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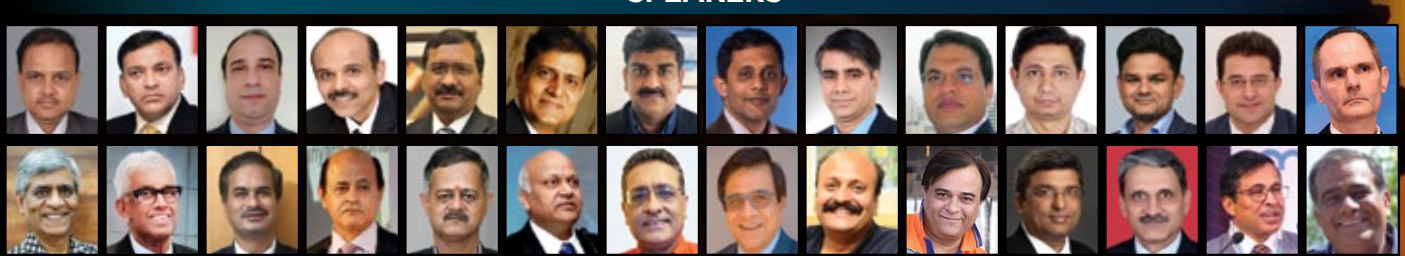

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Voice&Data is printed and published by Pradeep Gupta on behalf of Cyber Media (India) Ltd, D-74, Panchsheel Enclave, New Delhi - 110 017, and printed by him at M/s Archna Printers, D-127, Okhla Industrial Area, Phase-1, New Delhi 110020. Editor: Shubhendu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

For Subscription queries contact rsevoicendata@cybermedia.co.in

All Payments Favoring: CYBER MEDIA (INDIA) LTD
Distributors in India: IBH Books & Magazines Dist. Pvt. Ltd, Mumbai.

Corporate Website: www.cybermedia.co.in
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October 2021

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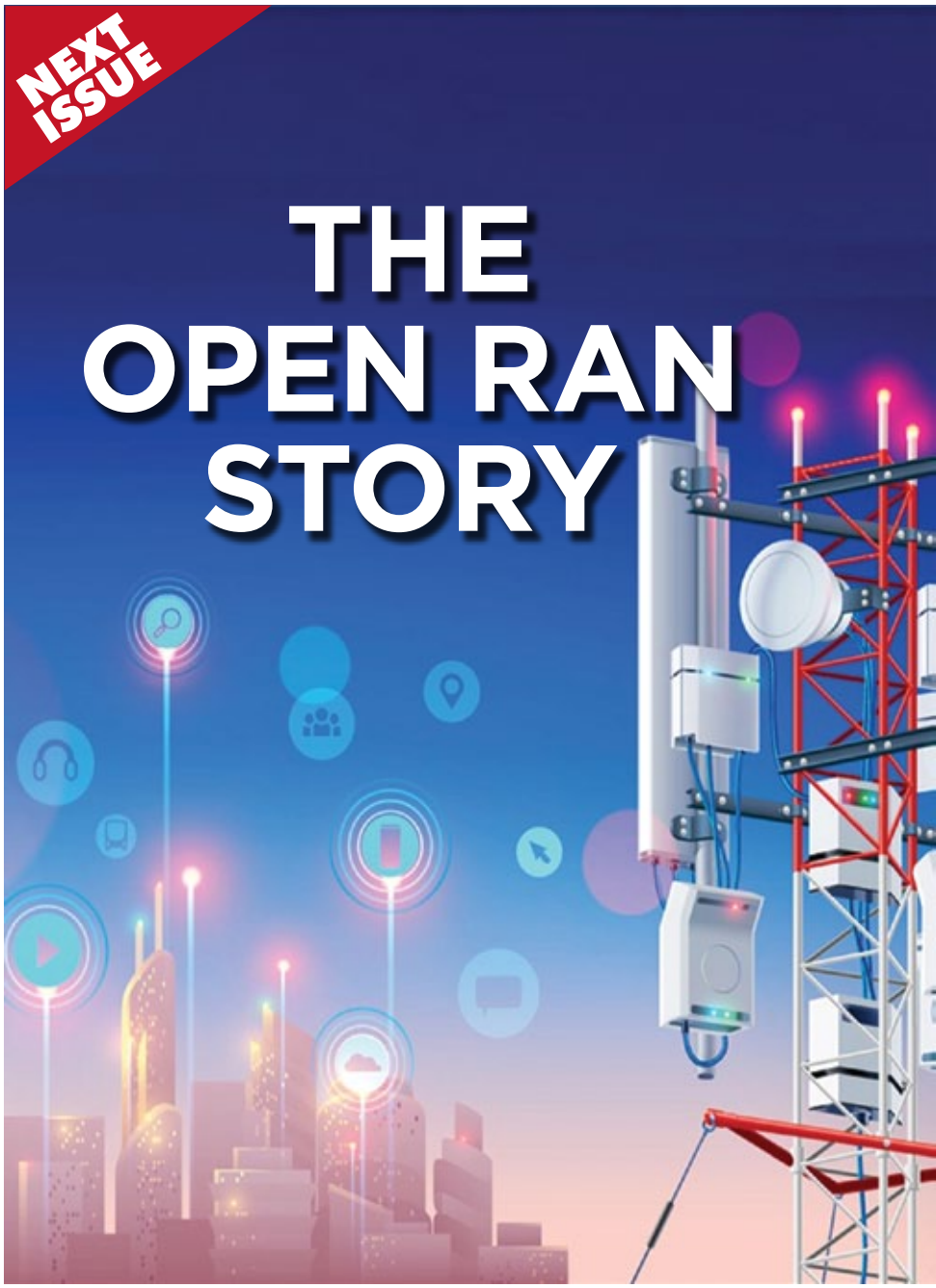

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SHUBHENDU
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[OPENING NOTE]

Caution: 5G to make autonomous weapons lethal

It isn't the first time that guns have been packed with artificial intelligence (AI) and remote management capabilities. In fact, the quest for autonomous weapon system has been growing in direct proportion to the growth of communication technologies, including the internet and M2M communication protocols. While the Special Purpose Unmanned Rifle (SPUR) mounted on the back of a quadrupedal robot dog by Ghost Robotics has been making news recently, in 2015 a South Korean company showcased a gun turret with ability to identify, track and shoot targets, theoretically without the need for human mediation. The US too had its CROWS turret – the Common Remotely Operated Weapon System developed during the Iraq War.

While the Q-UGV or the quadrupedal uncrewed ground vehicle is equipped with the sniper rifle that can fire 6.5 millimeter Creedmoor cartridges, the ammunition developed with long-range target shooting in mind, the Korean Super aEgis II uses .50 calibre bullets with a machine gun powerful enough to stop a truck and has a range of around four kilometers. The other recent news that shocked the world and hints at the dangers of lethal autonomous weapons systems (LAWS) or simply AWS – autonomous weapon systems – was the report which confirmed Iran's allegation that "smart satellite-controlled machine gun" was used to assassinate its top scientist and father of nuclear weapons programme Mohsen Fakhrizadeh on 27 November 2020.

According to the New York Times report, the sophisticated hit was carried out by Israel's intelligence agency Mossad, which reportedly used a modified Belgian-made FN MAG machine gun that was controlled remotely from a command centre thousand-miles outside the country. The computerized machine gun, required no on-site operatives, took less than a minute to kill Fakhrizadeh who was driving his own vehicle, without a scratch to his wife who was in the passenger seat beside him – barely 10 inches away.

The report also indicates that Mossad used a very sophisticated face-recognition technology that enabled the 7.62-mm gun to fire 15 bullets, pin-pointed at the scientist in a moving vehicle from atop a Nissan Zamyad pickup truck that was also fitted with multiple cameras and explosive to destroy all proof after completion of the operation. With a 1.2 second satellite communication network lag in relay of video inputs from the camera to the command centre, the operatives used AI to simulate and calculate the exact path of the car to ensure accurate fire, without missing a single shot.

Together, the developments hint towards the trend that has the potential to transform wars; in fact, LAWS has been described as the third revolution in warfare after gunpowder and nuclear weapons. The combined power of 5G-AI-ML will make it more lethal – to an extent that they will be able to independently respond to changing environment and decide how to achieve a nation's pre-programmed goals.

Maybe, it is time to rethink what to automate and to what extent. Anything "beyond meaningful human control" may lead to catastrophe.

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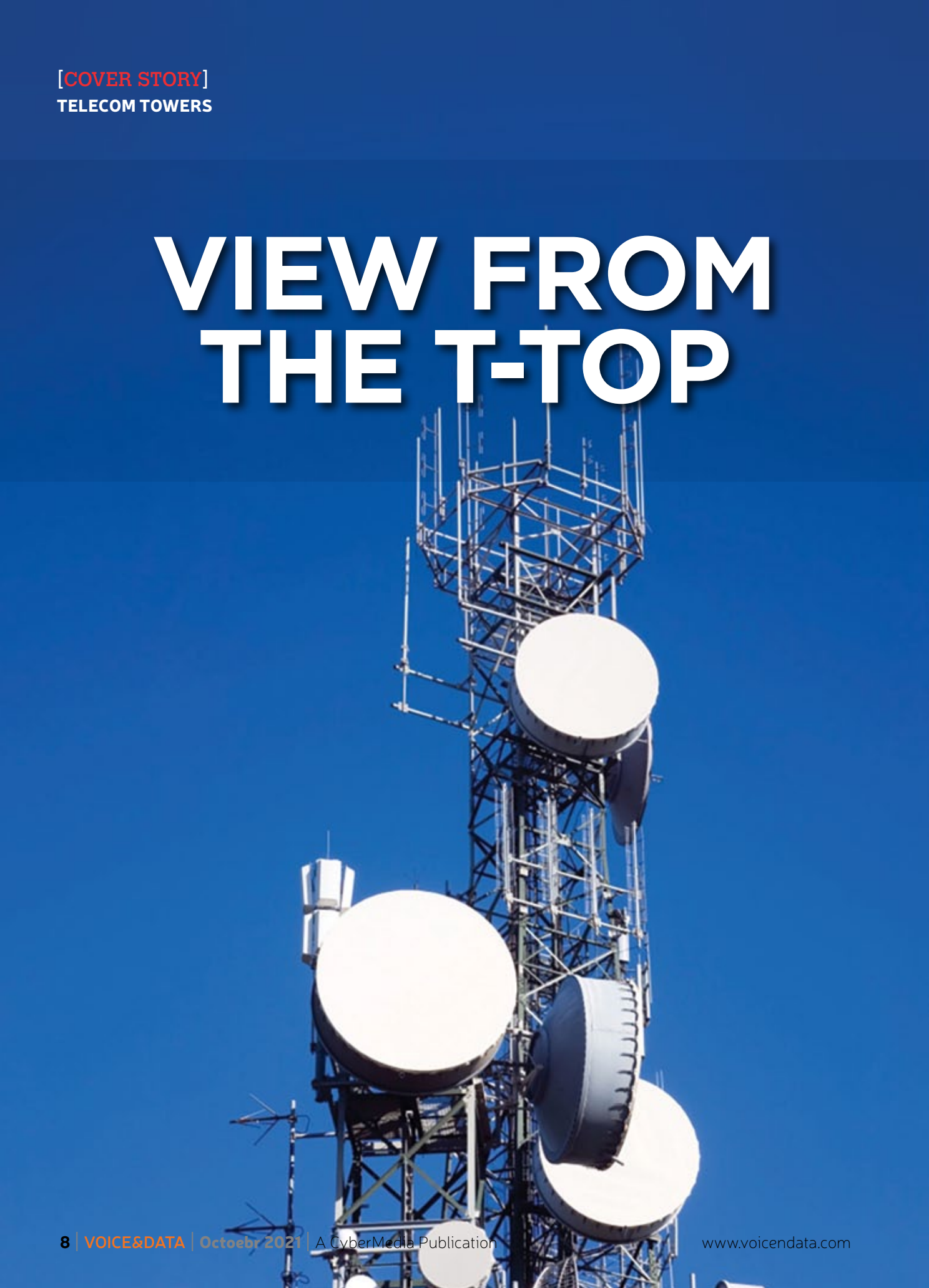
VIEW FROM THE T-TOP



A lot can be ascertained about the health and future of the telecom industry by looking at the tower ecosystem. Here is a bird's eye view of what it looks like

BY PRATIMA HARIGUNANI

As strange as it may sound, there is a simple, and quick, way to check about a body's health. Just look at its gut. There is so much that resides there – it is the seat of its immunity, it helps the body to digest its fuel well and it harbours all the good bacteria. And when something wrong happens in the body, the gut is the first one to feel it.

So when we look at the gut of the telecom industry, it is the first tell-tale sign of what's good or what's problematic about it. Towers say a lot about the profitability, degree of consolidation, competitive equations, ARPUs, network efficiency and environmental impact of telcos in any market.

Right now they are telling something interesting through tenancy ratios, capex investments, and technology innovations.

Let's climb up higher and get a better peek into it.

Industry health – vital signs

How about starting with the most fundamental sign? It is called the Tenancy Ratio. It basically means the average number of tenants or operators that are sharing tower infrastructure. When an industry is expanding and growing, these ratios go upward too.

This signals available capacity and infrastructure utilization rate in the industry too. Also, after a major wave of consolidation, this ratio underwent an upheaval. Tower companies faced some crucial tenancy exits as the number of operators shrunk drastically to just four or three from a ten+ scenario before.

And mobile network operators or MNOs started coming under pressure more and more because of drop in tariff prices, high spectrum fees, TCO optimization struggles and capacity expansion imperatives. For instance, a recent ICRA reckoning pointed out that Vodafone Idea Limited (VIL) has been under financial stress as reflected by mounting losses, churn in the subscriber base, largely stagnant 4G user base, and pressure on ARPU levels and burgeoning debt levels. This is likely to have a bearing on towers too. And, in case of VIL exit, the tower industry would confront vacation of around 180,000 tenancies that are occupied

> Towers say a lot about the profitability, degree of consolidation, competitive equations, ARPUs, network efficiency and environmental impact of telcos.

> Tower companies faced some crucial tenancy exits as the number of operators shrunk drastically to just four or three from a ten+ scenario before.

by VIL currently. Just 40-50% of these tenancies are expected to be regained by the tower companies over a period of 18-24 months

For the ICRA sample of independent tower companies, VIL occupies 35% tenancy share and 36% revenue share. So if VIL shuts down operations, tower companies will have to face a loss of these tenancies, which would be translating into revenue and EBITDA decline for the industry. As per ICRA's expectations, existing telcos will gradually take up only 40-50% of VIL's tenancies. The total tenancies for the industry by FY2024 are likely to remain lower than FY2021 levels.

ICRA also hints that the demand for loadings and high-power small cells is expected to remain elevated for the tower industry. It is not just tenancy loss that tower companies face as a concern. They might also bear the brunt of write-offs for VIL's receivables, which have been witnessing a steady increase lately – ICRA added. However, relatively low debt levels and strong liquidity position of the tower companies, are likely to alleviate these concerns to some extent.

If we look at a CRISIL June 2019 report 'Tower Signals, it explained that, "The consolidation wave has reduced the number of players to about five as of 2019, from about 15 players in 2012. With telecom operators divesting in tower assets, the towers industry is expected to see the shift to pure-play independent tower cos from the operator-led model."

A good example is how the merger of Vodafone and Idea led to over 57,000 tenancy losses. And despite exit penalties which offset revenue loss, the ripples of tenancy losses can continue in consequent years too.

The performance improvement approaches

Tower companies can drive comprehensive operational improvements through smart management of energy costs. The costs, which are often treated as a pass-through to operators, can be a rich pocket for removing inefficiencies.

They can resort to better care of site infrastructure, preventive maintenance, and Tower Operating Centers (TOC), etc. for controlling downtime and improving site-level performance and profitability.

Tower companies can experiment with new site designs and tailoring site specifications to tenancy profiles.

Configuration errors like over- and under-configuration can be handled through better capacity planning and asset utilization.

Efficiencies can be elevated and costs can be cut down through smart vendor management, contract management and collections.

Source: Kearney report

> Tower companies are not just concerned about tenancy loss. They might also bear the brunt of write-offs for VIL's receivables, which have been increasing lately.

A newly-shaping oligopolistic structure has also squeezed rent revenue per tower because the number of tenants per tower tends to go down, also affecting tower valuations. This could, or should, lead to attempts at finding innovative models ahead. Also, after the COVID-19 hit many industries and consumers, the momentum of digital transformation has unlocked a new appetite for data and telco services.

The telecom industry has witnessed technology evolution from 2G to 3G and to 4G and is on the cusp of further evolution to 5G. The new technology would need denser networks and, thus, the demand for towers would remain buoyant, augurs Ankit Jain, Assistant Vice President and Sector Head - Corporate Ratings, ICRA Limited. "While the initial expansion can be done using installation of small cells, however, as demand on these sites increase, these have the potential to be converted to full tower sites. As far as the other alternatives are concerned, in particular satellite communications, which can be a disruptive technology, we expect that the penetration of the same would not be rampant to begin with and satcom can actually complement the existing network and coexist in the ecosystem."

