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"IoT and AI are integral to the evolution of telecom services"

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Voice&Data is printed and published by Pradeep Gupta on behalf of
Cyber Media (India) Ltd, D-74, Panchsheel Enclave, New Delhi - 110 017,
and printed by him at M/s Archana Printers, D-127, Okhla Industrial
Area, Phase-1, New Delhi 110020. Editor: Shubhendu Parth

For Subscription queries contact rsevoicendata@cybermedia.co.in

All Payments Favoring: CYBER MEDIA (INDIA) LTD
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Corporate Website: www.cybermedia.co.in
www.ciol.com (India's #1 IT Portal)

February 2024

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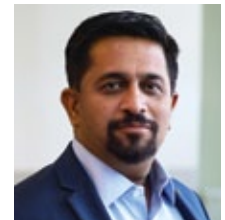
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[OPENING NOTE]

Pioneering India's digital frontier with geospatial technology

Addressing the National Conference on Geospatial Policy for National Development recently in Delhi, Union Minister of State for Science & Technology Dr Jitendra Singh did not mince words when he said that the troika of space, drone, and geospatial policy will catapult India as a pre-eminent technological power. And, there is no denying the facts.

In recent years, India has strategically converged policies to harness the potential of these three technologies. This approach has unlocked new avenues for private participation in the space sector, liberalised guidelines for geospatial data, and reformed drone policies, marking significant milestones in India's technological advancement.

Geospatial technology, in tandem with space and drone integration, illuminates India's path towards achieving "broadband for all" and "Digital Bharat" aspirations. With remarkable progress in unlocking the space sector, liberalising geospatial data guidelines, and reforming drone policies, India is poised to emerge as a global technological powerhouse. The indispensability of geospatial technology in realising these dreams cannot be overstated.

The precision of geospatial technology in identifying underserved areas is unmatched. Leveraging satellite imagery, demographic data, and mobile network information, geospatial tools pinpoint regions with low Internet penetration, enabling targeted interventions and infrastructure development. Additionally, terrain analysis facilitates understanding the feasibility and cost-effectiveness of deploying broadband infrastructure, especially in challenging geographic areas.

In infrastructure planning and design, geospatial technology optimises network layouts and tower placements. Mapping efficient fibre optic routes and predicting coverage zones allocate resources judiciously, minimising redundancy and maximising reach. Real-time monitoring, facilitated by geospatial tools, ensures prompt detection of outages and facilitates swift repairs, enhancing service reliability.

The benefits of geospatial data extend beyond infrastructure optimisation, fostering transparency and accountability through publicly accessible dashboards showcasing broadband availability and penetration levels. Such transparency empowers stakeholders to make data-driven decisions, facilitating targeted interventions to bridge the digital divide effectively.

Examples abound, with initiatives like the BharatNet project leveraging geospatial mapping to extend fibre optic connectivity to unserved villages. Telecom operators increasingly rely on geospatial tools to enhance network planning and coverage prediction.

However, challenges persist, including the need for comprehensive and accessible geospatial data, particularly in rural areas. Skill development initiatives are imperative to equip stakeholders with the expertise to harness geospatial insights effectively. Moreover, ensuring the affordability and accessibility of geospatial technologies for smaller players in the communications sector is critical for widespread adoption.

Addressing these challenges is paramount to unleashing the full potential of geospatial technology in accelerating India's broadband penetration journey. By doing so, India can bridge the digital divide, empower its citizens, and propel itself towards the forefront of the global digital landscape.

The convergence of space, drone, and geospatial policies not only signifies technological advancement but also heralds a future where every Indian has access to the transformative power of the Internet. As India marches towards becoming a USD 10 trillion economy, geospatial technology emerges as the cornerstone of its digital transformation, underpinning progress, inclusion, and prosperity for all.

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Powering inclusive growth through technology

The interim budget charts a transformative path, leveraging telecom, technology, and infrastructure for inclusive growth and a developed India by 2047



BY JAIDEEP GHOSH

In her recent interim budget speech, Finance Minister of India Nirmala Sitharaman provided a comprehensive overview of the nation's progress over the past decade and outlined a visionary path toward achieving Developed Nation status by 2047, marking a century of independence.

The government's fiscal strategy emphasises prudence, reinforcing a resilient domestic economy, and directing increased resources toward critical infrastructure development while maintaining a focus on socioeconomic development. Key sectors such as transportation infrastructure, housing, water supply, sanitation, green energy, health, education, skilling, agriculture, and rural development take precedence.

The specific focus is on uplifting the underprivileged segments: the poor, women, youth, and farmers.

To achieve this, the government recognises the transformative power of technology and robust telecom infrastructure in creating a synergy that uplifts marginalised communities and propels the nation toward a digitally inclusive future.

DIGITAL INFRASTRUCTURE AS AN ENGINE OF GROWTH AND SOCIAL UPLIFTMENT

The robust interdependence between growth and technology is evident as technology becomes a driver of social upliftment. Reciprocally, social upliftment schemes fuel technological innovation, creating a high synergy between the two.

Major government initiatives, such as Direct Benefit Transfer, UPI, DigiLocker, and the vaccination portal CoWIN, have effectively harnessed technology platforms and telecom connectivity to swiftly and reliably reach the intended audience. By intertwining technology with social upliftment schemes, India is creating an environment where the benefits of technological advancements can permeate every corner of the nation. This integrated approach holds significant potential for empowering underserved communities.

For instance, technology and robust connectivity empower women to participate more actively in the economy through remote work, online skill development, and access to financial services, thereby contributing to women's empowerment. Similarly, technology-driven

The industry's wish list centred on tax reduction and rationalisation, including telecom operator license fees, must wait due to the status quo in tax rates.

educational initiatives, including virtual classrooms and interactive content, equip the younger generation with the skills needed for the digital age.

It also helps boost agriculture and drive rural transformation. Precision agriculture enabled by IoT and 5G has the potential to optimise resources, enhance productivity, and improve food security and livelihoods. High-speed internet connectivity, delivered through mobile and satellite communication, can revolutionise rural lives, unlocking new entrepreneurial avenues from any corner of the nation.

This integrated approach addresses socio-economic disparities and positions India at the forefront of the global digital-first revolution, exemplified by the success of India's Digital Public Infrastructure, internationally recognised as India Stack.

IN BRIEF

- **Fiscal strategy:** Emphasis on prudence, resilient domestic economy, and critical infrastructure development with a focus on key sectors.
- **Inclusive growth:** Special attention to underprivileged segments—poor, women, youth, and farmers—through transformative technology.
- **Digital revolution:** Interweaving technology and telecom infrastructure for socio-economic development, leveraging major government initiatives.
- **Sectoral focus:** Budget priorities on transportation, housing, water supply, sanitation, green energy, health, education, skilling, agriculture, and rural development.
- **Global standing:** A significant boost of Rs 1 lakh crore for research and innovation, aligning with global players like China and Japan.

WHAT DOES THE BUDGET HAVE FOR TECHNOLOGY AND TELECOM SECTORS?

A massive boost of Rs 1 lakh crore (USD 12 billion) corpus for long-term financing at low or nil interest rates aims to support research and innovation in sunrise sectors, potentially elevating India's global standing. This is a game changer, similar to what China and Japan have pursued.

The budget also promises to introduce a new scheme focusing on strengthening deep-tech technologies in the defence sector, aligning with the goal of a self-reliant India. Specifically, this scheme supports the initiative to make India self-reliant, Atmanirbhar Bharat in defence.

The Finance Minister also announced a significant allocation, a 71.4% increase, aimed at reducing the gap in chip and electronics manufacturing compared to other countries. Funds allocated for compound and chip assembly have increased by 133%, totalling Rs 4,203 crore. Additionally, the allocation towards semiconductor fab stands at Rs 1,500 crore, reflecting a 50% increase.

Reduced import duties, announced a day before the interim budget (10% from 15%), aim to enhance the competitiveness of smartphone exports. Furthermore, the customs duty exemption granted to vessels laying submarine communication cables in India has been extended by six months, up to 30 September 2024.

While the industry had a wish list largely around reduction and rationalisation of taxes and other fees such as reduction of telecom operator license fees, given the status quo maintained on tax rates, those have to wait for consideration at a later stage. While tax and other reforms are awaited later this year, the growth generated by government initiatives will create significant benefits for the technology and telecom sectors.

With its focus on infrastructure creation and social upliftment, the Interim Budget sets India on a path towards economic renaissance and a Viksit Bharat by 2047. 🇮🇳

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Unlocking the potential of AI in business communications

As businesses navigate communication challenges with AI solutions, balancing internal needs and customer demands, strategic deployment is the key to success



BY SATHESH MURTHY

The Indian business landscape is no stranger to the rapid advancements in technology that are reshaping industries and redefining the way organisations operate. As Artificial Intelligence (AI) continues to gain prominence, it is ushering in a new era where AI-driven solutions are no longer confined to the realm of data scientists but are accessible to the broader workforce and consumers. While AI adoption is on the rise, the path to leveraging its full potential can be riddled with complexities.

CHALLENGES FACING INDIAN BUSINESSES

Indian businesses, like their global counterparts, are grappling with several key challenges that AI can address effectively. Two of these challenges pertain to internal operations, while the other two are customer-facing.

Conversational data insights: With the rise of remote work and digital channels, a staggering number of business conversations occur daily. This wealth

Indian businesses are seeking ways to efficiently sift through communication data to gain valuable insights into customers, suppliers, and partners.

Assist solutions, powered by AI, provide real-time information and insights to boost agent productivity at the call centre and improve service levels.

of unstructured conversation data is a goldmine of untapped knowledge. However, the sheer volume of data and its unstructured nature make it challenging to extract actionable insights. Indian businesses are seeking ways to efficiently sift through this data to gain valuable insights into customers, suppliers, and partners.

Empowering sales teams: Sales teams often struggle with managing numerous conversations and disjointed toolsets, resulting in missed opportunities to act on critical customer insights. AI-powered solutions can automate tasks for sales representatives, such as scheduling meetings and updating CRM logs, while providing visibility into sales metrics and improving overall productivity.

Intelligent self-service: Contact centres, the primary customer-facing interaction point, face challenges in providing efficient self-service options. Customers today prefer quick, intelligent assistance without waiting on hold or navigating complex menu options. AI-driven virtual assistants and chatbots have the potential to automate call centre tasks, increase customer satisfaction, and reduce operational costs.

Empowering contact centre agents: Contact centre agents require quick access to resources to assist customers effectively. Assist solutions, powered by AI, provide real-time information and insights to boost agent productivity and improve service levels. AI also helps forecast future agent hiring requirements, thanks to increased efficiency.

ESSENTIAL CONSIDERATIONS WHEN DEPLOYING AI

While the benefits of AI are evident, deploying AI solutions requires a strategic approach. Here are some key considerations for Indian businesses.

AI is a tool, not a complete solution: Modern AI is an advanced tool that uses Machine Learning and Natural Language Processing. It is essential to recognise that AI is not a standalone solution and requires ongoing monitoring to ensure it provides accurate information.

Compliance and ethics: As AI adoption grows, new regulations come into play. Indian businesses must stay updated with evolving regulations to maintain compliance, ensuring ethical AI usage and data privacy.

Privacy and data security: Introducing AI can bring new security and privacy risks. Businesses and vendors must implement policies and practices to map and protect sensitive information.

Transparency and ethical AI: Ethical AI begins with transparency. It is vital to establish clear guidelines for AI usage and prioritise vendors that provide transparency on their AI technology.

Consider all costs: The price of an AI platform is not the final cost; other factors like training, hidden costs, and maintenance overhead should be considered.

Avoid vendor lock-in: As AI evolves rapidly, flexibility and choice are critical. Indian businesses should select vendors that support their unique workflows and allow integration with third-party applications.

THE FUTURE OF AI IN INDIAN BUSINESS COMMUNICATIONS

The AI revolution will transform the way Indian businesses operate, communicate, and engage with customers. Navigating this transformation requires a trusted technology partner. As Indian businesses look to embrace the transformative power of AI, expertise, cutting-edge technology, and commitment to ethical AI are at the heart of this approach.

Trust, innovation and a commitment to responsible AI should be the guardrails for how Indian businesses select vendors to work with when it comes to AI solutions. After all, AI-driven insights present new opportunities to drive unprecedented levels of productivity and customer satisfaction.. 🌟

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LT GEN DR S P KOCHHAR

MAKING ADVANCEMENTS IN INTERFERENCE-FREE SPECTRUM COEXISTENCE



The future of wireless communication will be a dynamic interplay of tech innovation, regulatory adaptation, security vigilance, and environmental considerations

Advanced wireless systems have revolutionised how people communicate with each other to the point where a majority of the earth's population now uses cellular mobile phones with other wireless devices. The realm of wireless communications is getting increasingly complex and congested, presenting significant challenges in terms of spectrum coexistence and interference.

Electromagnetic Compatibility (EMC) is crucial for devices to function effectively in their electromagnetic environment without negatively impacting other devices. This requires strong immunity to external signal interference and controlled electromagnetic emissions, often achieved through careful circuit design, filters and shielding. Challenges in EMC arise due to trends towards lower voltage, energy-efficient and compact designs,



Innovation in spectrum-sharing techniques will be key to addressing spectrum scarcity, with cognitive radio and dynamic spectrum access likely playing significant roles.



The proliferation of wireless communication systems across a wider electromagnetic spectrum makes maintaining Electromagnetic Compatibility more challenging.

and cost-cutting measures, which can reduce resistance to Electromagnetic Interference (EMI). Adding radio transceivers and antennas to devices increases the risk of both internal and external interference.

The proliferation of wireless communication systems across a wider electromagnetic spectrum makes maintaining EMC more challenging, leading to coexistence issues. This is especially pertinent in areas with a high concentration of sensitive devices, such as healthcare facilities or using unlicensed or shared spectrum. In India, EMC of devices is not just a technical requirement, but a necessity for ensuring the seamless operation of a vast array of wireless communication systems across an ever-expanding spectrum. Ensuring EMC and coexistence is crucial for the reliability and performance of electronic systems, particularly in critical infrastructure sectors like defence, transportation, communication, healthcare, public safety and Smart Grid systems.

Adhering to EMC and coexistence standards, which realistically reflect the expected electromagnetic environments and usage scenarios, is vital for reliable operation. In radio frequency (RF) communication, interference from unwanted RF signals, either in-band or near-band, is a traditional concern. This is particularly relevant in licensed frequency bands, where all non-licensed signals are considered interference and in shared spectrums, where interference definitions are more complex.

In the case of Smart Grid systems, both interference and coexistence are significant concerns. Interference can be from intended or unintended RF emissions disrupting communications in Smart Grid wireless devices. This interference can vary in time and bandwidth, with different devices responding differently to various waveforms, such as amplitude-modulated or wideband direct sequence spread spectrum signals.

ADVANCEMENTS IN SPECTRUM TECHNOLOGIES

The evolution of technologies is playing a pivotal role in revolutionising wireless communication, addressing the

growing demand for bandwidth in densely populated areas. Dynamic Shared Spectrum (DSS) dynamically allocates frequency bands in real time, catering to the ever-changing requirements of users. In synergy with DSS, Cognitive Radio (CR) intelligently detects and utilises available communication channels, avoiding interference and significantly enhancing spectrum efficiency. Similarly, the integration of Artificial Intelligence (AI) and Machine Learning (ML) into spectrum management has helped improve network performance.

Dynamic Shared Spectrum: This involves dynamically allocating frequency bands to users based on real-time usage and requirements. This approach is particularly beneficial in densely populated areas where the demand for spectrum is high. DSS operates by transmitting 4G Long Term Evolution (LTE) and 5G New Radio (NR) signals over a shared frequency. This technology dynamically assigns cellular resources between both networks depending on current demand.

Cognitive Radio Technology: It is a form of wireless communication in which a transceiver can intelligently detect which communication channels are in use and which are not. It instantly moves into vacant channels while avoiding occupied ones. It does not cause any interference to the licensed user. Given India's spectrum scarcity and the high demand for wireless services, CR technology can significantly enhance spectrum efficiency by dynamically identifying and utilising available channels.

Artificial Intelligence and Machine Learning: AI and ML are transforming network management by enhancing performance and managing interference in complex RF environments. They have made immense contributions, ranging from predictive analytics to automated optimisation, fault detections and self-healing, improvements in security and energy usage, and network slicing.

Predictive analytics, for instance, involves the examination of network data to predict traffic patterns,



IN BRIEF

- Wireless communications face challenges in spectrum coexistence and interference due to increased complexity.
- Electromagnetic Compatibility (EMC) is vital for device functionality and is crucial in critical infrastructure sectors.
- Adhering to EMC standards is essential, especially in Smart Grid systems, to ensure reliable operations.
- Advancements include Dynamic Shared Spectrum, Cognitive Radio, and integration of AI/ML in spectrum management.
- Techniques like Beamforming, MIMO, RU scheduling, and spatial reuse enhance network performance.
- Challenges include spectrum scarcity, interference management, evolving regulations, and security concerns.
- The future involves 6G technology, spectrum-sharing innovations, and sustainable, energy-efficient communication.

Predictive analytics involves the examination of network data to predict traffic patterns, facilitating optimal resource allocation and preventing congestion.

facilitating optimal resource allocation and preventing congestion. Automated optimisation, driven by AI algorithms, dynamically adjusts network parameters in real time, reducing manual intervention and increasing operational efficiency. The fault detection and self-healing capabilities of AI swiftly identify and rectify network issues, often resolving problems before they impact users, thereby minimising downtime and enhancing reliability.

Furthermore, AI contributes significantly to security enhancements by efficiently detecting and responding to threats, identifying attack patterns, and taking pre-emptive actions to safeguard the network. In terms of energy efficiency, AI plays a crucial role in optimising the energy consumption of network infrastructure, which becomes increasingly vital as networks expand and energy costs rise.

In the context of 5G networks, AI and ML manage network slicing to allocate resources effectively for various services, ensuring each service receives the necessary resources without adversely affecting others. Additionally, AI enhances data processing at the network edge, resulting in reduced latency and improved response times, particularly beneficial for critical applications such as autonomous vehicles and industrial automation.

CHANGING TECHNOLOGIES AND TECHNIQUES

The evolution of wireless communication technologies has been instrumental in meeting the burgeoning demands of modern communication networks. Among these, several key techniques stand out for their impact on enhancing network performance, reducing interference, and optimising resource utilisation.

