the Union Cabinet approved the proposal for India's first commercial semiconductor chip fabrication plant. Under this proposal, Tata Electronics Private Limited (TEPL), a Tata Group firm, is partnering with Taiwan-headquartered Powerchip Semiconductor Manufacturing Company (PSMC) to establish a chipmaking facility, commonly known as a fab, in Dholera, Gujarat.

The decision to establish this chipmaking plant has set in motion India's first commercial chip development plan, expected to start delivering the first chips approximately three years from now. In light of this, Voice&Data delves

> The joint venture plant by TEPL and PSMC will manufacture three billion chips annually across four nodes or sizes—28nm, 50nm, 55nm, and 90nm.

> The 28nm chips are utilised in various applications such as OLED displays for TVs and phones, connected home appliances, and Industry of Things (IoT) devices.

deeper into the potential impact of this chip fab on the overall networking and IT hardware industry, which in turn powers India's communications operations.

WHY A CHIP FAB IS IMPORTANT

A chip fab is crucial as it takes semiconductor wafers and transforms them into chipsets and processors. These chips are typically categorised into various 'nodes', which denote the size of a single semiconductor chip. Smaller chips often indicate more advanced technology—modern smartphones, for example, utilise chips as tiny as 3nm (nanometers).

Upon completion, the joint venture plant by TEPL and PSMC will manufacture three billion chips annually across four nodes or sizes—28nm, 50nm, 55nm, and 90nm. Although none of these nodes are new per se—for instance, commercialisation of the 90nm chip node happened over two decades ago in 2003—yet, each of these nodes is still of immense strategic importance.

Of particular interest is the 28nm node. A November 2020 note to investors by UK-based analyst and consultant, Omdia, emphasised that 28nm chips are utilised in various applications such as OLED displays for TVs and phones, connected home appliances, the Internet of Things (IoT) devices like smart bulbs and plugs, Wi-Fi routers, modems, and extenders, as well as navigation devices such as GPS units in cars, and more.

The 28nm node, along with others such as 55nm, holds significant strategic importance due to its ability to strike the right balance between technological sophistication and production cost. Even as more cutting-edge devices transition away from the 28nm chip node, it is unlikely to disappear completely from demand. Its importance can be judged by the fact that as recently as 2021, the market-controlling Taiwan Semiconductor Manufacturing Company (TSMC) set up new plants to cater to the demand for 28nm chips.

For India, having its chip fab capable of producing such nodes is a much-needed transition. It paves the way for increased domestic value addition in appliances once the fab becomes operational.

WHAT DOES THIS MEAN FOR NETWORKING HARDWARE?

Today, domestic value addition is crucial in electronics manufacturing due to two primary reasons: geopolitical significance and control over the overall value chain. Specifically, in hardware such as Wi-Fi modems and routers, geopolitical concerns have gained prominence over the past seven years, particularly regarding cybersecurity. There is a growing apprehension about the world's dependency on China for such devices, highlighting the need for diversification and greater domestic control over the production of networking hardware.

Consequently, the United States of America became the first nation to officially take action against China by banning the use of their networking hardware in state affairs. Subsequently, they recommended against their usage in networking infrastructure. This move, which led to sanctions against the Chinese electronics conglomerate Huawei and the latter's subsequent downfall, was closely followed by similar measures in India and the European Union.

Presently, India can manufacture exterior casing for Wi-Fi router hardware, and other parts of the networking component supply chain are also localised. However, semiconductor chips account for 40% or more in terms of the value of the component supply chain. The ability to localise this aspect will not only bring in greater revenue but also help the government increase domestic tax collection.

More importantly, this will reduce India's reliance on other nations for sourcing chips amid geopolitical conflicts. As seen in the past decade, the US sanctions on licenses for chip supply to China had a cascading effect on the nation's biggest tech brand, Huawei, which has seen its market capitalisation plummet since its peak in 2016-17.

> Once the fabs are operational, India will be able to source chips locally, reducing its dependence on imports that are often restricted by geopolitical conflicts.

IN BRIEF

- India's first chip fab partnership with PSMC marks a significant step toward self-reliance in electronics manufacturing.
- The joint venture aims to produce three billion chips annually across multiple nodes, catering to diverse technological needs.
- 28nm chip node holds strategic importance due to its versatility in various applications, ensuring sustained demand.
- The establishment of domestic chip fabrication capabilities reduces India's reliance on imports, enhancing strategic autonomy.
- While India's chipmaking journey has commenced, achieving self-reliance will take several years, with the fab's completion expected in 2027.
- The impact of India's chip fab on the networking hardware sector underscores the nation's drive for greater domestic control and resilience.

In networking hardware, this means that once the fabs become operational, India will be able to source chips locally, reducing its dependence on imports that are often restricted by geopolitical conflicts. This is crucial to ensure that the country's communications infrastructure is not curtailed by the influence of any other nation.

THE EXTENT OF CHIPMAKING IN INDIA

While India has taken the vital first step, the country is still some years away at the very least from achieving self-reliance in the space. The TEPL-PSMC fab is likely to see groundbreaking work commence in the coming weeks, following Prime Minister Narendra Modi's mandate at February's Cabinet meeting that all manufacturing work on new chip facilities must begin within the next 100 days.

Following the announcement, Union IT Minister Ashwini Vaishnaw stated at a press briefing that the Centre hopes the manufacturing of the chip fab will be completed within the next two-and-a-half to three years, instead of the usual timespan of over four years required for a chip fab to be built. Even if this accelerated timeline is met, the first chips are unlikely to reach commercial companies through the supply chain before the end of 2027. Further time could also be required for the facility to scale up its manufacturing capacity to the proposed volume of three billion chips per year.

What remains to be seen is how demand for the chip nodes to be produced in this fab will persist in 2027 and beyond. Given that TSMC, the world's largest chip manufacturer, has invested in building four full-capacity giga fabs to ramp up 28nm chip manufacturing, it is unlikely that demand will abruptly taper off. However, India's contribution to local chip demand will still take some time to materialise.

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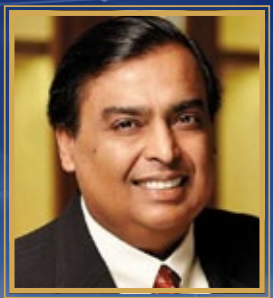

MUKESH DHIRUBHAI AMBANI
Chairman and MD,
Reliance Industries

PATHBREAKER OF THE YEAR

DR NEERAJ MITTAL
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DCC & Secy, DoT

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Can Truecaller weather India's CNAP plan?

With 70% of its business coming from India, the Swedish caller ID services company faces uncertainty as the country moves ahead with Calling Name Presentation

BY V&D BUREAU

On 23 February, the Telecom Regulatory Authority of India (TRAI) released a set of recommendations for introducing caller identification as a default feature in Indian telecom networks. The recommendations offered a look at not just how the feature would work but also put up for debate conversations around what would happen to one particular company—Sweden-headquartered caller and spam identification service, Truecaller.

The reason for this is very simple—last year, Truecaller earned USD 167.9 million in annual revenue, of which India contributed USD 126.4 million—just over 75%. In terms of the firm's user base, at the end of December last year, Truecaller had 374.1 million users, of which 266.2 million or over 71% came from India. This makes the business over-reliant on India; without its business here, Truecaller's annual revenue will only be a fraction of what it is right now.

WHAT TRUECALLER BRINGS TO THE TABLE

Truecaller's active user base ropes in approximately one in every three smartphone users in India on average, making the app one of the most popular mobile applications across Indian phones. This, however, comes with a caveat.

Truecaller has attempted to expand to offer a wide range of features, including establishing a social media-like ability for users to comment on certain numbers or even look others up. While this would have otherwise been good, the company continues to be identified as a caller identification service provider only.

> Last year, 75% of Truecaller's USD 167.9 million revenue came from India, with over 71% of its 374.1 million global user base originating from the country.

The publicly listed firm operates this service through its database of contacts, which allows numbers to be marked as spam through voluntary user reporting and Truecaller's flagging mechanism. While there have been many voices underlining that this database of contacts has largely been acquired by accessing users' phone number databases, the fact is that Truecaller has a massive database of mobile numbers, which makes it a vital cog in today's data-driven world.

THE KEY CHALLENGES THAT LIE AHEAD

The company faces a growing array of privacy regulations in India and worldwide. Specifically, the Digital Personal Data Privacy (DPDP) Act of 2023, which is awaiting notification pending clearance and adoption of its rules, could present a substantial compliance challenge.

Add to this the Ministry of Communications' efforts to introduce CNAP or Calling Name Presentation, a facility that is currently in development and could be introduced in the years to come. The TRAI has recommended the rollout of the default caller identification feature across all telecom operators in the country, providing users with a native method to identify incoming calls. However, users may need to opt-in to utilise this feature, which as per the present recommendation, is not expected to be mandatory for all calls nationwide. Nevertheless, if users do choose to enable it, every call should display a corresponding name.

The introduction of such a feature is likely to reduce the necessity for users to rely on Truecaller. Consequently, industry experts anticipate a certain level of impact on the company's market position, as Truecaller's core offering will lose its USP and distinctive features.

Moreover, Truecaller's Gold and Premium subscription services are likely to face an even greater impact. These services already face challenges in gaining traction among users, with non-paying customers happily waiting for the advertisements to be over. However, with the introduction of a default CNAP feature, industry analysts predict that Truecaller may find it difficult to attract users to its premium offerings, potentially resulting in slower revenue growth or even revenue decline.

NOT ALL IS LOST, THOUGH

CNAP, for now, is still far away in the future. What's more, it faces numerous challenges, including the need to seek feedback from telecom operators and technical considerations, before it can be implemented.

Telcos, for instance, have expressed their concerns that the implementation of CNAP will lead to substantial infrastructure costs and also add considerably to call latencies, or the amount of time a user has to wait for the network to fetch a caller's details before it is connected. The delays in fetching call details before a connection could lead to a frustrating user experience and require careful consideration in its implementation.

Furthermore, experts have raised doubts about the reliability of CNAP results. TRAI's recommendation suggests fetching the name of the person to whom the phone number was originally issued. Such names could be misleading in terms of a wilful scammer, who often uses stolen KYC data to gain access to SIM cards. Also, incorporating such details would be challenging for a government entity, as they lack access to privately maintained databases for cross-referencing.

Moreover, on 4 March, Union IT Minister Ashwini Vaishnaw launched Chakshu— a platform for reporting fraud and spam calls, which the government claims has already helped recover over 7,00,000 stolen mobile phones. Vaishnaw mentioned during a post-announcement press conference that the government may collaborate with Truecaller to strengthen such features using its spam database, potentially opening new avenues for partnership.

If and when such avenues are opened, partnering with the government could be a strategic move for the company to remain relevant in the market and potentially increase earnings.

However, it is still too early to fully understand what lies in the future for solutions such as CNAP and platforms like Chakshu. Until then, Truecaller would be sure to look over their shoulders and prepare for a revenue emergency that could arise here—needing them to alter their operating strategy in the long run.

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5G is still in the early stages of its lifecycle

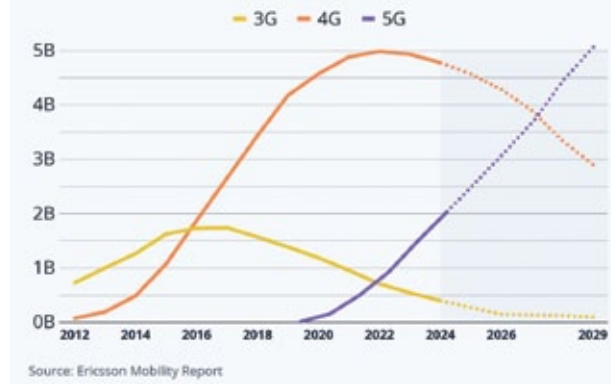
BY FELIX RICHTER

More than 15 years after the release of the first iPhone, the smartphone market has matured to a point that true innovations have become few and far between. It speaks volumes of the lack of new ideas that the transition to 5G was perhaps the most meaningful change brought to flagship smartphones in the past few years. While 4G networks were quick enough for most day-to-day tasks performed by average users, 5G marks a significant leap forward, offering unparalleled speed, reliability, and connectivity.

Compared to its predecessor, 5G offers exponentially faster data transfer rates and reduced latency. This advancement not only enhances the user experience by enabling quicker downloads, smoother streaming, and seamless gaming but also facilitates the widespread adoption of emerging technologies like augmented reality, virtual reality, and the Internet of Things (IoT). Moreover, 5G's lower latency and higher bandwidth make it suitable for critical applications such as remote surgery, autonomous vehicles, and smart city infrastructure. Overall, the transition to 5G heralds a new era of connectivity, unlocking endless possibilities for innovation and transforming how we interact with technology on a global scale.

And while 5G has been available since 2019 and many users have already grown accustomed to its obvious advantages, it is important to note that we are still in the early stages of the transition to 5G, leaving significant growth potential for smartphone makers for years to come.

GLOBAL SMARTPHONE SUBSCRIPTION



According to estimates from Ericsson's Mobility Report, the number of 5G smartphone subscriptions worldwide reached 1.5 billion, by the end of 2023 and will blow past two billion by the end of 2024. That would mean 5G reaching that milestone quicker than 4G did after its introduction in 2009, while 3G was superseded before ever reaching the two-billion mark. While Samsung and several other smartphone makers released their first 5G handsets in 2019, Apple jumped on the 5G bandwagon in the fall of 2020, bringing the new standard to the entire iPhone 12 product line.

The author is a Data Journalist with Statista.

Qualcomm intros 7th gen 5G modem-to-antenna solution

Qualcomm Technologies has unveiled the Snapdragon X80 5G Modem-RF System, seventh generation of its 5G modem-to-antenna solution. The platform integrates Artificial Intelligence (AI) with unmatched spectrum flexibility, power efficiency, and performance, heralding a new era of intelligent computing across various product segments.

Designed to be 5G Advanced-ready, the Snapdragon X80 is targeted at smartphones, mobile broadband, PCs, XR, automotive, industrial IoT, private networks, and fixed wireless access. Notable features include the first 5G modem with fully integrated NB-NTN satellite communications support, a 6-antenna architecture for smartphones, 6X carrier aggregation, and AI-based mmWave range extension for fixed wireless access customer premise equipment.

The Snapdragon X80 features revolutionary AI innovations, based on a dedicated tensor accelerator, that improves data speed, latency, quality of service, coverage, location accuracy, spectrum efficiency, power efficiency and multi-antenna management.