So where does this weird mix of opportunities and challenges leaves tower companies? Would they be able to leverage their assets well? Would they be able to create a new industry direction, especially when industry-dynamic can adversely affect their tenancy metrics?

Switching to a better diet

Thankfully, not all is bleak about the state of tower landscape in India.

Post the consolidation in the services industry, tower companies witnessed sizable tenancy losses resulting in decline in tenancy ratios, but as Jain points out, with the healthy increase in data usage in the recent past, there has been an increase in the tower rollouts and tenancy numbers. "It is expected that if the telecom services industry structure remains intact, there will be a steady demand for towers and the tenancy numbers are expected to increase steadily."

Plus, the scenario is changing into a tech-savvy and green shade as companies start embracing new ideas. Like using virtualization, drone mapping, robotic field inspections, aerial imaging, 3D equipment modelling, analytics etc. for better asset management. Digital twins is emerging as a plausible option for sharpening data management without indulging into risks, high costs and capital-intensive processes. Sharper data leads to new revenue opportunities and higher margins in many ways.

The space can also start looking at new business models – like smaller cell sites, active network sharing, operator consolidation, ISP opportunity, ATM/kiosks etc. Jain opines that while there are opportunities for the tower companies to graduate towards new revenue streams like smart cities, installation of EV charging points at tower sites, advertising at tower sites, active infrastructure sharing, etc, some of these are futuristic and their revenue share vis-a-vis the core revenues of the tower companies is likely to remain low in the near to medium term.

Many companies are showing interest and investments in trekking up to these new heights. One among many such step-ups is the shift towards green initiatives. They range from prudent usage of diesel, reduced opex, automated/remote management, to use of renewables and better asset-maintenance efforts. Also tower companies are working on new models of revenue to monetise their real estate assets. There is already excitement about advent of small cells, custom-made sites, hotspots, fibre backhaul and 5G-oriented solutions.

If tower companies are able to steer some of these big shifts right, they can turn into something much more than a cost-sharing asset model for telcos. They can strengthen specialist solutions for telcos and enhance the industry's profitability and green impact by investing in the right technologies and models. Just helping strongly on site rentals, power, and fuel can be a big turning point for a telco where these areas account for 70-80% of network costs. And, thus, they help customers through better prices and services too.

And that's a calculation that is based on solid precedents; not just gut-feel.

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Ankit Jain
Assistant Vice President & Sector Head - Corporate Ratings, ICRA Limited

"Around 40-50% of the lost tenancies can be regained gradually"

With a strong wave of consolidation in the telecom industry, and its many ripples on the tower infrastructure space, how soon can these towers think of getting back into a pole position with happier tenancy ratios, government relief, and sustainable growth? ICRA Limited Assistant Vice President & Sector Head - Corporate Ratings ***Ankit Jain****, in an interview with* ***Pratima Harigunani****, shares his views on some latest developments. Excerpts:*

What is the state of tower infrastructure and growth in the telecom space in India? Has expansion and capex picked up this year? What effects have transpired after a major industry consolidation?

The telecom services industry in the past had more than 10 operators, resulting in healthy tenancy ratios for the tower companies. Post the consolidation in the services industry, tower companies witnessed sizable tenancy losses resulting in decline in tenancy ratios. However, with the healthy increase in data usage in the recent past, there has been an increase in the tower rollouts and tenancy numbers. It is expected that if the telecom services industry structure remains intact, there will be a steady demand for towers and the tenancy numbers are expected to increase steadily.

What is the state of tenancy ratios right now? If a Telco suffers survival due to profitability pressures and poor ARPUs, what domino effects can tower companies face, especially when VIL occupies 35% tenancy share?

As stated above, the tenancy ratio for the tower industry has witnessed a decline to around 1.3-1.4 times with the consolidation in the telecom services industry. In case of further consolidation, it is expected that the tenancy ratio will decline further. For ICRA sample of tower companies – namely Indus Towers Limited, ATC Telecom Infrastructure Private Limited, Ascend Telecom Infrastructure Private Limited, and Tower Vision India Private Limited – VIL occupies around 35% share in the tenancies. In case of severe financial stress on this telco, we expect that these tenancies will face an exit. However, in such a scenario, with an increase in traffic on the remaining telcos, they will have to expand their network and take up additional tenancies. ICRA expects that around 40-50% of the lost tenancies can be regained gradually and the balance will be lost due to network alignment and redundancies.

You suggest that relief measures on license and spectrum levies can help ease out financial distress in the industry – would this trickle towards the tower industry too? How soon, if so?

The relief measures that we talked about will aid the telecom service providers and ease the financial stress in the services industry. With improving health of the telecom industry, the rollouts are bound to increase which will provide a fillip to the demand for towers and thus will increase the business potential for the tower industry.

What is the relative dominance of telcos, captive companies, independent tower companies in the telecom infrastructure space?

To start with, the telecom service providers owned the towers. They themselves incurred capex to expand the network. However, steadily, sharing of infrastructure started, telcos hived off their tower business to separate entities and towers became a separate industry. Further, telcos monetized their stakes in these tower companies, which led to the evolution of independent tower companies. As we stand today, a sizable share of the pie belongs to independent tower companies, while there would be some captive tower units as well (mainly with BSNL).

How can tower companies get greener when most power and fuel costs still work as pass-through costs towards operators?

The energy models have undergone a lot of change, starting with pass-through to a Fixed Energy Model (FEM) and then to a mix of both. FEM allowed tower companies to innovate on the energy front and earn margins on energy. This coupled with increasing ESG considerations turned the focus of tower companies towards green energy. Moreover, tower companies are again focusing on shifting the energy model back to FEM.

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TV RAMACHANDRAN

RIAs are at the core of OTT ecosystem

Rich Interactive Applications are driving growth for telcos and opening new avenues of revenue. Without RIAs, telco networks would remain mere pipes

India, the world's fastest growing Rich Interactive Applications (RIAs) market, is poised to become the world's 6th largest by 2024. Internet apps are disrupting the way we live and conduct business. It is a gross injustice to call these modern computer apps, that have revolutionized our lives, as OTT since this term, which is an abbreviation for Over The Top, has obvious negative connotations. OTTs are open, transparent and vibrant, and have enabled rich interactions on social, work, academic and other fronts. It might, therefore, be far more appropriate to refer to them as RIAs rather than as OTTs.

Expert bodies such as ICRIER, the reputed Indian research agency and WIK, the expert consultancy of Germany, have quantified the noteworthy impact of RIAs on GDP and personal life enhancement. ICRIER reported that apps have the potential to contribute USD271 billion (Rs 18 lakh crore) to India's GDP by 2020. WIK found, in their research, a high annual consumer surplus contribution of USD98 billion (Rs 7 lakh crore) in 2017, based on a consumer study – an average per capita of USD249 (Rs 16,000).

RIAs are powerfully driving revenue growth for telcos and opening new avenues of revenue. Without RIAs, telco networks would remain mere pipes without much revenue opportunity. Thus, to term the heavily-beneficial RIAs as OTTs is not appropriate and this view needs to certainly change now.

> Industry players are heavily investing in acquiring or developing new content and services, and are also focusing on improving customers' experiences.

The COVID-19 crisis accelerated the growth of RIAs in India since these apps helped provide a near-normal existence in a practical and effective way in this era of lockdowns, work disruptions, social distancing and other constraints, to normal activity. From just two OTT platform providers in 2012, the number has increased to over 60 players now.

The Indian RIA/OTT market ecosystem comprises of television distributors, telecom companies, content providers, broadcasters and independent platforms. The OTT eco-system is growing and witnessing interesting trends.

India is seen as the new streaming hub: A Boston Consulting Group report predicts that the OTT content market is at an inflection point in India and likely to reach a market size of USD5 billion by 2023. OTT platforms are increasing direct-to-digital releases and enriching content library with diverse content and new features.

Premium original content: Premium, original content is one of the biggest growth drivers and differentiators in the OTT industry. The Indian viewer has shown a greater tendency to spend on original content. Industry players are heavily investing in acquiring or developing new content and services, and are also focusing on improving customers' experiences.

Rising regional market: Another major trend is the preference for vernacular with 93% of the time spent on videos in Hindi and other regional languages. With over 300 million smartphone users in the country, creators are coming from tier-2 and tier-3 cities and OTT players are investing in going regional.

Rural India, a new distribution channel: Unlike the common thought that urbanites are watching more content online, 65% video consumption is coming from the rural areas. With increased internet penetration in the rural areas (estimated to be ~650 million by 2023), OTT players are keen on developing regional content to cater to the rural markets.

Production houses are going digital: Due to the pandemic, the average time spent by Indian OTT subscribers has increased from 20 minutes to an hour. About 49% of India's youth spend 2-3 hours watching content online. To keep up with the growing demand for more content, production houses are venturing from linear TV to OTT.

Business models expand: Even as the digital content ecosystem evolves, the single biggest challenge is monetization. But OTT players say that monetization models will emerge now that they are getting the audiences.

OTT is fast becoming the main form of content consumption. Going forward, many factors will play a key role in shaping the eco-system.

Technology and infrastructure upgrade: OTTs would require significant investments in technology to deliver the best Quality of Experience (QoE) to subscribers. Robust internet penetration, fibre roll out, and affordable smart TVs will be essential. OTT players will benefit from 5G networks deployment over the next few years. These networks are expected to be at least 10 times faster than 4G LTE and reduce latency by at least half in commercial implementations.

> Unlike the common thought that urbanites are watching more content online, 65% video consumption is coming from the rural areas.

> OTT players will benefit from 5G networks deployment over the next few years. These networks are expected to be at least 10 times faster than 4G LTE.

Regulatory framework vis-à-vis creative freedom: The RIA/OTT segment has nicely flourished and grown in India thanks mainly to the excellent regulatory approach. The regulatory framework has been rightly balanced between the aspects of oversight and the nurturing of innovation and creativity. Our system has possibly become a fine role model for other countries that wish to expeditiously and optimally secure the vast economic benefits of RIAs/OTTs.

Pricing/Monetization: Another significant factor in the Indian scenario will always be pricing by OTT platforms. Besides experimenting with content to strengthen its consumer base, the streamers were also exploring with pricing in order to appeal to more consumers. Advertising-based model may lead the industry into a new era.

An explosion of options: OTT will influence a number of sectors and generate new avenues. Here are few examples.

- **Kids' education & entertainment (edutainment):** PwC, in its 2019 report, stated that more than 40% of new internet users in the world were children. Broadcasters are making the most of this shifting content consumption patterns to create storylines that resonate with today's young audiences. A Bobble.AI report states that Edutech platforms such as Udemy, Unacademy, and Byjus have posted about 80% increase in the time spent during lockdown.

- **Online gaming has surged during the lockdown:** Gaming apps topped the new downloads category on both Android and iOS phones in Q1 of 2020. The All India Gaming Federation (AIGF) found that Online Gaming has grown by 12% during the lockdown.

- **Fitness industry seeks virtual presence via OTT:** Platforms are expected to expand their offerings into genres like health and fitness to cater to the increased fitness demand and emerging audience segments.

- **Redefining sports through OTT:** More and more people are adopting OTT as a way to watch sporting events conveniently on various devices.

- **Live streaming:** In the wake of COVID-19, OTT has also presented a unique opportunity for live streaming large events such as concerts, music festivals and conferences that would have otherwise been cancelled.

> The OTT eco-system will get more ambitious over the next few years as the primary goal shifts more towards user experience, recommendation and personalization.

The OTT eco-system will get more ambitious over the next few years as the primary goal shifts more towards user experience, recommendation and personalization. Content will continue to act as the life blood to keep the platform intact and running. Great technology will be another enabler. Regulation needs to keep evolving to strike the right balance between protecting consumer/business interests and encouraging innovation.

India needs to chart its own course and needs to resist the temptation to follow global precedence to enable a unique remarkable RIA ecosystem to evolve and thrive! The Indian consumer will undoubtedly be the winner.

Ramachandran is Hon. Fellow, IET (London) and President, Broadband India Forum

(Research inputs by Garima Kapoor)

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The time for seamless streaming is now

By keeping traffic local – the distance content data needs to travel – OTT players can vastly reduce latency, and thereby, improve user experience

BY SUDHIR KUNDER

While internet traffic has risen substantially as a result of the digital transformation push triggered by COVID-19, three types of data traffic showed exponential growth during the pandemic: the traffic from collaborative communication tools, from streaming services, and from online gaming each saw huge growth. Since lockdown, people have relied on the internet more than ever for business, entertainment, and for personal use.

Far from experiencing a post-crisis slowdown, this growth continues unabated: OTT and VOD traffic rose

> The COVID-19 pandemic has disrupted big screen entertainment, with digital streaming platforms successfully taking its place.

> Indian regional content has also got relevant viewership in communities that reside in countries like Dubai, Malaysia, Singapore, the UK, and USA.

by 139% from Jan 2021 to Aug 2021. Traffic from social and online media grew by 144%, and online gaming traffic grew by 137%. Since the migration of enterprises and education sectors to the virtual environment, online activities are here to stay – and the trend in traffic increases will only continue. Needless to say this growth in internet traffic will require a reliable, secured digital infrastructure to support it.

At the end of March 2021, the total number of internet users in India was 825.30 million as per Telecom Regulatory Authority of India (TRAI). Among the above internet users, 325 million users were estimated to be active viewers of either ad-support or paid streaming. Additionally, reports by the Broadband India Forum suggested that over 65% of the OTT consumption during the lockdown was from rural India. If that speaks of the past, reports by RBSA Advisors indicate that the Indian OTT market is expected to grow to USD4 billion in 2025 and up to USD12.5 billion by 2030. With nearly 60 players in India, OTT has become a mainstream platform for content for the Indian audience.

Observing the rise in demand of OTT content consumption, international OTT players like Netflix, Amazon, and Disney are investing in the Indian market with more and more regional language content. The accelerated drive towards digitalization triggered by the pandemic, along with the unlimited data plans, affordable devices, and convenient subscription plans, have been major factors in the growth of the OTT platforms in the country.

OTT is driving significant behavior change

OTT players are partnering with telecom companies like Airtel, Jio, and Vodafone Idea as observed in the recent past, making content available to the customer in terms of bundled offerings and other distribution channels, demonstrating potential of growth through collaboration. This collaboration has been seen across many telecom players within the Indian ecosystem, as well as standalone OTT players who have grown significantly during this pandemic, thereby clearly indicating that this is a key focus area not only for revenue generation but also for giving focus to OTT as a segment.

While YouTube is the 4th most used app in India, many broadcasters are launching their own digital platforms for the discerning consumer. These platforms have been aggressively pushed by various companies, for example Zee 5 and Sony Live.

As a result, the volume of organizations adding additional 100GE ports to support the high demand has grown exponentially. Smartphone prices dropped, giving a wider section of society access to online platforms. This rise in millennial consumers has also had a positive impact on the digital India campaign. The effects of globalization coupled with large telecom companies dropping data costs resulted in significant growth in data consumption. The COVID-19 pandemic has disrupted big screen entertainment, with digital streaming platforms successfully taking its place.

Rise of regional content, rural consumption

Given India's vast geography, OTT platforms have been able to bring a lot of content in regional languages, from movies to series. This has enabled them to expand their reach to a wider audience while also boosting revenues, all within a short period of time. As per industry analysts, 40% of OTT viewership today is accessing regional content.

The first independent OTT platform in India, Big Flix, launched by Reliance Entertainment in 2018, featured

> While video on demand is not as heavily affected by latency as real-time communication is, constant buffering will negatively impact user experience.

> It is necessary for players to understand the benefits of interconnection services and why secure and resilient digital infrastructure is importance.

movies in nine Indian languages. From there, the OTT sector has grown to proudly own over 60 providers in India, each giving its customer a wide range of content across multiple languages.

With the exponential growth of the OTT market, organizations like Netflix and Amazon find multiple opportunities and have thus in addition to international content also begun to launch India-centric productions locally. Recent statistics from Netflix India indicated upcoming projects included seventy Indian originals and ninety additional programs in English and regional languages together. Furthermore, the availability of content in both original as well as dubbed languages has inflated OTT consumption across the Indian subcontinent, also stimulating value propositions for OTT players.

India is not a homogeneous market, but one that is made up of smaller and diverse OTT players that capture their unique viewers in terms of regional languages. Indian regional content has also got relevant viewership in communities that reside in countries like Dubai, Malaysia, Singapore, the UK, and USA. This vast market potential has further fueled the development of content in multiple Indian languages.

Importance of latency in OTT streaming

Although OTT is largely considered in terms of the streaming of video entertainment and online gaming, over-the-top applications also play an important role in this sector, including video conferencing tools and educational platforms for real-time communication and streaming of video content. These applications are also taking leaps ahead in terms of their service offering. Recent multiple acquisitions and foreign investments on edutech players like Byju's and Unacademy have raised USD2.32 billion and USD354 million respectively.