Beamforming: This signal processing technique, used in antenna arrays, directs transmission power specifically towards receivers, improving signal quality and reducing interference.

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With wireless networks increasingly underpinning critical infrastructure and services, safeguarding against cyber threats and ensuring communication integrity are paramount.

MIMO technology: Multiple Input Multiple Output (MIMO) uses multiple antennas at both transmitter and receiver ends, enabling communication with multiple users over the same frequency band, thereby boosting network efficiency and capacity.

RU scheduling in 5G networks: Resource Unit or RU scheduling allocates the smallest units of time and frequency among users, optimising network throughput and ensuring fair resource distribution.

Spatial reuse: This involves reusing frequency bands in different spatial locations or by different users within the same area to maximise throughput while managing interference, especially in dense networks.

Channel bonding: It combines adjacent frequency channels into a single, wider channel, increasing bandwidth and data throughput, often used in Wi-Fi technologies. However, it requires careful management to avoid increased interference in crowded spectrum areas.

CHALLENGES AND FUTURE DIRECTIONS

As we delve into the future of wireless communications, we face a multifaceted landscape of challenges and opportunities. One of the primary hurdles is managing the increasing scarcity of the spectrum in the face of burgeoning device numbers and data demands. Efficiently allocating and utilising this limited resource is crucial. Concurrently, interference management remains a persistent technical challenge, especially in densely populated areas where multiple wireless technologies coexist. The growing complexity of networks, particularly with the advent of 5G and the anticipated arrival of 6G, adds another layer of complexity, necessitating seamless integration and compatibility among diverse devices and technologies.

On the regulatory front, the evolving spectrum of regulations and the need for international coordination

present their own set of challenges. Aligning global spectrum management strategies is essential but often complicated by differing national interests and regulatory frameworks.

Additionally, security concerns are more prominent than ever. With wireless networks increasingly underpinning critical infrastructure and services, safeguarding against cyber threats and ensuring communication integrity are paramount.

Looking ahead, the emergence of 6G promises even faster speeds and more reliable connections, potentially exploring new spectrum bands and incorporating cutting-edge technologies like AI and quantum communication. Innovation in spectrum-sharing techniques will be key to addressing spectrum scarcity, with cognitive radio and dynamic spectrum access likely playing significant roles. The integration of AI and ML will further advance, streamlining network management and optimisation. Moreover, there's a growing emphasis on developing sustainable and energy-efficient communication technologies, aligning with global environmental consciousness and the need for greener network infrastructures.

The future of wireless communication is set to be a dynamic interplay of technological innovation, regulatory adaptation, security vigilance, and environmental consideration. Navigating these challenges and opportunities will require continuous innovation, strategic planning, and international collaboration. 🌐

The author is a decorated military veteran who retired as the 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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Telecom turmoil: Govt forecasts 30% surge in revenue receipt

The government's bold projections in the interim budget raise the stakes for telecom giants amid regulatory pressures and market dynamics

BY V&D BUREAU

On February 1, during the presentation of the interim budget by Union Finance Minister Nirmala Sitharaman, a notable point emerged regarding revenue receipt projections for the telecom sector. The central government anticipates a steady increase in earnings from this industry, potentially signalling forthcoming trends for telecom operators. This, however, may not turn out to be beneficial for the telcos.

This anticipated 30% annual rise in income amounts to a substantial Rs 1.2 lakh crore from a sector that has been adopting new technologies for driving growth during the past few quarters.

THE RISE OF TELCO REVENUE FOR THE GOVERNMENT

Revenue earned from telecom operators has been on a steady rise. In FY23, the central government said that it had earned Rs 64,835 crore (USD 7.8 billion) in revenue

Between March 2023 and March 2025, the government's revenue receipt from the telecom sector is likely to go up by over 85%, a massive increase in two years.

In FY24, an initial projection had pegged telecom revenue to hit Rs 89,469 crore, which the Centre later revised to a higher end-March target of Rs 93,541 crore.

from telecom operators. In FY24, an initial projection had pegged telecom revenue to hit Rs 89,469 crore (USD 10.8 billion), which the Centre later revised to a higher end-March target of Rs 93,541 crore (US 11.3 billion).

This marked an eventual rise of nearly 44% YoY in telecom revenue between the last financial year and the current, ongoing one that is set to end on 31 March. Further, the Rs 1.2 lakh crore (USD 14.5 billion) target set for FY25 marks a further 29% YoY increase in the upcoming financial year. Cumulatively, between March 2023 and March 2025, the government's revenue receipt from the telecom sector is likely to go up by over 85%, a massive increase within two years.

To be sure, the revenue expectations are largely driven by private-sector telecom operators, namely Bharti Airtel, Reliance Jio and Vodafone-Idea. The three operators, as per the Telecom Regulatory Authority of India's (TRAI's) November 2023 data published on 29 January, comprise over 95% of the entire wireless and wired network services in India. In FY23, the three operators taken together had earned net operating revenue of Rs 2.72 lakh crore (USD 32.8 billion), a figure that is almost certain to exceed Rs 3 lakh crore (USD 36 billion) by FY25.

WHY IS THE GOVERNMENT ESTIMATE SO HIGH?

To understand this, it is important to understand what comprises the government's receipts of telecom revenue. At the very core of this revenue expectation are receipts of adjusted gross revenue (AGR) payouts by the telecom operators, which come through licensing fees and spectrum usage charges (SUCs) that the telcos pay. Pending fees and payouts of AGR exceed lakhs of crore every year, but due to the staggered payout schemes of such revenue, telecom revenue takes into account only the share that is due each year.

Further to this, the next biggest contributory factor behind telecom revenue for the Centre comes from spectrum auctions, which are typically sold at sky-high prices. These price slabs contribute massively

to the government's revenue, although each year the progress on auctions is different. Following the Budget, Union IT minister Ashwini Vaishnaw said at a press conference that the government expects higher telecom revenue in FY25 due to the "robust" health of the telecom sector, and also through an upcoming limited spectrum auction.

Industry experts and analysts, however, point out that even taking due AGRs from the three main telcos and the spectrum auction into account, the revenue expectation is steep. Media reports of the budget analysis further indicate that factors such as the advent of enterprise 5G network demand among industries for smart factory floor automation and other similar applications remain bleak. Further, satellite-based communication services, which are expected to commence operations this year, are not expected to be majority contributors to telecom revenue, and in turn the government's earnings—since they are yet to even begin, and initial demand is only expected to be tepid and gradual at best.

The Centre's revenue estimate from telecom operators, therefore, points to any abolition of fees levied to telecom operators highly unlikely going forward any time for now. Reliefs sought by the telecom operators ahead of the budget include reducing regulatory levies like licence fees, deferring USOF contributions till the existing funds are exhausted, customs duty exemptions on telecom equipment, waiving GST on regulatory payments, and refunding input tax credit or ITC, among others.

As a result, it now remains to be seen how the rest of FY24 and FY25 progresses for telecom companies. Steep expectations suggest existing fees and charges will not be revised. Telcos, however, have their work cut out. They face pressure from competitive expansion and low global average revenues per user. Tariff hikes may follow. Past lobbying for preferential data pricing raised net neutrality concerns. These factors clarify the revenue demands and expectations from telcos. 🧐

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A game-changer in India's OTT landscape

Viacom18's purchase of Hotstar promises a powerful OTT platform with extensive content, reshaping India's media industry



BY V&D BUREAU

On Monday, January 22, Sony backed out from a mammoth merger deal with Zee Entertainment, a deal that was valued at a whopping Rs 83,000 crore (USD 10 billion). Even as the contours of this breakup lead to murky legal tussles that can swing either way (as we saw with Elon Musk and Twitter's tug of war), the unlikely collateral that emerged from this is an impact on the valuation of Disney's India business. Fast forward to February 1, and media reported that Reliance Industries' entertainment arm, Viacom18, had swooped in to acquire a majority stake in Disney India.

As things stand right now, Viacom18, along with media entrepreneur James Murdoch's Bodhi Tree Systems, is acquiring 60% of Disney's India assets, including its

traditional television broadcast channels and over-the-top (OTT) digital streaming platforms. Viacom18 valued Disney India at USD 3.9 billion, substantially lower than the USD 10 billion that Disney was seeking. In the newly formed consortium, Viacom18 will own 51% of Disney India, while Disney itself will retain 40% of its stake in the new company. Murdoch's Bodhi Tree will hold 9% of the company, making it one of the biggest OTT groups in the country.

A RED-HOT OTT BATTLE

The reason why this tussle started with a footnote of the Zee-Sony ordeal is because of the valuation that Viacom18 is seemingly picking up Disney's India assets. The heart of Disney's India appeal lies with its streaming platform, Hotstar. At the end of September 2022, Hotstar

Competitors like Airtel and Vodafone-Idea may need to invest to secure premium streaming content, further boosting Viacom18 and Reliance's advantage.

was the biggest streaming platform in India with over 60 million paid subscribers—way ahead of Amazon's Prime Video and Netflix, its nearest competitors.

Since then, Hotstar has lost two of its biggest deals that used to draw subscribers to it: digital broadcasting rights for the Indian Premier League (IPL) cricket tournament, and US media giant HBO's streaming rights in India. Both these services were picked up and moved on to Viacom18-owned streaming platform, JioCinema, which has since catapulted on to becoming one of the biggest names in the Indian digital broadcasting space.

At the same time as when Hotstar lost its landmark deals, Zee was also slated to offer Disney's broadcasting division streaming rights it had for matches of the International Cricket Council (ICC). Now, Zee has disputed its obligation to follow through with this deal, since its merger with Sony is now off the chart. This, in turn, has further contributed to the ongoing downfall of Disney's India assets valuation, making this a murky multi-way pickle to plough through.

WHAT DOES THIS MEAN FOR THE INDUSTRY?

All of this adds up to a big fight in the video streaming industry. At the end of 2022, Disney+ Hotstar was at the top of the chart, in terms of subscriber market share, with 46 million active subscribers at the end of the year. Prime Video, with 40.8 million subscribers, ranked second, ahead of Netflix at third with 30.7 million subscribers. Since then, the advent of JioCinema has had a massive impact on these rankings.

By the first quarter of 2023, JioCinema had added over 10 million subscribers in anticipation of the IPL cricket tournament, while Hotstar lost over 8 million subscribers. Beyond this, JioCinema has continued to grow its subscriber base due to its content deals with HBO and NBC, as well as its broadcasting of homegrown reality TV show, Bigg Boss.

With the new deal, Hotstar and JioCinema are slated to come under a unified parent firm; although it is not clear yet if the two platforms will be merged into one by Viacom18. The precedent for this already lies in the streaming platform Voot being merged into JioCinema.

Experts, however, say that Hotstar still has a considerable brand appeal among Viacom18's subscriber target groups, a factor that could help keep it alive as an individual brand. Disney, with a 40% share of the company, could also play a role in it.

The crux of this move, though, could well lie in JioCinema and Hotstar forming an umbrella that would have a sizeable market share. While formal numbers are scarce, a combined OTT market share of over a quarter of the industry is likely to be under Reliance's overall ownership. This, in the long run, could give Viacom18 a billion-dollar streaming group—as per market researcher Statista, the OTT market is tipped to be valued at USD 5.6 billion by 2028.

HOW WILL THIS IMPACT THE DUO?

The merger of JioCinema and Hotstar into a single OTT platform, combined with Viacom18's production expertise, will significantly enhance the group's original localised content offerings. This move aligns with the strategies of global giants like Amazon Prime Video and Netflix. Leveraging Viacom18's extensive partnerships and content library, the conglomerate will boast one of the largest repositories to attract users and subscribers.

Some of the content that may become available with JioCinema and Hotstar together include broadcasting deals for live telecasts such as the English Premier League and IPL, as well as landmark content such as HBO, Marvel, Pixar, DC and Star Wars—all consolidated. This consolidation may lead to bundled subscription prices, making it one of the most appealing offers for Indian consumers. This could also create a lucrative bundled content platform for telecom operators, particularly benefiting Reliance's Jio Infocomm with increased revenue from bundled tariff plans. Competitors like Airtel and Vodafone-Idea may need to invest to secure premium streaming content, further boosting Viacom18 and Reliance's advantage.

If the deal proceeds, it could be the start of the creation of one of Asia's, and perhaps even the world's largest OTT services platforms under a single media and entertainment umbrella. 🍷

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TV RAMACHANDRAN

DRIVING HOME THE GIGABIT ECONOMY DREAM

Policymakers must urgently pursue opening the lower 6GHz band, vital for high-speed broadband access and achieving the Digital India goal



The Wi-Fi Revolution stands as the unheralded messiah, ushering in the data revolution of the modern era. While the advantages of the cellular mobile revolution are well understood, the latest 5G technology and the anticipation of the next-gen 6G by 2030, make it easy to overlook the fact that approximately 70% of data is consumed indoors. It is also important to understand that most of these higher 'G' cellular technologies rely on higher frequency spectrums which makes it difficult to penetrate buildings effectively. Consequently, with the advent of 5G and the anticipated 6G, there is a pressing need for increased support

from next-gen Wi-Fi technologies within buildings to complement and ensure a seamless user experience.

During the recently concluded Wireless Global Congress APAC 2024 in Delhi, organised by Wireless Broadband Alliance and Broadband India Forum (as a co-host), the vision was articulated for a Wi-Fi-powered Digital India, emphasising the necessity and capabilities of modern Wi-Fi. The conference provided valuable insights, emphasising that Wi-Fi is an indispensable tool for facilitating a Gigabit Economy. It was also recognised that the average data consumption for Fixed Broadband



Wi-Fi plays a critical role in delivering broadband access to users inside buildings, even when the fibre is used as the primary backhaul infrastructure.



India's Wi-Fi infrastructure, based on Wi-Fi 5 (802.11ac) and utilising 2.4 GHz and 5 GHz spectrum, is inadequate to support the data-intensive services of 5G and 6G.

(when used alongside Wi-Fi) in India exceeds 190GB per month, which is over ten times the average mobile data consumption of approximately 18GB per month and has the potential to reach up to 20 times the mobile data consumption.

WHERE DOES INDIA STAND?

India finds itself in a somewhat anomalous developmental situation. While it strides forward with the latest cellular mobile technology, it remains reliant on older Wi-Fi technologies – specifically, Wi-Fi 5 and older versions – which are suboptimal for the demands of the digital age. Modern next-gen Wi-Fi technologies, Wi-Fi 6E and Wi-Fi 7, not only offer higher speed and lower latency, thereby providing a user experience akin to, if not better than, 5G when indoors – whether in malls, airports, offices, hotels, or public spaces – but also deliver increased security and efficiency. Through interoperability techniques, they enable seamless broadband access across various homogeneous and heterogeneous networks. Wi-Fi 7, built upon the latest IEEE standards, offers significant complementarity with 5G, enhancing the customer's ability to enjoy 5G-like speeds both indoors and outdoors.

The conference emphasised that despite Wi-Fi having less than a twentieth of the spectrum (license-exempt) compared to cellular mobile technologies, it boasts a substantial economic value of USD 33 trillion. Currently, Wi-Fi handles 60-70% of global data traffic and facilitates high-quality data experiences for 2.2 billion devices. The global expansion of Wi-Fi is indeed impressive, with an annual shipment of 338 million devices (including Wi-Fi 6E) and a network spanning 540 million global Public Wi-Fi Hotspots (PWHs), with continued growth anticipated. It is likely to remain the dominant technology for data consumption well into the foreseeable future, particularly since data is likely to grow predominantly indoors. However, India has only about 0.1% of the global market share of this critical element of digital infrastructure.

For developing countries like India, Wi-Fi remains the most cost-effective means of data consumption. Trends indicate that while per capita data usage continues to rise, the cost per gigabyte of data continues to decline steadily. Therefore, the country urgently requires next-gen Wi-Fi technologies, such as Wi-Fi 6E now and Wi-Fi 7 in the future. It also needs a significantly higher penetration of PWHs, to fulfil its digital aspirations. Implementing PM WANI for these PWHs would enable the attainment of desired security levels through user identification and traceability.

THE NEXT BIG THING: OPEN ROAMING

The latest advancement in the Wi-Fi world is Open Roaming technology. It offers users a seamless experience as they transition from one location to another, both within the country and abroad. By decoupling access from identity, Open Roaming addresses the challenges associated with re-authentication and payment authorisation as users move across networks. Consequently, it tackles the crucial challenge of achieving ubiquitous and affordable universal access. Moreover, Open Roaming aids in addressing security concerns, standardisation, and quality of service issues while users are on the move. Embracing Open Roaming for Public Wi-Fi is pivotal for enabling seamless and interoperable Wi-Fi services in the future, and India would benefit greatly from its adoption.

PM-WANI, the government's and TRAI's globally unique wireless access network initiative for public Wi-Fi, is as commendable as Aadhar or the India Stack and could rightfully be considered the UPI of telecom. However, two of its three years of existence were impacted by COVID-19, resulting in muted growth with barely 2 lakh PWHs, primarily due to some initial challenges and a lack of public awareness. There may also be natural resistance from other telecom incumbents, along with a pressing need for regulatory intervention to establish suitable backhaul tariffs for this crucial emerging sector, which

While Wi-Fi has less than a twentieth of the spectrum (license-exempt) compared to cellular mobile technologies, it boasts USD 33 trillion in economic value.

The global expansion of Wi-Fi is impressive: an annual shipment of 338 million devices, including Wi-Fi 6E and a network spanning 540 million Public Wi-Fi Hotspots.

requires nurturing and support during its initial years in the public interest.

During the conference, a nuanced and calibrated approach to foster the successful growth of PM-WANI was proposed. This approach involves identifying niche areas rather than pursuing mass coverage. Some of these identified locations include study centres, digital libraries, special fairs, religious gatherings like the Maha Kumbh Mela, areas with high population density experiencing mobile network congestion, or locations lacking adequate coverage. Such targeted strategies aim to maximise the impact of PM-WANI and ensure its effectiveness in addressing connectivity challenges across diverse contexts.

THE KEY ENABLER: 6GHZ SPECTRUM

The deployment of next-gen Wi-Fi technologies hinges upon the availability of the 6GHz spectrum. It is crucial to recognise that the current Wi-Fi infrastructure in India, based on Wi-Fi 5 (802.11ac) and utilising a limited unlicensed spectrum of 2.4 GHz and 5 GHz, is inadequate to support the data-intensive services of 5G and 6G. Therefore, India must urgently embrace the adoption and implementation of Wi-Fi 6E (802.11ax) and Wi-Fi 7 (802.11be) standards. These standards allow high speeds, low latency, and improved service levels comparable to 5G networks, facilitating seamless utilisation of advanced applications and innovative services by customers.