Cisco, TELUS launch solution for connected cars

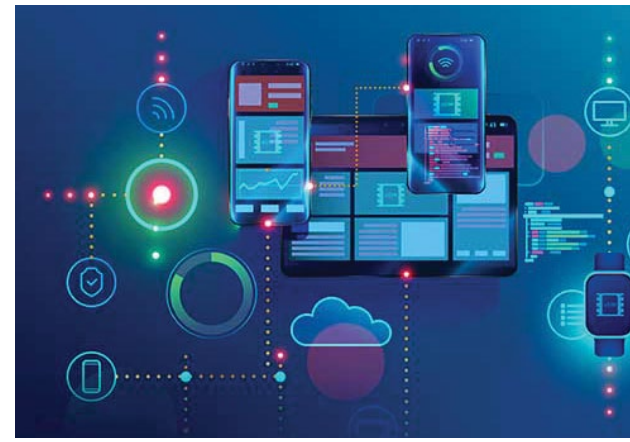
Cisco and TELUS have announced the launch of new 5G capabilities in North America, aimed at serving IoT use cases across industry verticals, particularly focusing on connected cars. The network will facilitate drive testing by a major North American automotive manufacturer's 5G Connected Car, paving the way for enhanced customer experiences and revenue opportunities for carmakers.

The TELUS Control Center powered by Cisco will now support automated provisioning, dynamic policy, charging, and quota management outcomes, enabling the launch of new subscription services on demand and managing SIM and vehicle lifecycle for any Connected Car OEM or enterprise.

This launch enables OEMs to utilise TELUS' high-performance wireless network for introducing 5G-enabled telematics, infotainment applications, and advanced network services, as well as subscription Wi-Fi services to customers. With electrification and software-defined vehicles driving the future of the connected mobility ecosystem, this innovation lays the foundation for OEMs to offer new onboard applications and advanced driver assistance system (ADAS) services while exploring subscription services to support revenue diversification goals.

The collaboration also introduces OnDemand network slice creation, full-stack observability with service assurance, and life cycle management capabilities, aimed at supporting advanced, mission-critical use cases in the future. This collaboration marks a foundational building block of Cisco's Mobility Services Platform strategy, aimed at enabling service providers to maximise return on investment and drive 5G monetisation with new value-added services and API-based network programmability outcomes.

Thales, Google introduce eSIM Discovery solution



Thales has tied up with Google to introduce eSIM Discovery solution, aimed at simplifying eSIM activation on Android devices with minimal user intervention. The process, initiated with just a single click, streamlines what could otherwise be a cumbersome task. According to a recent report by GSMA Intelligence, the eSIM market is projected to witness explosive growth by 2025, with over 3.4 billion eSIM-enabled devices forecasted, spanning from tablets and laptops to smartwatches. An overwhelming 98% of mobile network operators are gearing up to offer eSIM services, highlighting the growing interest and demand in optimising eSIM capabilities to enhance user experience.

Upon device activation, the Thales eSIM Discovery service swiftly identifies the user's preferred operator and facilitates the download of the appropriate subscription, ensuring seamless cellular access. This user-friendly approach notifies users of available profiles, enabling instant activation upon acceptance or manual retrieval via device settings.

Notably, the cloud-based architecture of Thales' solution ensures global accessibility and scalability, accommodating all Android devices and carriers worldwide. Eva Rudin, EVP Mobile Connectivity Solutions at Thales, highlighted the collaboration's objective to provide a standardised and secure eSIM activation process, benefiting both users and Android device manufacturers.

Rudin emphasised the simplicity and security of Thales' eSIM Discovery service, affirming its compatibility with existing subscription management platforms. This integration promises users a hassle-free, one-click eSIM activation experience, underscoring Thales' commitment to simplifying eSIM adoption across devices and connectivity providers.

THE CONNECTIVITY ARCTIC IN INDIA

WHEN WILL THIS ICE MELT?

Despite extensive telecom coverage, 5G rollout, and growing fibre networks, India still faces connectivity gaps. Here's a reality check on the connectivity desert

BY PRATIMA HARIGUNANI

It is great to brag about how fast our OTT shows stream now or how quickly we can order a burger from that restaurant on the other side of the town. But there is more to the connectivity bubble we are walking in today. The picture on the other side of the pond is quite different.

If we look at TRAI's Indian Telecom Services Performance Indicators January–March 2023, the Internet penetration in India as of March 2023, stood at 880 million. The number of telecom subscribers as of March 2023 was over 1,172 million. On the contrary, Nielsen's India Internet Report 2023 indicates that nearly half of the rural population is still not actively using the Internet. The current state of fibreisation of towers was observed at 38%, as per a KPMG India report for India Mobile Congress (IMC) 2023. According to an Ookla report, The State of Worldwide Connectivity in 2023, despite improvements in global connectivity, there are still areas that fall outside of network coverage.

These reports highlight the disparities in Internet performance between fixed and mobile networks across different regions, reminding the importance of addressing connectivity challenges worldwide. Interestingly, fixed networks demonstrated a 19% increase in median download speed (83.95 Mbps) and a 28% increase in upload speed (38.32 Mbps) in Q3 2023 compared to the

> Often digital arid zones fall behind in terms of economic growth, revenues, remote work opportunities, education, healthcare and new-age skills.

"India has 'connectivity desert' issues with more than half of all the network subscribers reporting slow to no connectivity last year."

Biswajeet Mahapatra
Principal Analyst, Forrester

WHAT DOES THE 'UNCONNECTED' LOSE?

- New economic opportunities
- Remote work jobs
- Agriculture productivity due to lack of data
- Digital skills
- Education and inclusion
- Government coverage for crucial initiatives

previous year. Due to a lack of bandwidth (and therefore slower speeds), people in Africa and APAC areas need help doing many things on the Internet.

When the Organisation for Economic Co-operation and Development (OECD) checked data from the 'Ookla for Good' initiative, evaluating broadband speeds across urban and rural areas within EU and G20 countries, it found that fixed broadband download speeds in rural areas were close to 50% slower than those in cities. Digital Arctics are not something that the world can ignore anymore, especially when it is going full tilt with fuel like 5G and fibre.

FORGOTTEN OR FAR-FLUNG?

It is a hard truth that while India is galloping fast on digitalisation, fibreisation, SatTech and lightning-fast download speeds, many in the country are still untouched by this revolution. Depending on their region, their constraints and the oblivion they suffer, their digital barren land hurts, and spreads.

According to data shared by TRAI, as of May 2023 Urban Telephone Subscribers were around 653.43 million and rural subscribers were 519.14 million. The urban teledensity was noted at 133.34% while it stood at 57.73% in rural areas. The share of urban and rural subscribers in total number of telephone subscribers at the end of May 2023 was 55.73% and 44.27%, respectively. For the record, the Delhi service area has shown a maximum teledensity of 273.19% while the Bihar service area was at a minimum of 55.61% at the end of May 2023.

India has 'connectivity desert' issues with more than half of all the network subscribers reporting slow to no connectivity last year, avers Biswajeet Mahapatra, Principal Analyst, Forrester. "With more workload including regular business activities, transactions, education, media and entertainment moving online, India is facing connectivity issues. It is not restricted to rural or far-off areas but is very much a challenge even in major metros and Tier-1/2/3 cities. Although a lot of investment has happened in the past few years in deploying 5G services, fibre optics, towers, etc., still it has not been able to satisfy the needs of consumers."

WHY DO WHITEOUTS LEAD TO BLACKOUTS?

Neglecting these regions and people is full of implications – for the industry as well as the economy. These digital arid zones fall behind in many areas like economic growth, revenues, remote work opportunities, education, healthcare and new-age skills. As seen in the OECD-Ookla data, the gap between the proportion of individuals with at least basic skills in cities and rural areas can reach 50%.

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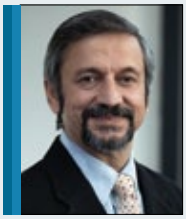


"High-speed Internet allows rural businesses to streamline operations by accessing cloud-based services and collaboration tools."

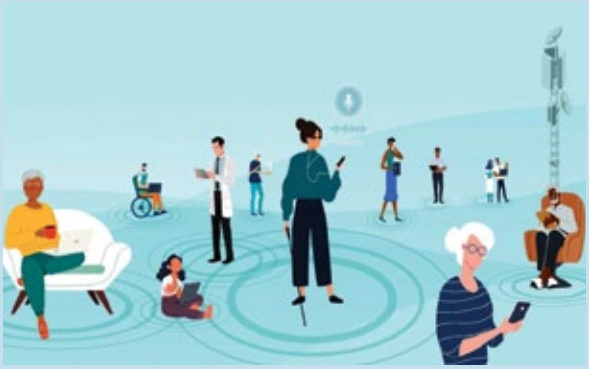
Pravir Dahiya
Chief Technology Officer, Tata Teleservices

There are many economic advantages or industrial applications that we are missing out on due to these 'barren white spaces'. Mahapatra picks out many such areas. "This gap directly impacts any application or transaction which requires real-time data streaming or processing. These may include quality degradation in education applications, longer processing time for any task completion, making real-time monitoring difficult and IoT-built solutions useless. There is an impact on the overall cost of operations, and businesses are forced to invest in redundant or duplicate networks and services just to manage their operations."

People can simply not take part in the modern economy without adequate connectivity, captures Petrus Potgieter, Associated Partner, Strand Consult. "For many applications, a mobile connection at LTE speed is still enough but if you want to broadcast video, for example, you need something better than that. Firstly, people need adequate connectivity for work as well as for education – even when this includes things like getting information about how to fix things around the house, something which most of us probably do from time to time. Secondly, industry and agriculture require connectivity for remote monitoring, remote device control and many other applications. Where regulation does not inhibit this, firms can often build out their infrastructure but for households, it is not as simple. Households with good connectivity can access services and information in a way that saves them a lot of time and money even if it is just basic government services."

We also asked Pravir Dahiya, Chief Technology Officer, Tata Teleservices, and he shared some views purely as an industry technocrat, independent of the company's strategy in this area. The situation of the 'connectivity desert' in India is largely the same in 2024 and has not changed significantly from 2023. He also remarked on the importance of this issue.

"Online marketplaces and reach to customers beyond physical boundaries get enabled by the presence of strong connectivity and digital infrastructure. This opens up opportunities for increased sales and revenue. High-speed Internet allows rural businesses to streamline operations and leverage technology-driven solutions. Access to cloud-based services, online collaboration tools, and real-time data analysis enhance productivity and decision-making," Dahiya points out.



DIGITAL INCLUSION IS A MIRAGE

- Less than 14% of the world's major tech companies deliver on digital inclusion.
- While 95% of the world has the theoretical potential to access the Internet, almost half the global population is offline due to limited digital skills or affordability issues.
- Only 27 companies out of 200 assessed have a passing score of 50 or above on the benchmark illustrating the huge progress needed in digital transformation by the remaining 173.

Source: Digital Inclusion Benchmark 2023 (World Benchmarking Alliance)

"Cutting-edge technologies like the HTS, managed LTE SDWAN, and LEO services can help address the connectivity desert issues in India."

Shivaji Chatterjee
President & Managing Director, Hughes Communications India

THAT OASIS IN THE DUNES

The good news is that penetration of the Internet in India's rural areas has gone up 200% between 2015 and 2021, compared to the 158% growth seen by urban areas in the same period – as captured in the Economic Survey 2022-23. A big factor here could be the 'Digital India' programme launched in 2015; the country has seen the addition of more Internet subscribers in rural areas in the last three years, from 2019 to 2021, than in their urban counterparts (95.76 million in rural compared to 92.81 million in urban areas). In 2023, the government shared that over 6,00,000 km of optic fibre has been laid, connecting almost 2,00,000 Gram Panchayats. It also stated that over 425 million Internet users are present in rural areas compared to 295 million in urban areas.

Potgieter, however, presents a different and optimistic picture. According to him, coverage gaps or 'digit deserts' are shrinking if the definition is kept constant. "The problem is that the demand for connectivity increases steadily so what might have been adequate coverage a few years ago can today denote a 'digital desert'. I have observed how over the past five years, my household data consumption has increased from 1 GB per day to 30 GB or more per day, with working from home, video meetings, etc. This is why operators need to constantly invest to improve network quality."

Experts believe that the advent of 5G and 6G, fuelled by rapid and wide fibreisation in the country, will fill this void soon.

Digital deserts must soon become part of the connectivity nervous system, not only for the democratisation of communication but also for various other outcomes. According to the KPMG report, the collective integration of 5G/6G, satellite communication (Satcom), and semiconductors could potentially contribute approximately USD 240 billion to the nation's economy within the next five years, thereby adding 1.6% to the national GDP by FY2028. Achieving this will require 100% fibreisation of towers for the implementation of 6G.

Technologies such as FWA, Satcom, Full Fibre, and 5G hold significant potential. However, as Mahapatra observes, they are also expensive and currently available only in select areas. Until these technologies are deployed nationwide and made affordable, their impact will be limited. Each of these technologies faces its own set of challenges; for instance, Satcom encounters latency issues, bandwidth constraints, higher costs, and weather challenges. Similarly, 5G faces challenges such as device compatibility, initial high costs, security concerns, device proximity, and availability.

Potgieter illustrates that many digital desert problems can be resolved by leveraging existing Low Earth Orbit (LEO) satellite services. However, he notes that countries like India and South Africa have existing licensing requirements that hinder the official launch of such services. In contrast, in Malawi, for instance, Starlink service is available for less than USD 50 per month, offering a potential solution to numerous connectivity issues. Additionally, emerging solutions include billing systems for prepaid fixed broadband.

"South African fibre broadband firm Vumatel has deployed overhead fibre connections in slums, offering uncapped household service at about USD 5 per month. However, this needs certainty about municipal planning permission and related matters. This low price point is most realistic for relatively densely populated areas. FWA is not new and is a good solution for relatively low broadband speeds. AirJaldi is providing similar services in India and there might be other small companies doing the same," he says.

Shivaji Chatterjee, President and Managing Director, Hughes Communications India shares how Hughes India in the last three decades has taken strides to address the digital divide issue in the country.

"Households with good connectivity can access services and information in a way that saves them time and money, even if it is basic government services."

Petrus Potgieter
Associated Partner, Strand Consult

"From covering underserved areas with satellite connectivity to launching new services like High Throughput Satellite (HTS) for the unserved regions in India, we have been catering to all walks of society. With its managed LTE SDWAN suite of services, its HTS solutions and the upcoming LEO services, Hughes covers the entire length and breadth of India. These cutting-edge technologies can serve as the backbone to address the connectivity desert issue," he highlights.

It is not about one technology but using all these technologies based on need, topology, and accessibility to ensure that cheaper, viable, effective, and non-interruptive yet good service is available for all the citizens, stresses Mahapatra.

In the same vein, Potgieter notes how all of the proposed solutions like 5G and 6G (other than the satellite) require a reasonable fibre optic backbone and it is important to ensure that firms can deploy fibre backbone circuits without excessive planning permission. "For local deployment, many developing cities do not have a good network of multiple-utility tunnels. Overhead fibre is an appropriate solution for these cities."

In the assessment of Rohit Kochar, Founder, Chairperson, and CEO of Bert Labs, 5G and 6G can help a lot in improving the efficiency of data packets. "With the Edge Distributed Computing solutions we offer, we make sure that data transmission is efficient, in both upstream and downstream areas. This is crucial for the split-second decisions that are made at an enterprise's edge, like at plant equipment."

Potgieter, however, also shares a real-world example to remind us how regulation often prevents solutions on the ground. "A colleague of mine lives in a small town in South Africa and although there is now optical fibre broadband in the town, he cannot get service because the road in front of the house is a provincial road and the municipality cannot authorise the last-mile construction. This causes a digital mini-desert and I believe there are many like that."