All the above applications have one thing in common: Latency. Latency is what causes the lag experienced in long-distance video conferencing, live streaming etc. While video on demand is not as heavily affected by latency as real-time communication is, constant buffering will negatively impact user experience, resulting in lost viewership or subscribers.

While it is easier for broadcast networks to circumvent the issues that arise out of latency, OTT platforms are constantly challenged with finding reliable and cost-effective methods of achieving this. The primary and best option is connecting with an Internet Exchange Point. The aim of an Internet Exchange Point is to provide a platform for networks of all segments to exchange traffic and keep local traffic local. This means that the OTT provider can connect with the long tail of the internet – the ISPs taking their content out to the edge, to regional users.

By keeping traffic local, the distance the data needs to travel – and therefore the latency – is vastly reduced, improving the performance of the content and the experience of the user. It thus is necessary for major players to understand the benefits of interconnection services and the importance of having a presence in a secure and resilient digital infrastructure to gain a competitive edge.

In recent months the world has undergone major changes. Under normal circumstances, the growth of the OTT ecosystem would have continued at a steady pace and the adaptation would have been slower. Internet penetration is only set to increase in rural areas, and thus the investments made by international players in generating regional content will only continue to grow. Even after everything has gone back to normal, and with the option of returning to the old normal, people have adapted to this new normal and the trend will continue to grow from here.

While every platform has its own advantages and disadvantages, OTT as a platform is here to stay and is growing rapidly in this digital age.

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Marching towards a multi-cloud future

While cloud has proved to be a major enabler for business continuity and transformation, as seen in the pandemic, it's time to step up to a multi-cloud phase

BY ANIL BHANSALI

From financial information to customer and product records, data has become the most important technology resource for businesses and individuals across the globe. With more powerful and agile computation, richer software, and smarter analytics, mobility and sensors, data can be accessed faster for critical business decisions and insights – thanks to cloud.

> Gartner reports that 81% of enterprises collaborate with two or more public cloud providers, to distribute their workloads across multiple cloud environments.

> Google Cloud can empower enterprise operations to create simple and scalable environments with a single unified way of managing all cloud environments.

Cloud computing has allowed businesses to lower storage and computation costs, garner more data streams from more sources, and gain the capacity to provide stronger insights. Moreover, many organizations leveraged cloud as a critical facilitator in digital transformation, especially during the pandemic, as they needed their workforce to be remotely operational and be available for their consumers. Small businesses have also leveraged cloud as a tool for asset optimization and identifying underutilized resources, helping in cost savings and business recovery.

The multi-cloud game

Gartner reports that 81% of enterprises collaborate with two or more public cloud providers. It empowers enterprises to distribute their workloads across multiple cloud environments, increasing efficiency and cost savings and mitigating risks related to individual cloud architectures. As cloud adoption grows, especially in larger enterprises, multiple departments have started moving mission-critical applications to public cloud infrastructure for greater accessibility, customization and optimized use – giving rise to a 'multi-cloud' environment.

A multi-cloud approach allows businesses to use optimal infrastructure for their demand. For example, the approach allows organizations to be agile and flexible. Companies can pick multiple cloud service partners, depending on the business needs. While multi-cloud deployment may require scaling operations, upskilling and allocating bandwidth, it delivers customized data storage and management that enables businesses to scale up projects and be at par with global peers. That's one of the critical factors why services such as Google Cloud can empower enterprise operations to create simple and scalable environments with a single unified way of managing all cloud environments. It is committed to meeting the needs of customers by providing choice, flexibility and openness. Moreover, the flexibility to run applications wherever users need them without added complexity has been a key factor of Anthos – as many consumers want to keep using their on-premise and other cloud infrastructure, but have a common layer of management without a high overhead.

Google in the game

As a contemporary applications platform for both hybrid and multi-cloud systems, Anthos allows clients to run their extensive software portfolio – including apps, data, and infrastructure – on-premises, in a single cloud, or across many clouds in a cohesive way. Combined with Google Cloud's BigQuery Omni, a versatile, multi-cloud analytics solution powered by Anthos, organizations can examine and analyze data across Google Cloud, Amazon Web Services, and Azure from a single pane of glass – progressing the 'anywhere analytics' strategy, which can help so many small enterprises achieve business success through fast, accurate and intelligent data insights.

Truly leveraging a multi-cloud environment means being flexible and taking advantage of the right cloud at the right time. It offers a rich set of cloud options to mitigate critical issues across a diverse range of computing and business functions; it enables a secure combination of shifting workloads between private and public clouds, which is cost-effective; and it facilitates minimum server hops leveraging proximity usage that augments low latency. Moreover, a multi-cloud infrastructure empowers enterprises to blend platforms and vendors so that the workloads are not locked in, eventually resulting in higher autonomy of addressing business concerns. And lastly, since enterprises are not 'putting all their eggs in one basket', they can react proactively to mitigate risks whenever required.

After major disruption due to the pandemic in 2020, the need for a modern technology stack is driving multi-cloud adoption. However, enterprises must consider multi-cloud as a new thought process/strategy, rather than just another technology that needs to be adopted. It is imperative today for organizations to make optimal workload-to-cloud placement decisions during their journey to complete digital transformation; but more importantly, it's about choosing the right cloud strategy and the right partner to harness the power of cloud to achieve their transformation goals.

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For intelligent industry phenomena, 5G holds the edge

While the 5G and edge are still evolving, their ability to optimize service performance and experience will create real socio-economic value in the days to come

BY MONIKA GUPTA

Let's imagine the future...

A critical surgery is being successfully conducted by doctors ... only that it is being guided 'virtually' and 'remotely' in real time from thousands of kilometres away. Or two 'connected' cars averting a fatal collision in only milliseconds due to their ability to 'self-communicate' via sensors. Or people being able to download a two-hour movie, which took 26 hours on 3G and 6 minutes on 4G, in 3.6 seconds flat...

This doesn't look too far away as we are already experiencing a paradigm shift in digital advancement. And the COVID pandemic has clearly revealed the importance and value of technology and the need for ubiquitous connectivity everywhere.

From health and wellbeing to transport and everything 'smart,' the connectivity afforded by 5G is all set to revolutionize the world. With the capability to connect one million devices within one kilometre, or a whopping 30 billion devices to the internet of things (IoT) by 2022, nothing seems to be beyond 5G's reach.

5G and edge... complementing and creating business value together

In discussing 5G technology, let us remember that 5G is incomplete without edge computing. While 5G increases connectivity speed, edge reduces response times – or latency – by creating faster, efficient, and intelligent systems by bringing compute capabilities into the network closer to the data source. Mobile edge computing, with 5G connectivity, will transform how we add value to our data and the insights we derive in real time, thereby unlocking new possibilities for digital business.

Complementing 5G and mobile edge compute with cloud technology gives customers (both enterprises and consumers) the flexibility of distributing workloads and computing resources based on the response times needed for the particular service or application, as well as creating distributed compute architecture.

In terms of relevance, 5G will contribute to industrial advances in three significant ways.

- Enable faster, effective inspections through predictive intelligence
- Enhance operational effectiveness
- Improve workplace and worker safety

For long, mobile connectivity was seen and developed only from a consumer perspective. But once data became available and internet browsing became widespread – enabling the means for communicating over voice extensively – it opened new platforms for mobile broadband. The high progression in mobile communications resulted in a huge new wave in communications!

Mobile edge computing, with 5G connectivity, will transform how we add value to our data in real time, thereby unlocking new possibilities for digital business.

> As 5G and edge are new technologies, enterprises have to understand the functional breadth and depth in its adoption and in managing the entire value chain.

But industry didn't adopt 5G in parallel, for the reason that industry requirements were different. Businesses want fast and secure, industry-proven, and reliable networks, as well as technology that are well suited to these needs. Going ahead, 5G and edge promises to fulfil these expectations. It will be at the core of this data-driven transformation, spurring the next wave of digital transformation in enterprise business.

Impetus to intelligent industry... in applications Land use cases

5G and edge networks will be a significant growth driver in intelligent automation – connected cars, ADAS and infotainment, smart factories, smart grids, smart cities, and more. As organizations seek to leverage capabilities in data, digital and industrial technologies, it will enable network equipment providers and enterprises to implement 5G and edge technologies at scale. This will also mean enabling companies' products, assets, and processes to unlock innovation and efficiencies within their business.

Given its capability to drive digitization and automation in Industry 4.0, the combined prowess of 5G and edge will optimize service performance and experience. Based on that, one can understand their usage across immersive technology, cognitive intelligence, image recognition, artificial intelligence (AI) and machine learning (ML), massive IoT, autonomous mobility, etc. – with the possibility of being delivered at scale and cost-effectively through a multipurpose and highly flexible network.

With COVID pushing enterprises to adapt and evolve, enterprises across sectors have been pushed to accelerate their digital transformation. Their focus is to digitize key industrial parts of their businesses and use embedded software, data, and new-generation wireless connectivity in business. 5G and edge could provide new approaches to technology, design, data, and communication to tackle the problems in business and society, especially as we look at unleashing human energy through technology for an inclusive and sustainable future.

Future challenges in 5G and edge ... and prospects

As 5G and edge are new technologies, enterprises have to understand the functional breadth and depth in its adoption and in managing the entire value chain, right from their use cases to business applications to enterprise architecture to public or private 5G network.

The universal penetration of technology and accessibility to data will pose challenges for security. Regulation, content moderation, and privacy protection will challenge the business models of BigTech. Computing will get faster, more intelligent, and require more optimized energy from green networks. This will require drawing up a roadmap on 5G and edge adoption in terms of use case assessment, business cases, as well as design a rollout strategy across their operations.

The ROI market for 5G technology was valued at USD2 billion in 2020 and projected to reach USD320.1 billion by 2026, according to Allied Market Research. But generating tangible ROI for industry will depend upon successful transition to 5G, full spectrum support to public and private CSPs, and successful lifecycle management such as quality analytics and deployment tools. Businesses should know the right time to adopt 5G to enable them to compete better, improve operations, and create new products and services.

5G and edge is still evolving. While countries across North America, Europe and Asia have started its commercial deployment, India's premier CSPs have indicated their preparedness to launch 5G services in 2021, which could usher in a new age of digital transformation in the country. As the device ecosystem develops further, we will see industry moving from pilots and trials to higher adoption – with expected mass adoption from 2023 or 2025.

In this scenario, 5G and edge clearly appear to be the pathway for creating real socio-economic value in Industry 4.0.

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5G can transform socio-economic fabric of the society

The new technology will allow the TSPs to open new avenues to services, beyond the normal voice and data

BY HEMANT KASHYAP

The next generation of connectivity will help telecom service providers (TSPs) move beyond connectivity and collaborate across the sectors to deliver new and rich services to the consumers and enterprises alike. Highlighting this at the recently held Voice&Data 5G Conference, Telecom Regulatory Authority of India (TRAI) Secretary V Raghunandan said that 5G had immense transformative capabilities across multiple aspects.

He tipped the telcos to go on and develop strategic partnerships in sectors such as finance, agriculture,

> The new telecom technology can provide millions of rural Indians with access to opportunities they were deprived of till now.

> 5G networks will give farmers access to bigger markets and forge a closer link with farmers and consumers, which was not earlier seen.

transportation, health and so on. Delivering the Special Address in the inaugural session, Raghunandan said that 5G will not only supply higher data speeds and capacity at lower latencies, it will also do so efficiently. He also pointed out that 5G will improve energy efficiency, spectral efficiency, network efficiency and efficiency of other systems.

The TRAI Secretary further said that 5G will allow the TSPs to open new avenues to services, beyond the normal voice and data. Internet of things (IoT), artificial intelligence (AI), augmented reality (AR), virtual reality (VR) and user experience related technologies were some of the non-telecom applications of 5G laid out by the TRAI secretary.

Rural India a priority

Highlighting the socio-economic transformation that 5G will bring about, Raghunandan said that the new telecom technology can provide millions of rural Indians with access to opportunities they were deprived of till now. "This will ensure a positive growth curve for the rural economy and remains the area with the greatest potential," he added.

According to the latest TRAI data shared by Raghunandan, there are about 534 million rural mobile broadband subscribers in India, which the TRAI Secretary pointed out represents almost 60% of all mobile subscribers in India.

He also mentioned that since agriculture and related verticals remain the primary business for most of the rural population, 5G can help in many ways. "5G networks will give farmers access to bigger markets and forge a closer link with farmers and consumers, which was not earlier seen," he stated.

Government's connectivity initiatives

Sharing details of the significant government policies aimed at facilitating deployment of the new generation of mobile networks, Raghunandan touched upon the National Digital Communication Policy that was announced in 2018. He further said that the government sought to facilitate the development of new use-cases for the next-gen mobile networks via the policy, including AI, machine-to-machine (M2M), AR and VR.

Next, he talked about the government's efforts of building an end-to-end 5G test bed, an initiative introduced in 2018. The three-year program, he said, had a budget of around Rs 224 crore. The program sought proof of concept (PoCs) for 5G compatible with the global standards. He ran the audience through the progress leading to the imminent rollout; first, DoT issued guidelines in June 2019 and by May 2021, 5G trials were underway across three spectrum bands.

Addressing the connectivity issues faced by the rural India, Raghunandan said that out of over six lakh villages, 33% were in Odisha and Arunachal Pradesh alone. Drawing the attention to the same, he then spoke about the government's flagship program – the BharatNet.

"The broadband project is the world's largest rural broadband project, aiming to connect all of the villages in the country," he said adding that out of the 2.5 lakh gram panchayats, 1.6 lakh have already been connected to the BharatNet. The TRAI Secretary also informed that over five lakh kilometers of fibre have already been laid across the country, while more than one lakh Wi-Fi hotspots have been installed. He also highlighted that more than five lakh FTTH connections were functional in the country that had about 15 lakh active users as per the May 2021 data, while 2.7 million GB data was used.

The TRAI secretary then talked about PM-WANI, the Wi-Fi Access Network Initiative by the Government of India. Cleared in 2020, the project will include PDOs, multiple industry players and others to set up a network of Wi-Fi Access hotspots across the rural India. It will be a cost-effective measure to extend the Digital India vision.

Lastly, he also mentioned that the ever-growing satcom industry has a big role to play in connecting India. "Though the affordability is a concern for the time being, it will surely help in furthering the mission to connect the entire country," he concluded.

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[REPORT]
5G CONFERENCE

"It's time for the shift from 4G to 5G"

Time is just right for the government to support the industry meet Digital India's ever-increasing quest for higher speed – the 5G

BY HEMANT KASHYAP

In his keynote address at the 3rd edition of Voice&Data 5G Conference Bharti Enterprises Vice Chairman Akhil Gupta said that it is a major evolution in the ever-increasing quest for higher speed by the customers. He added that everyone has to double up on 5G.

Gupta addressed the question whether there were enough use cases in the Indian scenario for deploying 5G. He mentioned two of the most important use cases for 5G that already exist. "First, the mobile phones," he said, "and it's time for the shift from 4G to 5G to start happening."

Secondly, he referred to the NDPC, saying that 5G will enable the mission to provide broadband to everyone. He said while it was "virtually impossible" to provide wireline connectivity across the country, wireless remains the only possible solution. He said that India needs 5G to provide connectivity to every nook and corner of the country.

Then he also addressed the deployment strategy for 5G in the country; whether telcos should limit it to cities or should it be a mass-market thing. He said that 5G will have to be mass market.

He listed out three pre-requisites for that to happen: coverage, affordability and infrastructure. Referring to NDPC, he said that the government's aim was to spread connectivity with 5G, rather than increase revenues. He called on the government to provide at least 100 MHz of spectrum and recommended that the floor price of the spectrum should be at a low level.

The Bharti vice-chairman said that the ball is in the government's court now; if 5G is to be a mass market phenomenon, government needs to look at the quantity and pricing of the spectrum. He further added that government should introduce "stringent rollout obligations" in order to avoid spectrum hoarding.

Referring to the recent TRAI recommendations on broadband and satcom, Gupta expressed the hope that DoT and states will implement the same. He said that for quick infrastructure deployment, these recommendations and their implementation is key; the infrastructure can become a bottleneck and telcos would seek to avoid the same, he added.

Financial health a major concern

Gupta added that the success of 5G depends solely depends on the financial health of the telecom industry. Talking about the much-awaited telecom relief package, he expressed hope that the cabinet will approve of the same. Notably, this came at a time when the DoT is about to present the same at a cabinet meeting, most likely today. He said that the sector's financial health is vital to keep industry players investing capex and opex for 5G.

He also addressed the "unsustainable" tariffs in the country. He said that since operators can't do the same on their own, government needs to introduce a floor pricing. He said the floor pricing can be for a limited time, till the industry stabilizes.

Gupta called the telecom sector the "backbone" of all technological development in the country, "and therefore, this (telecom relief package) cannot wait more," he concluded.