However, these modern Wi-Fi standards require a license-exempt 6 GHz spectrum. This spectrum has already been adopted by most major economies worldwide, including Argentina, Australia, Brazil, Canada, the EU, Hong Kong, Japan, Malaysia, Mexico, New Zealand, Saudi Arabia, Singapore, South Korea, Thailand, the UK and USA, among others.

It is essential to recognise that connectivity to various devices, whether within homes or enterprises, relies heavily on routers with Wi-Fi capability. Thus, Wi-Fi plays a critical role in delivering broadband access to users inside buildings, even when the fibre is used as the primary backhaul infrastructure. Regardless of the media used for connectivity—whether it is IMT, fibre optic cables, or satellite—the last hop for indoor usage would primarily have to be only Wi-Fi.

Over the next few years, it is also expected that there will be a substantial increase in the number of connected devices per person by 2030 from 15 today to as much as 60 since more and more surveillance cameras, remote controls and IoT devices are coming into operation. Modern Wi-Fi technologies like Wi-Fi 6E and Wi-Fi 7 which use license-exempt 6GHz spectrum and high channel bandwidths, of up to 320 MHz, would be imperative to achieve good QoE inside buildings.

With Artificial Intelligence (AI) and Wi-Fi together, we are entering a new age of AI-led data-driven innovation which involves leveraging AI algorithms, Natural Language Processing, and other AI techniques in advanced and modern Wi-Fi technologies and equipment. AI can quickly analyse large amounts of data and use it to make predictions about network performance. This process helps in moving from a reactive to a more proactive approach. With AI, new use cases like federated Cloud architecture, cybersecurity, network automation, network design and optimisation, AI operational efficiency, Digital Twins, and AI-based training solutions can be realised more efficiently.

New and innovative applications in areas such as disaster management, healthcare, etc. would also be based on intense data and therefore demand the use of strong and modern Wi-Fi like 6E and 7 along with AI.

Wi-Fi is a win-win for all stakeholders as it benefits consumers, 5G operators, the introduction of 6G, and also helps protect incumbent satellite and fixed backhaul services and, in fact, the overall economy. Therefore, it is high time – in fact overdue, for policymakers in India to also urgently seek the opening of at least the lower 6GHz band in a license-exempt manner as the proliferation of high-speed, low latency broadband access in unconnected and difficult-to-connect areas is imperative to help in digital inclusivity and acceleration in reaching national goals of Digital India. India cannot afford to lag behind its peers in this vital aspect. 🌟

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Views are personal.

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ANIL SARDANA

[COVER STORY]

SATCOM

A detailed illustration of a satellite in space. The satellite has a large parabolic dish antenna, several smaller antennas, and solar panels. It is positioned against the backdrop of the Earth's horizon and a starry space background. The text is overlaid on the lower half of the image.

5 HOT SATCOM STARTUPS IN INDIA

From super high-resolution imaging to rich satellite-driven data services and even white-label on-demand satellites, India's top Satcom startups are ready to roar

BY VERNIKA AWAL

Back in June 2020, the central government opened the doors of India's then-controlled space sector for private industry infusion. Since then, India has made multiple impressive strides, culminating in the first-ever launch of a privately-built rocket in November 2022. But the industry has not remained restricted to just this, for it has continued to see innovation at a breakneck pace. Alongside receiving its own Geospatial Policy in December 2022 and Space Policy in April 2023, this fledgling sector has also been home to multiple impressive startups in the satellite-driven communications or the Satcom industry.

Each of these startups has since gone on to scale new highs, including generating funding from famous, storied global investors such as PeakXV Partners (formerly Sequoia Capital India and Southeast Asia) and Google. These startups also serve unique points by themselves, offering technologies that very few others in the entire nation do. From intra-satellite communications in space to satellite-based data analytics, ultra-high precision imagery and even white-label commercial communications satellite manufacturing, India's Satcom startups are defying what early-stage startups can achieve.

On this note, here is taking a peek at the five hot Satcom startups in India (listed in alphabetical order), including issues that each is looking to solve, the progress that they have made, and the future that each may hold in national and global industries. Each of them has also received considerable government interest in not just backing them but also becoming their partners and customers, thereby showing that the domestic Satcom industry is not reserved just for the likes of Airtel's OneWeb and SpaceX's Starlink.

ASTROGATE LABS

Year of Incorporation: 2017

Founders: Nitish Singh (CEO) and Aditya Kedlaya (COO)

Set up by Nitish Singh and Aditya Kedlaya, Astrogate Labs is a Satcom startup that is actively engaged in creating fundamental infrastructure technology for satellite communications, both for satellite-to-ground stations and for satellite-to-satellites.

The company is focusing on changing the way ground stations communicate with satellites in orbit by

Astrogate Labs is changing the way ground stations communicate with satellites by replacing radio frequency broadcasts from satellites with laser optics.

replacing radio frequency broadcasts from satellites with laser optics. In an interview with a business newspaper, Singh said that the startup can offer precision satellite communications using lasers to lands as small as 500 square metres. Besides, it can also help companies retrofit laser communications modules on their satellites to amplify the bandwidth, latency and speed of their satellites used in communications. This is a crucial aspect since bandwidth and latency are essentially the two most important aspects of satellite operations.

It has already won its first major client, too—in August last year, Bengaluru-based space data company SatSure announced a strategic investment in Astrogate to incorporate its technology into the former's satellite operations subsidiary, called KalediEO. This will use Astrogate's laser-driven satellite communications bandwidth of 1 Gbps, to give SatSure high throughput small satellites—a sophisticated, in-demand technology in modern-day Satcom parlance.

The mission, alongside integrating Astrogate's data transfer technology, will also use its ground terminals, thereby showcasing unique solutions and use cases that the startup can offer.

Confidence in Astrogate's abilities was reflected in SatSure's investment, which will culminate in the launch of four earth observation satellites by the latter by 2025, according to media reports. SatSure, which itself has been invested in by Baring PE Partners and Promus Ventures in a USD 15 million series-A round in September 2023, will use Astrogate's tech as a key part of its offering.

As Prateep Basu, CEO and Co-founder of SatSure said about Astrogate, "Having developed various application suites across sectors ranging from agriculture to aviation, we will cover the entire earth observation data value chain by venturing upstream with our fleet of microsatellites. Our investment in Astrogate Labs aims to improve the utilisation of the massive amount of data that we will be generating from our satellites, by de-bottlenecking the downlink of it to Earth."

DHRUVA SPACE

Year of Incorporation: 2012

Founders: Sanjay Nekkanti (CEO), Chaitanya Dora Surapureddy (CFO), Krishna Teja Penamakuru (COO), and Abhay Egoor (CTO)

Dhruva Space, among India's other Satcom players, distinguishes itself by providing satellites, Earth stations, and launch services either as an integrated solution or as individual technology offerings to support space-based applications. As a Satcom startup exploring fundraising, Dhruva Space aims to significantly impact India's Satcom industry infrastructure. The company is also focussing on becoming a white-label satellite manufacturer and deployer, potentially representing private companies and research entities globally.

Critical to Dhruva's potential success, alongside any upcoming funding rounds, will be its 280,000-square feet manufacturing facility in Telangana, set in a 6.5-acre land allocated to it by the state government. The facility will develop and build a whole range of crucial Satcom infrastructure that includes space-grade solar panels, ground station equipment for satellite data transmission and reception, orbital deployers for putting contracted satellite clients in orbit, and platforms that also offer companies and academic entities the option to let Dhruva build satellites for them—based on reference technical designs.

Speaking about the startup's capabilities, its CEO and Co-founder Sanjay Nekkanti said in response to Voice&Data's questions, "In the space industry, we see satellite companies only focusing on building satellites, launch vehicle companies only manufacturing rockets, and ground station companies working on Earth stations. Globally, a very limited number of full-stack space companies offer an end-to-end solution for customers looking to launch and communicate with their space assets. Providing a full-stack solution is Dhruva's competitive advantage. Another of our key advantages is that our satellite platforms are application- and payload-agnostic, so we can serve any customer according to their requirements."

Dhruva Space aims to become a full-stack company offering end-to-end solutions for customers looking to launch and communicate with their space assets.

Through this, Dhruva can potentially become a key upstream player in the Satcom race, and in the long run, become a crucial private company for the overall space and Satcom industry akin to the likes of Boeing, Lockheed Martin and Northrup Grumman. Alongside corporate contracts, defence operations would also be key for Dhruva going forward. It also fits into India's narrative of looking to create a USD 13-billion space economy by 2025, by capturing more than 2% of the world's space and satellite operations.

DIGANTARA

Year of Incorporation: 2018

Founders: Anirudh Sharma (CEO), Rahul Rawat (COO), and Tanveer Ahmed (CTO)

Bengaluru-headquartered Satcom and space-tech startup, Digantara, became a significantly prominent name in the industry after Peak XV Partners, formerly Sequoia Capital India, led the startup's USD 12-million series-A funding round. This was a likely trickle-down effect of a marquee investor backing a startup—after all, Digantara was the first publicly-announced investment for Peak XV, and the Shailendra Singh/Rajan Anandan-backed investor comes with indelible ties to the much-storied Sequoia.

Naturally, the backing of such an investor catapults a startup to prominence, making Digantara one of the most promising satellite communications startups in the country today. The startup works to develop what it describes as a map for all satellites and debris in space. By using its constellation of micro-satellites equipped with cutting-edge sensor technologies, Digantara seeks to become a stakeholder in the nascent global Space Situational Awareness (SSA) industry.

The latter is a purely data-driven industry for intra-satellite communications that are already up and deployed in orbit. By using satellites and sensors, Digantara will create a map of objects that are in space. By doing so, it will offer any company running a space operation the ability to allow their satellites to communicate with one another, 'see' where they are and create cautious trajectories in space.

Investors have flagged Digantara's targeted SSA industry to be of massive significance and prospect in the long run. For one, private estimates peg the total number of satellites in orbit at around 8,300. Along with these, there is also a vast amount of space debris left up in the

Digantara is building a platform to support stakeholders across the value chain with accurate datasets and precise determination of orbital insights.

orbit, all of which pose risks and concerns for any space mission in future—with space orbits around Earth only set to become even more cluttered.

Then, there is geopolitics. With time, satellite communications are increasingly becoming strategically important for nations and concerns around space warfare are not fiction anymore. All of this leaves Digantara as possibly the greatest prospect of becoming a behemoth space corporation by offering all of Earth's orbital data to governments and corporations worldwide. Media reports quoting its CEO and Co-founder Anirudh Sharma indicate that the company is already working with government and defence agencies in Singapore and the United Kingdom, and its first-generation commercial space data service is set to commence operations in April this year.

GALAXEYE SPACE SOLUTIONS

Year of Incorporation: 2020

Founders: Suyash Singh (CEO), Denil Chawda (CTO), Rakshit Bhatt (VP – Products), Kishan Thakkar (VP – Engineering), and Pranit Mehta (VP – Business Development)

Yet another impressive satellite-based Satcom data startup is GalaxEye, founded by five IIT Madras alumni. The company has massive room for growth, having last raised a USD 3.5-million seed funding round back in December 2022.

The year 2024 promises to be massive for GalaxEye, which seeks to offer high-precision satellite-based imagery and data for industries that require sensor-

GalaxEye is building the world's first multi-sensor imaging satellite to enable governments and businesses to perform advanced geospatial analyses.

[COVER STORY]

SATCOM

based information such as weather and natural disaster prediction agencies, telecommunications, and more. In August last year, the company demonstrated working proof of its technology aboard a drone, when it offered its multi-sensor satellite sensing technology by putting it on a drone. This year, the challenge will get stiffer as GalaxEye nears the launch of its first satellite into orbit.

Speaking about the startup's objectives, GalaxEye's CEO and Co-founder Suyash Singh, said, "Our overarching objective is to build the most comprehensive dataset. Despite its high interpretability, optical data is frequently hindered by factors like low light conditions, fog and cloud cover, rendering it less accessible. Conversely, synthetic aperture radar (SAR) emerges as a promising solution due to its ability to penetrate through clouds and fog. However, the interpretation of SAR images is not straightforward. To surmount these challenges, our current focus centres on the development of advanced multimodal, multi-sensor payloads. These payloads are meticulously designed to capture both kinds of data and fuse it on the edge, transcending the limitations of individual sensing modalities. The intention is not solely to obtain information, but to derive meaningful insights from the synergistic combination of SAR and optical data."

Once up and running, GalaxEye has so far promised that it will offer industry-leading Satcom-based data analytics services to contractors and sub-contractors. In an interview with The Economic Times, Singh said that one of its early demonstrative contractors was working in wastewater harvesting—wherein a data analytics agency sourced the data from the startup through its demo satellite in space and used its own inferred actionable insights to offer results to their clients.

That is the kind of model that GalaxEye wants to regularise, once it nears frequent, smooth commercial operations.

PIXXEL

Year of Incorporation: 2019

Founders: Awais Ahmed (CEO) and Kshitij Khandelwal (CTO)

Pixxel created history by becoming the first private space startup in India to receive funding from a global venture capital fund, Canada's Radical VC, way back in March 2022. The company's investment saga hit another impressive milestone after it became

Pixxel focuses on hyperspectral satellite imagery, offering data and analytics services for communications, defence, environment, and maritime services.

the first space-tech and Satcom startup in India to raise funding from Google's investment arm in June last year. All of this goes on to showcase Pixxel's potential as one of India's foremost private Satcom startups right now.

Pixxel's main area of focus is on hyperspectral satellite imagery. By operating a host of high-resolution satellites in a constellation configuration around the orbit, Pixxel gathers super high-resolution imagery of the terrestrial surface. It then offers this raw data in two formats—one, companies can simply license the imaging from Pixxel, and use it for its inferences. The second scope that Pixxel leaves open is in its data analytics service, wherein the company uses its imagery to offer advanced analytics for on-ground and atmospheric conditions. Companies, in turn, can license the analytics from Pixxel's service repertoire.

The core structure of operation here, therefore, lies in serving satellite-driven data to companies, which can aid a wide range of industries that include communications, defence operations, environmental operations including emergency rescues of wildfires in remote locations, maritime services, and so on.

The proliferation of Satcom services in strategic data analytics has been a steadily developing front, and media reports indicate that the company is likely to commence full-fledged operations after successful trial phases as early as June this year. Reports also cite global mining giant Rio Tinto as one of Pixxel's clients, as part of "more than 50 commercial contracts" across government agencies, climate monitoring, oil and gas, and forestry—among target industries. Most of Pixxel's clients are based outside of India, and the startup expects to start generating monthly recurring revenue after June this year.

Given the schematics so far, Pixxel could very well become the first commercially successful Satcom startup in India, in the months and years to come. 🍀

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Cloud and its two new Musketeers

Convergence of Edge, 5G, and Cloud holds immense innovation potential, but overcoming infrastructure, security, and adoption challenges is crucial



BY PRATIMA HARIGUNANI

The sharpness of Edge, the wide swing of the 5G and the high jump of Cloud- imagine what happens when all these advantages converge? Interestingly, we are already living in a chapter where all this has already begun. The Three Musketeers have come together. And with that stage set, we are about to see many new applications and leaps, for

the average citizen, customers, and enterprises. From offerings around Multi-access Edge computing (MEC), the Internet of Things (IoT), and Industrial IoT (IIoT) that are powered with ultra-low latency-centric strengths to new applications in manufacturing, automotive, smart cities, and agriculture (driven by specific 5G+Edge play); this convergence is pointing towards a new world.

The evolving telecom value chain, influenced by cloud-native technologies, is prompting service providers to seek fresh revenue avenues through B2B models.



“The synergy between Edge and 5G opens up new revenue streams in areas like IoT, autonomous vehicles, smart city, healthcare, and industrial automation.”

Lt Gen Dr Sp Kochhar
Director General, COAI

How different would this new world be? What needs of new capex, new use cases, Artificial Intelligence (AI) capabilities, fresh infrastructure, and solutions would emerge to tap the real potential of this convergence? Will villains like viability, slow 5G traction, Edge footprint, geographical limitations, incumbent investments in Cloud infrastructure, and investment hesitation come in the way again?

THE END OF CONSTRAINTS

To start with, the confluence of 5G and Edge would be a big game-changer for the Telco market and what it does. Lt Gen Dr SP Kochhar, Director General, COAI stresses that Edge computing and 5G represent significant advancements in the telecommunications market. “These technologies are likely to bring both challenges and opportunities to traditional telco players. Edge computing and 5G can drastically enhance network performance and efficiency, leading to new services and applications. This could expand the market and create new revenue streams.”

He also remarks on the monetisation angle here. “This synergy between Edge and 5G opens up new revenue streams, particularly in sectors like IoT, autonomous vehicles, smart cities, healthcare (for telemedicine and remote monitoring) and industrial automation. These technologies enable the creation of new services and applications that were not feasible with slower speeds and higher latency, thus, creating opportunities for businesses to tap into new markets.”

As Dr Kochhar encapsulates, “The combination of Edge and 5G can lead to overall better network performance. By processing data closer to the source (Edge) and transmitting it quickly (5G), there’s a reduction in the strain on central servers and bandwidth usage, leading to more efficient network operations.”

John Strand, CEO of Strand Consult underlines that the prerequisite for technological development is that we get access to better, faster, and cheaper Internet. “With 5G, we not only get a more advanced product but also a more cost-effective way to produce high-speed broadband. A country like India will benefit greatly from 5G-based FWA solutions as well as the fact that low-income populations can get online.”

The new 5G telco workloads for enterprise connectivity, manufacturing floor automation, inspection, reconfiguration, and IoT use cases in warehousing, agriculture, transport, etc. hold tremendous promise for boosting growth, productivity, and profitability sustainably, as reckoned by Mark Papermaster, CTO of AMD.

“5G in the enterprise sector can be attributed to the absence of concrete use cases, but initiatives like 5G IIoT and 5G Private Networks are actively progressing through pilot and ‘proof of concept’ phases,” reasons Jayanta Dey, Executive President – 5G Business, HFCL. “In the Indian telecom industry, optimism surrounds the potential of 5G



“5G and Edge put extra pressure on cloud service providers to collect, process and disseminate larger volumes of data to the fast-growing user community.”