TIME TO REDRAW THE BLURRY MAP

Just bringing the isolated island into the digital mainland will not suffice. The 'unconnected' has to match the quality, speed, experience and applications that the 'connected' enjoy already. True digital inclusion will manifest when there is a fair and equal distribution of connectivity in the complete sense. The Ookla report has also argued that it is not only about being connected to the network per se; the quality of that broadband connection is equally crucial. Unlike other utility services like gas and electricity, where quality is generally stable, with broadband, the quality of the network experience is crucial to ensure users can benefit fully from multiple applications, the report underlines.

As Mahapatra points out, the major challenge is the lack of competition in the telco business. "In many cases, it is reduced to an oligopoly market with few options for consumers. We do not expect any major new players to enter this business, making the situation even more difficult. Until and unless the government steps the service quality will remain the same."

As Potgieter wraps it up well, "Functional literacy is a requirement for effective participation in an information-based economy and not something that can be changed overnight. However, making space, from a regulatory point of view, for a multitude of solutions and experimentation whenever and wherever it does not harm is likely to be the most fruitful approach."

The thing about grass is that it makes the neighbour's lawn look greener. The thing about snow is that it makes everyone's backyard look the same. Until India thaws all the cold pockets that have still not warmed up to connectivity, we cannot fully claim that our porch looks better than others, no matter how much faster our OTT streams become in an urban apartment. Real digitalisation should be felt everywhere. Time to change the green-eyed to the blue-eyed.

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Shivaji Chatterjee
President & Managing Director, Hughes Communications India

"QDA solutions adhere to prevailing telecom regulations"

QDA, or Quick Deployment Antenna, is an emergency connectivity tool that is reshaping communication maps in critical times and challenging areas where outreach is difficult but crucial. Notably, Hughes has recently intensified its efforts in emergency communication networks through satellite connectivity, particularly in the realm of QDA. This is further bolstered by what it terms a "made-in-India" technology, providing dependable and swiftly deployable communication solutions for rapid field deployment and timely information gathering within 15 minutes. How feasible is it to ensure seamless communication channels even amidst crises when traditional connectivity is lacking? ***Shivaji Chatterjee,*** *President and Managing Director of Hughes Communications India (HCI), provides insights from the front lines for a closer examination. In an interview with* ***Pratima Harigunani,*** *he elaborates on its ties with Satcom, miniaturisation, and terrestrial networks. Excerpt:*

Explain QDA to the uninitiated and what makes it faster to deploy and use.

Quick Deploy Antenna or QDA, as the term suggests, is one of the quickest ways to enable connectivity at any location for both strategic and general communication purposes. QDA solutions typically comprise lightweight hardware, including an antenna and an outdoor VSAT, along with essential accessories. The QDA modem features built-in Wifi and auto-sense mobility, enabling installation by any trained individual in under 20 minutes. Once installed, QDA ensures seamless and reliable satellite connectivity, capable of achieving multi-Mbps network speeds. HCIs QDA provides dependable and interoperable communication solutions with adaptable ranges suitable for various environments.

Are there any specific challenges in India regarding configuration, spectrum, permissions, latency, mobility, capacity, concurrency of usage, etc.? How do you ensure reliability, interoperability, range, QoS, network efficiency, congestion management, security against cyber-attacks, and transmission?

Our systems prioritise quality of service and data, ensuring efficient network utilisation and congestion management. Additionally, they incorporate security features such as encryption and authentication to fortify against cyber threats, while optimised transmission techniques maintain reliable data delivery. Furthermore, the QDA's form factor provides a notable advantage. Packaged in a uniquely designed carrying case that is crush-proof, rugged, and watertight, the entire QDA solution, along with its accessories, remains safeguarded during transportation.

All QDA solutions adhere to prevailing telecom regulations and licensing prerequisites, typically managed by the service provider, including those offered by Hughes. The QDA solution from Hughes has garnered interest across segments in India and has been successfully

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deployed in various situations involving emergency communication, disaster management, satellite news gathering, as well as security for business operations.

Are they adaptive and do they use AI for customisation, dynamic adjustments, optimisation etc.?

QDA solutions are designed to be adaptive and they are capable of incorporating customisation, dynamic adjustments, and optimisation to enhance performance and effectively adapt to changing conditions.

Where has the company demonstrated QDA in India so far? Are there any examples from disaster management, field hospitals, ambulances, mobility, law and order, etc.?

HCI's QDA has garnered widespread praise for its effectiveness across various operational scenarios. The National Disaster Response Force (NDRF) has successfully utilised Hughes QDA during earthquake relief operations in India, Nepal, and Turkey, earning high acclaim. QDA solutions have also proven instrumental in supporting police and security forces during operations in the Naxal-affected areas of Chhattisgarh, contributing to maintaining law and order effectively in the regions.

Additionally, in Ladakh, four strategically positioned QDAs serve as vital communication assets during natural disasters, aiding rescue and relief efforts. Furthermore, HCI's contributions to disaster management and law enforcement in Odisha include QDA terminals provided to the Fire Department, improving response times and operational efficiency during fire incidents, thereby minimising loss of lives. Overall, these diverse use cases underscore the growing interest in QDA solutions, highlighting their invaluable contribution and effectiveness across critical operations.

How amenable is QDA for business users? Can you share any industrial pilots or concepts that the company has implemented?

QDA is a versatile solution that can be deployed to address the communication needs of industrial applications. In recent years, we have witnessed a growing level of interest among enterprise users across various segments, including telecom, banking, and media, among others.

We have already executed a range of successful deployments, with Bharat Sanchar Nigam Limited (BSNL) adopting QDA solutions to extend connectivity to remote areas, thereby enhancing communication and infrastructure development. Additionally, Jammu & Kashmir Bank has incorporated QDAs for mobile ATM services, showcasing the platform's versatility. Most recently, we have provided a QDA solution to a national media agency, catering to their unique requirement for supporting connectivity for live streaming from remote locations and high-security zones.

Does QDA complement terrestrial networks effectively?

Quick deployment antennas serve as independent communication networks, providing connectivity in remote locations while also complementing existing terrestrial networks to enhance overall connectivity. QDA can seamlessly integrate with terrestrial infrastructure, extending coverage and improving connectivity, particularly in areas where traditional networks encounter challenges.

Are there any convergence issues? Can it also be considered for expanding terrestrial coverage beyond emergency use cases?

QDA is designed to operate independently or in tandem with terrestrial networks, depending on specific needs. Integration procedures may differ based on factors such as network protocols, bandwidth allocation, and geographical conditions. However, with careful planning and configuration, convergence issues can be effectively resolved, ensuring seamless interoperability between QDA and terrestrial networks. Moreover, QDA's adaptability accommodates various communication requirements, including voice, data, and multimedia services, thereby enhancing its suitability for expanding terrestrial coverage beyond emergency scenarios.

Will QDA have a role to play in Satcom networks?

The QDA plays a crucial role within satellite communication

> QDA solutions have proven instrumental in supporting police and security forces during operations in the Naxal-affected areas of Chhattisgarh.

or Satcom networks, leveraging its rapid deployment capabilities across various applications. In disaster management scenarios, the QDA swiftly establishes vital satellite communication links, providing emergency responders with an efficient and reliable means of coordination and information exchange, especially in areas where traditional infrastructure may be compromised.

Its adaptability extends to remote and challenging terrains, making it a go-to solution for satellite communication in locations where establishing conventional connectivity is logistically challenging. This capability is particularly beneficial for industries involved in mining, land exploration, and scientific research, ensuring seamless communication and data transmission in otherwise hard-to-reach environments.

What is the relevance and progress of the Jupiter series in this context?

The Jupiter Series of Basebands and modems provides high-capacity options with Gbps data handling capabilities. When integrated with QDA and with the advent of HTS footprints on GSAT-11 and GSAT-29, Jupiter modems will offer multi-Mbps upload traffic, which is highly beneficial for Satcom services. Additionally, the modems support location updates every time the QDA moves from one location to another.

How crucial are certifications like the one from TEC that the company received?

Certifications such as the one from the Telecommunication Engineering Centre (TEC) are incredibly important and provide a strong validation of the quality and reliability of our products. This mandatory certification not only demonstrates our commitment to adhering to industry standards and regulations but also ensures that our products meet the requirements for performance and safety. This not only helps build greater confidence among our customer base but also opens up opportunities for participation in government-backed projects.

We are actively working to extend TEC certification to more of our products, ensuring that the company remains at the forefront of delivering innovative, high-quality connectivity solutions tailored to the needs of the Indian market.

What is the company's roadmap for Satcom in India? What are the plans for 2024?

We are very excited about the potential growth of Satcom services in India. The deployment of High Throughput Satellites (HTS) in Geostationary Orbit (GEO) and advancements in global Low Earth Orbit (LEO) constellations have significantly increased available capacity, opening up new opportunities across sectors such as defence, aviation, maritime, and government. Additionally, we are also collaborating with multiple partners, including ISRO and OneWeb, to strategically expand our service offerings for enterprise customers and enable connectivity across previously underserved areas, fostering new opportunities and advancements for the nation.

How does miniaturisation in network equipment and satellites affect QDA?

The trend towards smaller and lighter network components represents a significant boon for the QDA. It greatly enhances its portability and mobility. By capitalising on compact satellites, the QDA can be swiftly and efficiently deployed across various scenarios, perfectly aligning with its mission to deliver rapid communication solutions. Besides, this miniaturisation also boosts the QDA's versatility, allowing it to adapt seamlessly to diverse environments, ranging from disaster management to military operations.

Furthermore, the efficiency gains associated with smaller satellites have the potential to contribute to heightened performance and reliability, thereby solidifying the QDA's role in establishing robust communication links. Ultimately, this evolution in network equipment and satellite design will not only enhance the effectiveness of the QDA but also position it as a cost-effective solution for on-the-go satellite communication needs.

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Amit Chadha
CEO & Managing Director, L&T Technology Services

"Data centre is the new Gold Souk for India"

As the CEO and Managing Director of L&T Technology Services (LTTS), ***Amit Chadha*** *is responsible for providing business and technology leadership, market direction and strategic vision to drive the company's performance. As an engineer and IT outsourcing expert, he is hands-on with technology and believes in empowering people to foster innovation and drive customer service. In an interaction with* ***Shubhendu Parth,*** *he touches on various aspects of LTTS business, its core strength, focus on next-gen communications, partnership with BSNL, and Industry 4.0. Excerpts:*

LTTS has its fingers in almost all pies in the evolving digital world. What is its core strength and how does it differentiate itself as a company?

I have been with LTTS for about 14 years, joining it when the company was about USD 60 million, and now we are talking about USD 1.15 billion in revenues from engineering services. We categorise our engineering services into three main buckets. Firstly, digital engineering comprises around 65% of our portfolio. Secondly, there is traditional engineering, accounting for about 20%, and finally, plant engineering, which makes up roughly 15%.

Now, when you look at engineering as a whole, it is further divided based on industry segments. For instance, in discrete manufacturing, our role involves digitising products and facilitating the transition from products to services. We support the creation and rollout of new products, provide maintenance for existing ones, and handle aspects like computing and communications.

In the process sector, our focus shifts to plant engineering. This entails engineering new plants or upgrading existing ones. Lastly, traditional engineering involves supporting legacy systems and similar tasks. Segment-wise, high tech and transportation are our major sectors, constituting around 20% each, followed by industrial at about 20%, plant engineering at 15%, and medical devices making up the remainder.

What is LTTS doing in the next-gen communications space?

On the next-gen communications front, there are a couple of key aspects to our current endeavours. Firstly, we initiated our journey by collaborating with Original Equipment Manufacturers (OEMs). We engage in product development and design for various OEMs in the telecommunications domain, covering core networks, Open RAN, telecom infrastructure, and related technologies. Over the years, we have established partnerships with several OEMs, supporting them on hardware, software, testing, and sustaining their products.

Additionally, to expand our reach beyond OEMs, we acquired Orchestra Technology in Dallas, which helped us secure our first 10-million-plus operator customer in the US. We have built on top of that and now we have a cli-

> We engage in product development and design for OEMs in the telecom domain, covering core networks, Open RAN, and telecom infrastructure.

> People now recognise and appreciate initiatives that have been successfully implemented in India, viewing them as scalable solutions applicable elsewhere.

ent with 20 million customers and another with 10 million customers, along with several smaller operators both in the US and Europe. For these operator clients, we provide comprehensive network engineering, design, testing, and support services across various industry use cases.

Recognising the need to scale our capabilities further, we conducted an analysis and identified the necessity to have end-to-end network design capabilities. This led us to acquire Smart World & Communication (SWC), an L&T business specialising in network design and rollout for smart cities. Leveraging their expertise, we developed our network architecture capabilities, including the creation of Cogni View, a system of systems integrated with Operations Support Systems (OSS) and Business Support Systems (BSS). Furthermore, we established our own Network Operations Center (NOC) in Chennai.

Our focus now extends beyond 5G to encompass elements of 6G, Wi-Fi 6, and satellite connectivity. To support this, we have established labs in different locations. We have a Qualcomm stack lab in Santa Clara, we have a lab in Dallas on 5G for a manufacturing setup, a third lab in Munich focusing on automotive, a fourth one in Chennai on a non-open 5G stack, and a fifth one in Mysore on open source 5g stack. These labs facilitate the development of use cases and experimentation with different technology stacks.

As a result of these efforts, we have successfully attracted major clients in the US and Europe, both in the operator and OEM segments, and have made significant progress in building out use cases for next-gen communications technology. Our journey in the next-gen communications space continues to evolve, and we are excited to see where the future takes us.

And what about partnerships with the telcos in India?

We recently announced a partnership with BSNL, wherein we are collaborating closely with them to roll out new initiatives in India. This partnership is significant for us as we are not only working on projects for BSNL but also implementing initiatives for ourselves. Our Smart World team plays a pivotal role in these endeavours, serving as the cornerstone of our next-gen communications initiatives. Leveraging the expertise of our Smart World team, we have been able to engage with clients in the US and Europe, showcasing our capabilities and solidifying our presence in the global market.

An interesting observation in the current Indian context is the shift in perception towards initiatives undertaken in India. People now recognise and appreciate initiatives that have been successfully implemented in India, viewing them as scalable solutions applicable elsewhere. This is a positive development that underscores the potential and scalability of projects originating from India, a sentiment that might not have been prevalent a decade ago.

Considering that LTTS has a strong engineering and manufacturing background, where does the company stand in terms of Industry 4.0 offerings, particularly since the rollout of 5G?

Whether it is Industry 4.0 or Artificial Intelligence (AI), connectivity plays a pivotal role as these technologies ride on top of it. One may want to move solutions to the Edge or move everything to the Cloud, but then you need to discuss connectivity. Hence, if you look at the bets we are making, next-gen communications is a key area for us. Within LTTS, we are heavily investing in it; we have dedicated resources to establish a sales team and develop comprehensive solutions for this purpose. Recently, I reviewed our AI implementation for telcos and directed focus towards the embedded layer, emphasising the importance of holistic solutions. As an electrical engineer myself, I allocate significant time towards solution development, balancing this alongside other responsibilities such as investor relations and financial reporting. Internally, we allocate between 1-2% of our revenues annually towards POCs, projects, and skill-building initiatives.