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"5G will herald Industry 4.0 era"

The new generation of mobile technology will help the sector acquire data, as also to react to it accordingly, with the help of AI and ML

BY HEMANT KASHYAP

Delivering the industry keynote at the Voice&Data 5G Conference Dell Technologies Director and CTO (Telecom) Saurabh Tewari said that 5G will herald the fourth industrial revolution. "Industry 4.0 will transform every vertical," he said highlighting the transformative power of the 5th generation mobile network.

Talking about the changes that 5G NR can potentially bring, Tewari first mentioned the general statistics related to the performance of the network; the throughput, the handover rate, the latency and so on. He showed that at every aspect, 5G truly becomes a generational shift. For instance, the throughput increases by a factor of 10 from 4G to 5G. At the same time, latency decreases by a factor of 10 as well.

Sharing insight about data across the edge of networks, Tewari said that according to a 2018 study, data sphere, driven by 5G, IoT, Edge, and artificial intelligence (AI) will reach 175 zettabytes by 2025 annually. He also pointed out that this could increase to 200-250 ZB given the pandemic-fueled increase in data consumption. Out of the 175 ZB, 90 ZB will come from IoT devices, all of which will be realtime consumption.

"5G with Multi-access Edge Computing (MEC) will deliver transformation across all industry verticals," he stated.

Driving revolution in manufacturing

Tewari pointed to manufacturing as a key industry vertical for 5G and IoT. "5G is going to play a major role in manufacturing," he said, adding that it will help the sector not only acquire data, but also to react to it accordingly, with the help of AI and ML. He illustrated the application of the reduced latency; it can enable factories to locate faulty parts and remove them from the production line to avoid defective products.

He introduced predictive maintenance, adding reliability to the manufacturing process. With lower latencies, industry can coordinate manufacturing "to a degree that has never been possible in the past." This potentially will reduce the time it takes for a product to reach from the production line to the customer. Also, it can dampen the effects of any shocks the supply chain faces; in the post-COVID world, the industry has to be prepared.

Tewari then introduced Dell's telecom products that were recently introduced in India – PowerEdge XR11 and XR12, the edge computing servers. He said that these servers had a wide horizon of use, are rugged and "do not compromise on the standard and security."

"Dell is working with all industry verticals to create products which will essentially work in close coordination with 5G networks, and create solutions that will pretty much transform any industry vertical," Tewari concluded.

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[REPORT]
5G CONFERENCE

The big economic booster

5G can make a lot of difference but it's time the telcos started developing India-relevant use cases in areas like agriculture and smart cities

BY HEMANT KASHYAP

The telecom sector will contribute nearly 8% of the GDP in coming years with India's per user per month mobile data usage growing to an astonishing 14 GB, said P Balaji, Chief Regulatory and Corporate Affairs Officer, Vodafone Idea Limited. Speaking at the inaugural session of Voice&Data 5G Conference Balaji said that during the pandemic, the industry witnessed accelerated digital adoption. He also reiterated that telecom sector was the lifeline of the Indian industry.

Balaji added that Vodafone Idea, per Ookla speed tests, delivered the fastest 4G in the country for the majority of the year. He said that VI's focus remains on 4G proliferation even though the telco is participating in the ongoing 5G trials is working to deploy it.

Highlighting the transformative nature of 5G, he further said that the fifth generation of mobile technology will connect billions of machines. He also listed some of the key use cases of the new generation of networks saying that 5G will fast track India's digital economy. He added that it will enable India to achieve the target of USD1 trillion digital economy as set by the NDPC, in the coming years.

VI's 5G plan

Drawing attention to VI's 5G venture, Balaji said that India's third largest telco has deployed one of the fastest dynamic spectrum refarming (DSR), massive MIMO, OpenRAN and core and access on the cloud. He also said that the telco has deployed 5G-ready equipment on both radio and access across the country. He also pointed out that VI's trial 5G networks are live in Gandhinagar and Pune, saying that the telco has developed the entire ecosystem to develop India-specific use cases.

Balaji highlighted Vodafone Idea's IoT business, describing it as a strategic move. He said that 5G will be a joint, synergic exercise between large enterprises, TSPs, government and startups.

Talking about the key for a successful 5G rollout, the telecom industry veteran said that telcos need to develop India-relevant use cases for the network in areas like agritech, smart cities, and so on. Second, he talked about the NDCP and the investments under the same. He said that according to the policy, the sector is to see USD100 billion investments. However, given the "financial stress", the same has been hard to come by.

Vodafone Idea has also mirrored Bharti Airtel's call to the government regarding the pricing of the 5G spectrum. Balaji said that the government needs to ensure that 5G spectrum becomes available at a reasonable price; "spectrum will be the raw material on which 5G will be built on," he said.

The Vodafone Chief Regulatory and Corporate Affairs Officer said that the telco would also like to have the backhaul sorted via ENV spectrum sale. Interestingly, Balaji also called on widespread adoption of global 5G standards, rather than the indigenous 5Gi, which has been a bone of contention between telcos, mobile handset manufacturers and TSDSI.

"The Indian telecom industry has been a hot bed of innovation, and as I see it, this will only accelerate as we set course for 5G," he stated.

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5G is much more than a generational shift

The entire telecom infrastructure needs to be renewed in order to utilize the power of 5G, says Pradeep Gupta, Chairman, CyberMedia Group

BY HEMANT KASHYAP

The next generation of mobility will have a far-reaching, mind-boggling, and profound impact of on everyone's lives, said CyberMedia Group Chairman Pradeep Gupta. He was addressing the inaugural session of the 5G-centered conference organized by Voice&Data. Welcoming the participants at the conference Gupta highlighted that 5G will usher in transformation across a wide variety of verticals and industries.

"It is much more than a generational shift," he said, adding that while 5G represents the next step in mobile telephony, it is barely limited to that. "We are talking about a completely new technology," Gupta stressed, pointing out that the entire telecom infrastructure needs to be renewed in order to utilize the power of 5G.

Gupta also mentioned the innovation in the use cases being developed for 5G. He reflected on the progression through the generations, starting from 1G. He further said that each new generation makes a lot of new applications possible and 5G will achieve the same.

"There will be a new era that will start getting ushered in due to 5G," Gupta said.

5G will change lives

Highlighting telemedicine and remote surgeries as an example, he touched upon the low latency promises of 5G that promises to makes it possible. "The kind of machine-to-human interaction that we are going to see will be of a completely different level," the CyberMedia Group chairman said.

Gupta also added that 5G will enable smart cities and one should expect to see autonomous vehicles finally become a reality; 5G's high speed, data capacity and low latency enables that, he stated.

He also mentioned that 5G will alter the way how governments interact with their people across the world, as a result of the new use-cases being developed. "5G, in its very essence, is something, which is going to be transformational like never before," Gupta concluded.

Generating synergies between private sector and government

While talking about 5G, Gupta pointed out that the industry will see a whole new infrastructure and a wide variety of network types. As such, he noted that the government and the private sector have worked together in 5G "right from the outset".

He further added that because of these synergies, India has taken technological leadership in many aspects of 5G. "That is something that can be done, because this is an emerging technology. "We can actually drive the various changes that are going to go ahead," he said.

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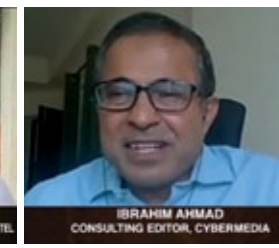
WELCOME NOTE

INAUGURAL SESSION

Session-1: Building a secure and resilient 5G Infrastructure

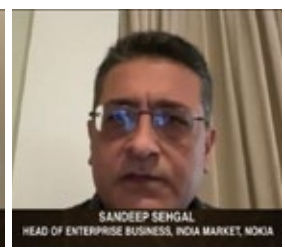
Session-2: How to align network slicing and private networks



Session-3: Building flexible fronthaul to deliver 5G

Session-4: Redefining Consumer Experiences with 5G

Session-5: Reaping RoI from private network investments



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The U in 5G – coz the keyword is use-case

Building a secure and resilient 5G Infrastructure – why, how and by when?

BY PRATIMA HARIGUNANI

A panel discussion at the Voice&Data 5G Conference on 'Building a secure and resilient 5G Infrastructure' talked about many significant aspects for the infrastructure that is critical for rolling out 5G services in India. The first question was the most poignant, uncomfortable and important one. Moderator Sunil Rajguru, Editor, PCQuest and CIOL argued how 5G is a capital-intensive proposition which can be a

"5G deployment at the network level would be gradual. On the operator side, it will be purely based on ROI. 5G will start from cities and slowly reach the rural areas."

Dr Rajkumar Upadhyay, Executive Director, C-DoT

Considering the cost and complexity of 5G, especially in India, the important aspect is – how will it affect an average user and the industry at large.

logistics challenge when we think of a nation-wide 5G grid, especially in the era following COVID-19.

Yes, 5G infrastructure requires a monumental shift. "There are some tectonic shifts in terms of IT and cloud. Considering the cost and complexity of 5G, especially in India, the important aspect is – how will it affect an average user and the industry at large. Unless use cases of 5G mature, the commercial case around huge expansion of 5G may not make much sense."

5G will start coming in pockets, he surmised. "Perhaps slowly and steadily, a little later, it will spread much faster. Remote surgery, drones, self-driving vehicles etc. – some of these can be adopted by India in near future but many use-cases will take a long time."

What can people do with 5G beyond what is being done with 4G, is what we need to confront, seconded Harsha Ram, Network Business Unit, Sify Technologies Ltd. "In India people are still trying to figure that out. It is not just a connectivity issue. It is a larger issue and a transformation aspect. It will not be an easy and overnight shift. It can stretch out for a period of time. In India 2G networks are still running. So 5G will not be a big step but more of an evolutionary journey."

"We see the whole nine yards of architecture for 5G. We will have a large number of base stations, small cells for very low latency and very high throughput."

Gulshan Khurana, EVP – Transmission & Core Planning – Technology, Vodafone Idea Ltd

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"5G is a capital-intensive proposition which can be a logistics challenge when we think of a nation-wide 5G grid, especially in the era following COVID-19."

Sunil Rajguru, Editor, PCQuest & CIOL

This evolution from 2G to 3G to 4G has been more about the band-width but 5G would be about industry level advancements, added Gulshan Khurana, EVP – Transmission and Core Planning – Technology, Vodafone Idea Ltd. "We see the whole nine yards of architecture for 5G. We will have a large number of base stations, small cells for very low latency and very high throughput. To add to this, we would have a strong back-haul, a lot of slicing, cloud-native core applications and a lot more. So 5G is bringing evolution to every aspect of ecosystem. All this will take time for us to completely mature, even though trials are already being done."

Dr Rajkumar Upadhyay, ED, C-DoT said that while 5G will need spectrum, it will need ways to be deployed with new transmission infrastructure, small cell set-ups, fibreization etc. "For all of this, a lot of money needs to be spent. So, deployment, in my opinion, at the network level would be gradual. On the operator side, it will be purely based on ROI. It is heartening to see that 4G penetration in India is good. 5G, too, will start from cities and slowly reach the rural areas."

The panel also touched upon issues of data privacy, data localization and security. For this concern, a number of arguments and suggestions emerged. Like how distributed, software-defined digital routing, a very high level of automation, a stack running on a cloud, edge systems, and other such novelties could further create challenges. That scenario opens up a new can of vulnerabilities that get lifted-and-shifted in a 5G environment. To have a robust IT infrastructure, solid firewalls with strict access controls would be a key step here, along with high-quality encryption standards. This will need a whole of heavy-lifting and a built-in approach to security. Enforcement of data protection regulation and having our own core infrastructure would also become important.

The cost of spectrum, the investment, and digital democratization are some issues we will grapple with and get better on – with time, the experts assured. Some experts even suggested that we can take a leap ahead towards 6G and 7G. Finally, the socio-economic impact on India was also addressed – especially at a ground level. The panel explained that education, healthcare, smart cities, manufacturing with Industry 4.0, global competitiveness, among other things will see an increased role of 5G.

When does the investment go in and how soon the use-cases develop, is all that we need to work on now. The sooner the better and with a strong "U" there.

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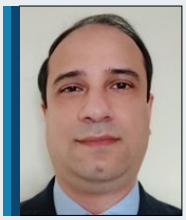
Network slicing – the right way to deliver 5G

As telcos look for solutions to garner maximum return from their 5G network investments, here is a solution that makes it a win-win proposition.

BY HEMANT KASHYAP

Network operators have transformed their networks from hardware-centric to software-centric. By being able to use each network function as an application, these developments have allowed network operators to create network slices that provide service assurance by creating virtual wireless networks as part of the overall wireless network, as also bringing in greater speeds, lower latency, greater capacity, ultra-reliability, and greater flexibility in the network operations and more.

According to GSMA, by 2025, operators can expect USD300-billion opportunity driven by network slicing that will enable them to separate the business traffic



"Slicing a network essentially means that a network operator logically separates different topologies based on the use case, and the priority."

Saurabh Tewari, Director & CTO (Telecom), Dell Technologies

from general internet traffic, the bulk of which will come from manufacturing, logistics, and automotive sectors. However, for this to happen there is also a need to align network slicing and private networks. The technology panel discussion at the Voice&Data TLF 5G Conference discussed the trends in network slicing, and what all it makes possible, along with challenges to overcome on the way to that. The session was moderated by Ibrahim Ahmad, Consulting Editor, CyberMedia.

What makes slicing possible?

"I think 5G is the first generation for enterprise. I think everything revolves around what we can do with enterprise," said Pankaj Kitchlu, Systems Engineering Director (India-SAARC), Juniper Networks. Pointing to the changes, he added that the architectural shift happens more towards giving a deterministic, predictable, hands-free environment.

"I think 5G will co-operate and collaborate and bring everything together as a platform. We didn't have platforms in any of the previous generations. So far, we've had upgrades; now we have a new network entirely," Kitchlu said. Similar views were expressed by the other two panelists – Saurabh Tewari, Director and CTO (Telecom), Dell Technologies and Saurabh Mittal, Head-Solution and Integration Network R&D, Bharti Airtel.

Talking about the actual changes that will happen with the new technology, Mittal highlighted that the changes will mostly come as network virtualization, cloudification and microservice architecture. "5G-based networks have to be absolutely agile. The radio has to be agile and flexible for reconfiguring for 5G, and the transport has to be programmable to meet the required SLA, QoS and Network Topology," he added.

There has been a semi-regular trend when progressing through generations. "When you look at legacy networks – 2G focused on voice, 3G as well. Data was always an afterthought. On 4G, voice became an afterthought, as the focus shifted to data. But when you move towards 5G NR, instead of the older concept of APNs, where you would give a small IP pool, on which we could isolate certain networks, one can have a logically separated network," Tewari pointed out.

To enable slicing, networks must have automation, disaggregation and shared architectures, Tewari explained. "One big advantage of disaggregation is that it allows telcos to use network components from multiple vendors. Because of this disaggregation, you are no longer bound by what one vendor is doing. You can share the same in the semiconductor industry and implement it very quickly," he said.

Challenges to network slicing

There are several challenges to overcome before companies can implement sliced networks. Keeping services up while the transformation happens is the biggest challenge the telcos are facing. "Right now, we are changing the wheels while we are driving, which is the biggest challenge," Kitchlu stated; and rightly so as telcos remain one of the few mission-critical services, and the networks just can't go down.

To enable slicing, networks must have disaggregation. One big advantage of disaggregation is that it allows telcos to use network components from multiple vendors.

"We didn't have platforms in any of the previous generations. So far, we've had upgrades; now we have a new network entirely."

Pankaj Kitchlu, Systems Engineering Director (India-SAARC), Juniper Networks

The challenges lie in Capex, operations, product life cycles, merging B2B and B2C traffic on one network, scalability and regulatory challenges. Networks are established to enable scalability of processes. With Industry 4.0 use cases there will be billions of connected devices over a network. The real challenge lies in how to manage the said scale according to the demand of the end user.

Another issue that lies in delivering network slicing is to manage B2C and B2B traffic across the same network. "How do we manage the right level of segregation and still manage the expectations," Mittal asked, pointing out that telcos are looking at network gear vendors to ensure they meet the requirements.

One of the most significant roadblocks here are the regulatory issues. The government has not allowed telcos to ever implement QoS over network delivery. Since the whole premise of network slicing is to establish the same differences, it raises a problem. The government's decision on 5G-based slicing will decide whether or not it will become a possibility.

"All of these are going to be challenges, which we can address satisfactorily for the person that matters the most in the entire ecosystem – the customers," Tewari concluded.

Security – an inherent part of network slicing

Slicing a network essentially means that a network operator logically separates different topologies based on the use case, and the priority. "This allows for significant isolation between critical services, and consumer services," Tewari said. Therefore, slicing will in fact generate far more secure networks.

Kitchlu, however pointed that there were some aspects and operations that will fall under the untrusted zone – a network zone susceptible to attacks. "Since these operations are internet-driven and not telco-driven, this might force network providers to look to harden this untrusted zone."

Furthermore, since network slicing allows telcos to separate one aspect of a network from the rest, a threat, when detected, can be quarantined in a specific slice. Since there are no physical network aspects the slices are logical and programmed into the network. Hence, the attackers can't compromise anything more than the particular slice which they attacked.