Biswajeet Mahapatra
Principal Analyst, Forrester



WHAT HAPPENS WHEN 5G MEETS EDGE?

- Edge computing decentralises data storage, reducing reliance on centralised cloud storage. This can lead to more efficient data management, especially for real-time applications.
- Edge computing processes data closer to the source, and 5G offers faster data transmission. This combination will greatly enhance the speed of data processing and response times.
- 5G networks offer significantly higher speeds compared to previous generations. This speed boost enables faster data transfer to and from Edge devices, enhancing the performance of applications that rely on real-time data.
- 5G's lower latency means quicker response times for Edge devices, which is crucial for applications like autonomous vehicles, IoT devices and real-time analytics.
- Improved latency and more localised data processing can greatly enhance customer experiences, especially in applications requiring real-time interactions or high-speed data analysis.
- Scope for use cases like weather forecasts and market needs, weather and climate accurate forecasting, automobile – autonomous flying cars, driverless cars, smart energy, smart cities, manufacturing etc.
- AR/VR experiences become more immersive, impacting entertainment and education.
- Data processed on Edge devices may be more vulnerable to attacks. The improved speed and connectivity of 5G can also enable more sophisticated security protocols.

FWA as a pioneering use case, providing an opportunity for an additional revenue stream. Both telecom players are making significant investments in FWA, considering the substantial untapped market with home broadband penetration at a mere 11% in India.”

THE EMERGENCE OF THE CLOUD

This confluence will etch its strong mark on the Cloud market above everything else, especially as speed, latency, and reach are major metrics for any Cloud player.

Cloud is already, or will be, the bedrock for any innovation, captures Biswajeet Mahapatra, Principal Analyst at Forrester. “Any new technologies, processes, or systems will have a direct impact on cloud providers. Both Edge and 5G will have an immense impact on the kind, size, and time of data being captured, stored, and processed securely. Further, mixing AI and IoT into this basket will have a major impact on the cloud services being consumed,” he said.

As more data is gathered and processed, more storage and computing capacity would be required from cloud services. At the same time, some of the processing of data would be pushed onto the devices due to Edge computing. This provides significant cost advantages to companies working on large data sets- yet opens up more security challenges.

Srikanth Doranadula, Group Vice President, Technology and Systems, Oracle India notes that the evolving telecom



“Cloud players will need to expand their hybrid and Edge offerings, partner with telcos, and build or acquire Edge and 5G services.”

Srikanth Doranadula

Group Vice President, Technology and Systems, Oracle India

value chain, influenced by cloud-native technologies, is prompting service providers to seek fresh revenue avenues through B2B go-to-market models.

“To navigate this shift, they need a programmable network and an open platform which is crucial for supporting digital services facilitated by these models. There would be essential steps involved in planning and launching 5G standalone networks with cloud-native foundations, accessing and interpreting 5G data, and capitalising on new revenue streams. The transformation of voice communications, coupled with the integration of real-time communications and IoT management into diverse industries, demands heightened protection. The emerging challenges include competition with Satellite, fostering an open ecosystem, embracing a frictionless API economy, and leveraging the potential of AI for both revenue generation and cost savings.”

Edge and 5G integration will profoundly impact the cloud market, presenting both opportunities and challenges for cloud players, states Pallav Agarwal, Founder and Director at HTS Solutions Private Limited. “The alliance promises lower latency, faster data processing, and enhanced connectivity. Cloud providers stand to benefit as demand for specialised Edge services rises, but adapting to a distributed infrastructure requires significant investment in Edge server placement and security protocols.”

Mahapatra cites how IoT and 5G will enable new business cases, especially in healthcare, automotive,

communication, media, and disaster management, where telco and cloud service providers can play major roles. “Cloud services have been modelled to processes large data volumes and provide services which can be limited only by the network capabilities. 5G and Edge put that extra pressure on cloud service providers to collect, process and disseminate larger volumes of data to an exponentially growing larger user community in real-time.”

He further adds that work needs to be done to make this experience seamless and better. “Cloud players will need to expand their hybrid and Edge offerings, partner with telcos, and build or acquire Edge and 5G services. Cloud service providers will collaborate with telcos to roll out Edge services somewhat like Azure Edge zones or AWS wavelength.”

CONVERGENCE BEGINS, BUT CHALLENGES REMAIN

Dr Kochhar aptly reminds us that implementing these technologies will require significant investment in new infrastructure and skill development. “Traditional telcos would need to adapt their networks to support 5G and integrate Edge computing capabilities, which involves both technical upgrades and potentially new business models.”

He also points out that there’s a risk of slow adoption or traction of 5G, particularly in regions with existing 4G infrastructure. “Customers and businesses might be hesitant to upgrade due to cost or lack of immediate



“Improved data throughput from 5G facilitates seamless cloud interactions, while dynamic resource scaling ensures efficient resource utilisation.”

Pallav Agarwal

Founder and Director, HTS Solutions



HURDLES ON THE WAY

- Significant investment is required to build and upgrade infrastructure for 5G and Edge computing. This includes new cell towers, data centres and upgrading existing telecom networks.
- To justify the investment, it's crucial to develop and promote new use cases that leverage the capabilities of 5G and Edge computing. This includes applications in smart cities, IoT, autonomous vehicles, telemedicine and more.
- AI can be used for network optimisation, predictive maintenance, data analytics and enhancing user experiences.
- Beyond traditional telecom infrastructure, new kinds of infrastructure such as decentralised data centres and advanced networking hardware are needed for Edge computing.
- As these technologies evolve, there is a growing need for skilled professionals and collaborations between various players

*As told to by Lt Gen Dr SP Kochhar,
Director General, COAI*

Enterprises must consider simultaneously upgrading their infrastructure while also implementing robust security measures to protect sensitive data.

need. Also, expanding the footprint of Edge computing requires significant investment. There's a challenge in ensuring that the infrastructure is evenly distributed to avoid digital divides between different regions. In regions with challenging topographies or low population density, the deployment of 5G and Edge computing infrastructure can be particularly difficult and costly."

5G cannot carry data over long distances like 4G, contends Mahapatra. "It requires infrastructure to be changed or upgraded. Fibreisation across the country has to be completed as well. A larger number of 5G towers need to be installed and 5G enabled devices need to be adopted faster." Then there are also security and privacy issues that need to be addressed, especially the kind of data being processed on the Edge and the vulnerability of applications supporting it. Mahapatra also reasons how any India-specific successful use cases are yet to be seen.

Dr Kochhar cautions that transitioning to or integrating Edge computing solutions might require additional investment and businesses might be hesitant to make this shift. Plus, regulatory hurdles and the allocation of 5G spectrum can also impact the pace of deployment and the effectiveness of these technologies.

Agarwal also adds that while this convergence opens avenues for innovation and improved customer experience, cloud players must invest in new technologies, and infrastructure upgrades, and address security concerns to harness the full potential, making strategic adjustments to leverage the evolving landscape effectively.

There's a strong technical path to be paved too. As Papermaster rightly dissects, purpose-built base station equipment will not cut it; customers need to use off-the-shelf servers to host base station instances along with the application and business IT infrastructure.



The infrastructure for Edge computing may require the setting up of Edge data centres and computing nodes close to areas requiring low-latency processing.

“Compute (or processor) performance, system design flexibility, scalability (small number of cores to large based on the workload), and energy efficiency are at the heart of this transition. These servers may need to be deployed in power and space-constrained facilities, and sometimes in extreme physical deployment environments like factory floors, mines, etc. Seamless migration of the software in the Cloud to the Edge compute or on-prem compute resources is critical.” He further adds: “Security will be paramount in these systems such as secure instantiation of containerised applications, encrypted storage, and secure IO interfaces.”

The current deployments of 5G FWA CPE are in the Sub-6 GHz band (n78 band). But as 5G adoption picks up, both for cellular and FWA, telcos will have to deal with a lack of spectrum in the Sub-6 GHz band, Dey argues. “Millimetre wave is a good complement to Sub-6 GHz band particularly in hotspots like stadiums. All the telcos in India have invested in 5G millimetre wave bands. Our portfolio of 5G FWA CPE products includes support for both Sub-6 GHz band and millimetre wave bands.”

Sayed Peerzade, EVP and Chief Cloud Officer, Yotta also opines that the adoption of these technologies may require significant infrastructure upgrades, demanding investments in new hardware and software. Also, as connectivity and data processing move closer to the Edge, security becomes a critical concern. Enterprises must, therefore, consider simultaneously upgrading their infrastructure while also implementing robust security

measures to protect sensitive data from falling into the wrong hands.

“The infrastructure for Edge computing may require the establishment of Edge data centres and computing nodes close to areas requiring low-latency processing. Similarly, major cloud service providers must have data centres strategically located to ensure low-latency access for businesses leveraging cloud computing services,” Peerzade points out.

Dinesh Dhut, Senior Director, DC Power/OSP (SEA and India) Product Development/Engineering, Vertiv outlines that the rollout of 5G commenced in India in 2022, encompassing Tier 1, 2, and 3 cities and towns. “India has become the fastest 5G rollout in the world after 5G deployments crossed the 4-lakh mark by December 2023. The role of infrastructure providers must evolve to align with the future requirements of 5G, including enhancements in fibre optics, an increased number of towers, small cells, 5G radio technology, and the implementation of distributed antenna systems for both indoor and outdoor applications.”

All for one, and one for all—the convergence is happening. We just have to make sure there are no wrinkles as the three big pastures weld and evolve into something new. It should be an adventure. Three Swashbucklers. Not three Stooges. 🍷

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The evolving transformation catalyst

In the crossfire over India's 6GHz spectrum, Wi-Fi 7 is fast emerging as the promising solution to break free from connectivity disputes



BY VERNIKA AWAL

As networking speeds and standards continue to evolve, one crucial aspect of it lies in how Wi-Fi technology is presented across the world. With nearly one billion users connecting to the internet, Wi-Fi hotspots have often been seen in India as a viable solution to offering connectivity in even the remotest of regions. However, no technology in India's multi-billion-dollar networking industry comes without conflicts—and Wi-Fi 7, the latest standard in wireless internet connectivity, is one of the newest and fewer spoken ones.

WHY WI-FI 7?

Developed by IEEE, the standardisation body that creates frameworks for the latest standards of Wi-Fi connectivity,

since as early as 2019, Wi-Fi 7 has been promised as a messiah of sorts for the global wireless connectivity industry. It is compatible backward to begin with, which means that all existing older devices will remain compatible with Wi-Fi 7 when it becomes ubiquitous globally. As such, the present standard of Wi-Fi stands at Wi-Fi 6E—which makes use of a much-contended 6GHz frequency spectrum.

Wi-Fi 7, on this note, is expected to be released in a more formal capacity by May this year with the standard promising a five-fold advantage. One, it can handle faster data speeds, which in turn will convert to faster Internet connectivity for those using it. Two, it can handle more data thanks to support for greater bandwidth, which

Wi-Fi 7 promises far more stable network connections, which means devices will remain connected steadily, without interruptions and connectivity drops.



“The variability in the availability of 6GHz (spectrum) is not exclusive to India, it is a global concern. Wi-Fi 7 has been purposefully designed to accommodate this.”

Rahul Patel

Senior Vice-President and General Manager, Qualcomm

will allow larger data transfer volumes at any instant, a crucial factor, given pretty much everything we do today involves data transfers and connectivity.

Besides, it promises much lower latency than before, which means seamlessly instant network connections between two devices, or between a device and a data server located remotely. Four, it promises far more stable network connections, which means that all of your devices will remain connected steadily, without interruptions and connectivity drops.

THE CRUCIAL FIFTH POINT

While each of the above four points promises to ease the lives of billions of people around the world, in India’s context, the greatest promise lies in the fifth advantageous point for Wi-Fi 7—unlike Wi-Fi 6E, it does not rely on the 6GHz band.

Before we delve further, a bit of context: access to the 6GHz band is a highly debated issue, with all telecom operators in the country claiming sole access to it to deliver 5G connectivity. This is crucial for telecom operators since their entire operating business models will depend on having access to the 6GHz connectivity band.

A report on the matter by a telecom news portal in December last indicated that the International Telecommunication Union, after much deliberations at the World Radiocommunication Conference 2023, reached a situation where telcos could have more quantum of spectrum for 5G expansion, as well as next-generation 6G technology-backed services. “The 6GHz range airwaves is an ideal mid-band, and can address the immediate spectrum requirements of telecom operators—as 5G-centric bandwidth-hungry applications continue to evolve,” the report stated.

To protect their interest, the three private-sector telecom operators in India—Bharti Airtel, Reliance Jio

Infocomm and Vodafone-Idea—wrote to the Union Telecom Minister Ashwini Vaishnaw through industry body Cellular Operators Association of India in December itself, on the sidelines of WRC-23, that “failure to designate spectrum in the 6GHz band for mobile services will harm India’s 5G interest.”

The parties in question are up in arms on the 6GHz spectrum issue, in large part because Wi-Fi 6E, the current latest Wi-Fi standard, has also laid claim to this spectrum band.

HOW WI-FI 7 CAN SOLVE THIS

Technology developers, on this note, claim that Wi-Fi 7 is the solution, not regulatory clashes and hurdles. In October last year, Rahul Patel, Senior Vice-President and General Manager at Qualcomm, told a business TV channel, “The variability in the availability of 6GHz (spectrum) is not exclusive to India, it is a global concern. Wi-Fi 7 has been purposefully designed to accommodate this variability, and India is no exception.”

He further added that Wi-Fi 7 “offers a unique capability that does not rely on the allocation of spectrum within the 6GHz band.” “This technology addresses numerous concerns that have arisen with Wi-Fi 6 and earlier generations, while also aligning with India’s rapid adoption of cloud-based and wireless applications,” he said.

While companies like Qualcomm, and later others such as Ericsson and Nokia, have vouched for Wi-Fi 7 to promote their commercial interests, there is a sizeable amount of truth to be considered here. Segregating spectrum access for a different form of data transmission such as Wi-Fi versus mobile data right at the very onset will help the industry avoid a regulatory tussle. Such tussles typically involve multiple rounds of consultations once the government is involved, and can lead to delays in industrial deployment of new technologies.

The promise lies in the fact that Wi-Fi 7, unlike Wi-Fi 6E, does not rely on the 6GHz band that telcos need for 5G-centric bandwidth-hungry applications.



IN BRIEF

- **Wi-Fi 7's promise:** The latest wireless standard, promises fivefold advantages, including faster data speeds and more stable connections.
- **Global connectivity:** Developed by IEEE, Wi-Fi 7 is expected to be a global solution, compatible with existing devices, ensuring widespread adoption.
- **Latency reduction:** Wi-Fi 7 pledges significantly lower latency, facilitating instant connections between devices and remote data servers.
- **6GHz spectrum conflict:** Unlike Wi-Fi 6E, Wi-Fi 7 does not rely on the contested 6GHz band, addressing concerns in India's networking industry.
- **Regulatory solutions:** Wi-Fi 7 proponents argue it can resolve spectrum allocation clashes, preventing delays in industrial deployment and regulatory tussles.
- **Adoption challenges:** Despite potential benefits, Wi-Fi 7 faces hurdles in adoption due to the need for infrastructure upgrades and device compatibility delays.

Industry stakeholders may argue that such regulatory delays end up leading to missed opportunities that can add up to multiple billions of dollars. It is this that is leading tech firms to bat for the nascent Wi-Fi technology standard well before it even reaches mainstream adoption pace. Once greenlighted for distribution across the country, multiple companies in the networking space would bring the latest Wi-Fi routers and associated networking infrastructure to support Wi-Fi 7. Devices such as smartphones, laptops, televisions and other smart appliances would upgrade in tandem, thus offering regulatory and operational ease.

CAN WE START USING WI-FI 7 THIS YEAR ITSELF?

While on the face of it, Wi-Fi 7 can solve much of India's 6GHz spectrum debacle, the adoption story for any new technology is never so easy. Upgrading existing networking infrastructure, at any given point, costs multiple billions of dollars. As such, the latest standards are rolled out at the very top of the consumption ladder and typically take well over a year to trickle down to mainstream accessibility.

On this note, Wi-Fi 7 would face similar hurdles, too. Existing Wi-Fi routers at home, which in India are often supplied as bundled offerings by the telcos themselves, would need to be upgraded to new ones to support Wi-Fi 7—and it remains to be seen if the already-cash-strapped telcos would even want to go ahead with such an exercise.

Then, comes the devices. Only a handful few smartphones and laptops today would support Wi-Fi 7, which means that mainstream support for the latest connectivity standard would only develop in the months to come.

This, in turn, means that while some users are likely to be able to begin using Wi-Fi 7 if it does become accessible to India in the coming months, the widespread presence of the standard may take time to develop. Until then, many regulatory and corporate debates are likely to be hosted—before the dust settles on the industry's adoption of a standard that promises to make the market better and simpler to boot. 🙄

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[INTERVIEW]

5G-FWA



Jayanta Dey

Executive President – 5G Business, HFCL

“5G-FWA will open up the road to monetisation for telcos”

FWA or Fixed Wireless Access could not only be the next but also a huge, inflection point for 5G. But will it help the country to connect places that fibre could not touch? Will it help telcos make money, and if so, would it be the volume route again? And what happens to 5G in non-SA mode and in cracking the unique, but untapped, promise it has for the enterprise market? Jayanta Dey, Executive President – 5G Business, HFCL answers some of these in an interaction with Pratima Harigunani. Excerpts:

What makes HFCL’s 5G FWA solutions so exciting? How do you envision them changing the home broadband space in India?

There has been a remarkable surge in demand for safe and high-speed Internet access in India driving the need for fibreisation and increased broadband penetration. In addition, the rising data demand from micro, small, and medium enterprises is further pushing the need for an innovative connectivity solution.

While mobile wireless networks and fibre-to-the-home (FTTH) broadband have continued to serve the urban and suburban regions well, these services have yet to adequately meet the last-mile connectivity requirements since it is commercially unfeasible to deploy fibre infrastructure in hard-to-reach regions, such as islands, mountains, and distant villages.

The first real use case, of 5G Fixed Wireless Access (5G-FWA), will open up the road to monetisation for telecom players who have yet to make any significant headway since the 5G launch last year.

How does it cater to both multi-technologies, including 5G Standalone and 5G Non-Standalone with LTE?

Last year we launched India’s first indigenous 5G FWA CPE solution, that supports both 5G Standalone Architecture (SA) and Non-Standalone Architecture (NSA)

As 5G networks expand, 5G FWA will become a key enabler for bridging the digital divide and ensuring Internet access becomes more inclusive for all.