Since LTTS is working on new technologies and solutions, is the company also filing for patents?

Indeed, I am proud to say that since my tenure as CEO, we have consistently filed patents, both for ourselves and

> We provide solutions for compute—from the SOC layer to the embedded layer, data and application layers—as well as end-to-end connectivity solutions.

our customers. During the last 10 quarters, the number of patents we are filing has jumped from 25 patents for our innovations and 25 for our clients per year to 25 each per quarter. This demonstrates our commitment to innovation and intellectual property for ourselves as well as for our customers.

In the context of Industry 4.0, how would you describe the evolution of private LTE and 5G network space in India and what role is LTTS playing in this space?

In the realm of digital manufacturing and Industry 4.0, the complexity of machinery is increasing, necessitating further training and skill development for technicians. Let us take an example of a car, which has evolved from a manual handle-based start system to the present-day fully automated vehicles. Similarly, the manufacturing sector has evolved. Today, digital manufacturing can be looked at from three perspectives. Firstly, the pre-launch phase involves creating digital mock-ups and simulated workflows before the plant goes live. This aims to understand the productivity levels and resolve clashes and supply chain issues. Secondly, post-launch, proactive monitoring of production lines is crucial to adjust capacity as needed. Flexibility is key here. Thirdly, real-time adjustments based on field input to adapt production schedules to demand. Connectivity is vital across all these stages.

In manufacturing plants, we usually see organisations implement Wi-Fi 6. Many organisations also adopt Zigbee networks, Microsoft networks, and microwave networks, before integrating 5G into the plant. These are common practices, enhancing connectivity and facilitating operations.

What about private LTE?

Certainly, our endeavours in private LTE are primarily aimed at serving private companies. We have collaborated with manufacturers in the US and India, and we have even secured contracts with entities like the UK Government. We have established a dedicated team within our next-gen communications division, focusing on enterprise networking solutions. This segment is integral to our overall strategy, and our team is diligently working to secure further success in this domain.

And Cloud?

Essentially, the Cloud is nothing but a form of storage, where data and computing power reside remotely. However, it is important to recognise that the cloud resides somewhere, data centres to be precise. This brings us back full circle to the significance of connectivity. In essence, the cloud operates within a comprehensive cycle, intertwining storage, computation, and connectivity.

However, I would like to highlight that India is witnessing a surge in the data centre market. I strongly believe that the data centre is the new Gold Souk for India and the democratisation of data centres, starting from the grassroots level, can herald a significant transformation in Digital India. Our pipeline in the Smart World business and our innovative solutions in data centres, such as the gEDGE data centre utilising dielectric liquid, underscore our commitment to sustainability and efficiency. This aligns with our vision of leveraging data centres as the catalyst for digital transformation in India.

So, the point is that data and connectivity are the bedrock upon which our digital landscape thrives. AI is a part of compute. If there is no data, there is no computing, which means there is no connectivity. Without compute and connectivity, there is no AI.

What does this mean from the LTTS' solution perspective?

We offer comprehensive solutions across various domains. We provide solutions for compute, spanning from the SOC layer to the embedded layer, and further to the data and application layers. Additionally, we offer storage solutions, primarily focusing on the SOC side. Moreover, we specialise in providing connectivity solutions, offering complete end-to-end solutions. In essence, if you have the resources, we can assemble a tailored network for you, complete with customised use cases.

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"Ciena is widely known for advancements in optical technology"

As the Vice President and Sales Leader for India, ***Amit Malik*** *is responsible for driving Ciena's sales strategy in India, a key growth market for the company. During his over 10-month stint with the company, he has been instrumental in supporting service providers' 5G plans and growing bandwidth demands. In an interaction with* ***Shubhendu Parth,*** *he talks about the changing dynamics of the communication and connectivity sectors, the challenges of managing data deluge, and the evolving enterprise solutions market. Excerpts:*

How do you perceive the evolution of the communication and connectivity sectors? What new developments do you anticipate beyond the current discussions about 5G and its strategic implications?

Let me first take a step back and examine the big drivers of technological evolution. It all began with a significant focus in India on enhancing connectivity. Initiatives like Digital India aimed to bridge the gap for the unconnected population. As these efforts progressed, the emphasis shifted towards not just connectivity but fast and reliable connectivity, recognising it as a platform for innovation and growth. We have seen this play out with the impact of 4G, where video content, for instance, became a significant income source for many. Even during the COVID-19 pandemic, we witnessed a surge in innovative ideas facilitated by connectivity. Now, with 5G, there is anticipation regarding its killer use case and potential for monetisation. However, it is important to understand that the true value of these platforms lies in fostering innovation, which takes time to materialise. While we are already witnessing promising ideas, it is a process that unfolds gradually. Fixed wireless access, such as the Air Fiber project by Jio and similar products by Airtel, is already reshaping connectivity paradigms, especially for households and small clusters. This theme of evolution in connectivity is ongoing and dynamic.

Now, transitioning to another significant driver, data consumption continues to skyrocket. The exponential growth in data consumption, doubling annually or even more, underscores the critical need for robust data infrastructure. Despite the considerable expansion of data centres in India, we are still far behind compared to countries like the US in terms of infrastructure readiness relative to population size. Moreover, the emergence of generative AI is poised to revolutionise data generation, potentially constituting a significant portion of Internet content in the future. This exponential surge in data

> Sustainability is a significant focus for Ciena, reflected in our product design, which prioritises space and power efficiency.

Amit Malik
Vice President & Sales Leader – India, Ciena

> Despite the considerable expansion of data centres, India is still far behind compared to countries like the US in terms of infrastructure readiness.

creation necessitates a corresponding increase in data centre capacities and network bandwidth. From a business perspective, this translates to a burgeoning demand for our services.

What about related developments in India?

India stands out as one of the fastest-growing economies among G20 nations. With this economic growth comes a parallel explosion in data demand. Despite potential geopolitical constraints, the trajectory remains clear: we anticipate a substantial increase in data consumption, driving the need for expanded infrastructure capacities.

You talked about the challenges of managing data deluge. So, what is Ciena doing to help the industry cope with it?

Ciena is engaged in multiple initiatives to address digital challenges in the industry. Firstly, we recognise the need for continuous innovation to stay ahead in this fast-paced environment. As an innovation leader, Ciena is widely acknowledged for its advancements in optical technology. From pioneering corded optics to introducing groundbreaking technologies like 800G, and now the upcoming 1.6T, we are at the forefront of optical innovation. These advancements enable our customers to transmit data faster and more efficiently, ultimately enhancing productivity and reducing costs. Additionally, sustainability is a significant focus for Ciena, reflected in our product design, which prioritises space and power efficiency. Our ambitious goal is to achieve carbon neutrality by 2024, and we are making significant progress towards this target, already achieving 85% of this.

Furthermore, Ciena has expanded its portfolio into routing and switching domains, further solidifying our position as a leader in the industry. We recognise the evolving nature of data demands and the blurring of the boundaries between service providers and enterprises. Challenges faced by enterprise and service provider CIOs are increasingly similar, emphasising scalability and resiliency. Just like the service providers, enterprises too need IT infrastructure, which they can scale. This is something that Ciena can support because we build for the service providers and then go to the enterprise market. This convergence presents new opportunities for Ciena to offer tailored solutions to meet the evolving needs of our customers across various sectors, including the government sector.

A significant aspect of these developments is their occurrence within India. Ciena stands out as one of the few organisations with a substantial research and development presence in the country. With nearly 3000 professionals dedicated to R&D, including hardware design, we are deeply invested in advancing technological frontiers. Furthermore, our commitment to the Make In India initiative is evidenced by our manufacturing facility in Chennai. This facility enables us to produce Routing and Switching solutions locally, facilitating easier access for our customers.

Since you plan to focus more on the enterprise business will it not conflict with your CSP clients because they are also moving towards providing enterprise business solutions?

I do not believe there is a conflict between our focus on enterprise business and our existing CSP clients. While CSPs remain our primary focus and core business, we see an opportunity to serve enterprise and government customers directly or through managed services in collaboration with CSPs. Our expansion into enterprise solutions complements our existing offerings and opens up new avenues for growth. We aim to continue serving CSPs as our core business while extending our reach to directly assist enterprise and government clients. Whether through direct engagement or partnership with CSPs, Ciena is committed to providing innovative solutions to address the diverse challenges of our customers.

Regarding enterprise solutions, given the rise of connected devices driven by 5G, does Ciena have plans to delve into managing sensor-based networks?

While we do not manufacture sensors or participate in

> We see an opportunity to serve enterprise and government customers directly or through managed services in collaboration with CSPs.

wireless technologies, the role of sensor-based networks is indeed crucial, and we anticipate being an important contributor. The game-changer in this realm is the edge. Over the past few years, there have been various definitions of the edge, reflecting its evolving nature in line with technological advancements. At Ciena, we perceive the edge as an ecosystem rather than a single entity under control, as numerous components need to converge seamlessly. Our neutrality within the ecosystem allows us to choose the best partners and technologies for collaboration.

Moreover, we see the edge as a converged environment, aligning with our expertise in IP and optical convergence. Our innovative wave router technology enables this convergence, facilitating seamless integration of optical and IP connectivity. At the edge, where sensors are connected, the challenge lies in synthesising and analysing the data locally while ensuring swift and simplified connectivity to data centres. This is where a converged network plays a pivotal role.

Furthermore, a converged network also streamlines edge deployment, paving the way for faster rollouts as the commercial viability of sensor-based networks becomes clearer. Overall, Ciena is poised to play a significant role in enabling and optimising sensor-based networks through our expertise in converged networking solutions.

Any play in the private 5G space?

In the private 5G space, we have Blue Planet, which is Ciena's automation arm. So, we are very strong from the slicing perspective. We are doing some POCs (proofs-of-concept) globally, wherein we can demonstrate how the slicing works. Not many have been able to achieve this effectively but with Blue Planet, we have been able to do that. However, in India, we have still not done anything around that space. We will start making investments around the Blue Planet journey this year This will involve building on our software portfolio to further strengthen our presence in the private 5G sector.

On the telecom front, tell us more about Ciena's partnerships in India.

Ciena plays a vital role in the backbone infrastructure of all three major telecommunications companies in India. Our solutions power their long-distance networks, serving as the backbone of their operations. While we do not operate in the radio or wireless domain, our expertise lies in the wide-ranging aspects of network infrastructure. As a result, we enjoy strong partnerships with all three telcos, cementing our position as a trusted provider in the Indian telecommunications landscape.

Earlier, you mentioned the wave router technology. Can you elaborate on it?

In today's landscape, managing networks has become increasingly costly due to the complexity that arises from multiple layers within the network infrastructure. Wave router addresses this challenge by collapsing layers, thereby simplifying network architecture. By creating a converged network, we enable our customers to save costs, space, and power while enhancing efficiency. However, true convergence goes beyond collapsing layers; the layers need to speak to each other. Besides, a strong layer of automation on top of it is critical. Wave router embodies this holistic approach, and we believe it will be a game-changer, helping TSPs optimise costs while ensuring operational excellence.

What has been Ciena's 'Make in India' story so far and what is the plan for 2024?

We started with the manufacturing of routing and switching gears. We have made significant strides in this area, and our products manufactured in India are not only catering to the domestic market but are also exported globally. Looking ahead to 2024, we see potential for further expansion. However, any decision to expand will be subject to thorough viability analysis to ensure it aligns with our commercial objectives and makes business sense. Are we open to expanding our manufacturing footprint in India? The answer is yes.

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Sideloading: A 'hole' new mobile security debate

As the world waits for Apple's stance on Sideloading, it is a good time to unpack doubts, trends, and possibilities around it

BY PRATIMA HARIGUNANI

Tempting but poisonous. Only a company like Apple could have suggested such a thing about 'sideloading'. And only a company like Apple could have fallen on people happily lazing under the tree — posing a question worth pondering and waking up for. The reasons behind Apple's long-standing criticism of its 'walled garden' approach to business are well understood. Some attribute it to the high total cost of ownership of an Apple device, while others express concern over the 'right to repair' issue. Whether fair or not, successful or not, these arguments have consistently subjected Apple to intense scrutiny.

However, recently, this closed fortress has faced mounting pressure to 'open up' from both regulators and consumers. An example of this is Apple's new posture

> Malware-infected mobile apps are also often the first step in complex multi-step campaigns that allow cybercriminals to carry out a variety of attacks.

"Apple's new stance on sideloading would undoubtedly disrupt the industry, with implications for users, developers, competitors, and regulators alike."

Pallav Agarwal
Founder and MD, HTS Solutions

on sideloading, which is now being confronted with more stringent regulations from the European Union. Allowing users to download apps from sources outside the App Store may soon become a reality, albeit initially only within the EU, courtesy of the EU's Digital Markets Act (DMA). This potential change carries significant implications for Apple.

Viewed through Apple's lens, the prohibition of sideloading could be construed as a proactive security measure undertaken by the company. However, viewed through a different lens, allowing sideloading could mean opening the garden to bees and butterflies that contribute to its vibrancy and beauty. Perhaps it is time to examine this issue through the prism of security.

WHAT APPLE FEARS?

Simply put, sideloading involves transferring files between two devices through a third medium or installing an app not present in an approved list of the device maker.

"Some devices allow sideloading without modification, while others need to be 'jailbroken' to make sideloading possible," explains Harish Kumar GS, Head of Sales, India and SAARC, Check Point Software Technologies. "Select users may turn to sideload an application mostly because the official channels simply do not offer the software the user needs. However, it is to be noted that most sources consider sideloading a security issue, as these apps are from unknown sources, rather than from an approved app store."

Although it is something that makes life easy for the device user, it is akin to having a sunroof in a closed garden. Or, as Apple would agree, it makes it easy for an attacker because now there is a hole in the garden wall.

According to Apple's October 2021 report, Building a Trusted Ecosystem for Millions of Apps: A Threat Analysis of Sideloading, the iPhone is considered a highly personal device where users store some of their most sensitive and personal information. "This means that maintaining security and privacy in the iOS ecosystem is critical to users. Supporting sideloading through direct downloads and third-party app stores would compromise the privacy and security protections that have made the iPhone so secure, and expose users to serious security risks."

It even pointed out that over the previous four years of the report, Android devices were found to have 15 to 47 times more malware infections than iPhones. It expressed concerns that mobile security threats are becoming increasingly common, especially on platforms that support sideloading.

It also expanded the fear radius beyond mobile users. The report states – "While consumers are often the primary targets, malware attacks can harm and expose developers, online advertisers, and even businesses that are not direct participants in the mobile app ecosystem. Malware-infected mobile apps are also often the first step in complex multi-step campaigns that allow cybercriminals to carry out a variety of attacks targeting a victim's financial resources."

Highlighting the Corporate costs of Malware attacks, Apple outlined that firms face high costs from malware attacks, which can originate via mobile apps, among other sources. "One single mobile device infected with malware costs an organisation an average of nearly USD 10,000," the report stated, adding that since its discovery in 2020, there have been over 30,000 recorded HiddenAds attacks, affecting users worldwide.