However, the era of a point security has ended with centralized networks. As networks decentralize and get closer to the edge, the security needs to be connected as well. "I think the real-time nature of the services need real-time reinforcement. It isn't easy. If there's detection, there's a compromise. There has to be some sort of connected policy," Kitchlu said. What's more, with 5G, or any new generation in fact, higher bandwidths bring with them more threat surface area. "Now, physical securities can't be guarantees," Mittal added.

For a while now, network security had been the last thing on the agenda. However, as the industry panel confirmed, the industry now looks to create networks with security as an intrinsic aspect. "So, security will be the least of our concern. But too much security can be a bit of a concern," Tewari stated.

Slicing – an exercise in cooperation

Since 5G will usher in the era of private networks, and user-specific use cases, cooperation will form the bedrock of optimum service delivery. Therefore, the customers, especially the enterprise, need to closely collaborate with network SPs to get the best out of networks. Slicing will make a lot possible, besides just differentiating QoS.

"Only time will tell how things will unfold. But I am sure that there is need for much more collaboration with the B2B customers."

Saurabh Mittal, Head-Solution and Integration Network R&D, Bharti Airtel

Telcos understand that they have to interact with their enterprise customers; to sit and deliberate on the customers' demand in order to create a network slice capable of meeting the said demands. "Only time will tell how things will unfold. But I am sure that there is need for much more collaboration with the B2B customers," Mittal said.

"If we have to get an industry-specific use case consumed, you have to have an expert from that industry. It is very important that collaboration in 5G happens in multiple spheres," Kitchlu said. Of course, network operators don't know anything about telemedicine, or disaster management. As such, there has to be a doctor and an NDRF person on board to assist telcos with delivering what is needed. That makes deploying the new network a much more exciting, and collaborative exercise.

On the same matter, telecom vendors and telcos are looking at the use cases they can develop with 5G. This will allow them to monetize more of their assets and get a decent return on their capex. Added Tewari: "I'm sure that everyone involved in the telecom sector is working together in making that ecosystem more and more secure, scalable and very, very high performance. As each and every product is secured, you end up securing the entire ecosystem."

> Industry 4.0 will add billions of connected devices over a network. The real challenge will be to manage the said scale according to the demand of the end user.

"Rather than keeping the promise of continuity, this is the promise of disruption, of disaggregation, of change," Kitchlu concluded.

Too much, too good thing

People within the telecom industry have repeatedly voiced an opinion that creating too many slices can lead to network underutilization. However, experts seem to think that is not the case. Unequivocally, the expert panel had said that the whole premise of network slicing is to increase network utilization.

Basically, a network slice creates a shared network for every single use case. This slice is logical; that means that network administrators can modify the algorithms and parameters of a slice as they wish. Therefore, this will lead to an improved overall network structure.

Right now, the network service providers are waiting for the 3GPP Release 17 for more standardization related to network slicing. Since the process still remains a work in progress, the industry believes that with Rel 17, they can implement slicing more efficiently.

"Slicing is endlessly customizable," Tewari highlighted as he talked about the best practices for network slicing. "So, you need a very strong feedback mechanism, which the upper layers of the network can consume and take a decision from," he added.

Essentially, creating slices will allow telcos to deliver capabilities. It can be a drone supply chain, or a person streaming 8k content. Everything will happen on the same network, albeit on different slices.

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The front foot forward

Building flexible front-haul to deliver 5G – is it easy, is it worth it, is it happening? A panel finds out at the conference on '5G Driving Transformation'

BY PRATIMA HARIGUNANI

The kind of latency and reliability that advanced 5G applications hinge on needs a specific architecture approach. Is front-haul a new media term then or is it a foundational aspect for disaggregation and impact for 5G? A panel discussion at the Voice&Data 5G Conference dug deeper into that question.

What are the changes we need as we segue from 4G to 5G, especially for legacy players and from a front-haul angle, asked Vikram Tiwathia, Deputy Director General, COAI. The panel unlocked some interesting peeks here.

"Yes, we have a high level of legacy in terms of towers

"5G is all about flexibility. It has high requirements in terms of latency and throughput, in an end-to-end way. That makes a flexible front-haul essential here."

Ankur Chauhan, Head R&D Engineering, Airtel

"We do not want the neck to become the bottleneck. As we start to migrate to 5G, there should be enough flexibility to make the transition."

Digvijay Sharma, Senior Director Sales, Ciena Communications, India

and uses of existing technology," averred Sandeep Dhingra, CTO – Network Software and Services, STL. "When you have to move to modern protocols, flexibility is key. One cannot just throw away one's legacy. It is going to be a process, a migration, a form of co-existence. That's why we need flexibility to support both – the existing and what is coming. Here we need disaggregation too. Flexibility with front-haul is essential to steer this change. There is also a mid-haul and cross-haul part here."

5G is all about flexibility, echoed Ankur Chauhan, Head R&D Engineering, Airtel. "It has high requirements in terms of latency and throughput, in an end-to-end way. That makes a flexible front-haul essential here. It can adapt to scenarios in which network is operating right now. It is going to enhance the experience of the user."

And, interestingly, for industry players there can be implications on ARPU too. Digvijay Sharma, Senior Director Sales, Ciena Communications, India shared. "We do not want the neck to become the bottleneck. As we start to migrate to 5G, there should be enough flexibility to make the transition. For ultra-low latency, high-bandwidth use case, this front-haul should be able to adapt to the needs of various applications."

The experts also talked how the split with CU, DU etc. helps. "The control and management are also getting split. This opens a lot of possibility for applications as a lot of cycle time is preserved. Compute resources sitting at DU itself open a lot of scope for new applications which can be highly latency-sensitive like security, facial recognition. Of course, there are always creative minds that can explore new service revenues with new applications," argued Sharma.

RAN also needs to be flexible, reminded Dhingra. "When we talk about revenue opportunities, 5G opens up

> 5G opens up new enterprise opportunities. Besides, there would be a great opportunity for consumer side, which needs a flexible front-haul.

"Legacy networks are run by managed service providers. With those SLAs and the way they run networks, multi-vendor synchronization may increase complexities."

Vikram Tiwathia, Deputy Director General, COAI

"We need flexibility to support both – the existing and what is coming. Flexibility with front-haul is essential to steer this change. There is also a mid-haul and cross-haul part here."

Sandeep Dhingra, CTO – Network Software and Services, STL

new enterprise opportunities. Besides that, there would be a great opportunity for consumer side which needs a flexible front-haul. Substantial fibreiztaion is required for front-haul and mind-haul."

But would multi-vendor ecosystem help here, asked Tiwathia. Chauhan opined that split architecture provides an opportunity for different vendors to interoperate with each other. "The final impact should remain intact with a good end-to-end QoS. Different vendors have different engineering designs. They have to adapt to each other. That's where flexible front-haul becomes even more important."

However, legacy networks are run by managed service providers, so far. With those SLAs and the way they run networks – would multi-vendor synchronisation increase complexity or benefits, Tiwathia wondered. "Components from different vendors open up opportunity for various innovations. Solutions can be customized for different operator requirements. Yes, it does come with its own complexity. That's why we segment it in different parts. Each segment follows its own portion of SLA. Despite some level of complexity, we see more benefits than challenges in end-to-end experience." Chauhan explained.

> With more software-ization of network, the fibre-in-the-air trend, and the 5G impetus – there is a lot of potential for Indian start-ups.

And India's software prowess and self-dependence are going to be remarkable in this shift. With more and more software-ization of network, the fibre-in-the-air trend, and the 5G impetus – there is a lot of potential for Indian start-ups to leverage this whole move towards the front-haul. Disaggregation of hardware and software is going to be a great step now because here the real magic is in the software.

The panel hinted at a scenario where there is emergence of not just great applications, an elevated user experience but for a new interoperable industry paradigm as well as the big opportunity to leverage India's software edge.

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5G – A transformational technology for the next decade

The new telecom standard ensures better connectivity and cloud, the key component that allows economy to touch every aspect of human life

BY HEMANT KASHYAP

At the Voice&Data 5G conference, Huawei Technologies Senior Global Director Emmanuel Coelho Alves talked about 5G and the future outlook of technology. Interacting with CyberMedia Consulting Editor Ibrahim Ahmad in a fireside chat he highlighted that connectivity is a must to enable organizations and the society working. He also pointed out that one of the key aspects of the new network, broadband access, can help in this regard.

"While work from home has become more of a reality than ever before, the next-gen networks can benefit in two ways," Alves stated, explaining that the end-users can benefit from the obvious upgrades, that is, better

> 5G is still a young technology, so more will come from it. Users and the industry need to have patience.

speed, lower latency; the works. "From a telecom player's perspective, this gives them all the more ways to sell the new technology," he pointed out.

Alves also said that he expected that working from home will also continue in the future, pandemic or not. Mentioning the rapid rise in e-commerce, the Huawei Senior Director said, "If you do e-commerce, you need connectivity. Digital transformation has been ongoing for the past few years. However, it has sped up over the past few months. I believe that every country is getting ready, putting it into practice and making the right policy for the industry."

More than just connectivity

When asked how 5G will connect the world, Aves was quick to point out that the next-gen networks will not limit themselves to connectivity. Two of the key deliverables, along with connectivity, remain content and cloud, for the consumer perspective. He added that enterprise had its own share of use cases. He also mentioned e-learning and video conferencing as two of the most in-demand use cases of connectivity for now.

"On the residential, it can be for e-learning and e-training, for students and other people alike. On the enterprise side, video conferencing has become the norm over the past year or so," he said.

"5G is not only about connectivity; content and cloud will play a key role," Alves said. Highlighting the key role of cloud in connectivity, especially with 5G, he pointed out that one needs both cloud and connectivity. "One can't exist without the other. And when you get both, you can touch every aspect of our daily lives."

5G is going full steam ahead

Prodding Alves for more Ahmad asked him about the active deployments across the world. "There are already more than 70 5G networks active across the world right now. They are targeting different applications. Most of them are addressing video and some new services as well. Some of these services have already been touched in 4G, such as gaming. We see countries in Europe, Asia and Middle East have some of these services. There are some use cases that are from the residential market, and some are for the enterprise market," Alves replied.

He further pointed out that the next-gen commercial services will seek to bring the best of both connectivity and cloud. Talking about broadband as a 5G use case, he said that it is something that one can see happening in quite a lot of countries. While Alves called broadband to be a good 5G use case, he said that the same wasn't the only choice operators have. "Eventually we will have multiple choices to suit the consumer," he stated.

"Of course, 5G is still a young technology, so more will come from it," he said categorically adding that users and the industry need to have patience.

Content – made for 4G, championed by 5G

Alves also talked about some of the most important use cases of 5G. "I would put video on the top of my list," he said while adding that even though 4G has already done it, 5G can extend what its predecessor has achieved.

Talking about video, he said that new use cases such as AR/VR solutions can really benefit from 5G technology. Further adding on the video-based content use cases, he said that it (5G) covers video for streaming, for AR/VR solutions that we can expect to see soon. "It can also see IPTV solution. There is also some work going on in broadcasting. There are a lot of capabilities that we are trying to leverage around this video use case."

He also talked about gaming as an intriguing use case for the next-gen networks. "Gaming comes next. Mobile

> I would put video on the top of my list. Even though 4G has already done it, 5G can extend what its predecessor has achieved.

> With cloud gaming coming in the picture again, the low latency and high speed of 5G can make gaming ultra-reliable and highly decentralized.

gaming will definitely attract attention from countries, operators and third-party service providers alike," he said. Of course, with cloud gaming coming in the picture again, the low latency and high speed of 5G can make gaming ultra-reliable and highly decentralized.

Talking more on low latency, Alves mentioned a lot of enterprise use cases that can leverage the same. "I could mention capabilities harnessing the low latency, such as sensors, maintenance, early detection of faults and defects, cameras for production lines, to reduce human intervention," he said.

He described a use case that can help with automation and other Industry 4.0 applications. "The real time footage of the production lines can be uploaded to a cloud system, which can then process the same and check if there are any defects in the products, and to make a decision."

Again, advising patience, Alves made a point to say that many 5G use cases are "longtail"; it will take a while to figure out how telcos can leverage 5G. "There will be more use cases to come, and there will be some use cases that haven't been talked about today, but will exist in the future".

Bumps on the road

While 5G has not garnered the best of publicities, there are some concerns regarding the infrastructure. Of course, 5G demands upgrades, and it can use legacy infrastructure. Still, Ibrahim made a point to address the same.

According to Alves, "We do have sometimes what I would call bump on the road. So, that is something that we do have to overcome. In cities, it is not easy to get [telecom] sites. "You need to get access to sites, regulators' approval, and spectrum. It is not a simple job."

Talking about India's 5G roadmap, he said that Huawei Technologies believe and is seeing the early roadmap that India is developing for 5G. "I believe that it is a positive trend and it just needs to go on."

Delivering true 5G

Alves delved deep in the capabilities that the networks required to deliver a proper next-gen experience. "On top of the spectrum, which is the baseline for 5G deployment, there are some technologies which are required for commercial 5G networks."

First, he talked about massive MIMO. Currently, all the three telcos in India – Reliance Jio, Bharti Airtel and Vodafone Idea – have deployed massive MIMO in their networks across circles. Introduced in 4G, this technology allows delivering network capacity higher by a factor of 10, he pointed out adding that the new networks will need a combination of spectrum and massive MIMO.

"The main advantage of massive MIMO is capacity; we do have advantage on coverage. So, it is a mix of both. Combining spectrum and massive MIMO gives (operators) a powerful radio pipeline, which gives multiple possibilities to deliver services."

Next, he talked about backhaul, highlighting that while microwave can connect base stations to the network core, telcos still need a good amount of spectrum. He said that fibre can also help with the same. "This is the base to delivering 5G; getting spectrum, using massive MIMO and a solid backhaul," he concluded.

Safe 5G, green 5G?

Most of the bad press the next gen networks have received is down to the apparent safety issues. During the peak of COVID-19, many blamed 5G as a culprit in spreading the virus – a virus, I may add, that was biological in nature. WHO had rebuked the same shortly thereafter; in India too, industry groups like COAI had called the claims "baseless".

This was also something that Ibrahim addressed in the fireside chat, asking questions about the safety and energy efficiency of 5G.

"First, lets us talk about safety. Definitely, 5G is safe. Not a single country has a policy to control [radio] emission. This has never been done in the past, either," Alves said. He added, "We believe that as of today, we have done enough research that we have done from the past, to guarantee the safety of the network. There are safety solutions in place that can be beneficial to the society".

> Combining spectrum and massive MIMO gives operators a powerful radio pipeline, which gives multiple possibilities to deliver services.

Coming to the energy side of things, he pointed out that it is something that one can see across every industry today – to deliver services and make products at the lowest possible use of energy. He also reflected on the efforts of the industry to deliver 5G by using the least energy possible. "We, in the 5G industry, have the duty to deliver 5G at the lowest possible energy [use]. In the US, the [federal government] has said that energy efficiency has been shortlisted as one of the key requirements for 6G. So that is something we need to take care of," he said.

Selling 5G

The case of Vodafone Idea has been a real eye-opener in regard of the fragilities of the telecom sector. The key reason for this close call can be put down to one factor – low ARPU levels. ARPU is a highly critical aspect of any telecom player. However, India's top three telcos are averaging an ARPU of Rs 129.33, which is nothing impressive. Alves, however, said that operators can find a wide variety of ways to sell 5G.

"From a consumer point of view, operators can leverage more ARPU with the help of not only speeds, but also content in the form of video, gaming, by partnerships, and so on. Operators can bundle together different [levels of] connectivity with different types of content," he said, adding that the same was happening in many markets. "On top of this, the enterprise segment can be offered various connectivity solutions by the verticals."

He concluded that 5G will create more selling points for the operators, given its wide applications and diverse capabilities. "In fact, 5G will increase the possibilities, the ways to sell it to the end users. Use cases will be very important; depending on what is the target, the price can be related to the service that you [operators] can offer."

Private networks – a story of hybrids

One of the most exciting enterprise use cases remain private networks. Companies have had private networks since forever; with 5G, however, businesses can achieve a lot more than just internal emails and logs. The next-gen networks can facilitate automation to an unprecedented extent. The low latencies can allow for AIoT/IoT-related applications that have never been implemented before.

"Operators are implementing a hybrid solution, a public + private network. At the end of the day, we need both. Some use cases will be possible on a private network, and some will need to have everything on public," Alves said. Citing the example of a logistics company, he said that it "might want to go with a mix of public and private network" given that it needs both coverage and low latencies.

"Operators have the ability to do both – package both the public and private networks in a single, hybrid solution, allowing synergy between public and private networks."

What can 5G do for India?

As far as this is concerned, the general consensus remains that India does not need 5G. Addressing the same sentiment, Ibrahim asked Alves what 5G can do for India.

"5G, as and when it comes, will prove to be a very good fit for India and the NDCP," he said, adding that India also has one more advantage. "Telecom companies across the world are looking for scale, and India has scale. From a device point of view as well, India can cut down the price [of 5G] given the scale and the number of devices".