Deployment of 5G FWA is much faster compared to fibre which often gets impacted due to rights-of-way and other challenges like fibre cuts.

technologies across multiple Sub-6 GHz and millimetre wave (mmWave) frequency bands to offer cost-effective and fibre-like speeds to customers using the 5G network. 5G Standalone offers some innovative features like network slicing but most of the 5G networks in the world are still 5G Non-Standalone which leverage the existing 4G network. Our FWA CPE products support both 5G Standalone and 5G Non-Standalone.

What lessons have you learned from the trials with telcos?

We had extensively tested the FWA CPE products in our R&D labs. When you do field trials and deploy in an operator's network for the first time, you see a few issues which we have been able to quickly resolve. We had done field trials both with operators in India as well as in the USA. Each operator has its frequency bands and there were a few band-specific configurations and optimisations which we needed to do. The FWA CPE products are based on global 3GPP Release 15 and Release 16 standards and that enabled easy integration with 5G Radio networks and 5G Core Networks that were based on products from other OEMs. We experienced smooth interoperability without any significant issues, underscoring the advantages of adhering to global standards such as 3GPP.

How can FWA assist telcos in enhancing their ARPU's?

It's been over a year since the much-awaited 5G launch. Jio and Airtel have extensively invested in 5G networks, increasing their network capacity and reach. 5G use cases for enterprises are yet to mature. Telcos are looking to monetise their 5G networks by offering 5G-based fixed-wireless broadband service. The home broadband market is important for the telcos as they have made significant investments in 5G, and 5G FWA is one of the most crucial use cases to help telcos monetise their 5G investments.

HFCL's 5G FWA CPE portfolio offers new business opportunities for telcos by allowing them to offer Internet

broadband services to consumers and enterprises using their existing 5G network infrastructure.

With FWA connections worldwide projected to reach 300 million by the end of 2028, what are the areas of opportunity in India?

5G FWA is gaining ground as a strong alternative to fixed broadband in both developed and emerging markets. India currently has one of the lowest fixed broadband penetrations in the world and is estimated at 11% approximately. There are 300 million households in India but approximately only 35 million households have a wireline broadband connection. 5G FWA will help to address the digital divide in India by increasing broadband penetration. Deployment of 5G FWA is much faster compared to fibre which often gets impacted due to rights-of-way and other challenges like fibre cuts.

Built to complement wired broadband connections in areas where fibre rollout is limited, HFCL's range of 5G FWA CPE solutions support both 5G SA and NSA technologies across multiple Sub-6 GHz and mmWave frequency bands that will help to offer cost-effective and fibre-like Internet speeds to customers.

How crucial and practical is 5G FWA in addressing the digital divide and improving teledensity in rural areas, particularly for unconnected homes and SMEs?

The rural Internet subscriber density in India stands at 37.25%, while the urban Internet subscriber density stands at 103.95%. This indicates that there is a significant gap in teledensity between rural and urban areas in India. Around half of India's population still lives in rural areas. FWA is a critical tool to provide reliable broadband services in rural areas. As 5G networks expand, 5G FWA becomes a key enabler for bridging the digital divide and ensuring Internet access becomes more inclusive for all.

Is FWA the most significant 5G use case after mobile broadband? Why or why not?

Indian telecom operators have invested over Rs 1.5 lakh

Higher volumes will drive down the cost of 5G FWA CPE and this will help accelerate the adoption of 5G FWA-based home broadband services.

crore in infrastructure in the last year to deploy 5G networks, expand fibre networks and upgrade existing infrastructure, according to data from Digital Infrastructure Providers Association.

Despite significant investments in 5G networks and spectrum auctions, the journey to monetisation is still unfolding. However, the positive aspect is that 5G, as the first cellular technology to cater to both the consumer and enterprise markets, holds immense potential. The current slow adoption of 5G in the enterprise sector can be attributed to the absence of concrete use cases, but initiatives like 5G Industrial IoT and 5G Private Networks are actively progressing through pilot and 'proof of concept' phases. In the Indian telecom industry, optimism surrounds the potential of 5G FWA as a pioneering use case, providing an opportunity for an additional revenue stream. Both telecom players are making significant investments in FWA, considering the substantial untapped market with home broadband penetration at a mere 11% in India.

With service provider revenues from FWA worldwide projected to increase from USD 27 billion in 2022 to USD 67 billion by 2028, where will these revenues primarily originate from?

Developed markets like the USA are currently driving 5G FWA growth. Currently, the USA is leading in the growth of FWA subscribers. The drivers for this growth include – firstly, the need for broadband services in rural areas and; secondly, DSL and cable customers migrating to 5G FWA for a true broadband experience. APAC, particularly India and China, will drive 5G FWA adoption going forward. In addition, Europe, Latin America and Africa will see growth in 5G FWA subscribers. Consumers in areas unserved or poorly served with wired broadband are demanding broadband service more comparable with those offered to their urban peers, and these needs can be served by 5G FWA.

Would telcos be able to drive more revenues by increasing volumes in this segment, or would they

earn better through premiums for speed offered to specific customers?

There is a place for both volume-based and premium FWA services. The consumer segment is served by a volume-based approach. Higher volumes will drive down the cost of 5G FWA CPE and this will help in the accelerated adoption of 5G FWA-based home broadband services. Enterprises and various industry verticals that need low latency, mission-critical services as well as industrial IoT will be willing to pay a premium for reliable and ultra-broadband 5G FWA services.

What advantages and challenges are associated with being an indigenous player? Could you elaborate further on your India-made CPE gear?

We take immense pride in being the first home-grown company to design and introduce a 5G FWA CPE solution that is set to revolutionise fibre-like 5G connectivity and take it to the next level across Indian and global markets.

We have worked closely with our telco customers in India to understand the specific needs of the Indian market. India is a vast country and there are diverse deployment scenarios for the rollout of 5G FWA services. We have built a comprehensive portfolio of 5G FWA CPE to address the different deployment scenarios. 5G operates at a much higher frequency band and so there are challenges with 5G signals travelling indoors through walls and windows. Hence, many of the 5G deployments require an Outdoor FWA CPE which is mounted on a rooftop or the walls of a building. On the other hand, homes or enterprises which have good indoor signal coverage are best served by an Indoor FWA CPE as it can be self-installed by the customer and avoids the need to send a technician home. Our portfolio of FWA CPE products includes both Outdoor and Indoor FWA CPE. We have implemented features to ensure that a single Outdoor FWA CPE can serve multiple homes in a multi-dwelling unit in an urban area or multiple independent homes that are close by in a suburban or rural area. 🏡

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Krishna Rangasayee
CEO & Founder, SiMa.ai

“The edge market will likely surpass the cloud market in size”

*What makes Edge a much-needed alternative to Cloud and other models? Where does ML computing beat classic computing? Where does analogue computing outshine digital counterparts? Why are there applications in the physical world that cannot entirely rely on a cloud-based experience? And yet, why does the edge market move much slower than the cloud market? **Krishna Rangasayee**, CEO and Founder of SiMa.ai responds to all these questions in an interaction with **Pratima Harigunani**. The company has Indian roots and is exploring extensive applications in autonomous vehicles, UAVs, robotics, and Industry 4.0, leveraging Cloud and IoT technologies. Excerpts:*

What strides and challenges have been in the Edge computing space, especially embedded Edge?

Artificial Intelligence (AI) has undeniably dominated the computing landscape for the past decade or so, primarily driven by cloud-based solutions. However, the growing need for real-world applications has prompted a notable transition towards a hybrid structure, emphasising the importance of Edge computing. Three key factors fuel this shift.

Firstly, the criticality of throughput and latency cannot be overstated. Physical applications, such as automotive safety systems or robotics with human-machine interfaces, demand instantaneous decision-making, making Edge computing imperative to avoid the latency inherent in cloud-based processes. Secondly, the escalating complexity of AI and Machine Learning (ML) brings privacy and security concerns to the forefront. Lastly, cost considerations play a pivotal role. The expensive nature of cloud propositions, coupled with the impending integration of AI and ML into every device globally, propels a substantial portion of computing onto the Edge.

How potent is it as a future enterprise market?

I would estimate it to be at least 10-20%. The edge market moves at a much slower pace compared to the cloud market, with tens of thousands of customers versus a few giants. Therefore, achieving market adoption is akin to boiling the ocean. However, when considering the scale, this percentage represents a significant portion. In my opinion, one day, the edge market will likely surpass the cloud market in size. This journey lies

In the automotive realm, the shift towards embedded edge technology mirrors the evolution from horse-drawn carriages to the inception of automobiles.

With sectors like smart cities and healthcare demanding split-second decisions, the low-latency prowess of Edge computing is a total win.

ahead of us, and the next decade will drive considerable architectural innovation, with people developing purpose-built platforms for the edge. Up until now, the focus has primarily been on the cloud, accompanied by an AI and cloud narrative. However, we are witnessing the emergence of an AI and edge narrative, which I find particularly intriguing.

What's the potential for Edge servers and Edge processors, especially in the Indian industry?

In the Indian industry, the potential for Edge servers and processors is a game-changer. Think of them as the silent architects reshaping how we operate. With sectors like smart cities and healthcare demanding split-second decisions, the low-latency prowess of Edge computing is a total win. Secondly, privacy is of utmost importance, especially in finance and healthcare. Edge servers bring data processing closer, ensuring compliance and a reassuring sense of security. It's like having a personal guard for your data. With Edge processors, there is also a significant cut-down in the cost.

How easy or complex is embedded edge technology in the automotive space? Is it a competitive advantage or a common denominator now?

In the automotive realm, the shift towards embedded edge technology mirrors the evolution from horse-drawn carriages to the inception of automobiles. This transformation unfolds on two critical fronts: the propulsion shift from combustion to electric powertrains and the infusion of intelligence for advanced driver assistance and safety.

The journey towards Level 3 automation, where vehicles assume control without constant driver attention, necessitates substantial advancements in AI and ML. Traditional methods, marked by long development cycles, have left the industry somewhat stagnant. The demand for new Electronic Control Units or ECUs forced technology to age rapidly within a car's lifecycle, akin to outdated navigation systems compared to today's sleek smartphone interfaces. Striving for Level 3 automation, combining AI and ML for advanced functions with deterministic algorithms for safety, emerges as the next frontier.

Is that the reason why the company is so focused on the automotive sector?

SiMa.ai recognises the immense potential of the automotive sector, which represents a substantial portion of the over USD 30 billion semiconductor market annually and 40% of the embedded edge market. Despite the challenges, we strategically chose to focus on the automotive sector after establishing a solid foundation in ML architecture and software. Our focus is on reshaping its trajectory with purpose-built platforms and value propositions, fueled by our unwavering belief in the strength of our product offering.

What's the latest intriguing question or update concerning Generative AI that you find fascinating?

I believe the latest noteworthy trend in Generative AI revolves around its accelerated integration into edge use cases. This shift from cloud-centric to edge-centric generative AI signifies a significant transformation. OpenAI's recent decision to pause ChatGPT Plus sign-ups underscores the crucial role of edge computing, especially for mission-critical applications where real-time performance is essential.

Another fascinating development is the emergence of smaller models, leading to the proliferation of localised generative AI services. This evolution not only revolutionises technical workflows but also holds the promise of positive changes at the municipal level. Cities experimenting with generative AI for real-time transit updates, enhanced recommendations, and traffic management indicate a forthcoming paradigm shift by 2024.

Moreover, buyer priorities are experiencing a seismic shift, with a growing emphasis on software flexibility over brand loyalty. The era of one-size-fits-all chip design is waning, giving way to a demand for software that seamlessly enables AI in products or services at the edge. Industry 4.0 is breathing life into the new factory floor.

Why is adopting a one-size-fits-all approach not advisable for new Edge and ML applications,



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The automotive sector represents a substantial portion of the over USD 30 billion semiconductor market annually and 40% of the embedded edge market.

especially when a CIO considers the importance of IT homogeneity, cost-effectiveness, and maintenance issues?

Over the past 10-15 years, AI has undeniably been the major driving force behind computing trends. AI applications have been the primary driver of computational demand, predominantly residing in the cloud. However, there are applications in the physical world that cannot solely rely on cloud-based solutions.

Three factors hinder the complete adoption of cloud-based experiences, and I have observed these obstacles becoming more pronounced as the industry transitions towards a hybrid structure. While some applications will continue to thrive in the cloud, there's a growing opportunity and necessity for others to operate at the edge. In my opinion, three things drive this shift.

What are they?

One is throughput and latency. Not every physical application can afford the latency that comes with the cloud.

Second, privacy and security. I think we have, whether right or wrong, become very comfortable with storing all of our personal information on the cloud, and we assume that it is a great place to do that. But now, partly due to the popularity of ChatGPT, there is a heightened sensitivity to privacy and security, and people are asking, "Can I benefit from AI and ML without having to publicly share my information on the cloud? Can I do localised processing, where the creator of the data can do the compute and the analysis where the data resides, rather than transmitting it around?" This is true in medical, smart vision, retail applications, and more.

The third element is cost. Cloud is not a very cheap proposition; it is quite expensive for many customers. Consider the scale, where now, AI and ML are going to be embedded in every single device on the planet. Currently, at the edge, microprocessors and microcontrollers make up USD 40 billion in annual consumption. That's a huge number. And soon, 99% of that will transition from classic compute to ML.

What helped you achieve full characterisation and testing for production-grade releases in just five months?

Since founding SiMa.ai, I have experienced the most satisfying and exhilarating moments of my 30+ year career. Achieving full characterisation and testing for production-grade releases in a mere five months is a testament to strategic decision-making, resilient team dynamics, and unwavering commitment to innovation. This journey reinforces our dedication to pioneering innovations at the embedded edge.

How does ML computing compare to classic computing in power consumption, costs, resource usage, and space density?

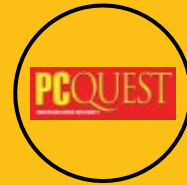
When comparing ML computing to classic computing, the critical metric is Frames Per Second per Watt (FPS/W), emphasising that a one-size-fits-all approach doesn't hold in this domain. ML computing, tailored to specific applications, excels in power consumption, cost efficiency, resource utilisation, and space density. Unlike classic computing, ML focuses on specialised hardware, optimising the FPS/W metric to deliver superior performance at reduced power costs. Traditional digital computing faces challenges in handling the diverse workloads of ML applications efficiently. ML-specific System-on-Chips or SoCs are designed to meet the unique demands of artificial intelligence, ensuring optimal FPS/W. This tailored approach results in cost-effective, high-performance solutions.

Can analogue computing find any specific use cases where it is better than digital computing?

Analogue computing, with its continuous and parallel processing capabilities, offers intriguing possibilities. In specific use cases where continuous data representation is advantageous, such as simulating physical systems or solving differential equations, analogue computing can outshine digital counterparts. Analogue's suitability lies in scenarios where the inherent parallelism and real-time processing capabilities align with the computational requirements, demonstrating a niche advantage over traditional digital computing. 🧠

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“IoT and AI are integral to the evolution of telecom services”

*In an era marked by rapid digital transformation, the telecommunications sector stands at the forefront of innovation, adapting to meet the evolving needs of businesses and consumers alike. As Senior Vice President of Engineering and Head of Consumer, Communications, and Media vertical at GlobalLogic India & APAC, **Vikram Puranik** plays a pivotal role in shaping the future of Communication Service Providers and Network Equipment Providers. With a focus on accelerating the digital journey of CSPs, he leads GlobalLogic in developing advanced telecom solutions leveraging technologies such as 5G, IoT, and AI/ML. In an interaction with **Shubhendu Parth**, he delves into key topics including the role of AI in transitioning to software-optimised networks, India’s focus on modernising OSS and BSS, harnessing Open RAN, and the crucial role of cloud technology in bridging the digital divide. Excerpts:*

GlobalLogic seems to have its fingers in many pies. Could you highlight the key areas the company is currently focusing on?

Our focus spans across various domains. Primarily, we excel in digital transformation, encompassing elements like designing seamless customer experiences, intricate engineering solutions, data analytics, and personalisation strategies. Our expertise extends to collaborating with telecom technology firms and telecommunications companies, catering to a significant portion of the telecom market. We also have robust partnerships with leading telecom operators worldwide, with some of them ranking among our top clients. Additionally, the communications and media sector represents a substantial portion of our revenue stream.

As we evolved, we particularly thrived in our collaborations with software product companies. We have leveraged our prowess in product engineering and agile development to bring innovative solutions to the telecom and tech sectors. For instance, we delve into topics like Gen AI and telecom, focusing on open standards such as Open API to address legacy technology challenges prevalent in the telecom industry.

Could you elaborate on the solutions GlobalLogic provides to telecom tech companies and telecom players?

We are pioneers in digital product engineering services, offering accelerators to expedite product roadmaps for telecom tech firms. Our solutions revolve around two main pillars, the modernisation of Business Support Systems (BSS) and Operations Support Systems (OSS) and digital customer experience.

We specialise in revamping BSS and OSS for telecom tech firms, facilitating their transition to cloud-native architectures. This involves cloud enablement and modernisation of legacy systems to meet the demands of a digital-native landscape. We also deliver seamless omnichannel experiences, spanning mobile apps, websites, chatbots, and social media interactions. By incorporating Gen AI capabilities, we empower telecom players to enhance customer support through automation and self-service options, revolutionising traditional customer service models.

Moreover, we offer tailored solutions to telecom operators, ranging from subscriber migration facilitation during mergers and acquisitions to the development of mobile apps and websites for enhanced customer engagement. Additionally, we assist in monetising investments in 5G infrastructure, catering to both consumer and enterprise segments through innovative use cases like private 5G networks for airports and factories.

Do you also collaborate with enterprises in deploying private 5G infrastructure and associated applications?

Yes, indeed. Our involvement in private 5G initiatives encompasses two aspects. Firstly, we collaborate with telecom operators to set up private 5G networks for enterprises, ensuring seamless integration and configuration. Secondly, we specialise in developing enterprise-specific use cases and applications to maximise the utility of private 5G infrastructure. This includes deploying applications for various industries

such as airports, manufacturing facilities, and automotive sectors, aimed at enhancing safety, efficiency, and customer experiences.

Given your expertise in both OTT and telecom sectors, how do you address the convergence of revenue streams between them?