Not to forget the concerns about Spyware and Stalkware. Apple's report warns that Spyware can harm both individuals via identity theft or stalking, and businesses and organisations via corporate espionage, etc. Developers and advertisers are also adversely affected by these attacks, primarily through piracy, intellectual property theft, and loss of advertising revenue.

"The security model Apple relied on where it could control any application from being loaded onto an iOS device was a large part of its protection framework."

Aaron Bugal
Field CTO – APJ, Sophos

IN BRIEF

- Apple's reconsideration of sideloading could revolutionise app distribution but raises serious security concerns.
- Android faces increased malware risks, highlighting the forgotten battlefront in mobile security.
- Spyware and stalkerware pose significant threats to individuals and businesses alike.
- Sideloading offers freedom but comes with security risks, prompting caution from experts.
- Sideloading's expansion could intensify malware attacks, leading to greater risks for users.
- Balancing user empowerment and platform security is crucial amid the debate over sideloading.

It continues the argument: "If Apple were forced to support sideloading, more harmful apps would reach users because it would be easier for cybercriminals to target them – even if sideloading were limited to third-party app stores only. The large amount of malware and resulting security and privacy threats on third-party app stores shows that they do not have sufficient vetting procedures to check for apps containing known malware, apps violating user privacy, copycat apps, apps with illegal or objectionable content, and unsafe apps targeted at children. Users would now be responsible for determining whether sideloaded apps are safe, a very difficult task even for experts." What it raises are apt concerns – particularly regarding malware, stalkerware, and spyware.

The stalkerware market was valued at about USD 128.8 million in 2023 and is projected to reach USD 279.2 million by 2033. This growth, as explained by Future Market Insights, is being driven by greater penetration of mobile device applications and platforms, as well as increased complexities associated with mobile systems and security problems. In India specifically, the risk of encountering stalkerware on a mobile device has increased by 130% over three years according to the latest threat telemetry shared in 2023 by Avast.

In ESE Threat Report: H2 2023, which recorded many significant cybersecurity incidents between June and November 2023, there was a notable surge in Android spyware detections, climbing by 89% during the second half of 2023 compared with the previous reported period. This increase was attributed to a significant number of legitimate Android apps starting to behave as spyware in the latter half of the year.

Meghna Bal, Head of Research at Esya Centre, provides further insights into Apple's side of the argument with additional examples and data. "Research by Apple and Nokia highlighted that closed ecosystems such as iOS

"While sideloading gives users and developers more freedom, opening up new pathways to distribute applications on mobile OS, it also comes with security risks."

Meghna Bal
Head of Research, Esya Centre

that do not permit sideloading, are significantly more secure than relatively open ecosystems, such as Android, where sideloading is possible. The Nokia report suggests that malware targeting Android phones constitutes more than 93% of all smartphone attacks. Notably, trojan applications, i.e., applications that appear to be benign but contain malware, are the leading source of malware infections in the smartphone sector."

Harshit Gupta, Head of Acies Consulting Product Leader at Kepler & Kore, succinctly summarises the complex debate surrounding the practice of sideloading, or installing applications from sources other than official app stores, in the technology sector. "It offers users more freedom and flexibility in their software choices, but it can pose security risks."

WHAT DO OPEN GARDENS MAINTAIN?

When operating systems are open or left open, they face the vulnerability of attracting the wrong people. However, being 'closed' is not a foolproof solution either.

Turning to the Zimperium 2023 Global Mobile Threat Report, it is evident that there has been a 51% increase in the total number of unique mobile malware samples detected year-over-year. Interestingly, 80% of the zero-day mobile vulnerabilities actively exploited in the past year were for iOS. However, there has also been a 138% year-over-year increase in critical Android vulnerabilities discovered. Whether it is Android or iOS, when security breaches occur, they impact both ecosystems.

Open systems take security as seriously as closed systems do—or at least, that is what they claim—just like closed systems boast about their security measures.

According to information shared by Google in December 2023, Android security updates delivered patches for 94 vulnerabilities. Some of these bugs were related to System, Arm, Imagination Technologies, MediaTek, Misc OEM, Unisoc, and Qualcomm components.

In 'The Android Platform Security Model (2023)' created by Rene Mayrhofer, Google, and Johannes Kepler University LinzAustria, Android is described as the most widely deployed end-user-focused operating system. It emphasises the need to strike a difficult balance between security, privacy, and usability for end-users, provide assurances for app developers, and maintain system performance under tight hardware constraints. To manage the complexity of diverse interests, Android's security design is based on a multi-party authorisation model: an action should only happen if all involved parties authorise it.

It is indeed a tough juggling act, especially with dangers like malware and droppers. In a recent report from Malwarebytes, Android droppers, and trojan horses that disguise themselves as innocent apps, represent a category of malware that underscores the danger of overlooking protection for the world's most popular operating system. As per the report, in the battle against malware, Android is the forgotten front line, especially when 80% of people use personal smartphones for work, and 71% of smartphones run Android.

Droppers are often found on third-party app stores or websites, pretending to be free versions of popular apps. They can also infiltrate Google Play, posing as useful utilities like financial tracking apps, authenticators, document scanners, VPNs, or QR code readers. Once they infiltrate an organisation, they can be extremely difficult to remove. In 2022, droppers accounted for 14% of detections on Android.

According to recent data from Malwarebytes, its ThreatDown Labs detected Android banking trojans 88,500 times in 2023. However, Macs were also under the line of fire, with malware making up 11% of detections on Macs last year. The Mac world is dominated by Potentially Unwanted Programs (PUPs). In 2022, it was the second most common detection on Macs, appearing on 10% of all machines that triggered a detection event.

> The question is not about who is weaker—Apple or Android—the debate revolves around whether they should lean towards more or less sideloading.

PROS AND CONS OF SIDELOADING

THE POSITIVES

- Easy access
- Flexibility
- Frictionless usage
- Wide reach
- Non-costly alternatives
- User-convenience
- An open ecosystem

THE NEGATIVES

- Malware
- Spyware
- Privacy intrusion
- Espionage
- Security weaknesses
- Invisible threats

However, for users, developers, and enterprises, the critical question is not about who is weaker—Apple or Android. The debate revolves around what they should lean towards more or less sideloading.

WHAT DOES THE 'REST' FEEL?

Is sideloading a real security threat? We asked several experts and here is what they have to say. According to Pallav Agarwal, Founder and MD of HTS Solutions, "One of the main security risks associated with sideloading is the potential for downloading and installing malicious or counterfeit apps. Since these apps bypass the security measures implemented by official app stores, they may contain malware, spyware, or other harmful components designed to steal data, compromise device security, or disrupt normal operations."

It is not just a concern for Apple. Sideloading poses a serious issue for Android and others due to similar security risks, points out Agarwal. "While Android devices already allow sideloading by default, it exposes users to potential malware and other security threats from unverified sources. Device makers and users should be wary of malicious apps, lack of updates in sideloaded apps, and privacy concerns."

Aaron Bugal, Field CTO – APJ at Sophos, adds that Android has historically allowed users of the Google mobile operating system to enable developer mode, inclusive of the ability to sideload applications from outside of the Google Play Store.

"Malicious applications published and subsequently caught, or even applications advertised to users using phishing and getting them to install them, have been a serious security issue for Android for a decade. With the introduction of sideloading in specific parts of the globe by Apple, we will see increased interest from malware authors and cybercriminals to go after mobile devices given the extended coverage that their attacks could achieve, given that a user could be iOS or Android."

WHAT SHOULD 'YOU' DO?

It is expected that if Apple agrees to this sideloading, they will roll out a slew of new anti-malware tools and may require apps downloaded outside its App Store

"Although it has not as yet been announced, industry sources are expecting Apple to start allowing sideloading of third-party apps within the 1H of 2024."

Harish Kumar Gs

Head – Sales, India & SAARC, Check Point Software Technologies

to go through a light review process and notarisation, predicts Kumar GS. "However, users who do download these sideloaded apps will still require stronger security defences such as Check Point Software's Harmony Mobile Protect, which essentially checks the behaviours of apps and reports anomalies to the user. This news will mainly impact iOS users. With this new sideloading access for iOS users, the surface attack area will just expand, allowing a wider area and access points to be attacked."

Agarwal suggests that users should exercise caution when sideloading apps and only download from trusted sources. "It is also essential to keep devices updated with the latest security patches and use reputable security software to scan for potential threats."

Bugal dismisses the idea of sideloading on security grounds. "As a device-maker, both Google and Apple must alert the user if these settings are enabled and recommend they disable sideloading unless necessary for them to have it. There are only a handful of scenarios where an application needs to be sideloaded, and typically most mobile users can find the application they need in their relevant app store."

He reckons that with sideloading now being offered in specific geographies, there are chances of more abuse of this direct-to-device installation with malicious applications published on websites that will phish users into installing them. "As the goal of these applications is to steal information, users will be tricked into providing unnecessary information and/or the overall integrity of the device will be manipulated. There are, of course, other safeguards that prevent applications running on Apple iOS devices from interfering with each other and the operating system. However, unknown security vulnerabilities, if left unpatched by users, could lead to a total takeover by cybercriminals."

WHAT IS EXPECTED NEXT?

Sideloading can also be perceived as a method to contest the closed ecosystems upheld by tech giants, contends Gupta. "These ecosystems, such as Apple's iOS, strictly regulate the apps users can install, often stifling innovation, competition, and user choice. Sideloading allows users to circumvent these restrictions, accessing a broader range of applications and potentially promoting greater innovation and competition in the app market."

As for what happens next in the Apple gardens, if Apple were to adopt a new stance allowing sideloading of apps on its devices, the industry impact would be profound, opines Agarwal. "Firstly, it would foster greater competition in the app distribution market. Alternative stores could emerge, offering developers new avenues to reach users and potentially challenging Apple's dominance. However, this move could also raise significant security concerns."

Such a shift could reshape the developer ecosystem, hints Agarwal. "While it may provide developers with more flexibility in distributing their apps, it could also lead to increased fragmentation and complexity in app development and maintenance. Additionally, Apple's decision could invite regulatory scrutiny. Antitrust authorities may examine whether Apple's control over app distribution unfairly limits competition, potentially leading to legal challenges or regulatory intervention."

The discussion surrounding sideloading, in Gupta's assessment, extends beyond individual freedoms and security concerns. "It delves into broader topics of platform governance, consumer protection, and regulatory oversight. Finding a balance between user empowerment and platform security requires collaboration among tech companies, regulators, and users."

It seems that when this Apple falls, it will shake up the whole tree in a new way.

Tempting but disruptive.

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Revolutionising telecom services

Privatisation of geospatial data, imaging, and connectivity is enabling the telecom industry to rationalise various expenses and achieve more optimised outcomes

BY VERNIKA AWAL

Two days before the end of 2022, the Government of India notified the liberalised geospatial policy. This not only kickstarted efforts to create new subsidised startups but essentially gave birth to a whole new industry. Two years on, this fledgling industry is becoming a crucial support and features provider for bigger industries, with telecom being one of its key customers.

In essence, what geospatial startups provide to the likes of Bharti Airtel, Reliance Jio and Vodafone-Idea include a wide range of high-resolution satellite imaging to gauge terrain and topography for new regions to expand or maintain telecommunications services, improve network latencies strategically, optimise management of resources, and get an on-demand supply of high-resolution organised data that address issues like network congestion in Tier-I towns.

While all of this sounds exciting, what makes geospatial services in the telecom industry one to watch for the future is that work on it, by startups and big corporations alike, has only just begun.

GENERATING OWN DATA

The exciting bit about India's geospatial data sector is

> Access to detailed GIS data at the planning stage helps telecom providers build their networks at appropriate locations as well as reduce construction costs.

> There is no singular consensus standard for satellite imagery, making it difficult for enterprises to switch between providers of geospatial data.

that it represents several homegrown startups that are taking their services to the global markets. One such entity is Bengaluru-headquartered Pixxel, which uses a constellation of satellites in a low-earth orbit (LEO) configuration to offer a wide range of services such as super high-resolution satellite imaging, as well as processed granular data of the surface as a service to clients.

In various media interactions before, Awais Ahmed, the chief executive officer (CEO) of Pixxel, has said that most of its clients lie outside of India. However, geospatial data represents an increasing opportunity for new technology adoption—making this the right market that tech and telecom vertical teams of IT services companies are also turning to.

But, before execution, it is important to understand the strategic role of geospatial data and why it is of tantamount importance to the telecom sector. A blog post on this topic by IT services provider Infosys BPM, says, "As telecom companies look towards deploying the latest technologies and the next generation of high-speed networks, geospatial data is an invaluable tool for the sector. It offers real-time information to guide strategic planning and efficient deployment of these networks."

It further highlights, "Data applications for geospatial enterprise solutions for the telecommunications industry include creating accurate, up-to-date maps and optimising asset locations to ensure efficient asset installation and maintenance and identify faults along the network. Access to detailed GIS data at the planning stage can guide telecom service providers towards building their networks at appropriate locations as well as reduce construction costs."

The Chicago-headquartered tech services firm, Intellias, further underlines that the adoption of geospatial data by telecom operators is crucial because of the nature of the industry, especially where it stands today. "Optimising telecom networks extends beyond the implementation of new technologies like 5G. To ensure success, telecom companies must focus on analysing and optimising their existing networks, leveraging spatial data examples to gain deeper insights into consumer behaviour," it states in a post describing the extent and outreach of geospatial services in the telecom industry.

The company further adds that by harnessing new location data streams, telecom companies can uncover valuable spatial data that informs long-term network planning, facilitates strategic marketing, and drives capability building for sustainable growth.

WHY IS IT IMPORTANT?

At the heart of the adoption of geospatial data among telecom operators lies the fact that telcos are under high pressure to maintain margins. In India, the national telecommunications industry is massive, addressing 118 crore of India's 143-crore population base. This essentially makes geospatial data services an industry that indirectly impacts over 82% of the country.

The telecommunications industry is proportionately significant, with an estimated cross-industry revenue of around USD 40 billion, according to consultancy firm KPMG. This revenue is also steadily growing, rising at a compound annual growth rate (CAGR) of 7-9%.

This is where geospatial services can play a key role. Today, the role of geospatial data and services is still limited, largely due to having only recently been liberalised. Yet, strategically speaking, the growth potential is restricted by the operating margins of the telecom sector, which in India are quite low for telcos.

WEAKNESSES AT SIGHT

Key weaknesses for geospatial services in terms of their growth and future potential come in the form of challenges typical to most nascent startups. It all starts with the fact that there is no singular consensus standard for satellite imagery, making it difficult for enterprises to switch between providers of geospatial data.

This lack of standardisation means that geospatial data is not yet at the stage of bulk adoption, leaving it with a much lower scale than what industry-wide adoption of data analytics typically looks like.

> Geospatial analytics helps telcos create a simulated real-world model based on high-resolution data, which may translate into practical business use cases.