He also talked about how India can make use of the multiple delivery options to deliver connectivity across the country. "India is quite a large country. You can't have one technology delivering everything, so it will be more on a case-by-case basis. There will be more development on wireless in some areas, and some areas will see the same on fixed. Of course, everything will coexist to deliver everything."

"I believe one of key aspects is the ecosystem," Alves said highlighting the takeaways from success stories across the world. "If we want to be successful in this decade, you need to address the network, the connectivity, and we need content. We need content and we need application."

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[REPORT]
5G CONFERENCE

Private networks – how strong, how soon?

Reaping ROI from private network investments – a panel discussion at Voice&Data 5G Conference finds out how

BY PRATIMA HARIGUNANI

So much is happening on all fronts due to the global pandemic, disruptive changes due to technology, economic challenges and the way telecom applications have been growing – we have seen so much in the last two to three years. With 5G said to be the real game-changer across all sorts of industries and applications, we need to look ahead and see what's coming.

Ibrahim Ahmad, Consulting Editor, CyberMedia made sure that this 'looking ahead' was done from all directions and perspectives.

In this panel that was galvanized at the conference '5G for Delivering Transformation' by Voice&Data, what came out was a practical view about the private network aspect of 5G's impact.

"If there is a moving train, how can you measure its parameters, it's not easy. That's where private LTE becomes a game-changer."

Sandeep Sehgal, Head of Enterprise Business, India Market, Nokia

"The systems should be able to work seamlessly in tough environments like mining with dust and temperature. A solid business case has to be built around that."

CK Prasad, Regional GM and Head IT, RailTel

"It is important is to confront security from a preventive stance and to properly start talking about health and environmental aspects."

N K Goyal, Chairman Emeritus, TEMA & CMAI

Sandeep Sehgal, Head of Enterprise Business, India Market, Nokia pointed out that internationally there are more than 350 deployments which Nokia has been involved in, and multiple sectors like mining, ports etc. where Nokia has seen a lot of excitement. With the industry moving towards 4.0 there have been challenges because using traditional approach to networks is not working very well.

"If there is a moving train, how can you measure its parameters, it's not easy. That's where private LTE becomes a game-changer. We do not put a large infrastructure but a small core one that connects and transforms everything. Our own plant in Chennai is where we have ripped off many kilometres of wires that were connecting hotspots. Today all our devices and instrumentation are completely connected on private LTE. It is a reality and a great showcase of how it can be done – in terms of deployment." Sehgal added that in India many customers have understood the potential. "They have seen these examples and POCs so we are very sure that it is going to happen."

Capital intensive systems in areas like mining, shipping and Railways is where private LTE makes more sense, seconded CK Prasad, Regional GM and Head IT, RailTel. "But converging multiple services into this infrastructure is important. Payloads, operational costs,

> Getting data and to act upon it to use it for improving production cycles and output has proven to be a big advantage.

"Getting good value from the infrastructure investment will define a lot of the monetization and business-case aspects."

Deepak Kalambkar, AVP Infrastructure & CSO, SafexPay

"With 5G said to be the real game-changer across all sorts of industries and applications, we need to look ahead and see what's coming."

Ibrahim Ahmad, Consulting Editor, CyberMedia

data communication, autonomous systems, breakdown-savvy strategy etc. are important factors to consider. Open RAN system deployment and hardware choices do bring down costs. Interoperability and easy hand-over will help the scenario more. In mining areas, there is a lot of dust and temperature so the systems should be able to work seamlessly in tough environments too. A solid business case has to be built around that."

The ruggedness and compatibility of these systems with existing environments were discussed deeply and industry's readiness was explored. "There are two aspects to communication system – core and RAN. Using the existing infrastructure after studying its dark spots is something we pay attention to. We also have capex-heavy and opex-heavy systems." Sehgal explained.

As to the expectations of an enterprise and some on-ground concerns, Deepak Kalambkar, AVP Infrastructure and CSO, SafexPay iterated the cost aspect. "Installation costs would be high and will get reduced as we scale. We have already implemented Private LTE in one of our environments." Getting good value from the infrastructure investment will define a lot of the monetization and business-case aspects, Prasad suggested.

ROI and TCO is key to success of private LTE, Sehgal also chimed in. "A large manufacturing organization in India started with only two use-cases. Today, we are at a stage where the customer has, himself, got eight use-cases after understanding the possibility and outcomes. Getting data and to act upon it to use it for improving production cycles and output has proven to be a big advantage."

NK Goyal, Chairman Emeritus, TEMA and CMAI underlined some more issues and outcomes of the private LTE model. "There are two fundamental things. Technology goes on changing. From 3G, to 4G to 5G. So far, we never talked of how we will use 4G. But only with 5G we have started hearing about use-cases. Is there a need to market a use-case? Though 5G is being implemented there is 6G ahead also." What is also important is to confront security from a preventive stance; and to properly start talking about health and environmental aspects.

The G seems to be endless. Where will this end, we don't know. But the pots are not at the end of the rainbow but on it. In this colourful path of 4G, 5G, and 6G; Private LTE is a reality and not a fantasy. That's what Private LTE is morphing into – more so, with the low-latency, high experience and holistic impact that it is capable of. If business compatibility, ruggedness, costs, security etc. can be mastered well, that would lead to a good path ahead.

Time to make the most of this turning point.

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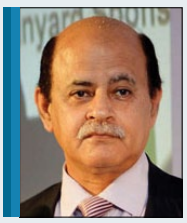
Five things for 5G

Fibre, affordable spectrum, investments, right use of software and private networks – a lot needs to be addressed in order to fully realize the potential of 5G

BY PRATIMA HARIGUNANI

The inaugural session at the conference '5G for Delivering Transformation' by Voice&Data led the tone of the conference in a quintessential way. A lot of pragmatic, salient and challenging issues were laid down by some industry stalwarts.

Talking about 'Building flexible front-haul to deliver 5G' Lt Gen Dr SP Kochhar, Director General, COAI said that 5G is an avant-garde technology which will revolutionize our world with enhanced broadband, ultra-reliable and low-latency communications. "Putting it simply – it



"To accommodate 5G, there is need for deployment of optical fibre. Presently only a limited – 33% of our mobile towers are connected with fibre."

Lt Gen Dr SP Kochhar, Director General, COAI

"The key is to go ahead with private networks. A private 5G network is a network built as a dedicated infrastructure for a private enterprise or a public agency."

TV Ramachandran, President, BIF

"As we enter this era of super-broadband, ultra latency and digital services that will fast-track every industry's journey towards digital, we will see new actors and ecosystems."

Sanjay Kaul, President-Asia Pacific & Japan, Service Provider Business, Cisco Systems

means greater speed, higher bandwidth and a boosted economy. India is gearing up to embrace this shift and 5G will be a game-changer for the telecom industry. It will stir up a lot of disruption with emerging technologies like internet of things (IoT), artificial intelligence (AI), etc. The evolution of front-haul mobile networks has mirrored the increasing reliance on optical fibre. Front-haul transmission is forecasted to triple in the next five years. This trend is driven and enabled by architectural and functional changes."

He also pointed at some imperatives that we need to gear up for. "Investment in key components of 5G network is going to be significant. The industry has been under financial stress. Despite financial constraints, telecom providers have continued to provide seamless connectivity. To accommodate 5G, there is need for deployment of optical fibre. Presently, only a limited – 33% – of our mobile towers are connected with fibre. The situation demands desperate improvements if we need to derive full gains from 5G. Although government has taken many measures there are still some gaps around. State governments should focus on a uniform policy across all states and departments."

5G will serve diverse applications for which we would need more spectrum. That is where we need to look at affordable pricing, he stressed. "We should adopt have a long-term benefits and not short-term revenue generation angle here. The industry needs to make extensive investments in towers, network capacity and other areas. The industry needs immediate relief to make the required investments and make the vision of new India a concrete reality," Kochhar said.

Underlining the importance of '5G Private Networks for Industry 4.0 and more' TV Ramachandran, President, BIF said that there is much excitement in many sections of the public in adopting the 5G impact. "To reach out to the vast and challenging terrains of the country will take effort and time. Benefits of 5G may not be available to a large section of the economy for some time. Many sectors are waiting for 5G's gains. But, should we wait that long? I would say a resounding 'No' here. The key is to go ahead with private networks. A private 5G network is a network built as a dedicated infrastructure for a private enterprise or a public agency. The assets and the network are owned by the entity; and cover only the geographical spread of that campus."

With latency reduced to considerable levels, real-time monitoring can be enabled. This raises an important question – what happens to privacy?

"Disruption is underway and players have to be smart to make the most of it. Technology will always produce new growth areas."

Prof. Amit Kapoor, Honorary Chairman, Institute for Competitiveness

He explained that ownership and dedication of infrastructure makes it all designed so carefully to meet the tight SLAs of that organization. "It is important to note that these networks do not need heavy investments. They can be built by infrastructure specialists or a telco or a combination of these entities. This makes it a win-win situation for all segments of the industry. Private networks are easy to cover reach to far areas." They also help to overcome spectrum challenges, as he hinted.

"Private networks are driven by clean spectrum, consistent and reliable coverage. They offer ultra-low latency features for time-sensitive operations and offer a seamless support for robotics. They also enable use-cases like hazard detection, AR, VR etc. 5G is part of a national critical infrastructure so security is a strong element to be considered where these networks help."

The conference also dwelt upon the important angle of 5G and Future of Internet. Sanjay Kaul, President-Asia Pacific and Japan, Service Provider Business, Cisco Systems reasoned that the world has changed forever and the way we look at our industry is something we could not have imagined a few years back. "Traffic continues to grow, full WFH or hybrid WFH is pervasive in many organizations of the world, while education and governance have become digital. Every business and service has pivoted to a digital mode. These are the forces that are truly driving us to create the future. As we enter this era of super-broadband, ultra latency and digital services that will fast-track every industry's journey towards digital, we will see new actors and ecosystems. All of that creates an opportunity."

What 5G does is, creates latency-less environment for education. This will lead to new business models in many industries too.

We still see so many people who do not have access to a decent broadband, he added as a disappointment. "We are pushing the boundaries to solve this gap. We are doing it through software innovations, silicon breakthroughs, optical innovations, embedding these pieces into end-to-end and connected systems."

Can 5G drive local innovations and start-ups – this aspect was addressed well by Prof. Amit Kapoor, Honorary Chairman, the Institute for Competitiveness. He translated how the advent of smart, connected and information-powered products is going to change the industry. "The transformation would be across industries – education etc. What 5G does is, it creates latency-less environment for education. This will lead to new business models in many industries too. He also added how bargaining power of buyers would improve and they would enjoy smarter products."

He pointed at some caution areas as well. "We will arrive in an era of system-based competition. It can also create some barriers of entry. Would it be then small players or large players getting an advantage then? Disruption is underway and players have to be smart to make the most of it. Technology will always produce new growth areas."

We cannot have ecosystems working in siloes, he argued. "With latency reduced to considerable levels, real-time monitoring can be enabled. What happens to privacy? Such questions will arise and we would need to answer them."

If 5G can be approached with all these lenses, India can certainly drive a confident and unprecedented wave of 5G transformation.

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Driving real social inclusion

While the country is on its way to roll out 5G services, for real digital revolution to happen the new technology must reach to people across rural India

BY HEMANT KASHYAP

Referring to the rural India as Bharat ONEOTT iNTERTAINMENT Limited CEO Yugal Kishor Sharma highlighted that it is unfortunate that two-thirds of the country still remains unconnected and stressed on the need to connect India with high-speed broadband to ensure digital inclusion. To make his point, Sharma showed a short clip, centered around a former runaway child, called Jameel.

The clip depicted how Jameel made making shoes his livelihood by first learning to makethem on the internet, and then selling the shoes on the internet, as well. Speaking at the Voice&Data 5G Conference he also said that India's true social inclusion can come only with digital inclusion.

> It is unfortunate that two-thirds of the country still remains unconnected. There is a need to connect India with high-speed broadband to ensure digital inclusion.

Pointing to the rural connectivity, and the lack thereof, he said that the government and the telecom sector are moving towards ensuring digital inclusion in the country. Furthermore, he said that till now, the sector has sorted out India's voice and mobile internet problems. He said that the next generation technology – 5G – will make the digital inclusion even better.

However, he said that the country now needs fibreized internet in every village. Pointing to the BharatNet project, Sharma added that the government is looking to connect every village with fibre by 2024. He likened the transformation in the transport sector and widespread electrification of the late 20th century to fibreization, calling it the information superhighway.

He said that the Hinduja Group has been working on connecting the unconnected in India. He concluded by saying that, "Internet for every villager will be the reason for their transformation," calling to the applications and services related to rural areas.

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[REPORT]
5G CONFERENCE

Getting ready for wide range of use cases

It is important to come out with new and innovative solutions. This will enabling 5G-powered companies to enter variety of markets and serviced areas

BY HEMANT KASHYAP

Indicating that 5G will bring huge number of advantages, Dr Rishi Bhatnagar, President, Aeris Communication, said that the company is waiting for India to launch its 5G so that it can create synergies with industry players and government to develop more use cases centered around the internet of things (IoT). He also talked about the company's IoT journey and how 5G will complement the IoT ecosystem.

Dr Bhatnagar talked about multiple 5G use cases which were not yet possible. He listed some examples such as autonomous cars. While autonomous cars are some way off, he said, the autonomous tractors for agritech applications can be a reality soon. He also mentioned remote surgery as another example of a use case with high demands from the network.

> While autonomous cars are some way off, autonomous tractors can be a reality soon. Remote surgery is another example of a use case with high demands from the network.

Talking about the impact on the industry and specifically on Aeris, he said, "For us, it becomes more and more important to come out with new solutions. 5G will allow the company to get into a variety of market sectors."

He added that 5G-based IoT use cases will definitely improve the overall customer experience. "The high capacity and low latency will make a lot of new use cases possible." Dr Rishi also said that Aeris was working with various testing facilities and institutes in India to test the new products and solutions that it will develop. He said that Aeris is already working in the same vein in the US, and will continue the same in India.

Touching upon the market and trends Dr Bhatnagar said that Aeris saw India as a great opportunity, and the government policy favors the companies to develop 5G-fueled digitization. He also announced the company's new product, Claerity AI, an artificial intelligence- (AI) based solution. The product was later launched at the Voice&Data 5G Conference.

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"5G is going to be a platform"

The government, telecom operators, gear makers, and others need to work in tandem to benefit from the new 5G-driven Digital India

BY HEMANT KASHYAP

5G holds the power to transform a variety of industries and allows for many use cases that were deemed impossible to achieve with previous generations, said Jagbir Singh, CTO, Vodafone Idea. Speaking at the Voice&Data 5G Conference, the telecom sector veteran highlighted that 5G will help the telcos evolve as a platform-provider of the new digital world.

Sharing Vodafone Idea's experience as a telecom operator, he said that telecom operators have till now deployed networks as a connectivity layer. "However, 5G will allow the operators to build the new networks as the platform for the digital society." Singh further added that it will transform everyone's day-to-day life.

Singh said that there were around 180-200 5G network operators across the world, covering around 500 million users. However, he said that by the end of 2026, this number will go up to 3.5 billion people. He said that this means that over the next five years, a large chunk of the population will still be on 4G. Hence, the target of the telcos now has to be to build 5G networks as a platform.

Talking about the impact of 5G and the evolving digital society Singh pointed out that in the present data-driven economy, most of the data consumption comes from consumption of video content. "Video content in India comprises of around 70% of overall data traffic," he said, further noting that 5G will take per person per month usage from the existing levels of 14 GB to 40 GB. He added that going forward this will be the key focus of 5G networks in the country. Since India's smartphone penetration is on the low side right now, 5G use cases will only be effective in high smartphone density regions. "Therefore, rural smartphone penetration is one of the most important aspects to make 5G a success," he stressed.

High speed is not enough

The Vodafone Idea CTO said that just high speed is not enough justification of the amount of investment that is going in 5G. As such, telcos need other applications for 5G to make it a worthwhile investment. Fixed wireless access remains one of the key factors to boost 5G connectivity. Singh mentioned that many of the aforementioned operators across markets have tried deploying FWA successfully. Speaking on the reason of the popularity of the FWA, he said that barring China, Japan and Korea, most of the countries do not have fibre penetration." He said FWA can provide FTTH-like performance in countries such as India, where fiber penetration remains at 3-4%.

Some of the key use cases that Singh mentioned included telemedicine and massive IoT. Talking of first, he said that rural areas will have access to better healthcare with proper FWA/5G penetration in these areas. Secondly, he said that massive IoT will become one of the most important 5G use case; he said that there will be at least 10 times the use by massive IoT as compared to consumers. He also highlighted that augmented reality (AR) and virtual reality (VR) also becomes an important use case; delivering expertise on the edge with the help of 5G can allow much faster solutions.

Finally, he added that developing 5G as a platform will be a cooperative exercise – government, telecom operators, gear makers and others have to work in tandem to successfully deploy 5G in the country.