We bridge the gap between communication and media industries by offering comprehensive solutions tailored to their needs. On the media front, we focus on enhancing user experiences across OTT platforms through front-end development and back-end support, including content management systems and monetisation strategies. Leveraging our expertise in telecom and OTT technologies, we collaborate with leading media tech companies to provide end-to-end solutions, encompassing video transcoding, content management, and digital rights management.

Additionally, we assist telecom operators in ensuring the quality of their video platforms through rigorous testing and automation processes, thereby enhancing the overall customer experience. As the industry evolves, we continue to innovate and adapt to emerging trends, facilitating seamless integration and monetisation opportunities across communication and media domains.

Going ahead, which advancements do you foresee impacting the communication, connectivity, and networking realms, as well as the OTT sector?

There are several transformative technologies poised to reshape the landscape. Advancements in next-generation fibre optic technologies, such as Hollow Core Fibre, are aimed at optimising existing communication infrastructure. By refining the efficiency of data transmission through these fibres, we aim to enhance network capabilities. Next, small and medium-sized operators in Europe and APAC are driving the adoption of Open Radio Access Network (ORAN) solutions, coupled with cloud-enabled 5G core architectures. This facilitates the transition from hardware-centric to software-defined networks, enabling greater agility and scalability.

We can also expect Gen AI to transform contact centres and customer touch points. The evolution from traditional call centres to automated chatbot-driven interactions powered by Gen AI technologies is poised to revolutionise customer service experiences, offering enhanced efficiency and personalisation. The integration of 5G and IoT technologies, particularly in enterprise

settings, presents another big opportunity for advanced applications such as Advanced Driver Assistance Systems (ADAS), telematics, and computer vision. These use cases span industries like transportation, manufacturing, and logistics, offering improved operational efficiencies and safety measures.

Last but not least, by leveraging AI and machine learning algorithms, networks are becoming increasingly autonomous and adaptive. This enables dynamic reconfiguration and optimisation based on real-time data, enhancing network performance and reliability.

And how do you envision these advancements evolving in 2024?

In 2024, we anticipate further maturation and adoption of these technologies, particularly in terms of autonomy and intelligence. The evolution of ETSI standards, such as Level 4 autonomy in network architectures, will lead to reduced human intervention and greater AI-driven decision-making. For example, AI systems will autonomously reconfigure network infrastructure in response to events like natural disasters or equipment failures, ensuring uninterrupted service delivery.

Similarly, AI-driven transformations in customer service will continue to evolve, offering more personalised and efficient support experiences. This includes advanced chatbot interactions, predictive issue resolution, and proactive service optimisation. Also, telcos will need to restructure their organisations to effectively cater to enterprise clients. This involves establishing specialised tiers focused on consulting, functional enablement, and product customisation. Companies like GlobalLogic will play a pivotal role in facilitating this transition by offering functional enablement services.

Overall, 2024 will witness a deeper integration of AI and advanced technologies across communication, connectivity, and networking domains, leading to more intelligent and adaptive systems.

Given the ongoing deployment of 5G infrastructure and the pivot of telcos towards enterprise services, how do you perceive the role of IoT and AI in this landscape?

IoT and AI are integral to the evolution of telecom services, particularly in enabling value-added offerings for enterprises. Traditionally, telcos provided connectivity services, but now they are expanding

AI and ML are making networks increasingly autonomous and adaptive, enabling dynamic reconfiguration and optimisation using real-time data.

their role to offer end-to-end solutions. This entails not only providing platforms and connectivity but also partnering with businesses to develop customised IoT solutions. GlobalLogic plays a crucial role in this ecosystem by facilitating device certification, building customised software, and enabling end-to-end IoT solutions. As telcos transition towards offering comprehensive IoT solutions, we collaborate closely with them to ensure seamless integration and delivery of value-added services.

Could you elaborate on how telcos are transitioning from providing connectivity to offering end-to-end IoT solutions, and how GlobalLogic contributes to this shift?

Telcos are shifting from merely providing connectivity to co-building end-to-end IoT solutions with businesses. This involves collaborating with companies like GlobalLogic to develop IoT platforms, APIs, and embedded OEM code for device certification. Our role extends to customising software, analysing data insights, and co-building industry-specific IoT solutions. By partnering closely with telcos, we enable them to offer comprehensive IoT solutions that go beyond connectivity, thus enhancing their value proposition to businesses.

Are there any specific industries or use cases where you foresee significant IoT deployments in the future?

Indeed. One notable area is the deployment of IoT solutions in smart factories. Telcos are collaborating with manufacturing companies to enable 5G-powered IoT infrastructure, facilitating automation and optimisation of factory operations. Additionally, industries such as transportation, logistics, and utilities are also ripe for IoT deployments, offering opportunities for enhanced efficiency, safety, and cost savings.

Are there any ongoing initiatives or collaborations in India regarding IoT and 5G deployments?

Currently, our focus is primarily on initiatives in North America and Japan. However, as the IoT and 5G landscape evolves in India, we remain open to exploring potential collaborations and partnerships in the region.

With India's recent foray into satellite-based communication through the open space policy, does GlobalLogic have a role to play in this domain?

While satellite-based communication holds immense potential, particularly in addressing connectivity challenges in remote areas, our focus primarily lies in collaborating with telcos to enable ground-based infrastructure and services. Companies like SpaceX's Starlink may provide downlink solutions, but the actual services are likely to be provided by established telecom operators like Airtel and Jio. However, we continue to monitor developments in satellite communication and explore potential opportunities for collaboration in related technologies.

Given the importance of network infrastructure in enabling 5G deployment, could you shed some light on GlobalLogic's involvement in this area?

As telcos transition to 5G, the need for robust network infrastructure becomes paramount. GlobalLogic is actively involved in developing protocols and software solutions for various network components, including fronthaul, middlehaul, and backhaul. We work closely with telcos and technology partners to ensure the seamless integration and optimisation of these components, thereby enabling the efficient and scalable deployment of 5G networks. Our focus is on enabling multiple protocols and architectures to support the diverse requirements of 5G networks and ensure their reliability and performance.

What about your approach to product development and service offerings?

At GlobalLogic, our focus is on delivering value to our customers through service accelerators and technology horizontals. Rather than competing with our customers' software products, we provide them with specialised services and solutions to expedite their product roadmaps and enhance productivity. Our service accelerators encompass areas such as cloud enablement, advanced data analytics, omnichannel user experience, and large-scale test automation. By working at a horizontal level, we aim to increase predictability and scalability while delivering quality outcomes for our customers. 🌟

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The dark, murky rise of UPI scams

India's contactless payments mechanism is fast becoming a hotbed for scammers exploiting new users, fear, and intimidation.



BY VERNIKA AWAL

On Friday, 2 February 2024, global Fintech platform Lyra started accepting payments in Indian Rupee at the iconic Eiffel Tower in Paris. The launch, which was scheduled for months now and was coordinated by the public-sector entity NPCI International Payments Limited, the global proliferation arm of the National Payments Corporation of India (NPCI) itself, was a grand success. It created

plenty of spectacle, marked as a landmark technology moment for India.

This is important, since until now, India has been a user and applications developer of underlying fundamental technologies that the West develops. With UPI, India is now at the forefront of contactless payments and the offering of Digital Public Infrastructure (DPI).



“The digital economy runs on digital identities, and fraudsters are banking on that. Out in the ether, anyone can be anybody.”

Ranjan R Reddy

Founder & Chief Executive Officer, Bureau



“RBI has mandated both banks and merchants to establish a fraud monitoring framework, including preventive and detective measures.”

Dnyanesh Pandit

Managing Director, Protiviti Member Firm for India

However, behind the glorious rise of UPI and India's cashless economy, an equivalent rise has also taken place in the dark, murky industry of scams centred around UPI itself. To be sure, while UPI itself is not to be blamed, the growth of UPI scams is undeniable, for it today contributes to a massive chunk of cybercrime volume affecting users all across India.

WHY DO SCAMMERS LOVE UPI?

The sheer volume of scams affecting UPI users across India is based on the stunning volume and value of UPI transactions in India. Official data from NPCI itself, as of 31 December 2023, shows that the total volume of UPI transactions has crossed 12 billion per month. The value of these transactions was a whopping Rs 18.2 lakh crore, or nearly USD 220 billion in just December 2023 itself.

This figure has also seen a staggering year-on-year (YoY) growth. The volume of transactions rose by 53.5% over December 2022's 7.83 billion monthly transactions on UPI. The value of UPI transactions also grew 42.2% since December 2022's Rs 12.8 lakh crore or USD 154.5 billion for that month.

It is this that scammers are targeting. Cybersecurity experts in India say that even if scammers can capture 1% of the overall UPI transaction value every year, the total value of cybercrimes through UPI will be at least USD 1.8 billion, or at least Rs 15,000 crore. This, to be sure, is the lower end of estimates, and the actual value of money that Indians are losing to UPI scams is far, far higher.

According to the data released by the Ministry of Finance in May last year, more than 95,000 cases of UPI scams were recorded by the end of March 2023. A report

by the IIT Kanpur's Future Crime Research Foundation in September last year said that between January 2020 and March 2023, there were approximately 23,000 cybercrimes every day. Out of this, nearly 77% were financial scams and crimes, and a whopping 47% involved UPI scams.

A May 2023 report by private digital identity startup Bureau had even higher estimates, pegging 55% of all financial cybercrimes to be linked with UPI scams.

HOW DOES A UPI SCAM HAPPEN?

While the modus operandi may vary, the overall format of a UPI scam takes advantage of a user's emotional vulnerability and technological awareness at the core. Scammers cash in with blanket strategies, such as luring users under the premises of lottery wins, bank account suspensions, and other such strategies. Then, they use a range of tactics that include intimidation, coaxing by using identity data from stolen databases to offer fraudulent authenticity for gaining trust, and finally, attempting to strike fear by threatening actions such as complete freezing of bank accounts and visiting residences for failing to comply with instructions.

In most cases, users are often asked to make small-ticket payments under the pretence of 'verification'. In most cases, scammers promptly refund such small amounts to gain trust. Once they have gained a user's trust, they subsequently send requests for bulk UPI payments from users. In other cases, they also show QR codes to users, urging them to enter their security PINs when prompted to verify their identities. These QRs are prepared with bulk money requests—thereby duping users of their hard-earned money.

From January 2020 till March 2023, there were nearly 23,000 cybercrimes every day; 77% of these were financial scams and crimes of which 47% involved UPI scams.



IN BRIEF

- **UPI's dominance:** UPI's staggering growth with 12 billion monthly transactions, worth USD 220 billion, makes it a prime target for scammers.
- **Rising UPI scams:** UPI scams contribute significantly to India's cybercrime volume, with an estimated value exceeding USD 1.8 billion annually.
- **Scam tactics:** Scammers exploit emotional vulnerability and tech awareness, using strategies like lottery wins, fake threats, and QR code manipulation.
- **Cybersecurity concerns:** Experts highlight reasons behind UPI scam proliferation, including AI tools, weak KYC processes, and challenges in verifying identities.
- **User vigilance:** While authenticating payment requests, users must avoid suspicious links, monitor transactions, and be cautious in sharing sensitive information.

Even if scammers capture 1% of the overall UPI transaction value each year, the total value of UPI scams will be at least USD 1.8 billion or Rs 15,000 crore.

WHAT DO CYBERSECURITY EXPERTS SAY?

In a press note issued on 3 October, global cybersecurity firm Palo Alto Networks noted that in less than six years before April 2023, over 20,000 such QR scam cases were registered with the Bengaluru city police. This would only be a fraction of the actual number of such cases since public statistics suggest that over 80% of such cases go unreported due to users fearing further consequences, shame and societal embarrassment.

Vicky Ray, Director, Cyber Consulting and Threat Intelligence at Palo Alto Networks, said at the time, "With QR codes now deeply integrated into our daily lives, related scams have surged in prominence. Cybercriminals exploit this by surreptitiously replacing QR codes in establishments such as bars, restaurants, lounges, shops, and clubs. This can result in unauthorised UPI payments and potential financial harm. Incidents of scanner replacement fraud are on the rise, and the threat may escalate in the future. Vigilance is paramount for both individuals and merchants. Regularly inspecting their QR code scanners and implementing essential precautions is crucial to thwarting these fraudulent activities."

Vitaly Kamluk, head of research for Asia-Pacific at Russian cybersecurity firm Kaspersky's Global Research and Analysis Team, GREAT, also concurred on growing concerns around UPI scams in a press note from January 2023.

The FCRF whitepaper on cyber scams listed several reasons behind the proliferation of these attacks, which include the proliferation of AI tools and easily accessible knowhow of such scams, targeting of unemployed or under-employed youth by crime syndicates in satellite towns near urban hubs, inadequate Know Your Customer (KYC) verification processes, availability of fake SIMs and leaked databases in unofficial marketplaces, and easily accessible Virtual Private Networks or VPNs, to mask attacker identities.

Other factors, which many cybersecurity experts also agree with, include a saturated workforce in police



“Regularly inspecting their QR code scanners and implementing essential precautions is crucial to thwarting these fraudulent activities.”

Vicky Ray

Director, Cyber Consulting and Threat Intelligence, Palo Alto Networks

teams in India, which prioritise other crimes before cyber frauds, and are also often not adequately trained to handle cybercrimes rising out of non-metropolitan towns.

A large part of these scams are linked with the inability to verify or authenticate identities on platforms across the internet, said Ranjan R Reddy, Chief Executive Officer of Bureau, in the company’s May 2023 ‘Anatomy of a Fraud’ report mentioned earlier in this story.

“The digital economy runs on digital identities, and fraudsters are banking on that. Out in the ether, anyone can be anybody. Identity is the critical question that Chief Risk Officers, CTOs, CIOs, CISOs, and their teams in businesses around the world ask every day. Not being able to discern which digital identities are trustworthy is the inflexion point between growth and failure. All it takes is for one bad actor to launch a successful digital fraud incursion for businesses to also lose consumer trust, brand equity, and revenue,” he said.

WHAT CAN USERS DO?

Through all of this, the greatest challenge behind UPI scams lies in the fact that they are not direct forms of cyber breaches, but are done by scammers convincing users to make a fraudulent transaction. As a result, it is difficult for any law agency to track and trace attackers, since they are also very good at hiding the trace of the money being stolen by them.

However, everything is not bleak. Dnyanesh Pandit, Managing Director of consulting firm Protiviti’s member firm for India, said that there are several steps that users can take to ensure their safety.

“These include checking the authorisation of a person seeking sensitive information, avoiding accessing links shared via spam-like emails or SMS messages, confirming the identity of requestor or payer on apps before making a payment, being aware of warning and alerts sent by third-party apps or regulators, avoiding installing and using

apps from malicious sources, following recommended security and KYC practices that include the change of PINs and passwords regularly, monitoring the transaction history in their UPI accounts after every transaction, and avoiding using public or unsecured networks that can be easily accessed by hackers,” Pandit said.

He emphasised that the Reserve Bank of India has implemented a comprehensive framework to regulate entities participating in UPI transactions. These entities include Payer PSP, Payee PSP, Remitter Bank, Beneficiary Bank, NPCI Bank Account holders, and Merchants. “Both banks and merchants are required to establish a fraud monitoring framework, including preventive and detective measures,” he said.

The potential scale of UPI scams is, at the end of the day, endless. Overall industry estimates state that there could be nearly 12,000 such scams happening across the country each day, with most of them bearing an average value of under Rs 10,000. Even at such averages, we are looking at thousands of crores being lost to UPI scams every year. Since they are not data breaches per se, no amount of policy measures or intervention from the Indian Cyber Emergency Response Team, CERT-In, can help in this regard.

The only resolution, therefore, is to spread user awareness and education, urging them to verify identities before making payments. Each of the top three UPI apps—Google Pay, Paytm and PhonePe—prompts users to be doubly sure in case any unusual payment times and patterns are detected.

The ball, therefore, lies in users’ courts. After all, if the growing reputation of scams around UPI isn’t checked, India’s global DPI dreams could very well see a dent that is not even the direct architectural fault of the payment technology itself. 🙄

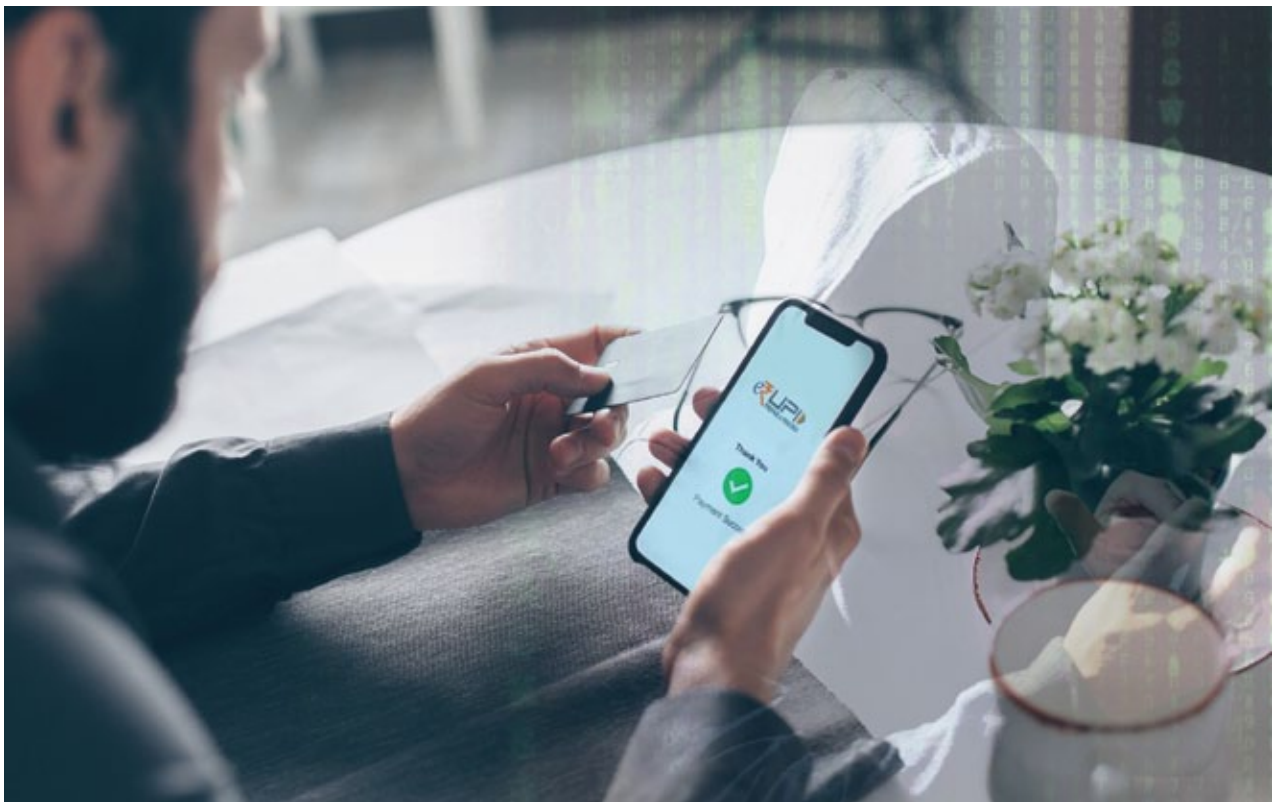
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THE UNDERBELLY OF DIGITAL FINANCIAL TRANSACTIONS

India's surge in mobile payments has also led to a rise in UPI scams, necessitating increased vigilance and proactive preventive measures



BY VAIBHAV KOULL



The extent of monetary loss due to Unified Payments Interface (UPI) scams in India is quite alarming, though it is challenging to capture the total figure accurately. A striking example of this is an incident in Mumbai in 2023, where a sophisticated KYC scam led to the loss of about Rs 1 crore from 81 individuals. This scam involved fraudsters mistakenly transferring money to victims'

accounts and then persuading them to return it, only to hack into their bank accounts upon the return of the funds. This case is just one among many, showcasing the severity of such scams.