IN BRIEF

- Geospatial data fuels telecom innovation, offering insights into consumer behaviour and optimising network planning.
- Privatisation of geospatial services aids telecoms in cost-cutting and enhancing service quality.
- Startups like Pixxel are leveraging high-resolution satellite imaging to expand globally.
- Telecom operators benefit from geospatial analytics, enabling strategic decision-making and efficient network deployment.
- Challenges remain, including data standardisation, limited expertise, and high costs.
- The future of telecom lies in harnessing geospatial data for sustainable growth and strategic advantage.

Other notable weaknesses include a limited number of professionals working in such technologies, due to the field itself being nascent. Furthermore, the quality of data has also been called into question in terms of its real-world applicability. Additionally, geospatial services are expensive, meaning that striking a long-term contract would lead to significant capital expenditure for telcos.

GAINS AND LOSSES FOR TELCOS?

Despite these challenges, telecom firms globally are turning to satellite data services to enhance their portfolios. Geospatial services are bridging the gap in terrain knowledge and understanding, with new satellites offering considerably better imagery data.

This, in turn, can help telcos understand how to differentiate their services. In strategic areas, a telco may choose to retain an on-ground cable or cell tower if it serves an upcoming circle or region. In other cases, telcos may simply choose to use geospatial data and offer satellite-based Internet and connectivity services—an area that has opened up since the liberalisation of the space sector.

Geospatial analytics can also help telcos determine if a region needs additional cell sites and towers, while 5G fixed wireless access (FWA) services could draw analytics to project potential demand in specific markets. It also helps telcos create a simulated real-world model based on high-resolution data, which may translate into practical business use cases.

As Infosys BPM's overview of the sector sums it up, "For organisations on the digital transformation journey, agility is key in responding to a rapidly changing technology and business landscape. Now more than ever, it is crucial to deliver and exceed organisational expectations with a robust digital mindset backed by innovation. Enabling businesses to sense, learn, respond, and evolve like living organisms will be imperative for business excellence. A comprehensive yet modular suite of services is doing precisely that."

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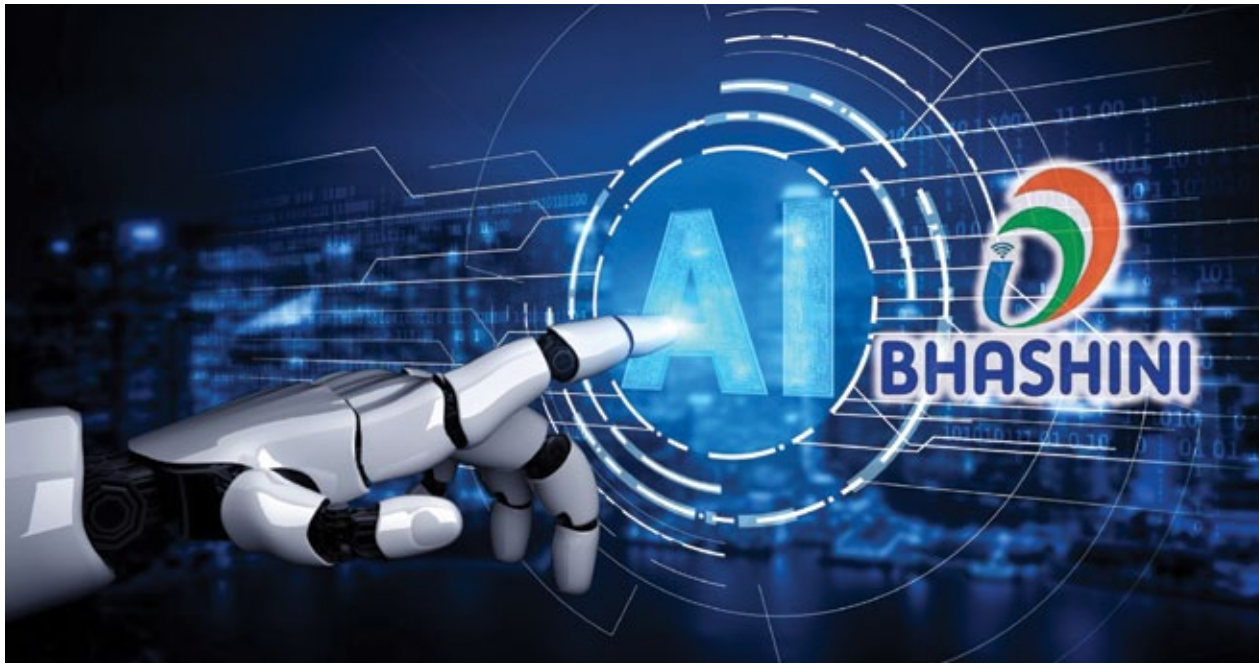
The rise of first-generation vernacular AI

Despite hurdles in data management and funding, the rise of vernacular AI in India promises to revolutionise business communication and responsiveness



BY VERNIKA AWAL

With 2023 firmly being the year that solely belonged to generative artificial intelligence (AI), it is no surprise that a host of Indian startups, some now fuelled by early-stage venture capital money, are going after creating 'Indian' AI models. Beyond the nationalist noise, each of these startups is looking to capture a piece of a potentially significant pie—that of businesses looking for India-specific AI tools and models.

The central government, too, is in on this game. Last year, Union Minister of State for Information Technology, Rajeev Chandrasekhar, underlined the Centre's work on the India AI Programme, which aims to establish Indic language datasets and indigenous AI compute infrastructure to meet the country-specific AI needs. The Centre, through the Ministry of Electronics and Information Technology (MeitY), also runs Bhashini, a central repository of organised Indic language data.

All of this points to the rise of the first generation of vernacular AI models, one that could either just serve the hype cycle and die out, or power the future of India's local language Internet.

WHY DO WE NEED VERNACULAR AI?

First and foremost, vernacular AI, or India-specific generative AI, refers to the creation of AI models that

> Vernacular AI, or India-specific generative AI, will cater to Indian languages and take into account local biases in terms of culture and socio-political factors.

> For the English language, sourcing data from publicly available information is simpler since the Internet was built with English as its primary language.

will cater to Indian languages, and take into account the country's range of biases in terms of culture and socio-political factors. This is imperative because the most prominent AI models globally, which include OpenAI's Generative Pre-trained Transformer (GPT), Meta's Llama and Google's Gemini, were trained primarily on a global dataset, which enterprises and the government believe may not adequately represent biases specific to Indian culture, which is important for local usage.

The factor of bias here is increasingly important since it seeks to address fallacies in the training dataset of AI models. Insufficient representation of a nation or culture-specific data in an AI model, in simple terms, may mean that an AI tool would not 'understand' the specific cultural writing need of a text-only AI model while keeping India-specific sensibilities in mind.

Examples of uses of vernacular AI include the likes of Interactive Voice Response or IVR services offered as part of the customer care initiative by companies across sectors, interactive chatbots operated in public benefit interfaces by state and central governments such as subsidies and post-retirement benefits, and more. In such use cases, a multilingual chatbot can help address various queries that users may have, in a language of their choice.

In the corporate space, local language multilingual chatbots can help offer product and sales support to teams. Various companies, including automobiles and consumer electronics appliances, are working on creating chatbots that can help support such requirements.

MANAGING LOCAL LANGUAGE DATA

To build all of this, though, the first and foremost step is the availability of data. For the English language, sourcing of such data from publicly available information is simpler since most of the Internet was built with English as its primary language. This makes sourcing such data not only easier but also more affordable.

The need for government intervention in India through Bhashini, as well as the involvement of privately funded startups, is to create similar databases in Indic languages. This requires sizeable funds to first digitise available public information from newspapers, literary sources and voluntary contributions in public libraries. Subsequently, such data must be organised and structured to enable algorithms to 'read' them. This is what the likes of BharatGPT, Sarvam's OpenHathi, Ola's Krutrim and others are focusing on; this also makes venture capital funding critical.

Sarvam AI, for instance, has raised USD 41 million in its series-A funding round with Lightspeed leading the funding round. Ola founder Bhavish Aggarwal's Krutrim has raised USD 24 million in debt funding, followed by USD 50 million in its first round of funding led by Matrix Partners. Others follow similar patterns.

Hanooman, a multimodal AI model backed by the promoters of BharatGPT and Reliance Industries, is another such example. It is a suite of AI services that are being built with four purpose-specific AI models at hand. It is slated to serve four industries, namely education, financial services, governance and healthcare. Overall, Hanooman will have four Large Language Models or LLMs, the largest of which is likely to be trained on 40 billion data parameters.

The LLMs are currently at the beta stage, being trained to offer text-to-image and text-to-video responses. This is what is known as multi-modal AI—or AI models that can understand and respond in multiple modes or formats. Hanooman is being built to understand and offer results in 11 Indic languages, with an aspiration to support 22 languages in the future.

THE FUTURE OF INDIAN AI

Despite its promising start, India's AI future is just beginning. A senior consultant, on conditions of anonymity due to involvement with multiple Indian AI startups, while speaking with Voice&Data emphasised that initial funding rounds are only the first step.

"While sourcing and structuring data in Indic languages is a logistical challenge, the costs associated with it remain reasonable. However, sourcing GPUs for training Indian data-specific AI models is immensely expensive. Even well-funded companies like Sarvam and Krutrim, as well as the Government of India-backed BharatGPT, may only have just about enough funds for the first tranche

> Multilingual chatbot can help address various queries that users may have, in a language of their choice and also offer product and sales support to teams.

WHAT IS BHASHINI?

A project under the Ministry of Electronics and Information Technology (MeitY), Bhashini is an initiative of the Government of India to build a database of 22 languages spoken in India and offer it as an open-source repository. It is also a chatbot tool that can be used as a prototype for deployment across various commercial services and showcases the way ahead for India-specific AI use cases across industries.

Built with an overarching objective of enabling users to access the Internet and digital services in their native languages, Bhashini is an AI-powered language translation service that can help live transliteration across English and multiple Indian languages. Bhashini also showcases a future where a single chatbot interface is proficient in multilingual conversations with users. The platform is accessible through dedicated Android and iOS apps.

of the required compute and may soon require additional funding," the consultant explained.

In addition to securing ongoing funding, startups must develop viable business models promptly to meet investor expectations.

"Krutrim has so far talked about its plans for consumer-oriented AI applications, while Sarvam and BharatGPT may go the enterprise way. Regardless of their plans, each must find a market fit rather than aimlessly working on generative AI with the hope of fitting into the flow later," the consultant emphasised.

Not only is the consultant's assessment correct, but global AI entities such as ChatGPT, Llama, and Gemini, which have undertaken Indic language training, are expected to intensify competition for Indian vernacular AI startups.

GLOBAL THREATS KNOCKING

While Indian startups hold the bias argument, global firms leverage their vast datasets and stronger investor confidence. Besides, India's deep tech track record has yet to yield global-scale billion-dollar enterprises; this further works in favour of global competitors.

With Microsoft supporting OpenAI, Google backing Gemini, and Meta (formerly Facebook) endorsing Llama, the division of commercial success between India's first-generation AI startups and Western Big Tech remains uncertain. Although the outcome of this battle will only become clear in the long run, India's first-generation AI startups have laid the groundwork by establishing an organised database model for vernacular languages, with the potential to capture a significant share of the country's fledgling AI market.

This achievement, however, is a long-term endeavour and may take up to a decade to fully materialise. Nevertheless, 2023 and 2024 could be remembered as the years when India's vernacular AI industry began its ascent.

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The importance of integrating AI with existing business functions and tools

Arun 'Rak' Ramchandran, President & Global Head – Consulting & GenAI Practice, Hi-Tech & Professional Services, Hexaware, talks about their GenAI solutions, LLMs, data, cloud, privacy, and sustainability.

BY MINU SIRSALEWALA

How does Hexaware strategically align Generative AI capabilities with the specific business goals of its clients?

Hexaware strategically aligns GenAI capabilities with specific business goals by employing a structured approach, including understanding client needs, addressing challenges like bias, compliance, and data security, and fostering collaboration. Our approach focuses on creating customized use cases, prioritizing those based on feasibility, relevance, and RoI, and integrating AI with existing business functions and tools.

Our customizable GenAI services and solutions power optimal business operations and create seamless AI journeys. Through our consulting framework, Decode AI, and execution framework, Encode AI, we cover the entire lifecycle to ensure rapid deployment and maximum value creation for

> We advise organizations to establish a robust data governance framework, clearly defining roles and permissions regarding data access and actions.

Arun 'Rak' Ramchandran
President & Global Head – Consulting & GenAI Practice, Hi-Tech & Professional Services, Hexaware

> Innovation thrives with the ability to rapidly prototype and deploy AI models, while reliability is ensured through continuous monitoring.

diverse industry needs. We're committed to disrupting ourselves, our clients, and industries by infusing GenAI into every aspect of service delivery.

How can organizations ensure data quality and traceability in GenAI solutions, and what methodologies maintain clear data lineage throughout the development lifecycle?

Ensuring data quality and traceability in GenAI solutions are paramount for reliability and effectiveness. At Hexaware, we advocate for a comprehensive approach to address these challenges.

Firstly, let's talk about data quality. We advise organizations to establish a robust data governance framework, clearly defining roles and permissions regarding data access and actions. Additionally, implementing data validation checks during data ingestion and processing is crucial to maintain accuracy, consistency, and completeness. We also ensure regular data cleaning processes to address any missing, incorrect, or irrelevant data.

Moving on to data traceability, it's imperative to maintain clear data lineage records, documenting the origin and movement of data throughout its lifecycle. Version control systems should be utilized to track changes in data, models, and pipelines, facilitating understanding of the impact of these changes. While effective metadata management ensures comprehensive documentation of data sources, transformations, and usage.

Throughout the development lifecycle, continuous monitoring of data and models is essential to detect any anomalies or drifts in data distribution or model performance. Automation of data validation, data lineage tracking, and monitoring processes is highly recommended to minimize manual errors and enhance efficiency.

What strategies are crucial to safeguarding the integrity, privacy, and addressing ethical considerations associated with GenAI solutions?

At Hexaware, safeguarding the integrity, privacy, and ethical considerations of our GenAI solutions is our utmost priority. We've developed a comprehensive framework based on four key pillars: fairness, accountability, transparency, and reliability and security.

Fairness is foundational to our approach. We dive deep into our data to root out any biases to ensure that our solutions are delivering equitable outcomes for all. Accountability is essential in maintaining trust. We document our processes and decisions, including bias checks and third-party oversight, to make sure we're answerable every step of the way.

Transparency is crucial for building confidence. We want our clients to know exactly what they're getting with our GenAI solutions. That means being crystal clear about where our data comes from and how our models work.

And of course, we take privacy and security very seriously. We employ stringent measures to protect privacy, including anonymization of personal data, and regularly test and monitor our systems to maintain their integrity.

Our assurance strategy empowers clients to evaluate and adopt GenAI responsibly, considering these dimensions. We address implications such as PII theft and regulatory compliance through solution groups encompassing standard operating procedures, organizational mandates, design mandates, and tools/assets, ensuring technologically advanced and ethically sound GenAI adoption.