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How can telecom network operators become 5G ready?

5G will bring in plethora of opportunities beyond high-speed wireless broadband; it will also push industry-wide business models change in the days to come

BY GIRISH GUPTA

With more and more 5G infrastructure being deployed both by network infrastructure providers and service providers to bring low-latency, high-speed data communications, 5G continues its rapid march across the globe. But it's not only about speed but delivering diverse performance capabilities with optimized network service slices. New technologies using shared infrastructure and advanced equipment will enable network operators to offer E2E network connectivity and customized services – for individuals, industries, and locations – as part of the Industry 4.0 initiative.

The ability to 'slice' the network will be the biggest potential boost of the 5G revolution, turning network operators from mere channels for communication to real

> The ability to 'slice' the network is the biggest boost of 5G revolution, turning network operators from mere channels for communication to real value-added players.

> Once 5G kicks in, operators can offer customized services to end customers with the ability to slice networks while collaborating with global technology partners.

value-added players. Near-zero latency, a larger pipeline for data, far faster internet connections, and the ability to utilize artificial intelligence (AI) on the edge of the network in conjunction with end devices are some of the well-known expected benefits of 5G. Not only this, but 5G will provide options for managing industrial internet of things (IIoT) devices and eventually change the way network operators do business. This will not only benefit operators but end-users, small businesses, enterprises, and more.

With virtualization characteristics, operators will be free to allocate, distribute, compartmentalize, or slice and dice their substantial assets as per dynamic market demand to the single end-user. Network slicing and virtualization come with their own opportunities for operators such as the ability to increase their portfolio and their profitability. Operators could deploy a network for groups including Netflix subscribers, gamers, video interfaces, and others. Operators can assign resources as needed for various purposes, thus increasing their efficiency and offering top-quality service with 5G-based virtualization.

Extending that logic, network operators could design converged networks explicitly for enterprises to connect everything untethering all possibilities of connectivity on a real-time basis combined with customized applications addressing multiple use cases of the enterprises Operators should consider developing a virtual 'intranet' by building a private network, ensuring that end customers can realign their resources to focus on their core business without any worry of digital connectivity needs of the business.

There are a plethora of opportunities offered by 5G beyond high-speed wireless broadband, provided we prepare aptly. I am highlighting a few that the industry shall look forward to shifting business models in the times to come.

#1

Become platform provider instead of communication service provider: 5G will have a disruptive impact on the telecom industry, which pushes service providers to adopt new business models and monetization strategies. Operators will not only provide connectivity to consumers and enterprise users but allow a wide range of applications. An evolution to CSP shall be as Communication Platform-as-a-Service Providers (CPaaS). I believe that the key to success for CPaaS platforms should not be calculated by traffic, but by the number of communication platforms it can offer.

#2

Customized services to enterprises: A major share of the revenue from 5G will be contributed by enterprises beyond mobility consumers. Industry experts suggest enterprise services portfolio will improve by many bounds, once 5G kicks in. Operators can offer customized services to end customers with the ability to slice networks while collaborating with global technology partners to develop applications that end-users could plug into as a one-stop solution for multiple operational needs as demand arises. These premium applications and services at the convenience of customers' fingertips will create an enhanced experience while enabling customer stickiness.

#3

Build an intelligent system to manage resources: While handling the virtual distribution of services of multiple platforms, CPaaS will require resource management via intelligent systems to ease out their operations as much as possible. The ongoing shifts in demand will need the implementation of a smart, automated software system that can not only deploy assets and resources dynamically but also predict needs ahead of timewhile realigning them for the future. Enabling systems and processes with advanced technologies like machine learning and artificial intelligence will be able to trigger the much needed optimization for any virtual network.

5G promises to be a technological opportunity for enterprises and businesses, enabling them to go digital as never before. But for network operators moving to 5G means nothing less than opening new market opportunities, revolutionary and ways of doing business that was unimaginable until now.

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A big boost to job market

Adoption of 5G in India will not only transform the way sectors do business, it will also enable the country create new job opportunities

BY GAUTAM VOHRA

5G will go down in history as an enabler, a catalyst that allowed all sectors to explore their full potential. 5G will be the game changer that will power distributed computing. With 5G, the nature of data will undergo a fundamental change; it will become more inbound, real-time, and infused with AI. Businesses across industries will be able to capitalize on this real-time data access, derive insight, deploy new services, capitalize on new 5G business opportunities, and unlock entirely new revenue-generating models.

In fact, one of the biggest gainers of 5G adoption would be the Indian IT sector. For Indian IT firms 5G is a golden bet that they can't ignore as it has a potential of close to USD30 billion business opportunity. Further, the global investment in next 12-15 years is expected to be around USD3.5 trillion which means that the IT and telecom sector will witness a growth in financials, projects, and jobs.

The public-private opportunities that will open up owing to 5G will also help the IT sector as it will create a need for a different layer of IT requirements and give them another window to explore. The recent move by the government wherein a relief package and relaxation on AGR was announced for the telecom companies coupled

> IT organizations have started to classify telecom, mobiletech, gaming, edutech, and healthcare – sectors that are expected to be impacted heavily by 5G – as separate verticals.

> With 5G projected to drive new opportunities, the industry is projected to create approximately 1,00,000 to 1,50,000 jobs during the period 2021 to 2025.

with the PLI package for telecom OEM will also give direct and indirect boost to the IT industry as the sector will have a pivotal role to build 5G space in telecom.

The growing opportunities will also fuel job creation. Starting with Q4 the job opportunities focusing on 5G by the IT sector are expected to grow. The IT sector promises roles around 90+ skills for 5G focussed areas and catering to the telecom industry, which in return makes it a dominant field that cannot be ignored by any top IT organizations. The focus is how to get the talent and develop solutions needed for their end customer. There has been a 35% growth in demand during the past six months across IT organizations that are leading 5G projects.

Categories like development, IT infra, QA, production support for 5G space technologies is where the real traction has built up and the industry is seeing a good traction. The hiring demands for Java, PL/SqL, .Net developers , cloud, SAP, UI/UX, RPA, Sybase, IOS/Android/Build, network security, data security, CyberArch, performance tester/PB tester, configuration management, release and deployment, etc. have also gone up significantly. The roll out of 5G is also expected to open up job opportunities in the field of internet on things (IOT), integration, network optimization and testing. Profiles in the areas of development, quality assurance, production support, and infrastructure are also witnessing a boom.

There are Indian IT major giants working on 5G rollout platforms for which scope of jobs have spiked in HD video conferencing and software-as-a-service enabled applications development, which in turn will help IT firms to gear up and leverage opportunities that are opening up in the healthcare industry. Some of the IT organizations have started to classify telecom, mobiletech, gaming, edutech, and healthcare – sectors that are expected to be impacted heavily by 5G – as separate verticals or segments. In fact, job creation has already started and hiring has opened up.

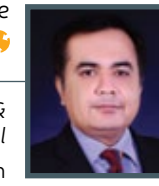
Also, the Indian telecom market and allied services are building up capacity to cater the services. With 5G projected to create new opportunities for software development, artificial intelligence (AI), network implementation and transmission, product enhancement towards mobile, communication, and broadband one can expect a new spike of job opportunities. The industry is projected to create approximately 1,00,000 to 1,50,000 jobs during the period 2021 to 2025. This will include talent who are directly involved and indirectly involved towards the technology execution in the market – nearly 40% skill segment development, 30% quality assurance and infrastructure, and the for production support.

There is also an upward trend of setting up research and development centres and hubs getting stationed in Indian cities, primarily in IT corridors. This is a very positive sign for talents. There is a lot of positive response from telecom and IT companies collaborating and opening Global Delivery Centres (GDC) in India. More than eight top telecom technology companies have established GDCs in the country catering to the global needs. They are also ramping up their headcount and adding resources. Further, the growth of mid-sized IT firms are taking the lead on telecom projects and making India a hub of GDC centres in the space.

While the opportunities are exploding, both for players in the sector as well as talent, the real challenges in today's world relate to the upskilling and reskilling of existing resources, as well as ensuring the new aspirants are equipped with knowledge to meet the current needs.

This gap in the demand-supply is forcing companies to explore newer types of partners and models of talent acquisition. Some of the companies are developing and entering into partnership for certifications on 5G through regular training and knowledge sharing programmes in collaboration with Telecom Skill Sector Council, whereas others are collaborating with staffing companies to help them with the right mix. They are also reaching out to staffing companies and are adopting the hire, train, and deployment model.

In a nutshell 5G will not only transform the way sectors do business it will also boost the job creation in the country significantly.



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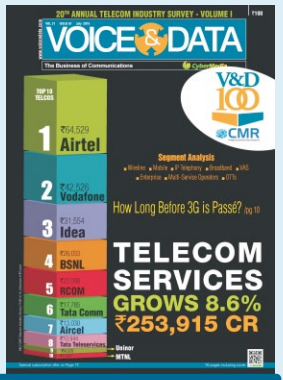

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[COMMENTARY]
ADTECH

Advertising sector gets the mobile edge

With more users hooking on to mobile internet, mobile advertising is fast becoming a more prominent component in a brand's strategic armoury

BY SHAAN RAZA

In a world of hyper-exposure to advertisements, that the pandemic has had a 'sobering effect' on the advertising sector as a whole is beyond doubt. Yet, for an industry characterized by a cross-platform media landscape with a plethora of platforms and channels available to brands and publishers coupled with multitudes of end-consumers being online nearly 24/7 – this is merely a short-term phenomenon.

With digital advertising continually extending the frontiers of this sector making impressive inroads into the larger advertising spend, the advertising industry is not only already undergoing positive change but is even poised for further change. Given the sheer pace and scale of smartphone penetration in recent times helped by the rising all-around internet connectivity in most places, companies and brands are increasingly looking to mobile advertising for the projection of their brand promise and value proposition.

As such, mobile advertising has emerged as one of the foremost drivers of the new changes that are sweeping the industry and is even redrawing the landscape of the broader advertising industry.

Traditional mediums coming up with digital extensions

With COVID-19 catalyzing across-the-spectrum digitization like never before – engulfing businesses as well as end-consumers – even the traditional advertising platforms are not immune to this trend. In fact, the traditional advertising platforms such as TV, radio, print and outdoor have been made to recast their content strategies working out and evolving their own digital extensions. As a result, along with purely digital-only channels, these extensions have imparted an added impetus to the digital advertising industry.

Even as the broader advertising industry had suffered last year, expectedly enough, according to Dentsu Digital Report 2021, digital advertising in India saw a 15.3% surge in growth. This was even better than the performance globally which had recorded a nearly 12% growth in the year.

New takers for mobile advertising

That mobile advertising already dominates the advertising landscape is evident from the fact that of the total digital advertising budget in India, mobile advertising accounts for nearly 45-55%, which is further expected to grow to around 65-70% by next year. Against the backdrop of ever-rising consumers increasingly searching and purchasing products and services of all kinds and most sectors on their mobile phones, apart from the 'organically digital' sectors such as online grocery and retail, pharma, food delivery, edutech, media and entertainment, traditional sectors so far dependent on traditional media platforms are also taking to mobile advertising.

As smartphones get more sophisticated accommodating more complex applications and features, the avenues for advertisers for targeting customers on this gadget have increased manifold.

It has been estimated that the largest spenders on mobile marketing in India are FMCG, retail, e-commerce, BFSI, and automobile companies, among others. Remember many of these sectors were earlier mostly dependent on traditional platforms for advertising and marketing.

On offer: An astounding array of choices

As smartphones get more sophisticated accommodating not only more applications and features but also more complex applications and features, the avenues for advertisers for targeting customers on this gadget have increased manifold. From search to mobile browsers, to social media, to in-app formats such as in-video to in-gaming, to OTT platforms, to e-commerce platforms, to native and programmatic advertising, there are plenty of ways to target end-customers on a mobile phone and reap benefits from the standpoint of a brand and advertiser.

For instance, whereas search can lead to click-to-call and in-store purchases, advertising on social media on mobile besides allowing a variety of ad formats, enables easy tracking, access to a larger audience, while facilitating a personalized connection. In fact, on mobile social media, there is also the potential for the advertisement going viral thereby generating more eyeballs and business for the advertisers. The in-built analytics of several social media platforms also helps an advertiser to assess the impact of an advertisement. Also, with time, the gap between display and search is on the rise with more ad spend being done on display than mobile search.

Personalization like never before

Mobile phones are by their nature are very personal and even private objects for consumers. So, advertising into this personal space requires extremely personalized and tailored content for companies. And derived from user profiling based on solid information such as device types, demographics, location, income groups and past digital usage patterns, among many others, it goes without saying that mobile advertising has involved a sharper, more personalized, more accurate and pinpointed targeting for advertisers. Against this, the typical desktop advertising can never match the intensity and the accuracy of the personalized advertising on mobiles. In addition, not only phone-based ads have a higher Click Through Rate (CTR), phone-based cost per click (CPCs) is also much less than desktop clicks.

Easy for brands and publishers alike

Powered by big data and AI, the advent of programmatic advertising on mobiles has made life so much simpler for both brands and publishers in the whole media buying process. Instead of the traditional RFPs, Insert Orders (IOs) and negotiations, the demand-side platforms (DSPs) and supply-side platforms (SSPs connected through ad exchanges now enable purchasing of impressions in a real-time bidding setting targeting a highly specified audience. Removing the need for the publisher to set up any campaigns or the advertiser to distribute any ad tags, there is reduced wastage. Programmatic advertising is particularly relevant for advertising on mobile apps.

In-app and native advertising make a potent pair

Speaking of mobile apps, by most assessments, there has been an ongoing shift from mobile web to mobile applications. As more and more Indians increasingly consume new mobile app-based services such as education, health and fitness, gaming, entertainment, hyper-local delivery, video content, the prospects for mobile in-app advertising have never been better. Combined with native advertising that enables the blending of ad content seamlessly into the larger backdrop of the interface or the application content without being intrusive to the user, in-app advertising is filled with immense promise for advertisers. According to the latest estimates in a global context, advertisers spend a whopping 81% on mobile in-app native ads as compared to mobile web native ads.

According to estimates, not only mobile ad spending is projected to rise substantially in India, but also that the country is expected to figure among the leaders in terms of digital ad-spend growth in the coming few years. Moreover, the expanding 4G network and the incoming 5G along with more consumers flocking to mobile internet will ensure that mobile advertising continues to become a more prominent component in a brand's strategic armoury impinging on the larger advertising sector.

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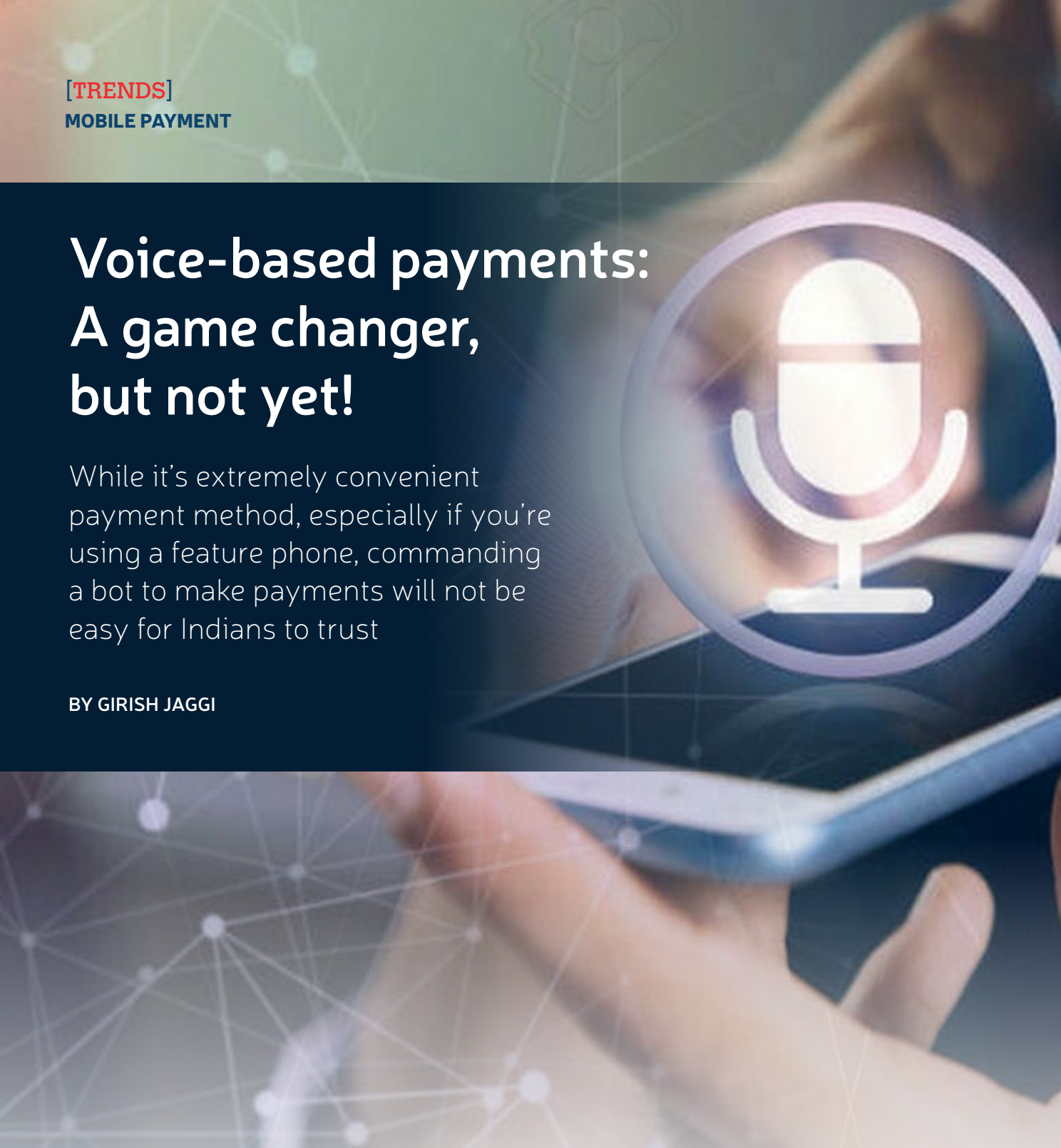
Voice-based payments: A game changer, but not yet!