Furthermore, a report by the Union Finance Ministry indicates the breadth of this issue, with over 95,000 cases of UPI transaction fraud recorded between 2022

Criminals are increasingly leveraging AI technologies to create synthetic content, including deepfakes like audio, images, and videos to deceive victims.

QR code scams are on the rise and users are often deceived into scanning QR codes that lead to unauthorised transactions from their accounts.

and 2023 alone. This number, while not reflecting the total financial loss, gives us an idea of the frequency and potential scale of UPI-related frauds.

These figures underscore the critical need for users to remain vigilant and informed about the risks associated with digital transactions. It is a stark reminder of the importance of cybersecurity measures and awareness in our increasingly digital financial environment.

THE MANY SHADES OF UPI SCAMS

There are several common types of scams associated with UPI. Firstly, we have phishing scams where scammers impersonate banks or UPI service providers through fake emails or messages. Their goal is to trick individuals into revealing their PINs and login details. Then there's vishing, which is similar to phishing, but it happens over phone calls. Here, the scammers pretend to be bank officials or UPI representatives to extract personal information.

Another prevalent scam is related to remote access. In this case, fraudsters convince people to download certain remote access applications. This allows the scammer to take control of the victim's device and access their UPI-linked accounts. There are also instances of fake UPI apps. These are counterfeit applications designed to look like legitimate ones. Unwitting users might download them and end up providing their transactional information to scammers.

QR code scams are also on the rise. Users are often deceived into scanning QR codes that lead to unauthorised transactions from their accounts. Another variant is the request money scam, where fraudsters send UPI collect requests and dupe users into approving them, leading to unauthorised debits from their accounts.

Additionally, SIM card swapping is a serious concern. In this fraud, criminals obtain a victim's SIM card linked to their UPI-enabled mobile application. They can then receive OTPs and other verification codes meant for the victim, allowing them to access the victim's UPI-linked bank account and carry out fraudulent transactions.

To counter SIM card swapping, users must report lost or stolen SIM cards immediately to their mobile service providers. Also, implementing Two-factor Authentication on sensitive accounts can offer an additional security layer.

Finally, there's the issue of app permissions abuse. Some fraudulent activities involve malicious apps that gain unauthorised access to a user's device permissions. These apps often request excessive permissions, like access to SMS, contacts, or location data, and exploit this information for fraudulent transactions or to steal sensitive data. Users should be vigilant about the permissions they grant to apps, avoiding those that request unwarranted access to personal information.

Further, payment fraud through the use of AI will become sophisticated and will be a growing concern. Criminals are increasingly leveraging AI technologies, like generative AI, to create synthetic content. This includes advanced deepfakes encompassing audio, images, and videos that are so refined they can be almost indistinguishable from real content. These deepfakes can be used to deceive individuals and businesses, create bogus accounts, and execute complex social engineering scams. When it comes to UPI scams, it is a game of wits, not just technology. Our biggest shield is not just the code in the app, but the awareness in our minds.

TECH FLAW OR USER BEHAVIOUR?

It would be right to say that the majority of UPI scams happen more due to user errors rather than any fundamental flaws in the UPI system itself. The payments interface itself is designed by incorporating numerous security layers to safeguard transactions. However, the primary vulnerability lies not in the technology but in user awareness and behaviour.

Scammers are adept at exploiting human psychology, leveraging a lack of awareness to manipulate users into revealing sensitive information or taking risky actions. These fraudulent activities often leverage on social engineering tactics, where the focus is on deceiving the person rather than breaking through the technological

SIM card swapping enables criminals to receive OTPs and other verification codes, allowing them to access the victim's UPI-linked bank account.

defences of the UPI platform. So, the issue is less about technical shortcomings and more about educating and alerting users to these deceptive strategies. In the digital world of UPI transactions, the line of defense is often not just coded by developers, but also crafted by informed users.

OPTIONS TO DEAL WITH IT?

Users can significantly reduce the risk of falling victim to UPI scams by taking several proactive steps. First and foremost, it is crucial to use trusted apps. Only download UPI-enabled applications from official app stores and ensure they are from reputable sources. Enabling Two-Factor Authentication (2FA) on all your UPI-linked accounts is another vital step, as it adds an extra layer of security.

It is also important to be cautious with unsolicited communication. Never share personal information, OTPs, or any sensitive data with anyone who contacts you out of the blue, even if they claim to be from a bank or a UPI service. When dealing with QR codes, verify their legitimacy to ensure they have not been tampered with.

Keeping your software updated is essential. Regularly update your mobile device's operating system and applications to patch any security vulnerabilities. Education is your best defence; stay informed about the latest UPI frauds and scams to recognise and avoid them.

Never share your PINs, passwords, or bank account details with anyone. Be particularly wary of unexpected UPI requests, especially if they ask for money or personal information. Always verify the identity of the sender or the organisation before responding to any monetary requests.

Avoid downloading remote access apps, especially if suggested by strangers or unverified sources. Keep your UPI and banking apps updated to access the latest security features. Monitoring your transaction history and bank statements regularly is key to detecting any unauthorised activity.

Lastly, awareness and education are paramount. Keep yourself and your family members, especially those who are less tech-savvy, informed about the latest scam types. This knowledge is a powerful tool in preventing such scams."

These strategies collectively form a robust defence against the evolving threats in the digital payment landscape.

In the unfortunate event that someone becomes a victim of UPI fraud, the immediate course of action is crucial. The first step should always be to contact the UPI service provider, be it GPay, PhonePe, Paytm, or any other, and inform them about the fraudulent transaction as soon as possible. It is important to flag the transaction and request a refund through the service provider's support channels.

If you find that the UPI service provider is not responding adequately, your next step should be to approach the National Payments Corporation of India (NPCI). You can file a complaint on their portal at npci.org.in, utilising their UPI Dispute Redressal Mechanism.

Additionally, it is advisable to file a complaint with the Payment Service Provider (PSP) bank as well as the bank where you have your account. These institutions can also take measures to address the fraud. It is also important to extend the complaint beyond just the financial institutions. Filing a complaint on the Cybercrime portal and at a cyber police station is a critical step. You can also register a complaint on the National Cyber Crime Reporting portal.

Taking these steps not only helps in addressing the immediate issue but also aids in the larger fight against cyber fraud, contributing to a safer digital transaction environment for everyone. Quick action is crucial—report, respond, and recover. It is a chord that can help mitigate the damage. 🙌

*The author is Managing Director at Protiviti Member Firm for India.
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Regulatory indecision hampering mobile gaming ad revenue?

A sizeable portion of online mobile gaming’s advertising revenue hinges on the Government of India’s ability to make a regulatory decision for the sector



BY VERNIKA AWAL

In early 2023, the Ministry of Electronics and Information Technology (MeitY) decided to crack down on India’s nascent online gaming industry. While we say nascent, that is not to be mistaken for small—the largest online gaming firm today is almost as large as a midcap enterprise. However,

irrespective of size, a large chunk of the country’s largest revenue-generating sub-division of the gaming industry has, for nearly a year now, been stuck in the middle of a regulatory indecision that could, potentially, hurt the advertising potential that this sector could realise.



“The government has found no suitable applicants for self-regulatory bodies for gaming and is considering whether it should take matters into its own hands.”

Rajeev Chandrasekhar
Union Minister of State for IT

REFERENCE TO CONTEXT

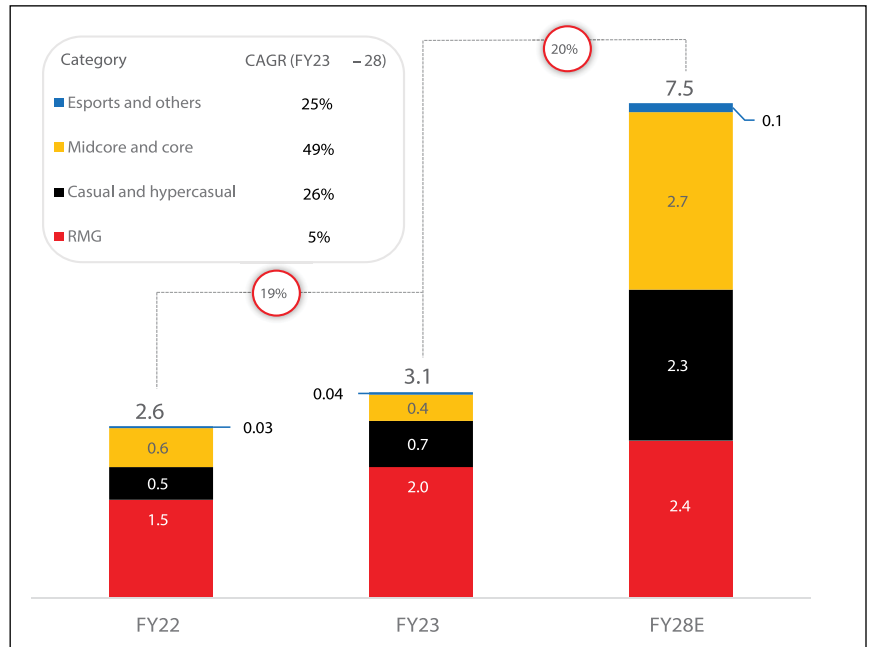
On 6 April 2023, MeitY amended the existing Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021—bringing online gaming under its ambit. This particular version of online gaming is defined as a sub-segment of the overall gaming industry that includes the ever-contentious titles such as rummy, fantasy sports and other casual games that include financial transactions.

Online gaming, in this definition, has been contentious in India for more than a year now; multiple courts, including landmark high court judgements, have debated and ruled on whether rummy and fantasy sports could be reasonably classified as games of 'skill'. A large faction of regulators have held the belief that they qualify more as games of 'chance', and must therefore be clubbed under the same bracket as betting and gambling, and regulated on the same note as well.

The industry, meanwhile, has claimed that a player needs to possess specific skills to play and win a hand of rummy, or top the charts and win money in a fantasy league—hence, these titles are nothing like betting or gambling.

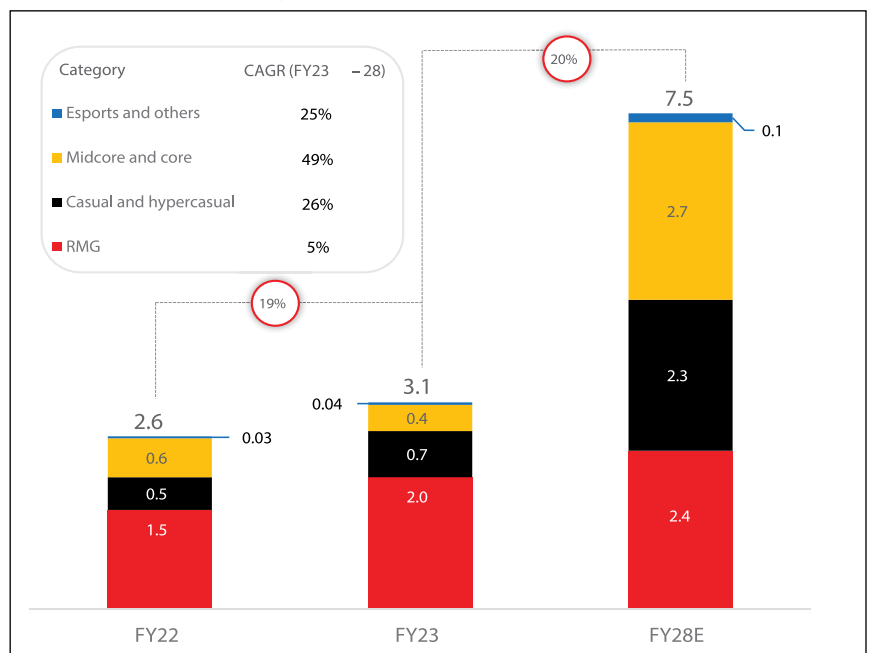
MeitY, meanwhile, ruled that all of these games and gaming companies are, at the very least, intermediaries. This essentially means that these firms offer platforms, akin to how Meta offers Instagram as a mobile-first social media platform. Amid much ado and a Supreme Court hearing that now promises to

Gaming market size in India: Growth by category (in USD Bn)



Source: Lumikai Analysis based on third-party analytics data providers, secondary research, Lumikai proprietary data, primary survey, and expert interviews.

Gaming market size in India: Growth by revenue stream (in USD Bn)



Source: Lumikai Analysis based on third-party analytics data providers, secondary research, Lumikai proprietary data, primary survey, and expert interviews.

*Others' include virtual gifting/tipping, subscriptions, and game pass purchases.



IN BRIEF

- **Regulatory limbo:** MeitY's indecision affects India's online gaming industry, caught in a year-long debate over 'skill' vs. 'chance' games.
- **Intermediary status:** MeitY deems gaming companies as intermediaries, urging them to propose self-regulatory bodies for oversight.
- **SRB struggle:** The government's call for SRBs sees no suitable applicants after eight months, raising questions about regulatory clarity.
- **Advertising restrictions:** The Ministry of Information & Broadcasting restricts ads from online gaming firms, emphasising the need for 'permissible' games.
- **Revenue impact:** Lumikai's report projects a 20% CAGR, reaching USD 7.5 billion by 2028, with online gaming contributing 65% of the sector's revenue in FY 2023.
- **Ad revenue growth:** Despite challenges, gaming ad revenue is expected to triple to USD 1.7 billion by FY 2028, posing a significant industry concern.

Between FY 2019 and FY 2023, the average revenue per user of the overall gaming market rose 10x to nearly Rs 1,600.

be a major potboiler slated for a precedent-setting hearing that is to commence on 2 April this year, MeitY recommended that the online gaming industry submit proposals for setting up self-regulatory bodies (SRBs).

These bodies, to be sure, were to be appointed by MeitY itself, and were to act as nodal enforcement bodies that would judge if a game could be permitted to operate or not. Multiple factors, including that of money laundering, were to be taken into effect. Most importantly, though, SRBs were to issue verdicts on whether a game is a game or a betting platform in disguise.

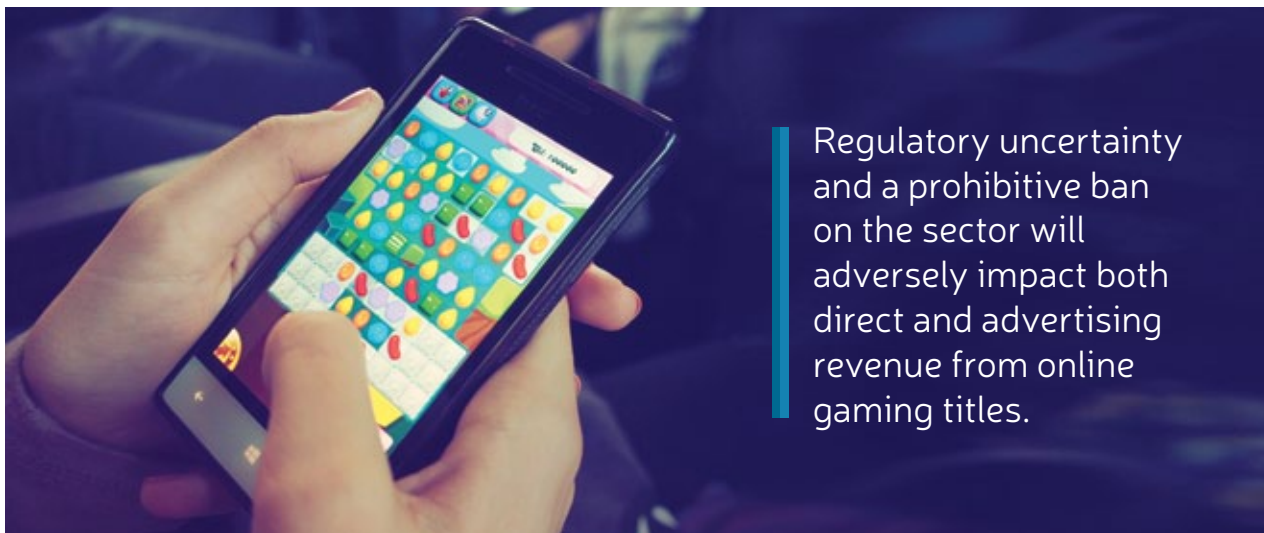
However, in January, Union Minister of State for IT, Rajeev Chandrasekhar, told a business newspaper that after nearly eight months, the government found no suitable applicants for SRBs, and is now considering whether it should take matters into its own hands.

WHY THE LONG CONTEXT?

The long-shot aftermath of all of this, potentially, can have a significant impact on advertising revenue in the gaming sector. On 25 August 2023, the Ministry of Information & Broadcasting (I&B) issued a notice to all traditional and social media platforms, warning them of "appropriate actions under various statutes" if they allowed direct or surrogate advertising by online gaming firms to be broadcast on them.

The I&B ministry's key concern was that allowing such ads would let gambling and betting platforms advertise their services. It is because of this that the ministry

While revenues from advertisement contributed USD 600 million in FY 2023, it is projected to nearly triple to USD 1.7 billion by FY 2028.