We also stay updated on various responsible and ethical AI frameworks and regulations like those found in the US, EU, and China, as well as hyperscaler organizations like Microsoft. This allows us to advise, implement, and monitor them for our clients using suitable governance mechanisms.

> It's very important to maintain the authenticity and originality as there is a risk of produced content mirroring existing works.

In GenAI and hybrid cloud environments, what key features are essential for deploying and managing solutions, and what benefits do they offer to organizations?

When it comes to deploying and managing GenAI solutions in hybrid cloud environments, there are some must-have features that make all the difference. Scalability is key—think auto-scaling and distributed processing to handle those fluctuating workloads and massive datasets without breaking a sweat. And, of course, security and compliance features like data encryption and access control are non-negotiables to keep sensitive data safe and meet regulatory requirements.

Then there's interoperability—having standard APIs and containerization tech ensure smooth deployment across different platforms. Monitoring and management tools, including performance tracking and automated updates, help keep AI models running smoothly.

Now, let's talk about the benefits. Efficiency gets a boost as resources are used more effectively, cutting down on operational costs. Hybrid cloud setups offer flexibility, allowing you to tap into both on-premises and cloud resources as needed. Innovation thrives with the ability to rapidly prototype and deploy AI models, while reliability is ensured through continuous monitoring. Also, robust security features not only protect your data but also keep you compliant with regulations. Last but not least, cost efficiency kicks in as you streamline infrastructure maintenance and scaling expenses.

What challenges has Hexaware faced in scaling the development of GenAI solutions, and what strategies or technologies are being employed for efficient and reliable development?

Hexaware has encountered several challenges in scaling the development of GenAI solutions while ensuring efficiency, speed, and accuracy. One major challenge lies in ensuring data quality, as GenAI solutions heavily rely on accurate and unbiased input data. To address this, we prioritize meticulous data preparation, ensuring that data artifacts are accurate, current, and comprehensive.

Another challenge involves navigating legal and regulatory compliance, given the rapid evolution of GenAI. Engaging local legal and compliance experts is crucial to ensure that our solutions comply with regional and global regulations, especially as our user base expands.

It's very important to maintain the authenticity and originality as there is a risk of produced content mirroring existing works. We work closely with clients' legal teams to address potential legal implications, and solutions may incorporate features like content watermarking to meet client expectations.

Security and data privacy are paramount concerns, with organizations wary of potential data breaches. Our solutions include built-in guardrails to prevent data loss, ensuring confidential and personally identifiable information (PII) remains protected. Total Cost of Ownership (TCO) is also a consideration, particularly as clients transition from pilot phases to full-scale implementation. We provide clients with visibility into evolving costs, whether based on closed-source models (usage/API calls) or open-source models (hosting, compute, and maintenance).

Lastly, there's a focus on sustainability impact, with clients expressing concerns about the environmental footprint of using LLMs. We guide clients in selecting models aligned with their ESG principles, ensuring that GenAI solutions are in line with organizational sustainability goals.

How does Hexaware leverage advancements in large language models (LLMs) to enhance GenAI capabilities, especially in natural language understanding and generation?

Hexaware leverages cutting-edge large language models (LLMs) to elevate our Generative AI capabilities, particularly in natural language understanding and generation. With access to advanced LLMs like GPT-

> The 'generative' aspect of RAG synthesizes summaries from the internal dataset, minimizing reliance on external knowledge.

4, Llama 2, and Mixtral 8x7B, we develop innovative solutions across various domains.

For instance, for enhanced customer interaction, LLMs power chatbots and virtual assistants to deliver more human-like experiences. Our Tensai platform seamlessly integrates static and dynamic data sources to enhance both agent and customer experiences.

Moreover, LLMs can facilitate content generation by producing human-like text for marketing, social media, and beyond. Our content hub solution acts as a central content generation engine, engaging with different LLMs to match specific requirements.

Additionally, LLMs support data analysis and augmentation by extracting insights from vast text datasets. Our product discovery tool automates product description generation for online listings, utilizing these capabilities. Also, LLMs contribute to training and education by creating personalized learning materials and offering intelligent tutoring. We offer a digital coaching solution that provides smart tutoring and evaluation powered by advanced LLMs.

LLMs also find applications in industry-specific use cases, such as our medical coding acceleration solution, which automates medical code deciphering. Advancements in LLMs present a significant opportunity for Hexaware to develop innovative solutions across various domains for our clients.

In the context of GenAI, how does the organization approach the selection and optimization of compute models to ensure efficient and scalable performance, considering the balance between efficiency and model accuracy?

In our approach to model selection and optimization within GenAI, we employ two primary methods, each with its nuances. Firstly, there's Retrieval Augmented Generation (RAG), which allows us to efficiently retrieve relevant information by vectorizing our data. This method ensures scalability by minimizing the need for extensive adjustments to the chosen model while accommodating increasing data volumes. The organization often opts for this route as it requires minimal tinkering with the model architecture. The 'generative' aspect of RAG synthesizes summaries from the internal dataset, minimizing reliance on external knowledge.

Alternatively, we fine-tune models to enhance accuracy, leveraging our internal, that is, domain-specific, knowledge base. This fine-tuning process ensures that the models are tailored precisely to our requirements, striking a balance between efficiency and accuracy. We experiment with different scenarios, adjusting parameters and incorporating data augmentation techniques to refine the models further. By carefully navigating these approaches, we achieve scalable performance without compromising on accuracy or efficiency.

In the pursuit of unleashing the transformative power of generative AI to nurture ideas aligning with business goals, could you share a notable success story or case study where Hexaware's Generative AI solutions significantly contributed to the achievement of specific business objectives for a client?

One instance that stands out is our collaboration with a prominent insurance client based in Europe. They needed to enhance the efficiency of their agents by leveraging data scattered across their repository of policy documentation and customer-specific information. Our Gen AI-led approach adhered to key principles: restricting responses to insurance-related topics and inquiries, concentrating on the client's products and data while avoiding competitor comparisons, operating within the framework of a Belgium-based insurance company, and promptly deleting indexed data in the Vector Database post-session to maintain data privacy. This streamlined operations, empowering agents with actionable insights and driving tangible business outcomes.

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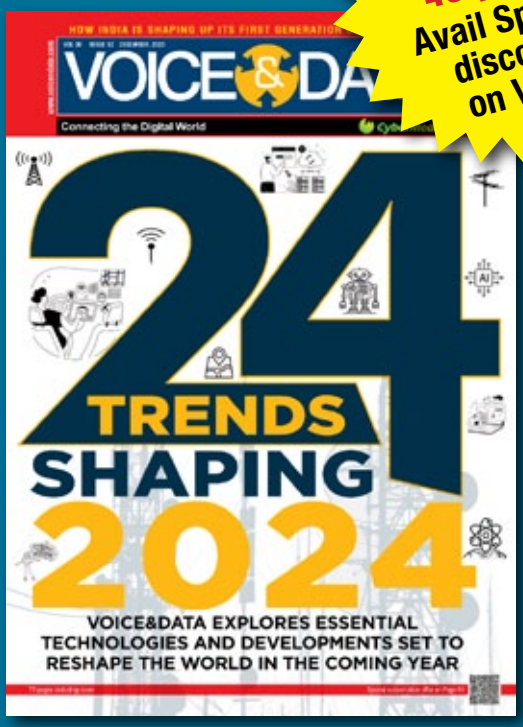

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A Rs 45,000-crore survival act

With a plan to raise substantial funds, Vodafone-Idea aims to revitalise its struggling telecom business and compete in the 5G era. Will it work?

BY VOICE&DATA BUREAU

Vodafone-Idea, India's third and thereby the smallest private sector telecom operator, recently announced that its board of directors has cleared a plan to raise Rs 20,000 crore (USD 2.4 billion) through equity and equity-linked instruments. Overall, the company aims to raise Rs 45,000 crore (USD 5.4 billion), taking into account a new round of debt that the cash-strapped telecom operator seeks to raise.

The fund will inject the much-needed lifeline into the telecom operator, which has for long been losing users and is swamped with debt. However, much of the funding will depend on Vodafone-Idea's ability to attract the right strategic investors, who can make use of the most lucrative assets that the operator possesses.

THE STATE OF AFFAIRS

Vodafone-Idea presently has a debt of over Rs 2 lakh crore, most of which is owed to the central government from the operator's purchase of network spectrum from the government. At this moment, the Centre is the single largest shareholder in Vodafone-Idea, which became a combined entity after the merger of Vodafone India and Idea Cellular in August 2018.

> The equity and debt fundraising will enable the company to invest in expanding 4G coverage, rolling out 5G networks, and increasing capacity.

> As of the December quarter, the company's quarterly gross revenue stood at Rs 10,673 crore, with a net loss of Rs 6,986 crore.

Overall, the Department of Investments and Public Assets Management (DIPAM) holds a 33.1% stake in the operator. Vodafone's parent group, Britain's Vodafone PLC, holds 32.3%, while domestic promoter, the Aditya Birla Group, holds 18.1% of the company. Public shareholders have the rest 16.5% of the telco.

This shareholding pattern is likely to change in the coming months, with the operator set to seek shareholder approval for raising funds on 2 April. Industry stakeholders expect Vodafone-Idea to complete its process of raising further capital by the end of the June quarter or Q1FY25.

The operator's 27 February press statement further stated that it has a net bank debt of "less than Rs 4,500 crore", and should be able to go about the entire fundraising move without any trouble.

HOW WILL VI UTILISE THE FUNDS?

The raising of funds will be key for the operator, which remains the only private telecom player without consumer-end 5G services. Vodafone-Idea is yet to comprehensively expand its 4G services, even as Reliance Jio and Bharti Airtel compete with each other to cover all network circles across the country with 5G services.

"The equity and debt fundraising will enable the company to make investments towards significant expansion of 4G coverage, 5G network rollout and capacity expansion. These investments will enable the company to improve its competitive positioning and offer an even better customer experience," the company stated in a press release explaining it will be utilising the funds.

At the India Mobile Congress in October last year, Aditya Birla Group Chairman and the promoter of Vodafone-Idea Kumar Mangalam Birla said that the operator is looking to imminently make investments to introduce consumer-end 5G services.

WHAT DO THE FINANCIALS LOOK LIKE?

A fresh infusion of funds through equity and debt will be a shot in the arm for Vodafone-Idea, which has struggled considerably and for a long time. As of the December quarter, the company's quarterly gross revenue stood at Rs 10,673 crore, with a net loss of Rs 6,986 crore. The operator's subscriber base was 215.2 million users, with an Average Revenue Per User or ARPU of Rs 145.

As a result of its subscriber churn and pressures from competing telcos, Vodafone-Idea has not been able to make much headway. Five years ago, in the December quarter, right after its merger with Idea Cellular, the operator had reported a gross quarterly revenue of Rs 11,765 crore, with a net loss of Rs 5,005 crore. The operator had reported a subscriber base of 387.2 million users, at an ARPU of Rs 89.

Therefore, in the past five years, Vodafone-Idea's gross quarterly revenue has declined by 9.3%, while net loss has increased by 39.6%. Meanwhile, its subscriber base has dropped by 44.4%. It is also important to note that Vodafone-Idea was the largest telecom operator with over 400 million subscribers at the time of its merger. Since then, its decline has been steady.

In comparison, Airtel's quarterly gross revenue jumped 84.7% to Rs 37,900 crore in the past five years, while Reliance's Jio's quarterly gross revenue more than doubled to Rs 25,368 crore during this period. Airtel's subscriber base grew nearly 40% to 397 million, while Jio's user base grew 68% in the past five years to 470.9 million as of December 2023. All of these metrics place Vodafone-Idea unfavourably.

CAN IT PULL OFF THE ADDITIONAL FUNDRAISING?

Yes. Even with the above-mentioned decline, Vodafone-Idea still has plenty of assets under its umbrella. Its steadily increasing ARPU also signals confidence among investors, while its rise in net loss has also been arrested in the interim. Overall, the operator's net loss declined 12.6% in a year until December 2023—a factor that will have a positive impact on the investors.

The change is reflected in the operator's stock price, too. During the past year, Vodafone-Idea's stock went up from Rs 5.70 per share to a peak of Rs 18.42, marking a 3.3x increase. Since then, the stock has dropped nearly 24% from its high, but industry experts and brokerage analysts expect it to grow if the company can raise further funds through the equity route.

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Do dark patterns signal tougher days ahead for mobile commerce?

The government's decision to target deceptive practices like false discounts may trigger a massive change in India's smartphone-driven e-commerce industry

BY VERNIKA AWAL

Around 15 years ago, as Internet access in India became more affordable and thus accessible to a wider section of the population, Sachin Bansal's Flipkart gained popularity. Over time, Flipkart emerged as one of India's first and most recognisable startups. With Amazon's entry in 2013, e-commerce surged, reshaping commerce in India. Now, as the Ministry of Consumer Affairs aims to regulate these giants, the smartphone-driven e-commerce industry faces a potential overhaul.

ENTER, THE 'DARK PATTERNS'

The government's crackdown on the e-commerce industry focuses on consumer protection, which the government points out is being increasingly violated

> Dark patterns are tactics used by e-commerce and mobile commerce platforms to lure users, including false promotions claiming 'limited period discounts'.

> While dark patterns exploit consumer dependence on online marketplaces, they drive substantial revenues for mobile commerce and e-commerce players.

through 'dark patterns'. In simple terms, dark patterns are habitual practices and tactics used by e-commerce and mobile commerce platforms to lure users. These include false promotions claiming 'limited period discounts' that do not match their advertising, thus duping users under false pretexts.

On 8 December 2023, the Ministry of Consumer Affairs, through the Central Consumer Protection Authority (CCPA), identified 13 activities as dark patterns. These include false urgencies, forced actions, confirm shaming, auto-adding extra items to carts, disguised ads, and trick questions.

Forced actions involve advertising a product at a certain price, and subsequently asking them to subscribe at the last step of payment to avail of the discount. Confirm shaming, meanwhile, entails repeatedly prompting users that they may 'miss out' on deals and offers—and also showing a misleading statistic to force them into buying a product or a subscription plan.

While these dark patterns exploit consumer dependence on online marketplaces, they drive substantial incremental revenues for the mobile commerce and e-commerce industry. For smartphone users, in particular, these platforms frequently push notifications prompting them to avail the 'last minute' deals, which are often misleading in the way they are advertised.

Although exact statistics on the impact of these notifications are not available, industry consultants suggest that they contribute significantly to overall industry revenue.

LEGAL RECOURSE TO USERS?

A paper on dark patterns by law firm Lakshmikumaran & Sridharan (LKS), published on 19 December, states, "The use of dark patterns is neither new nor uncommon. Companies such as Google, LinkedIn, Amazon, Facebook and Apple have all been identified as having utilised dark patterns at some point." A paper published in October 2022 by the Organisation for Economic Co-operation and Development (OECD) noted that 57.4% of the cookie consent notices on Europe's most popular websites used interface designs which led users to accept options detrimental to their privacy.