While it's extremely convenient payment method, especially if you're using a feature phone, commanding a bot to make payments will not be easy for Indians to trust

BY GIRISH JAGGI



With a population of over a billion and most of them belonging to the rural populace, it is no surprise that majority of Indians till date prefer to use feature phone over a smartphone. While the internet and smartphone penetration has been steadily increasing year on year, India still has a long way to go to completely adopt smartphone usage with active internet connectivity. Looking at the statistics, the National Payments Corporation of India (NPCI) which has been instrumental in developing UPI, Aadhar payments, etc. is now testing a voice-based payment pilot for feature phones, especially those with poor connectivity in their region.

Very similar to how UPI pins are generated in a smartphone, this new service will allow phone users to generate authentication pins through common dial-in. As a security measure, two-factor authentication is

> National Payments Corporation of India (NPCI) is testing a voice-based payment pilot for feature phones, especially those with poor connectivity in their region.

tested in the pilot. In its beta-testing phase, there are a lot of developments still underway, like – handling merchant payment at banks end, ability to manage concurrent calls, setting up proxy identity numbers to authenticate the acceptance, etc. Live experiments are underway with very few financial institutions testing the service in a controlled environment, albeit with their own set of restrictions.

In 2016, under the leadership of then RBI governor, Raghuram Rajan, UPI payment was introduced in the country. The initial few months for the mobile payment service adoption were slow. It took UPI 17 months to reach 5K cr transaction value, however, this figure doubled within the next three months and tripled in just one more month. As of June 2021, UPI payments have crossed a mark of 5,47,373.17 cr and are continuing to show growth to date. NPCI is hoping to replicate the success with voice-based payment services as well.

While it's extremely gratifying in having a convenient payment method, especially if you're using a feature phone, commanding a bot to make payments will not be easy for Indians to trust. Historically rural India has believed in physically making payments to their vendors, dealers, etc. hence even they took a while to open bank accounts. Users will find it difficult to trust voice-based payments fearing that personal conversation might get recorded too. Keeping all this aside, the biggest concern will trust in this new feature/offering by the NPCI as people will tag it "too-risky" and having "lack of familiarity", the adoption process will be slow. Apart from this, there are challenges at the end of financial institutions as well. Cost of integration, hindrance in merchant adoption, large scale rollout, bank policies, etc. all will factor in ensuring smooth functioning and adoption of the service.

India has generally been a technology-friendly country and technology has slowly but eventually found its way to the hinterlands. A lot of leg work is yet to be done if this has to be mass adopted by India, especially by the rural markets. Emphasis has to be given on security, intuitive nature, back-end support by financial institutions, cost, and efficiency of the product. While the initial results are so far promising, the success of a larger rollout, post-approval from RBI remains to be seen.

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[REPORT]
WEBINAR

5G is not far away. Are we ready?

Disaggregation, non-static models, and 'breaking the box' thinking are some ways to do it. These together with innovative usage can make 5G truly powerful

BY PRATIMA H

What if you are flying an aeroplane and then asked to change some of its parts? All that as you play the part of the pilot and engineer at the same time? Not easy. But sometimes, that's a reality,

This is something that the telcos and industry players are experiencing as they enter a new sky of happy turbulence with the arrival of 5G. But what makes it worth it is the destination. If the new parts snap in the right way, the plane would become a new bird altogether. Faster, more beautiful, smoother and headed towards a new runway.

Panel moderator Pradeep Gupta, Chairman, CyberMedia set the tone well as he urged experts with a big bundle of questions and what-ifs. They discussed the imperative and outcomes of 5G in a special Voice&Data webinar. And it turns out that 5G's presence and disruption would be quite pervasive and deep.

What 5G can do?

Connectedness of every kind of area – from factories to vehicles would be first impact-footprint of 5G's advent. "The cables connecting interconnecting machines, servers etc., would disappear. The next wave would be beyond machines, like farming sector and sensors around flood controlling systems, soil, plants etc. As we have more processing capabilities going ahead, we will see a huge transformation," argued Deepak Sanghi, Sr. VP, Architecture Engineering and Planning, IP, Optical and Transmission Networks, Bharti Airtel Ltd.

Gupta seconded that and hoped that would transpire soon, reminding that agriculture productivity is an essential area to work upon. "I wish what we are discussing here comes true."

Pankaj Kitchlu, Systems Engineering Director (India-SAARC) Juniper Networks illustrated many Industry 4.0 use cases too. "When we finally go to standalone 5G we will see a huge change. The 'less than one millisecond' latency would reflect a huge transformation. Two things are happening in society at large – enterprise and public safety. These areas will get the most impetus from 5G's real-time power.

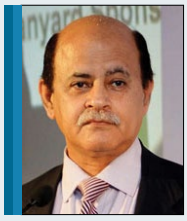
Now with 5G, enterprises can go to another level – like machine to machine interaction, AI, cloud-native technologies, guided vehicles and what not, he shared.

"The cables connecting interconnecting machines, servers etc., would disappear. The next wave would be beyond machines and we will see a huge transformation."

Deepak Sanghi, Sr. VP, Architecture Engineering & Planning, Bharti Airtel Ltd.

"Two things are happening in society at large – enterprise and public safety. These areas will get the most impetus from 5G's real-time power."

Pankaj Kitchlu, Systems Engineering Director (India-SAARC) Juniper Networks



"Security can no longer be a layer. It was ok in 4G but now in 5G it has to be different. It needs to have the same type of characteristics as 5G."

Lt. Gen Dr. S P Kochhar, Director General, COAI

"The quality of services would be very different. Texting takes a byte. Gaming takes some more. A surgery or a rescue operation would need a different level of service. The right policy within the radio, transport and core will allow to pick up a granule or a mountain – as required. It would allow to give it the treatment it desires and convert it into service-based function in the ecosystem. The platform is ready and it allow people to scale up services."

What 5G would need?

Lt. Gen Dr. S P Kochhar, Director General, Cellular Operators Association of India gave the viewpoint on edge computing and new devices. "We are trying to work in an expanded space with severe constraints of time. We need adaptability and flexibility in networks. That is also required in users – like in the form of disaggregated data plane and computing at the edge. Even cybersecurity would have to be looked at in a different manner. That was always a separate layer. It would not happen so in 5G. It would need to have the same flexibility and agility as 5G and hence, built organically like 5G. Security can no longer be a layer. It was ok in 4G but now in 5G it has to be different. It needs to have the same type of characteristics as 5G."

> The world has seen many networks on 5G. It is good to be first in the race at times. But for India it is also important to bring something new with some efficiency.

Security has to be connected everywhere, seconded Kitchlu. "Rather than getting a device that is retrofitted – you have to have security on each layer. It has to be connected. Specially with the new wave of attacks – like DOS etc.- we are witnessing. Real-time enforcement in terabytes of capacity is what we are moving towards."

Gupta also asked if telcos are equipped to upgrade the existing infrastructure for 5G and also what network innovations can we expect next.

Sanghi replied that there is a lot of talk going around standards. "In the last year, the world has seen many networks on 5G. It is good to be first in the race at times. But for India it is also important to bring something new with some efficiency. We keep hearing news about large-scale trials, spectrum aspects, small-multiple series of experiments which have begun at Indian as well as global operators. Yes, the 5G is a different platform. That new paradigm of building this platform has a lot of demanding tasks in terms of flexibility, agility and openness. The radio part, backhaul and core architecture etc. – all that has to come together. Managing transition is difficult than managing anything green-field, especially when services are running on it. We need to get out of the 'box' thinking and static thinking. An operator has to have capabilities to acquire multiple strengths, be it hardware or software."

Yes, 5G is going to be more than a big sweep of transformation. It would have many cascading effects and a lot would need to change to make the most of it. We have barely scratched the surface of this big phenomenon that is going to change our lives in many ways.

5G's possibilities would be limited by imagination, as the panel concurred.

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AWS, Intel to speed-up digital innovation in India

The National Institution for Transforming India, Amazon Web Services (AWS), and Intel have come together to establish a new experience studio at the NITI Aayog Frontier Technologies Cloud Innovation Center (CIC). The studio will be a hub for collaboration and experimentation to enable problem solving and innovation between government stakeholders, startups, enterprises, and industry domain experts.

It will use artificial intelligence (AI), machine learning (ML), Internet of Things (IoT), augmented reality and virtual reality (AR/ VR), blockchain, and robotics to accelerate their application in public sector use cases. These solutions will be used in healthcare, agriculture, and smart infrastructure. The studio is said to serve as an innovation hub for government, healthcare, education, and nonprofit startups from India to showcase their solutions. It will also provide startups with an option to access necessary support to enhance and scale their solutions.

"As the NITI Aayog Frontier Technologies CIC identifies societal challenges to address, it is important to embrace a culture of open innovation and working backwards from problem statements," Amitabh Kant, CEO, NITI Aayog, said. It will adopt a hybrid model enabling physical and virtual workspaces to collaborate seamlessly. The physical workspace design in the studio will enable solutions showcase, interactive demos, and rapid prototyping among stakeholders to converge on ideas for further action.

Citrix makes app delivery and security easy

Citrix Systems has launched its App Delivery and Security Service, an intent-based cloud solution that automates the process in real-time. The app removes the complexity from every step of app delivery, including provisioning, securing, on-boarding, and management, the company stated in a press release.

"It has the perfect mix of customizability and built-in intelligence that will allow enterprises to deploy their revenue generating apps quickly and securely without sacrificing the functionality that their customers depend on," said Geoffrey Knaak, Technical Manager, Senior Systems Administrator, Aria Systems, Inc. The company further said that the solution is designed to help IT transform app delivery from a slow, manual process based largely on guesswork into an efficient, automated one driven by intent. It will be needed to keep up with the business and deliver meaningful outcomes.

According to Citrix, the app automatically translates business and technical intent into application delivery and security policies and configurations. Administrators can, for instance, define a maximum acceptable application latency threshold for a region, and servers and systems will adjust to keep app delivery within the parameters. It also comes with the self-healing and continuously optimizing features that auto-detects and corrects application delivery issues like performance degradation, new demands and outages. "When a slow server is uncovered, it can be automatically removed from the load balancing pool," the release stated.

It also collects and analyzes 10 billion data points a day from more than one billion users across 50,000 networks in 200 countries to provide real-time visibility into state of the Internet through Citrix Intelligent Traffic Management. Armed with this data, IT can optimize the application experience for individual users and prescribe the best locations for additional hosting sites if traffic increases to maintain service levels.

Linode to provide cloud infrastructure for start-ups

Linode has launched Rise, a start-up program built to give bootstrapped and venture capital-backed start-ups a route to infrastructure credits. The start-ups designed around capital-efficient business models and the use of open-source and third-party applications to reduce cloud lock-in.

The participants in the program will receive, a three-year discount program, lifelong discounts based on usage, access to technology consultants to help build an infrastructure growth strategy, and guidance on architecture, migrations, and software deployments. According to the company press release, participants will also receive membership to its community of members, alumni, and advisors, as well as free customer support. "We created Rise to address a serious challenge for startups who often get locked-in to the big three cloud providers with the enticement of never ending infrastructure credits," Jonathan Hill, vice president of revenue operations, Linode, said.

Nutanix's cloud platform to deliver data services

Multi-cloud computing company Nutanix has announced a new cloud platform which will help customers to simplify data management, optimize database and big data workload performance for the most critical applications. According to a company release, it will deliver unstructured data from on-premises to cloud. In addition, its database service Nutanix Era will deliver one-click storage and role based access control for database management across hybrid multi-cloud environments.

"Customers require a variety of ways to store data – both structured and unstructured. And are looking for ways to simplify management without needing to rely on different vendors to do so," Rajiv Mirani, Chief Technology Officer at Nutanix, said.

Customers can use its security and compliance policies through support for role-based access control, as well as securely share access to databases and database management operations. Lastly, Era will support multi-region failover capabilities, delivering increased resilience through a highly available database-as-a-service.

PallyCon launches service to trace OTT content leak

PallyCon, a digital rights management (DRM) and content protection service provider, has announced the launch of an anti-piracy service for the OTT platforms. The service tracks and mines illegal content leakage and sends a red alert to the source of the illicit content generator.

It is supported by forensic watermark integration which globally monitors content leakage. It issues a Digital Millennium Copyright Act (DMCA) Takedown Notice to the pirated website for eliminating unlawful content from the site.

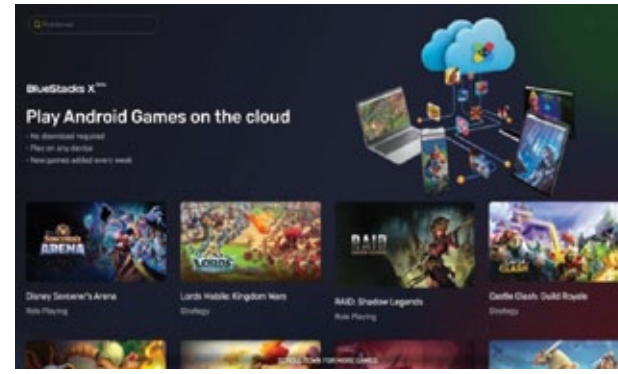
"Producing premium content requires effort, time, and money. Illegal content copy leads to massive losses to producers and diminishes the charm of new movie releases or any creative content produced," James Ahn, Founder & CEO of INKA ENTWORKS, said.

BlueStacks launches cloud service for mobile games

Android gaming company BlueStacks Inc has announced the release of BlueStacks X (beta), world's first cloud-based game streaming service for mobile games that will be available on Windows 10 and 11, Mac, iOS, Android, Chromebook and Raspberry Pi. "It is the only cloud gaming service on the market that offers free game streaming for mobile games across platforms and devices," the company stated in a press release.

BlueStacks X (beta) is powered by hybrid cloud technology, built in partnership with now.gg, its sister company. Hybrid cloud enables the cloud to offload parts of compute and graphics rendering to the endpoints, dramatically reducing the cloud costs and enabling users to enjoy a free service. This can be achieved both with using a native client and browsers capable of native graphics rendering. This technology works transparently and does not require any integration from game developers.

"BlueStacks App Player recently crossed one billion lifetime downloads. BlueStacks X is a natural next step for us. Hybrid cloud is a big technological breakthrough which makes it economically viable to launch the service," said the company CEO Rosen Sharma. "We are a trusted partner to top mobile game developers. There is a lot of excitement among them about BlueStacks X and some of the other innovations we have like deep Discord integration."



Keysight to help NIO verify 5G and C-V2X connectivity in EVs

Keysight Technologies has announced that NIO, a Chinese manufacturer of battery electric vehicles (EVs), has selected its solutions to verify 5G and cellular vehicle to everything (C-V2X) connectivity. "NIO selected Keysight's 5G and C-V2X network emulation solutions to advance development of premium EVs primarily targeting the Chinese market," a company press release stated.

According to the company, the solution enables NIO to verify 5G and C-V2X designs according to the latest 5G new radio (NR) and C-V2X specifications as defined by 3GPP and other standards organizations. It also enables NIO to emulate and verify complex hardware-in-the-loop (HIL) drive test scenarios in a lab environment under controlled and repeatable test conditions.

"The solution enables us to confidently verify the performance equipment designed for deployment on board our electric vehicles," said Wang Wei, Senior Manager at NIO. "Thanks to its integrated portfolio of test solutions across multiple cellular technologies, we can quickly and cost-efficiently deliver EVs that maximize safety for passengers and road users alike." Successful market introductions of highly complex passenger transport EVs rely on comprehensive validation of connectivity, implemented to improve road safety, efficiency in transportation of people, as well as drivers' and passengers' in-car experiences. Keysight's connected car solutions support a wide range of technologies including 5G, C-V2X and Global Navigation Satellite System (GNSS), to improve reliability, cybersecurity and safety.

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