Regulatory uncertainty and a prohibitive ban on the sector will adversely impact both direct and advertising revenue from online gaming titles.

underlined that only “permissible” online real-money games were to be allowed to advertise.

While this move, on paper, kept it legal for online gaming entities in India to advertise, the challenge lay in this one word, “permissible”. In the absence of SRBs, who is to judge what is permissible, and what isn’t?

THE IMPACT OF IT ALL

A report published by gaming-first venture capital fund, Lumikai, on 31 October 2023 said that India’s gaming market was set to grow at a compound annual growth rate (CAGR) of 20%, to reach a revenue of USD 7.5 billion by FY 2028. More importantly, the report said that in four years between FY 2019 and FY 2023, the average revenue per user of the overall gaming market rose 10x to nearly Rs 1,600.

What’s intriguing to note here is the role of online gaming in driving this growth. Lumikai’s report indicates that in FY 2023, online gaming as defined so far in India accounted for nearly 65% of the entire gaming sector’s revenue. This makes for US 2 billion in revenue. However, in the next five financial years up to FY 2028, it is advertising that would rule the revenue growth roster—while ad money contributed USD 600 million in revenue in FY 2023, it is projected to nearly triple to USD 1.7 billion by FY 2028.

While this ad revenue is expected cumulatively from all forms of gaming, it is safe to say that, with online gaming’s proliferation, this sub-segment would have a massive impact on how this ad revenue growth takes place.

A senior executive at a top online gaming firm, on condition of anonymity due to the pending Supreme Court hearing, said that this is a key concern. “Many significant marketing campaigns remain under concern for us since we do not want to spend heavily on producing them, and later be banned from running them. The SRB appointments could have cleared the air on this, but until then, we’ve only got unpredictability to contend with,” he said.

Executives from two other firms, which are also a part of the upcoming Supreme Court hearing, agreed to this. “Ads are crucial to maintain a healthy balance in any industry. It also supports tertiary aspects of an industry and expedites the overall growth of a particular industry. Right now, with no clarity on regulations, we are not sure how the sector is to be regulated,” one of the executives said.

The three of them estimate that if the regulatory uncertainty is not fixed by this year itself, and a prohibitive ban is put on the sector, both direct and advertising revenue from online gaming titles will be adversely impacted. While a ban may not be on the cards, the government has not been in favour of the sector so far. All eyes, therefore, would be on the Supreme Court, and the judgement it gives concerning how online games are to be considered would be crucial in laying a precedent for ads from this sector.

Eventually, this could make a billion-dollar difference, within as little as the next three years. 🍀

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Telecom, technology downturn hits IT service providers

India's USD 245-billion IT services sector is staring at its weakest financial years, and a downturn in spending among telecom and tech clients is not helping



BY VERNIKA AWAL

The second week of January this year confirmed a bit of unwelcome news for India's mammoth Information Technology (IT) services industry. As weak macroeconomic sentiments persisted, the bellwether indicator of technology spending in India was heading for one of its weakest financial years in recent history. Even as Tata Consultancy Services (TCS) and Infosys look at a flat

FY24, and Wipro heads for a considerable decline, HCL Technologies remains the only company that could post any meaningful growth for the year.

Data collated by Voice&Data for this report shows that technology and telecommunications remain a sore point for IT service providers. These two verticals, while not being the top serving vertical for any of the top four

The December quarter reflected a considerable slowdown in tech and telecom verticals for all three out of the top four of India's IT services.

This slowdown also reflects the global slump in telecommunications innovation spending, as well as tech spending among clients around the world.

The Scorecard

	Revenue Contribution of Telecom Sector (in %)	YoY change (in %)	Revenue Contribution of Tech Sector (in %)	YoY change (in %)
TCS	6.7	-4.9	8.4	-5
Infosys	11.4	-8	7.7	-5.1
HCLTech	9.7	8.3	12.8	-9.2
Wipro	4	-19.2	12.1	1

Note: All year-on-year (YoY) figures in constant currency
Source: Quarterly reports

IT services firms, are still significant—taken together for India’s top four IT services firms, they generate at least 15.1% of TCS’ quarterly revenue as of Q3FY24, and as much as 22.5% of HCL Tech’s quarterly revenue for the period. This, in turn, makes them key indicators of the health of the market, since tech and telecom are also big on discretionary deals.

THE STATE OF THE MARKET

Discretionary deals are super important for the IT services industry since they are the lifeline of the service providers doing well. In a healthy market, discretionary deals are available aplenty. They offer large margins of profitability for the service providers, which in turn helps the overall industry thrive.

The reason why these sectors are often seen as being heavier on discretionary deals and low on core cost optimisation deals is because services in these areas are largely to upgrade to newer infrastructure, or adopt a nascent area of technology. As a result of this, the December quarter reflected a considerable slowdown in tech and telecom verticals for all three out of the top four of India’s IT services.

Starting with TCS, revenue from technology services dropped 5% YoY in constant currency to account for 8.4% of the company’s overall revenue as of the Decem-

ber quarter. Communication and media, which includes telecom and networking as sub-sectors, also saw a 4.9% YoY drop in revenue. Among the companies, Infosys performed the worst; its communication services are down 8% YoY in constant currency to account for 11.4% of its quarterly revenue. Technology, meanwhile, dropped 5.1% YoY to 7.7%. For Wipro, tech and communications revenue dropped to 12.1% and 4% respectively. While tech revenue grew by 1% during the December quarter, communications revenue declined by a considerable 19.2%.

IMPACT ON NETWORKING AND TELECOM

An analysis of the type of deals available in the sector shed light on the issues with the overall IT services industry, and what they face at the moment. The entire sector is going through a slump right, driven by global macroeconomic headwinds. This is causing clients to spend less on various aspects, including innovation and advancements in technology. Apart from the regular maintenance and servicing deals, telecommunications and networking typically involve discretionary spending on new areas, such as the adoption of the industrial Internet of Things (IIoT), 5G and other enterprise connectivity options. Satcom, too, is one such area.

In the technology sector too, this holds for the nature of client deals that is causing the overall slowdown. The only outlier to all of this is HCL Tech, which saw an 8.3% YoY constant currency revenue growth in its telecommunications vertical. However, it is important to note that HCL Tech’s growth in telecom revenue was boosted by a solo deal—the company’s largest-ever deal, won back in August last year from US telecom major, Verizon. The USD 2.1 billion deal fuelled the rise of this vertical for the company. Apart from this, the slump is persistent, as seen in a 9.2% YoY constant currency revenue decline from its technology vertical. This now contributes only 12.8% of its overall revenue.

This slowdown also reflects the global slump in telecommunications innovation spending, as well as tech spending among clients around the world. Until macroeconomic conditions improve, experts, including the chief executives of the top four IT services firms, continue to



IN BRIEF

- India's IT services industry faces a challenging year as weak macroeconomic sentiments impact spending on communication and technology.
- HCL Technologies stands out as the sole company poised for meaningful growth in FY24 amidst a decline for others.
- Technology and telecommunications, constituting 15.1-22.5% of top IT firms' revenue, indicate market health and discretionary deal trends.
- Discretionary deals, crucial for IT services, offer high profitability margins; a healthy market thrives on them.
- Tech and telecom sectors experience a considerable slowdown, affecting TCS, Infosys, and Wipro, driven by global macroeconomic headwinds.
- Slump in telecommunications innovation spending reflects a global trend, tied to cautious client budgets in a challenging economic environment.

Discretionary deals offer large margins of profitability for the service providers, which in turn helps the overall industry thrive.

expect weak adoption of cutting-edge tech standards. This is because the latter requires additional budget allocations from companies, which continues to remain difficult for clients to pull off in such a cautious environment.

EARLY SIGNS OF RECOVERY?

Experts indicate that there are signs that show that the next few quarters could be crucial to observe. TCS, in its investor presentation, said that it is seeing traction for the adoption of IIoT, delivering OTT platform experiences to customers, and working on enterprise 5G networks as well. It also singled out the demand for data on cloud platforms, driven by a rising drive for generative AI applications around the world.

TCS, to be sure, acts as an indicator for the entire industry; in the past four quarters, it earned USD 28.9 billion in revenue, and with nearly 600,000 people, employs over 43% of the entire workforce strength of the top four firms in the IT services industry. Due to this influence, trends observed by TCS across the industry typically precede the market performances of its peers. This, in turn, drives home an early sign that recovery could well be around the corner.

In simpler terms, if macroeconomic conditions improve over the next few quarters, discretionary spending in technology and telecommunications is likely to return for the IT services company. At present, despite a flat overall year for TCS and Infosys, tech and telecom represent mid to high-single-digit declines in revenue. For Wipro, this decline was even sharper. Even as HCL Tech expects some growth, its telecom revenue growth is an outlier due to the effects of a single deal, and cannot be taken as a trend for the entire vertical.

Nevertheless, if conditions improve, a reversal to mid to high-single-digit growth in vertical-wise quarterly revenue could help the IT services industry, as well as its top four, to return to a year of growth that investors would dearly wish for right now. 🙏

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Batt(l)ing for the future of telecom

BY DEEPAK MAHESHWARI

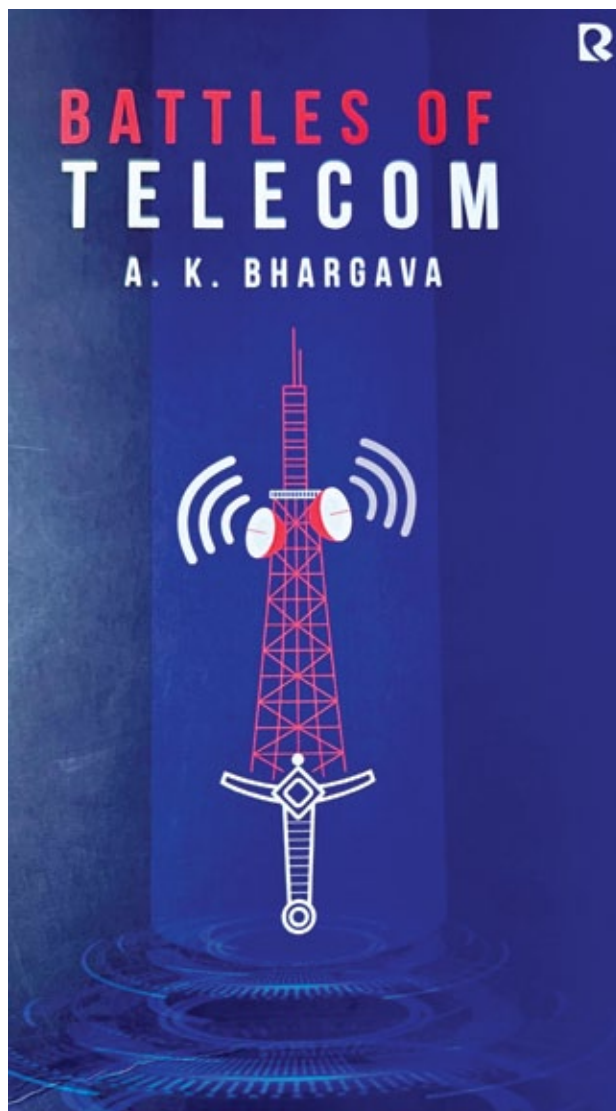
Despite the tremendous growth in Indian telecom as well as the wider digital revolution enabled by it, there is a lack of credible and informative books covering the long arc of history spanning more than a century and a half. This is more so when one looks at books authored by practitioners even as there are few excellent books by some academicians.

Building upon his rich and wide experience in the sector spanning over four decades, 'Battles of Telecom' is a bold attempt by A K Bhargava to fill this vacuum. An Indian Telecom Service (ITS) officer of the 1977 batch, he not only worked extensively in the field across different functions and geographies, but he assumed leadership roles in the public sector companies Mahanagar Telephone Nigam Limited and Bharat Broadband Network Limited and rose to become a member of the Telecom Commission. Post-retirement, he also served for three years as a member of the Telecom Disputes Settlement and Appellate Tribunal, TDSAT.

BATTLES GALORE

Like in any other domain of technological evolution that has an interface with policy and society, it is but natural to come across a litany of contestation in a sector like telecom. In that respect, the book does not disappoint. It covers a lot of ground, from perception to passivity, policy to power, competition to convergence, monopoly to manufacturing, licensing to litigation, and corruption to consumer protection.

Befitting the title, the book commences with the pivotal role of telegraphy before, during and after 1857; the year that saw the first major uprising against the British Raj. Yes, telegraph lines were already crisscrossing the length and breadth of the country, interconnecting major cities.



Title: Battles of Telecom

Publisher: Rumour Books India

Pages: 338

Price: Rs 399 (Paperback) / Rs 287 (Kindle)

Interlaced with candid personal anecdotes, the book provides insight into policies and regulations as well as the moral dilemma of a public servant.

The book covers a lot of ground, from passivity to policy, competition, monopoly, manufacturing, licensing, litigation, and corruption.

Chapters on the perception and legal battles are quite interesting. How telecom became to be seen as a necessity for all rather than as a luxury for few has important lessons for the policymakers. The Supreme Court's judgment in 2012 cancelling 122 licenses in one go has been discussed in detail.

The diagnosis of the malaise within the public sector service providers and the prescriptions including some bitter medicines deserve due consideration.

Interlaced with occasional yet candid personal anecdotes, the book provides additional nuances to the often unintended consequences of certain policies and regulations as well as the moral dilemma of a public servant. On the other hand, there are numerous interesting quotations, that highlight the author's literary interests.

Overall, the writing style is lucid and largely shorn of technical jargon. Numerous charts, tables and a detailed appendix would be immensely useful to the researchers. The author also tries his level best to allay the perception of widespread corruption even as he does not hold back in calling a spade a spade, even if it means naming a couple of ministers.

MISSING FROM BATTLES?

No book can be complete in all respects and an author must choose what to include and what to exclude. Whether as an act of omission or commission, a few aspects are conspicuous by their sheer absence or inadequate treatment.

These include, but are not limited to, the Prime Minister's Task Force on Information Technology and Software Development in 1998 (IT Task Force), the Group on Telecom and Information Technology in 1999 (GoT-IT) and the Group of Minister (GoM). Likewise, while the Indian Telegraph Act, 1885 has been covered in great detail, its predecessors are absent.

The chapter on Internet hails the benign policy announced in November 1998, but misses on the January 1998 policy that had proposed to allow just a handful of

services including Archies and Veronica! Add to that the battles for opening of Internet telephony and de-licensing of spectrum for Wi-Fi.

Even the coverage of standards and the role of the Telecom Tariff Order and the Interconnection Regulation of the Telecom Regulatory Authority of India are sketchy at best.

Structurally, the book does not have a table of contents and index. Some maps showing the evolution of the network at various points in time would have been extremely beneficial.

BATTLE FOR BETTERMENT

Underlining the critical role of telecom in enabling the wider digital revolution, the closing chapter offers a glimpse of the future battles, emerging from close encounters between technology, policy and society.

The telecom sector is becoming increasingly more complex with the advent of IPv6, 5G, Internet of Things (IoT), Artificial Intelligence (AI) and many more technological and market evolutions.

Even if the victory is ephemeral in such an ongoing battle, the book closes with a sobering observation: "In the telecom world, the service providers who get their ACT (availability, accessibility, affordability, capacity, coverage, cost, content, technology, timing, tariff) together can surely win the battles of the future."

Overall, a useful addition to a rather limited bookshelf of readable and insightful books on Indian telecom. Now that the 2003 Act would repeal the 1885 Act, hopefully, a revised and updated edition should follow sooner than later.

Yes, yeh dil maange more (there is a desire for more). 🙏

The author is a public policy consultant and researcher.

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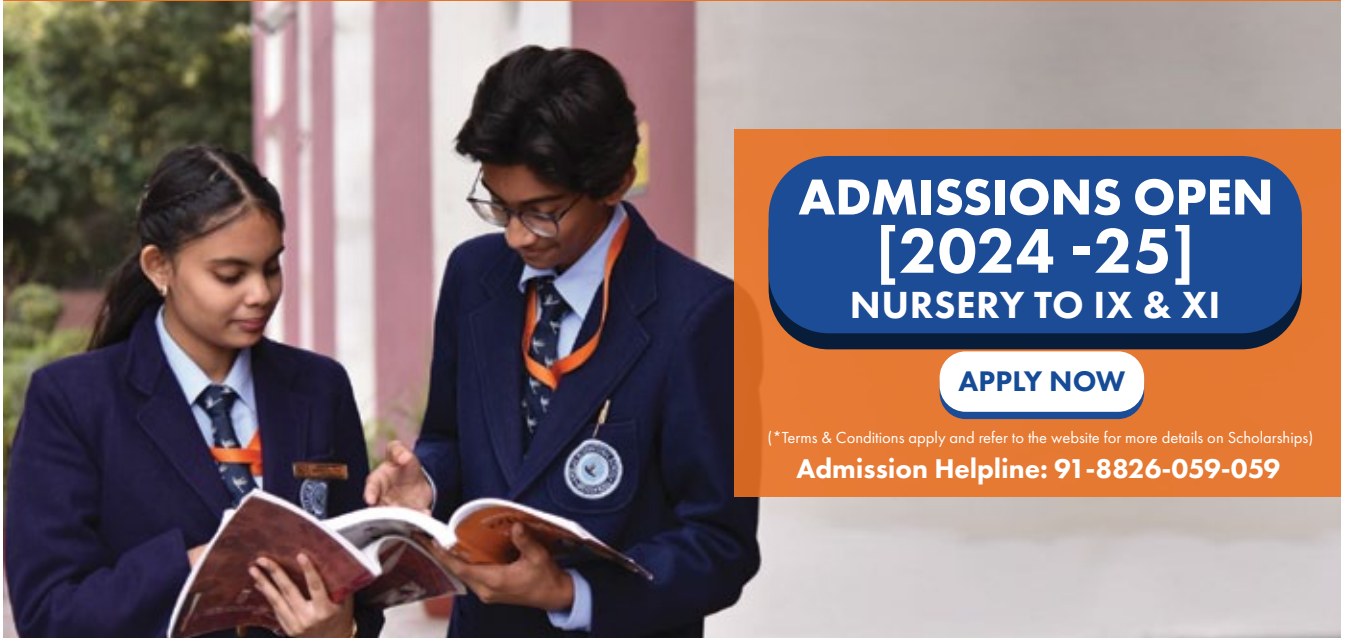
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