The regulation, however, has been flagged as unspecific and contradictory by many. A 21 December 2023 note by Arun Prabhu and Anirban Mohapatra, Partners at law firm Cyril Amarchand & Mangaldas (CAM), and Mansi Jain, Associate, points out, "The prescription of specified dark patterns in the (Centre's) guidelines, which makes up for the bulk of the content, while helpful in providing guidance may be problematic where treated as definitive. While there has been an attempt to keep this list (of dark patterns) illustrative, in essence, where something is called out as a 'specified' dark pattern, any action that falls within these definitions will likely be scrutinised heavily, and at the very least, be open to frequent litigation."

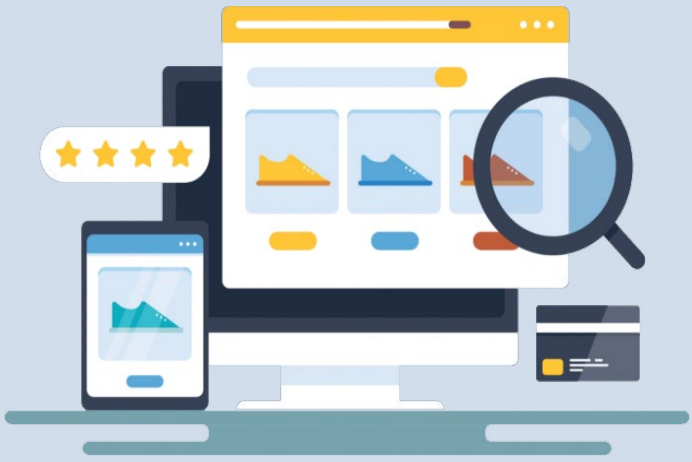
"Further, while some entries in this list are clear and helpful, there are several problems ranging from redundancy and overlap to overbroad restrictions and business judgement, all of which may lead to unintended consequences on an emerging digital ecosystem," the note by CAM's partners read. These entries, as defined in the note, include 'rogue malware' and 'SaaS billing'. Such areas will likely require further refinement.

WHAT IT MEANS FOR USERS RIGHT?

While the CCPA guidelines are likely to be further worked upon before they become legislatively applicable, users would likely take note of a positive impact on how online commerce may work in months and years to come. Any legislative recourse against predatory applications is also likely to include penal consequences towards companies.

However, arguments for or against will neither be

> Large platforms are likely to see a more defined regulatory environment in terms of sales and seasons that they can run on their platforms.



IN BRIEF

- **Government crackdown:** Indian authorities target dark patterns, the deceptive tactics employed by e-commerce platforms for consumer protection.
- **Identifying dark patterns:** The Ministry of Consumer Affairs has listed 13 dark pattern activities including false urgencies and 'confirm shaming' to dupe users.
- **Legal challenges:** Regulations aim to curb dark patterns, but legal experts raise concerns over specificity and potential unintended consequences.
- **User impact:** While legislation evolves, users may see improvements in online shopping transparency, though legal battles and debates are inevitable.
- **Industry transformation:** Regulations could reshape promotional strategies, introducing more defined rules for e-commerce giants in India's digital market.

easy, nor difficult to make. The LKS note in December last year points out that, "In India, one of the necessary ingredients to establish that a user interface and experience utilises a dark pattern, and is therefore prohibited, is that it was 'designed to mislead'. While this position is different from Europe's Digital Services Act (DSA) regulation and the California Consumer Privacy Act (CCPA) in the United States, the requirement to prove the intention behind the design might be useful to ensure that an intelligent analysis is carried out before a particular UI/UX design choice is considered a dark pattern."

"On the other hand, it may be somewhat practically difficult to establish in each case that the intention behind the design was to mislead the user. It remains to be seen how the Central Consumer Protection Authority (of India) interprets this," the LKS note stated.

However, on the face of things, consumers are likely to see some levels of accountability being introduced into their mobile commerce shopping experience. For platforms, though, such moves would entail restrictions to promotional activities such as 'coupons' that bring users in under the pretext of added discounts. Large platforms will likely see a more defined regulatory environment in terms of sales and seasons that they can run on their platforms.

Conversations around regulating dark patterns are being held with increasing importance to make the Internet more equitable. However, regulations typically take time to be designed, and in turn, may also leave room open for legal debates and lawsuits. How the entire discussion pans out is something that only time will tell.

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BIS adopts Wi-SUN standards for smart meter RF networks

The Bureau of Indian Standards (BIS) has adopted the Wi-SUN Alliance Field Area Networks (FAN) specification, integrated within IEEE 2857-2021, as the national standard for India's Smart Meter RF Communication Networks. This adoption aims to foster interoperable, multi-service, and secure wireless communication networks across India, catering to government, utilities, service providers, and enterprises.

The Wi-SUN Alliance FAN specification, backed by a global ecosystem of over 350 industry-leading companies, is pivotal in facilitating the specification and deployment of large-scale outdoor networks, including smart metering projects, smart grids, street lighting, and other IoT applications.

India's concerted effort towards achieving energy independence, as evidenced by budget allocations towards renewables and smart city initiatives, underscores the significance of interoperable solutions like Wi-SUN. With a proven track record in smart metering networks globally, Wi-SUN FAN offers reliability and security through its open standard approach, mitigating risks associated with proprietary solutions.

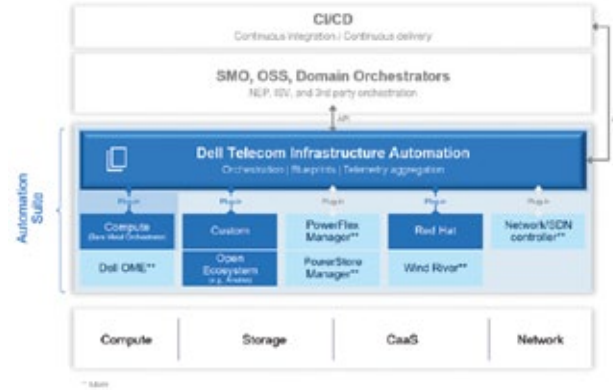
Wi-SUN's adoption of IPv6 and public-key infrastructure (PKI) ensures robust security measures, enabling mutual authentication of devices and networks to prevent unauthorised access. This adherence to open standards also facilitates better operational efficiency and cost-effectiveness for power distribution companies in India, essential for the widespread adoption of smart metering technology.

The ongoing deployment of Wi-SUN's wireless mesh technology in projects like the Smart City Living Lab in Hyderabad exemplifies its practical application and potential to drive economic growth and local development. With Wi-SUN FAN technical specifications and test labs in the country, the stage is set for accelerated adoption and compliance testing, marking a significant step towards a smarter and more connected India.

Dell unveils solution to accelerate network cloud transformation

Dell Technologies has announced new solutions to help communications service providers (CSPs) facilitate network cloud and operations transformation for improved economics and agility while ensuring network reliability. The solutions simplify deployment, automate operations, and streamline support and lifecycle management of disaggregated network cloud infrastructure for CSPs. It also introduced Dell Telecom Infrastructure Automation Suite to accelerate network cloud transformation. This software automates the orchestration and lifecycle management of multi-vendor network cloud infrastructure, enabling CSPs to deploy and manage their chosen infrastructure across distributed, multi-vendor environments seamlessly.

The suite offers numerous benefits, including time savings on configuration and provisioning, infrastructure discovery and automation down to the network's infrastructure layer, comprehensive telemetry for informed decision-making, and proactive, predictive support with specialised insights. Additionally, Dell's Telecom Infrastructure Blocks for Red Hat, a fully engineered hardware and software solution, supports telecom cloud design, deployment, and lifecycle management. It includes support for 5G core workloads at the edge, integrations with the Dell Telecom Infrastructure Automation Suite, and Dell Technologies Certification on Infrastructure Blocks.



According to Dennis Hoffman, Senior Vice President and General Manager of Telecom Systems Business at Dell Technologies, successful network cloud transformation necessitates addressing the people, process, and technology aspects, with Dell contributing both its technology and cloud transformation expertise to ecosystem partnerships with communication service providers worldwide.

Globe Telecom has partnered with Dell to deploy a telecom cloud using Dell Telecom Infrastructure Blocks for Red Hat, aiming to enhance deployment time, increase network operation efficiency, and provide faster hardware and software compatibility validation.

Tata Elxsi, Telefónica automate cloud infra for telecom

Tata Elxsi and Telefónica have announced a significant breakthrough in automating cloud infrastructure for telecom. They successfully implemented a cloud-native infrastructure management system based on ETSI Open-Source MANO (OSM). This achievement allows telecom operators to build and manage networks with greater efficiency and agility.

The collaboration involved enhancing OSM's capabilities through features like infrastructure automation, serverless operations execution environments, and the deployment of multi-cloud Platform-as-a-Service (PaaS) solutions. These advancements mark a new era for Telco Cloud technologies and drive digital transformation within the industry.

"The collaboration aims to advance the boundaries of technology and standardisation, propelling operators towards cloud-native agility," emphasised Francisco-Javier Ramón, Multicloud Tools Manager in gCTIO Unit at Telefónica.

"We are thrilled to partner with Telefónica to revolutionise the orchestration landscape," said B Ramesh Ramanathan, Principal Architect, CTO Office at Tata Elxsi, adding that the collaboration enhances the company's presence within the open-source community and propels NEURON towards the realm of 5G and beyond and autonomous networks."

The integration of OSM with Tata Elxsi's award-winning NEURON platform represents a pivotal moment in the multi-domain transformation towards autonomous network systems. NEURON's business intent-driven functionalities, coupled with OSM's platform, provide operators with unparalleled control and flexibility in managing complex infrastructures.

The collaboration lays the groundwork for future advancements in Telco Cloud technology, paving the way for cutting-edge solutions that address the evolving needs of the telecommunications industry. Powered by OSM, NEURON now possesses the capability to seamlessly integrate infrastructure, services, security, networking, and configuration into a unified, intent-driven deployment.

HFCL, MediaTek unveil advanced 5G indoor CPE solution

HFCL Limited has announced that it has partnered with MediaTek to integrate its T750 chipset into HFCL 5G FWA Indoor CPE. The HFCL 5G FWA Indoor CPE, distinguished by its ultra-compact design and low power consumption, leverages the MediaTek chipset to ensure seamless connectivity across multiple devices with dual-band 4x4 Wi-Fi 6 support.

Equipped with a 2.5 Gbps Ethernet interface for high-speed data transfer, the HFCL 5G FWA Indoor CPE offers advanced features, including easy mesh capabilities and an embedded eSIM, catering to the diverse needs of telco customers.

The plug-and-play HFCL 5G FWA Indoor CPE includes an AI-integrated mobile app for user-friendly self-installation and optimal signal location identification. Its zero-touch management features enable automated provisioning and remote upgrades, enhancing the overall user experience.

Evan Su, General Manager of Wireless Communications at MediaTek, highlighted the significance of the partnership in supporting India's local manufacturing vision and promoting sustainable telecom ecosystems. The HFCL 5G FWA Indoor CPE, supporting both Standalone and Non-standalone technologies, delivers uninterrupted connectivity with fibre-like speeds wirelessly, addressing challenges associated with fibre deployments in hard-to-reach areas.

Mahendra Nahata, Managing Director of HFCL, expressed satisfaction in partnering with MediaTek to deliver advanced 5G solutions globally, addressing last-mile connectivity challenges efficiently.

With the global 5G last-mile equipment market projected to reach USD 68 billion by 2030, the collaboration between HFCL and MediaTek marks a significant advancement in meeting the growing demand for 5G technology solutions worldwide.

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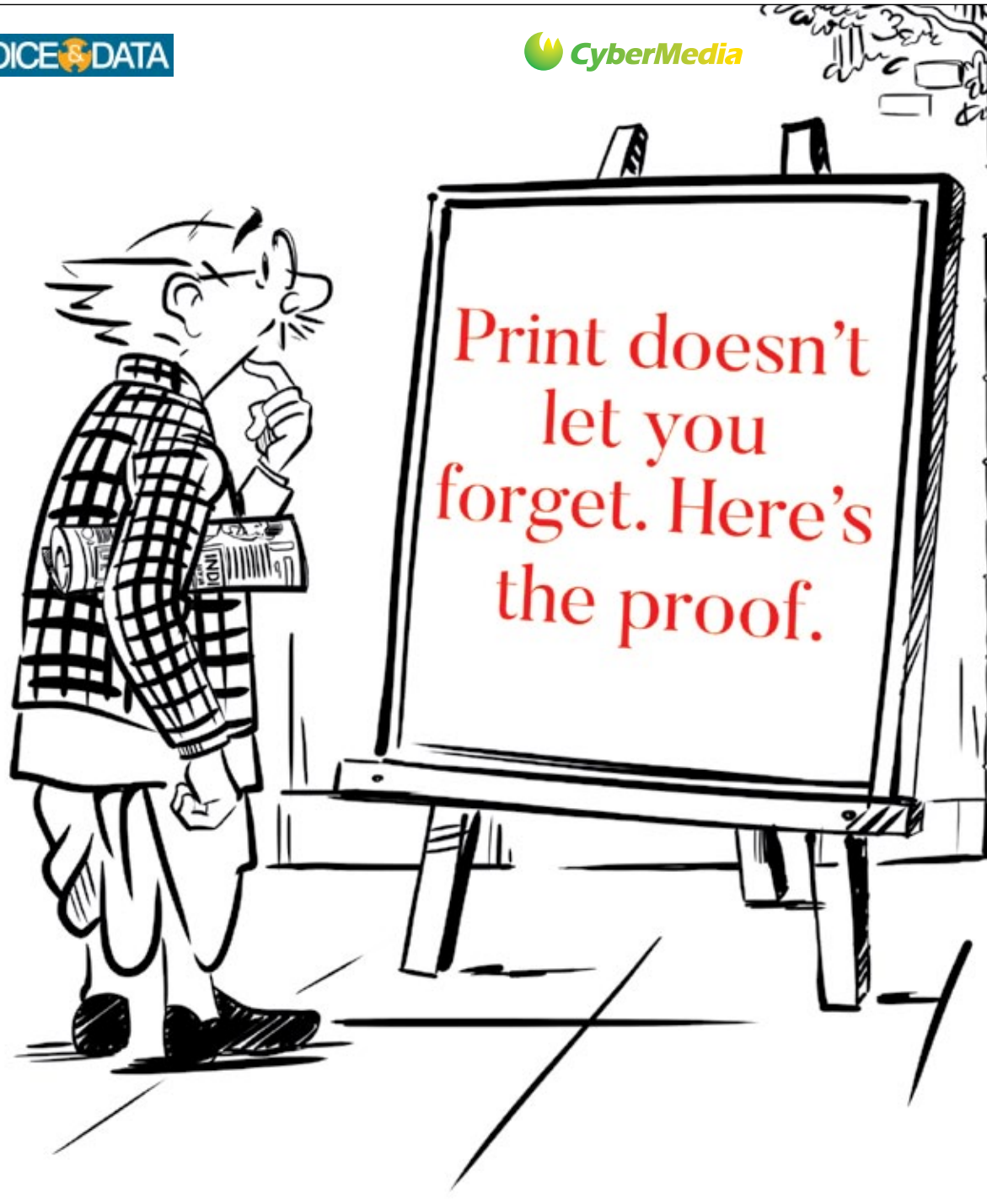

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